

UP168. WP6 Upland Pond. 5/31/2017.



UP207. WP713 Upland. 5/31/2017.



DEPARTMENT OF THE ARMY

FORT WORTH DISTRICT, CORPS OF ENGINEERS P. O. BOX 17300 FORT WORTH, TEXAS 76102-0300

July 27, 2017

Regulatory Division

SUBJECT: SWF-2003-00336, Lake Ralph Hall, Upper Trinity Regional Water District

Mr. Larry Patterson Upper Trinity Regional Water District 900 N. Kealy P.O. Drawer 305 Lewisville, Texas 75067

Dear Mr. Patterson:

This letter is in regard to your request for an approved jurisdictional determination information received March 29, 2017, and additional information received June 22 and July 5, 2017, concerning the proposed Lake Ralph Hall Reservoir project located in Fannin County, Texas. The study area for the approved jurisdictional determination encompasses approximately 13,100 acres.

We have reviewed the site in question in accordance with Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act of 1899. Under Section 404, the USACE regulates the discharge of dredged and fill material into waters of the United States, including wetlands. Our responsibility under Section 10 is to regulate any work in, or affecting, navigable waters of the United States.

Based on the <u>Supplemental Report in Support for AJD for proposed Lake Ralph Hall project</u>, dated June 21, 2017, multiple previous site visits associated with the ongoing development of the Environmental Impact Statement associated with the permit application, and other information available to us, waters of the United States under Section 404 do exist in the study area. We concur with the delineation of waters of the United States as shown on the 11 maps sheets included in the referenced report identified as <u>Aquatic Resources Proposed Lake Ralph Hall Supplemental Jurisdictional Determination</u>. This approved jurisdictional determination (JD) is valid for a period of no more than five (5) years from the date of this letter unless new information warrants revision of the delineation before the expiration date. A copy of the Approved Jurisdictional Determination form supporting this determination is enclosed for your information.

This determination does not convey any property rights, either in real estate or material or any exclusive privileges, nor does it authorize any injury to property or invasion of rights or Federal, State, or local laws or regulations. This determination does not eliminate the requirements to obtain State or local permits or approvals as needed.

Department of the Army authorization would be required for the discharge of dredged or fill material into any areas identified as waters of the United States, unless otherwise exempted. If you anticipate a discharge, please provide us with a detailed description of the proposed project, a suitable map of the proposed project area showing the location of proposed discharges, the type and amount of material (temporary or permanent), if any, to be discharged, and plan and cross-section views of the proposed project. Please note that it is unlawful to start work without a Department of the Army permit if one is required.

The Applicant may accept or appeal this approved JD or provide new information in accordance with the enclosed Notification of Administration Appeal Options and Process and Request for Appeal (NAAOP-RFA). If the Applicant elects to appeal this approved JD, the Applicant must complete Section II (Request for Appeal or Objections to an Initial Proffered Permit) of the enclosure and return it to the Division Engineer, ATTN: CESWD-PD-O Appeals Review Officer, U.S. Army Corps of Engineers, 1100 Commerce Street, Dallas, Suite 831, Texas 75242-0216 within 60 days of the date of this notice. Failure to notify the USACE within 60 days of the date of this notice means you accept the approved JD in its entirety and waive all rights to appeal the approved JD.

Thank you for your interest in our nation's water resources. If you have any questions concerning this matter please contact Mr. Chandler Peter at (817) 886-1736. Other information concern our regulatory program is at http://www.swf.usace.army.mil/Missions/Regulatory.

Please help the regulatory program improve its service by completing the survey on the following website: http://corpsmapu.usace.army.mil/cm_apex/f?p=regulatory_survey

Sincerely,

Chief, Regulatory Division

Enclosures:

Approved Jurisdictional Determination Form

NOTIFICATION OF ADMINISTRATIVE APPEAL OPTIONS AND PROCESS AND REQUEST FOR APPEAL

Applicant: Upper Trinity Regional Water District	File Number: 2003-00336	Date: 7/24/2017
Attached is:		Sec Section below
INITIAL PROFFERED PERMIT (Standard F	ermit or Letter of permission)	A
PROFFERED PERMIT (Standard Permit or I	etter of permission)	В
PERMIT DENIAL		С
X APPROVED JURISDICTIONAL DETERMI		D
PRELIMINARY JURISDICTIONAL DETER	RMINATION	E

SECTION I - The following identifies your rights and options regarding an administrative appeal of the above decision. Additional information may be found at

http://www.usace.army.mil/Missions/CivilWorks/RegulatoryProgramandPermits/appeals.aspx or Corps regulations at 33 CFR Part 331.

- A: INITIAL PROFFERED PERMIT: You may accept or object to the permit.
- ACCEPT: If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final
 authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your
 signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights
 to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- OBJECT: If you object to the permit (Standard or LOP) because of certain terms and conditions therein, you may request that the permit be modified accordingly. You must complete Section II of this form and return the form to the district engineer. Your objections must be received by the district engineer within 60 days of the date of this notice, or you will forfeit your right to appeal the permit in the future. Upon receipt of your letter, the district engineer will evaluate your objections and may: (a) modify the permit to address all of your concerns, (b) modify the permit to address some of your objections, or (c) not modify the permit having determined that the permit should be issued as previously written. After evaluating your objections, the district engineer will send you a proffered permit for your reconsideration, as indicated in Section B below.
- B: PROFFERED PERMIT: You may accept or appeal the permit
- ACCEPT: If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final
 authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your
 signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights
 to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- APPEAL: If you choose to decline the proffered permit (Standard or LOP) because of certain terms and conditions therein, you may appeal the declined permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.
- C: PERMIT DENIAL: You may appeal the denial of a permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.
- D: APPROVED JURISDICTIONAL DETERMINATION: You may accept or appeal the approved JD or provide new information.
- ACCEPT: You do not need to notify the Corps to accept an approved JD. Failure to notify the Corps within 60 days of the date of this notice, means that you accept the approved JD in its entirety, and waive all rights to appeal the approved JD.
- APPEAL: If you disagree with the approved JD, you may appeal the approved JD under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.
- E: PRELIMINARY JURISDICTIONAL DETERMINATION: You do not need to respond to the Corps regarding the preliminary JD. The Preliminary JD is not appealable. If you wish, you may request an approved JD (which may be appealed), by contacting the Corps district for further instruction. Also you may provide new information for further consideration by the Corps to reevaluate the JD.

SECTION II - REQUEST FOR APPEAL of OBJECTI		
REASONS FOR APPEAL OR OBJECTIONS: (Describinitial proffered permit in clear concise statements. You may attacor objections are addressed in the administrative record.)	be your reasons for appealing the c	decision or your objections to an
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ADDITIONAL INFORMATION: The appeal is limited to a review	of the administrative record, the	Come memorandum for the
record of the appeal conference or meeting, and any supplemental	information that the review officer	er has determined is needed to
clarify the administrative record. Neither the appellant nor the Cor	rps may add new information or at	analyses to the record. However,
you may provide additional information to clarify the location of in		dministrative record.
POINT OF CONTACT FOR QUESTIONS OR INFOR If you have questions regarding this decision and/or the appeal	· · · · · · · · · · · · · · · · · · ·	rding the appeal process you may
process you may contact:	also contact:	ding the appear process you had
,	Mr. Elliott Carman	· · · · · · · · · · · · · · · · · · ·
!	Administrative Appeals Review Off U.S. Army Corps of Engineers	.icer (CESWD-PD-O)
,	1100 Commerce Street, Suite 831	
·	Dallas, Texas 75242-1317 469-487-7061	
RIGHT OF ENTRY: Your signature below grants the right of entr	ry to Corps of Engineers personnel	
consultants, to conduct investigations of the project site during the notice of any site investigation, and will have the opportunity to pa		
notice of any site investigation, and will have the opportunity to pa	Date:	Telephone number:
- 1	Date.	Telephone number.
Signature of appellant or agent.	1	

APPROVED JURISDICTIONAL DETERMINATION FORM U.S. Army Corps of Engineers

This form should be completed by following the instructions provided in Section IV of the JD Form Instructional Guidebook.

SEC	TION I:	BACKG	ROUND	INFORMAT	TON

A. REPORT COMPLETION DATE FOR APPROVED JURISDICTIONAL DETERMINATION (JD): 26 June			
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В.	DISTRICT OFFICE,	FILE NAME, AND	NUMBER: Fort Worth	District, Lake Ralp	h Hall, SWF-2003-00336
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B.	DISTRICT OFFICE, FILE NAME, AND NUMBER: Fort Worth District, Lake Ralph Hall, SWF-2003-00336
c.	PROJECT LOCATION AND BACKGROUND INFORMATION: State: Texas County/parish/borough: Fannin City: Ladonia Center coordinates of site (lat/long in degree decimal format): Lat. 33.46302° N, Long. 95.90102° W. Universal Transverse Mercator: Name of nearest waterbody: North Sulphur River Name of nearest Traditional Navigable Water (TNW) into which the aquatic resource flows: Sulphur River Name of watershed or Hydrologic Unit Code (HUC): 8 - 11140301 Check if map/diagram of review area and/or potential jurisdictional areas is/arc available upon request. Check if other sites (e.g., offsite mitigation sites, disposal sites, etc) are associated with this action and are recorded on a different JD form.
D.	REVIEW PERFORMED FOR SITE EVALUATION (CHECK ALL THAT APPLY); Office (Desk) Determination. Date: June 26, 2017 Field Determination. Date(s): Specific field investigation to develop data to produce PJD dated October 26, 2006 were conducted by applicant August-September, 2005. USACE and cooperating agencies conducted numerous site visits to portions of project area from 2002 through 2015 associated with jurisdictional determination and resource assessments associated with development of Environmental Impact Statement for proposed project.
	CTION II: SUMMARY OF FINDINGS RHA SECTION 10 DETERMINATION OF JURISDICTION.
	re Are no "navigable waters of the U.S." within Rivers and Harbors Act (RHA) jurisdiction (as defined by 33 CFR part 329) in the ew area. [Required] Waters subject to the ebb and flow of the tide. Waters are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce. Explain:
В.	CWA SECTION 404 DETERMINATION OF JURISDICTION.
The	re Are "waters of the U.S." within Clean Water Act (CWA) jurisdiction (as defined by 33 CFR part 328) in the review area. [Required]
	1. Waters of the U.S. a. Indicate presence of waters of U.S. in review area (check all that apply): □ TNWs, including territorial seas □ Wetlands adjacent to TNWs □ Relatively permanent waters² (RPWs) that flow directly or indirectly into TNWs □ Non-RPWs that flow directly or indirectly into TNWs □ Wetlands directly abutting RPWs that flow directly or indirectly into TNWs □ Wetlands adjacent to but not directly abutting RPWs that flow directly or indirectly into TNWs □ Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs □ Impoundments of jurisdictional waters □ Isolated (interstate or intrastate) waters, including isolated wetlands
	 b. Identify (estimate) size of waters of the IJ.S. in the review area; Stream (non-wetland) waters: linear feet; 690,918 acreage; 387.14 (streams) Other open waters: acres; 59.89 (on channel ponds) Wetlands: 10.0 acres (PEM lacustrine fringe around on-channel ponds).
	c. Limits (boundaries) of jurisdiction based on: 1987 Delineation Manual and Great Plains Delineation Supplement Elevation of established OHWM (if known):
	2. Non-regulated waters/wetlands (check if applicable): ³

¹ Boxes checked below shall be supported by completing the appropriate sections in Section III below. ² For purposes of this form, an RPW is defined as a tributary that is not a TNW and that typically flows year-round or has continuous flow at least "seasonally" (e.g., typically 3 months).
³ Supporting documentation is presented in Section III.F.

Potentially jurisdictional waters and/or wetlands were assessed within the review area and determined to be not jurisdictional. Explain: 212 open water stock tanks constructed in uplands occur within the study area totaling 83 acres (Table A-3 of Appendix A). Additionally, there are 3.8 acres (comprised of 26 features – Table A-4 of Appendix A) of forested wetlands associated with remnant channels of the North Sulphur River. Due to historic channelization and significant channel degradation, the 100 year flood of the North Sulphur River is contained in its existing channel banks. No hydrologic connection/significant nexus exists between the remnant channels and the North Sulphur River.

SECTION III: CWA ANALYSIS

A. TNWs AND WETLANDS ADJACENT TO TNWs

The agencies will assert jurisdiction over TNWs and wetlands adjacent to TNWs. If the aquatic resource is a TNW, complete Section III.A.1 and Section III.D.1. only; if the aquatic resource is a wetland adjacent to a TNW, complete Sections III.A.1 and 2 and Section III.D.1.; otherwise, see Section III.B below.

1 TNW

Identify TNW: No TNWs are in assessment area. The nearest USACE designated navigable water is the segment of the Sulphur River downstream of Wright Patman Dam to the Texas/Arkansas state border. See section B.1.ii below for distance.

Summarize rationale supporting determination:

Wetland adjacent to TNW

Summarize rationale supporting conclusion that wetland is "adjacent": N/A.

B. CHARACTERISTICS OF TRIBUTARY (THAT IS NOT A TNW) AND ITS ADJACENT WETLANDS (IF ANY):

This section summarizes information regarding characteristics of the tributary and its adjacent wetlands, if any, and it helps determine whether or not the standards for jurisdiction established under Rapanos have been met.

The agencies will assert jurisdiction over non-navigable tributaries of TNWs where the tributaries are "relatively permanent waters" (RPWs), i.e. tributaries that typically flow year-round or have continuous flow at least seasonally (e.g., typically 3 months). A wetland that directly abuts an RPW is also jurisdictional. If the aquatic resource is not a TNW, but has year-round (perennial) flow, skip to Section III.D.2. If the aquatic resource is a wetland directly abutting a tributary with perennial flow, skip to Section III.D.4.

A wetland that is adjacent to but that does not directly abut an RPW requires a significant nexus evaluation. Corps districts and EPA regions will include in the record any available information that documents the existence of a significant nexus between a relatively permanent tributary that is not perennial (and its adjacent wetlands if any) and a traditional navigable water, even though a significant nexus finding is not required as a matter of law.

If the waterbody is not an RPW, or a wetland directly abutting an RPW, a JD will require additional data to determine if the waterbody has a significant nexus with a TNW. If the tributary has adjacent wetlands, the significant nexus evaluation must consider the tributary in combination with all of its adjacent wetlands. This significant nexus evaluation that combines, for analytical purposes, the tributary and all of its adjacent wetlands is used whether the review area identified in the JD request is the tributary, or its adjacent wetlands, or both. If the JD covers a tributary with adjacent wetlands, complete Section III.B.I for the tributary, Section III.B.2 for any onsite wetlands, and Section III.B.3 for all wetlands adjacent to that tributary, both onsite and offsite. The determination whether a significant nexus exists is determined in Section III.C below.

1. Characteristics of non-TNWs that flow directly or indirectly into TNW

(i) General Area Conditions: Watershed size: 100 square miles Drainage area: 467 square miles Average annual rainfall: 33 inches Average annual snowfall: 3 inches (ii) Physical Characteristics: (a) Relationship with TNW: ☐ Tributary flows directly into TNW. ☑ Ephemeral tributaries flow through 2 and the North Sulphur River flows through 1 tributary before entering TNW. Project waters are more than 100 river miles from TNW.

^{*} Note that the Instructional Guidebook contains additional information regarding swales, ditches, washes, and erosional features generally and in the arid West.

	Project waters are more than 30 river miles from RPW. Project waters are 105 aerial (straight) miles from TNW. Project waters are 37 aerial (straight) miles from RPW. Project waters cross or serve as state boundaries. Explain:
	Identify flow route to TNW ⁵ : Named (see item b below) and unnamed tributaries flow into North Sulphur River which flows into to Sulphur River (starting at confluence with South Sulphur River which becomes navigable approximately 105 miles downstream. Tributary stream order, if known: Varies.
(h)	General Tributary Characteristics (check all that apply): Tributary is: Natural. Explain: Artificial (man-made). Explain:
channels but i	Manipulated (man-altered). Explain: North Sulphur River and named (Merrill, Bralley Pool, ch, Davis, Pickle, Pot, Brushy, Bear, Allen, Long and Headrick Branch Creeks) and unnamed tributries to it are natural modified due to headcuts. North Sulphur River channelized in 1930s. Unique soil properties continue to erode and channel utaries continue to degrade. Headcuts occur to all tributaries in the study area.
	Tributary properties with respect to top of bank (estimate): Average width: 150 feet Average depth: 45 feet Average side slopes: 2:1.
	Primary tributary substrate composition (check all that apply): Silts
	Other. Explain: Bedrock is decomposing soft shale.
	Tributary condition/stability [e.g., highly croding, sloughing banks]. Explain: highly croding, sloughing banks with channel croded into underlying shale bedrock; delamination of the shale results in average channel down-cutting at a rate of 2 inches/year and channel widening of 4 inches/year as side slopes are destabilized and slough.
•	Presence of run/riffle/pool complexes. Explain: No riffle pool complexes exist. Tributary geometry: Relatively straight Tributary gradient (approximate average slope): Dependent on tributary, North Sulphur River is 0.1 %
(c)	Flow: Tributary provides for: Intermittent but not seasonal flow Other tributaries are epemeral. Estimate average number of flow events in review area/year: 6-10 Describe flow regime: Channel flow is extremely flashy with high flows immediately following significant rain events rapidly reducing to a trickle unless subsequent rainfall experienced in the watershed. Channel is frequently dry in most locations with variable to non-existent pooling. Other information on duration and volume: Stage discharge and rating curves are provided in the geomorphological evaluation and hydraulic and hydrologic analyses.
	Surface flow is: Discrete and confined. Characteristics: Flashy—immediate peak with rapidly diminishing flows.
	Subsurface flow: Unknown. Explain findings: No groundwater discharges documented in hydrologic analysis. [] Dyc (or other) test performed:
	Tributary has (check all that apply): Bed and banks

⁵ Flow route can be described by identifying, e.g., tributary a, which flows through the review area, to flow into tributary b, which then flows into TNW.

⁶A natural or man-made discontinuity in the OHWM does not necessarily sever jurisdiction (e.g., where the stream temporarily flows underground, or where the OHWM has been removed by development or agricultural practices). Where there is a break in the OHWM that is unrelated to the waterbody's flow regime (e.g., flow over a rock outcrop or through a culvert), the agencies will look for indicators of flow above and below the break.

	☐ other (list): ☐ Discontinuous OHWM.7 Explain:
Ĭ:	f factors other than the OHWM were used to determine lateral extent of CWA jurisdiction (check all that apply): High Tide Line indicated by: Mean High Water Mark indicated by: survey to available datum; physical markings (foreshore) physical markings; physical markings/characteristics vegetation lines/changes in vegetation types. other (list):
Chara F	ical Characteristics: oterize tributary (e.g., water color is clear, discolored, oily film; water quality; general watershed characteristics, etc.). explain: Turbid during flow events but clearer during lower flows fy specific pollutants, if known: Suspended solids.
□ Ñ □ V □ E □	tical Characteristics. Channel supports (check all that apply): Liparian corridor. Characteristics (type, average width): Vetland fringe. Characteristics: Emergent wetland occurs on fringes of on-channel stock tanks. Labitat for: Federally Listed species. Explain findings: Fish/spawn areas. Explain findings: Other environmentally-sensitive species. Explain findings: Aquatic/wildlife diversity. Explain findings: Limited invertebrate and songbird utilization.
2. Characteri	istics of wetlands adjacent to non-TNW that flow directly or indirectly into TNW
(a) <u>Q</u>	cal Characteristics: ioneral Wetland Characteristics: roperties: PEM fringes associated with on channel ponds Wetland size: 10 acres Wetland type. Explain: Wetlands confined to on channel ponds Wetland quality. Explain: Detailed functional assessment of the wetlands not accomplished. Vegetation in wetland areas are typically desirable and include Typha, Eleocharis, Polyuganum, Carex, Juneus, Sagittaria, Ludwigia, Potamigeton and Ranunculus species. Hydrilla was also documented in some assessed areas. Wetlands are expected to rate as low to average quality based on geomorphic and vegetation type, density as well as agricultural activities and grazing adjacent and in the wetland areas. Wetlands provide soil rentention and protection at pond edges.
P	roject wetlands cross or serve as state boundaries. N/A
F	teneral Flow Relationship with Non-TNW: Iow is: Ephemeral flow. Explain: Wetlands are associated with on-channel pond construction. Outlets exist and/or any precipitation events from ponds into connecting named and unnamed tributaries to the North Sulphur River.
S	arface flow is: Confined Characteristics:
S	ubsurface flow: Unknown. Explain findings: Dye (or other) test performed:
Σ	Vetland Adjacency Determination with Non-TNW: Directly abutting – wetlands are created by and connected to pond pool elevations. Not directly abutting Discrete wetland hydrologic connection. Explain: Ecological connection. Explain: Separated by berm/barrier. Explain: There is an earthen berm east of the wetland.
P1 P3 F1	roximity (Relationship) to TNW roject wetlands are 30 (or more) river miles from TNW. roject waters are 30 (or more) aerial (straight) miles from TNW. row is from: Wetland to navigable waters. restimate approximate location of wetland as within the 2-year or less floodplain.
(ii) Chemi	cal Characteristics:

Characterize wetland system (e.g., water color is clear, brown, oil film on surface; water quality; general watershed characteristics; etc.). Explain: Herbaceous fringe varying in widths from 1 to more than 20 feet as part of 27 on-channel ponds. Wetlands perform water quality functions from overland flow to waters via filtration and sediment trapping, retention and nutrient transformation. Nutrient transformation from stream flow into ponds also accomplished. Identify specific pollutants, if known: unknown.

(iii) Biological Characteristics. Wetland supports (check all that apply):
Riparian buffer. Characteristics (type, average width):
☑ Vegetation type/percent cover. Explain: Eleocharis, Typha,
Habitat for:
☐ Federally Listed species. Explain findings:
☐ Fish/spawn areas, Explain findings;
☐ Other environmentally-sensitive species. Explain findings:
Aquatic/wildlife diversity. Explain findings: Variation in vegetation communities compared to upland vegetation can
provide minor habitat for occasional use of wetland and water dependent species.

3. Characteristics of all wetlands adjacent to tributaries (if any)

All wetland(s) being considered in the cumulative analysis: 25-30

Approximately 10 acres in total are being considered in the cumulative analysis as identified in the delineation report at 27 onchannel ponds. Off-site desk top estimation was used to identify wetland fringes occurring with on-channel ponds. The higher resolution aerial photographs from 2014-2016 compared to those used in the 2006 PJD report facilitated in refinements of the previously identified (delineated) aquatic resources as well as identification in modifications to aquatic resources within the project area (erosional features, impoundments, etc.). These refinements to the delineated aquatic resources were performed as a "desktop" evaluation. To ground-truth observations from the desktop evaluation, field investigations were performed May 30 through June 2, 2017 to assess a representative sample area of portions of the 13,094-acre assessment area. These "on the ground" assessments aided in verification of identified aquatic resources from the desktop evaluation as well as to map the limits of potential waters of the U.S. identified both from the desktop evaluation and in the field. As an example, 14 of the 47 mapped on-channel ponds within the assessment area representing approximately 29.7 percent were investigated in the field. Lacustrine "fringe" wetland areas associated with the 14 on-channel ponds assessed in the field were observed and recorded in the field. The lacustrine wetlands, predominantly herbaceous emergent wetlands, represented approximately 3.4 acres of the 23.8 acres of the 14 on-channel ponds assessed or approximately 14.3 percent of the assessed on-channel pond acreage. This percentage of fringe wetlands was used to estimate the lacustrine wetland area associated with the total delineated area of onchannel impoundments within the assessment area that would be considered as hydraulically and hydrologically connected to waters of the U.S. Calculation of area of Lacustrine Fringe Wetlands (emergent) totaled 3.4 acres identified for 23.8 acres of 14 on-channel pends that were field assessed. This equated to 14.3 percent of 69.9 acres of 47 on-channel pends within assessment area resulting in the determination that slightly less than 10 acres of on-channel fringe wetlands exist.

Summarize overall biological, chemical and physical functions being performed: See descriptions above.

C. SIGNIFICANT NEXUS DETERMINATION

A significant nexus analysis will assess the flow characteristics and functions of the tributary itself and the functions performed by any wetlands adjacent to the tributary to determine if they significantly affect the chemical, physical, and biological integrity of a TNW. For each of the following situations, a significant nexus exists if the tributary, in combination with all of its adjacent wetlands, has more than a speculative or insubstantial effect on the chemical, physical and/or biological integrity of a TNW. Considerations when evaluating significant nexus include, but are not limited to the volume, duration, and frequency of the flow of water in the tributary and its proximity to a TNW, and the functions performed by the tributary and all its adjacent wetlands. It is not appropriate to determine significant nexus based solely on any specific threshold of distance (e.g. between a tributary and its adjacent wetland or between a tributary and the TNW). Similarly, the fact an adjacent wetland lies within or outside of a floodplain is not solely determinative of significant nexus.

Draw connections between the features documented and the effects on the TNW, as identified in the Rapanos Guidance and discussed in the Instructional Guidebook. Factors to consider include, for example:

- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to carry pollutants or flood waters to TNWs, or to reduce the amount of pollutants or flood waters reaching a TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), provide habitat and lifecycle support functions for fish and
 other species, such as feeding, nesting, spawning, or rearing young for species that are present in the TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to transfer nutrients and organic earbon that support downstream foodwebs?
- Does the tributary, in combination with its adjacent wetlands (if any), have other relationships to the physical, chemical, or biological integrity of the TNW?

Note: the above list of considerations is not inclusive and other functions observed or known to occur should be documented below:

- Significant nexus findings for non-RPW that has no adjacent wetlands and flows directly or indirectly into TNWs. Explain findings of presence or absence of significant nexus below, based on the tributary itself, then go to Section JH.D:
- Significant nexus findings for non-RPW and its adjacent wetlands, where the non-RPW flows directly or indirectly into TNWs. Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D: The North Sulphur River totals 65,646 linear feet in the study area and is intermittent. Additionally, numerous ephemeral tributaries totaling 625,272 lineal feet have continuous ordinary high water marks that feed into the North Sulphur River. On said tributaries are 47 on channel ponds totaling 59.89 acres of open water. Wetland fringes associated with the ponds total 10 acres. All streams flow during and shortly after precipitation events allowing for biological and chemical contributions to the North Sulphur River which flows into Relatively Permanent Flow portions of the channel and eventually into the Sulphur River which is a TNW. Sediment, biota (including fish from on channel stock tanks) and organic matter are contributed to the North Sulphur River. Tributaries can also act as refugia during high flow events in the North Sulphur River. The tributaries and on channel wetlands also contribute as well as carry pollutants and flood waters to TNWs, can reduce amount of pollutants or flood water reaching a TNW, and transfer nutrients and organic carbon downstream.
- Significant nexus findings for wetlands adjacent to an RPW but that do not directly abut the RPW. Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D:.

D.	DETERMINATIONS OF JURISDICTIONAL FINDINGS. THE SUBJECT WATERS/WETLANDS ARE (CHECK ALL
	THAT APPLY):

	TERMINATIONS OF JURISDICTIONAL FINDINGS. THE SUBJECT WATERS/WETLANDS ARE (CHECK ALL IAT APPLY):
1.	TNWs and Adjacent Wetlands. Check all that apply and provide size estimates in review area: TNWs: linear feet width (ft), Or, acres. Wetlands adjacent to TNWs: acres.
2.	 RPWs that flow directly or indirectly into TNWs. Tributaries of TNWs where tributaries typically flow year-round are jurisdictional. Provide data and rationale indicating that tributary is perennial: Tributaries of TNW where tributaries have continuous flow "seasonally" (e.g., typically three months each year) are jurisdictional. Data supporting this conclusion is provided at Section III.B. Provide rationale indicating that tributary flows seasonally:
	Provide estimates for jurisdictional waters in the review area (check all that apply): Tributary waters: linear feet width (ft). Other non-wetland waters: acres. Identify type(s) of waters:
3.	Non-RPWs ⁸ that flow directly or indirectly into TNWs. Materbody that is not a TNW or an RPW, but flows directly or indirectly into a TNW, and it has a significant nexus with a TNW is jurisdictional. Data supporting this conclusion is provided at Section III.C.
	Provide estimates for jurisdictional waters within the review area (check all that apply): Tributary waters: 690,918 linear feet and up to 45 width (ft). Other non-wetland waters: 59.89 acres of on channel ponds. Identify type(s) of waters: On channel ponds.
4.	Wetlands directly abutting an RPW that flow directly or indirectly into TNWs. Wetlands directly abut RPW and thus are jurisdictional as adjacent wetlands. Wetlands directly abutting an RPW where tributaries typically flow year-round. Provide data and rationale indicating that tributary is perennial in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW:
	■ Wetlands directly abutting an RPW where tributaries typically flow "seasonally." Provide data indicating that tributary is seasonal in Section III.B and rationale in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW:
	Provide acreage estimates for jurisdictional wetlands in the review area: acres.
5.	Wetlands adjacent to but not directly abutting an RPW that flow directly or indirectly into TNWs. Wetlands that do not directly abut an RPW, but when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisidictional. Data supporting this conclusion is provided at Section III.C.

*See Footnote # 3.

DEGRADATION OR DESTRUCTION OF WHICH COULD AFFECT INTERSTATE COMMERCE, INCLUDING ANY SUCH WATERS (CHECK ALL THAT APPLY): 10 which are or could be used by interstate or foreign travelers for recreational or other purposes. from which fish or shellfish are or could be taken and sold in interstate or foreign commerce. which are or could be used for industrial purposes by industries in interstate commerce. Interstate isolated waters. Explain: Other factors. Explain: Identify water body and summarize rationale supporting determination: Provide estimates for jurisdictional waters in the review area (check all that apply): Tributary waters: linear feet width (ft). Other non-wetland waters: acres. Identify type(s) of waters: Wetlands: acres.			Provide acreage estimates for jurisdictional wetlands in the review area: 10 acres,
7. Impoundments of jurisdictional waters. As a general rule, the impoundment of a jurisdictional tributary remains jurisdictional. Demonstrate that mispoundment was created from "waters of the U.S.," (see 69.89 acres of on-channel ponds and associated fringe wetlands as detailed in this form), or Demonstrate that water is isolated with a nexus to commerce (see E below). F. ISOLATED [INTERSTATE OR INTRA-STATE] WATERS, INCLUDING ISOLATED WETLANDS, THE USE, DEGRADATION OR DESTRUCTION OF WHICH COULD AFFECT INTERSTATE COMMERCE, INCLUDING ANY SUCH WATERS (CHECK ALL THAT APPLY); which are or could be used by interstate or foreign travelers for recreational or other purposes. from which fish or shellfish are or could be taken and sold in interstate or foreign commerce. which are or could be used for industrial purposes by industries in interstate commerce. Interstate isolated waters. Explain: Other factors. Explain: Identify water body and summarize rationale supporting determination: Provide estimates for jurisdictional waters in the review area (check all that apply): Tributary waters: linear feet width (ft). Other non-wethand waters: acres. Identify type(s) of waters: Wethands: acres. Wethands: acres. F. NON-JURISDICTIONAL WATERS, INCLUDING WETLANDS (CHECK ALL THAT APPLY); If potential wetlands were assessed within the review area, these areas did not meet the criteria in the 1987 Corps of Engineers Wethands: acres. Wethand Delineation Manual and Great Plains Regional Supplement. Review area included isolated waters with no substantial nexus to intensitate (or foreign) commerce. Prior to the Jan 2001 Suppense Court decision in "SWANCC," the review area would have been regulated based galejy on the "Migratory Bird Rule" (MBR). Waters do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction. Explain: Numerous stock tanks constructed in uplands exist as well as stock tanks that are not connected to irribaries to the North Sulphur River, Isolated forested wetl		6,	Wetlands adjacent to such waters, and have when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisdictional. Data supporting this
As a general rule, the impoundment of a jurisdictional tributary remains jurisdictional. Demonstrate that impoundment was created from "waters of the U.S.," (see 69.89 acres of on-channel ponds and associated fringe wetlands as detailed in this form), or			Provide estimates for jurisdictional wetlands in the review area: acres.
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		a fir	nding is required for jurisdiction (check all that apply); Non-wetland waters (i.e., rivers, streams); linear feet, width (ft). Lakes/ponds; 83 acres upland ponds/stock tanks. Other non-wetland waters: acres. List type of aquatic resource: .

⁹ To complete the analysis refer to the key in Section III,D.6 of the Instructional Guidehook,
¹⁰ Prior to asserting or declining CWA jurisdiction based solely on this category, Corps Districts will elevate the action to Corps and EPA HQ for review consistent with the process described in the Corps/EPA Memorandum Regarding CWA Act Jurisdiction Following Rapanos.

SECTION IV: DATA SOURCES.

. S	UPI	PORTING DATA. Data reviewed for JD (check all that apply - checked items shall be included in case file and, where checked
	and	requested, appropriately reference sources below):
	\boxtimes	Maps, plans, plots or plat submitted by or on behalf of the applicant/consultant:
	$\overline{\boxtimes}$	Data sheets prepared/submitted by or on behalf of the applicant/consultant.
		Office concurs with data sheets/delineation report.
		Office does not concur with data sheets/delineation report.
	\Box	Data sheets prepared by the Corps:
	Ħ	Corps navigable waters' study:
	$\overline{\boxtimes}$	U.S. Geological Survey Hydrologic Atlas:
	4.3	USGS NHD data.
		☑ USGS 8 and 12 digit HUC maps.
	\boxtimes	U.S. Geological Survey map(s). Cite scale & quad name; Greenville NW, Celeste, Pike, Wolfe City, Gober, Ladonia, Honcy Grove
		Dodd City.
	\boxtimes	USDA Natural Resources Conservation Service Soil Survey, Citation: Fannin.
	X	National wetlands inventory map(s). Cite name: See USGS quad map names.
		State/Local wetland inventory map(s): State/Local wetland inventory map(s):
	Ħ	FEMA/FIRM maps:
	H	· · · · · · · · · · · · · · · · · · ·
	닖	100-year Floodplain Elevation is: (National Geodectic Vertical Datum of 1929)
	X	Photographs: Acrial (Name & Date): 2003-2005 and 2014-2016 FSA NAIP and 2015 Texas Ortho-imagery Project.
	_	or 🖸 Other (Name & Date): On site photos from 2006 delineation report and 2017 supplment.
	닏	Previous determination(s). File no. and date of response letter:
	╚	Applicable/supporting case law:
	╚	Applicable/supporting scientific literature:
		Other information (please specify):

B. ADDITIONAL COMMENTS TO SUPPORT JD:

APPENDIX C /'3 SWAMPIM ASSESSMENT PROTOCOL DOCUMENTATION

Stream Watershed Assessment and Measurement Protocol Interaction Model (SWAMPIM)

for Streams and On-Channel Impoundments Prepared for Lake Ralph Hall Environmental Assessment

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1.0 Introduction

1.1 General Notes and Information

Recognizing that streams provide many functions and that the interaction of streams with their respective watersheds is key to the quantity and quality of functions provided, various stream assessment protocols have been developed for use across the country (Somerville and Pruitt 2004). The breadth and scope of stream assessments are as varied as the reasons for undertaking them. The SWAMPIM provides an assessment tool based primarily on geological and morphological habitat characteristics, floodplain and riparian condition, and water quality. It was developed based on existing protocols in use that have been extensively peer reviewed and field-tested across a wide variety of environmental settings. The evaluation used in this protocol can reasonably evaluate the aquatic resources within a project area through assessing the condition level of selected variables related to each function such that a holistic evaluation of the physical, biological, and chemical parameters of the aquatic system is accomplished within the context of its watershed.

The SWAMPIM was developed to provide an assessment tool for quantifying impacts on streams and impoundments within the U.S. Army Corps of Engineers (USACE), Fort Worth District, especially within the north central and east Texas area (refer to Figure 1). Information gathered using the SWAMPIM can be used to determine the appropriate amount of compensatory mitigation required for permitted impacts. The SWAMPIM is not intended to replace other decision-making tools, but to be used to develop relative assessments of environmental functions in the pre- and post-project phase, and provide a realistic basis for determining mitigation needs.

U.S. Army Corps of Engineers Districts within the State of Texas

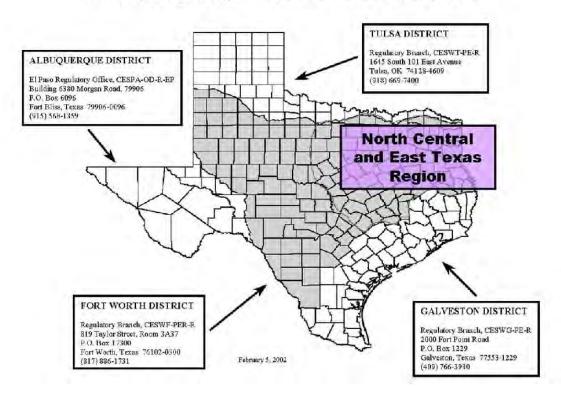


Figure 1. USACE Fort Worth District, north central and east Texas region

1.2 SWAMPIM Overview

Figure 2 (following this section) shows an overview of the SWAMPIM process. Functional capacity of aquatic resources on a watershed basis is evaluated using the SWAMPIM by defining stream assessment reaches based on geomorphic characteristics of stream size, valley characteristics, and underlying geology. Specific characteristics used in defining assessment reaches may include valley width, stream width, valley slope, geologic materials, and tributary influence. Representative reaches are then selected for evaluation for the identified stream assessment reaches. Section 2 of this document provides a detailed description of the SWAMPIM process for streams and rivers.

On-channel impoundments are characterized by relative impoundment size and representatives of each impoundment size category are selected for evaluation. The data collected at the representative reaches and impoundments are used to determine overall quality on a relative basis for the aquatic resources in a project area. Section 4 describes the SWAMPIM process for impoundments.

Due to the complex and dynamic conditions within stream channels and based on the proposed use of the data collected, assessment protocols have been developed that range from subjective, visual-based assessment protocols that are rapid and relatively easy-to-use to objective, quantitative assessments that are usually labor intensive, time consuming, and costly. Selected stream assessment and mitigation protocols were reviewed and summarized (Somerville and Pruitt, 2004) in an effort to recommend components to best assess and document physical stream conditions pertinent to the Clean Water Act (CWA) Section 404 regulatory program. Five suggestions for programmatically complete stream assessment protocols were developed for use in the regulatory program.

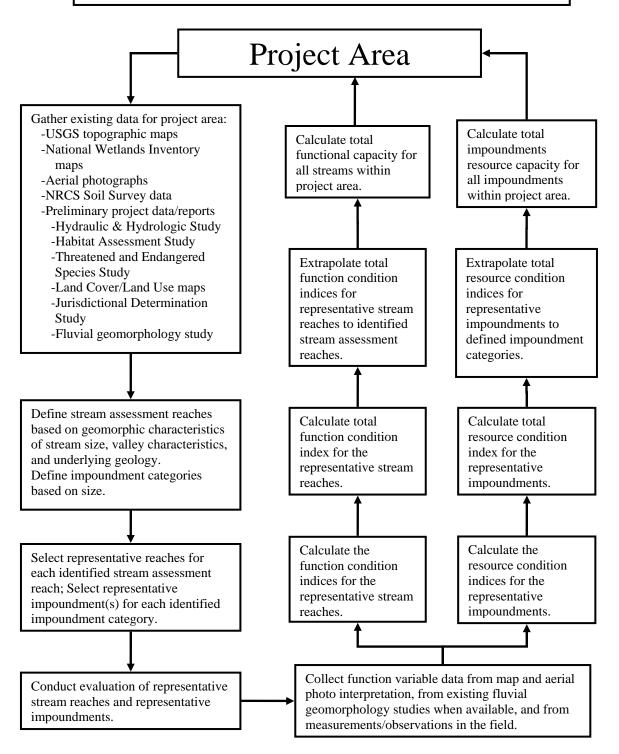
- 1) Classification: Stream assessment should be preceded by classification to narrow the natural variability of physical stream variables.
- 2) Objectivity: The assessment procedure should remove as much observer bias as possible by providing well-defined procedures for objective measures of explicitly defined stream variables.

- 3) Quantitative Methods: The assessment procedure should utilize quantitative measures of stream variables to the maximum extent practicable.
- 4) Fluvial Geomorphological Emphasis: Stream assessments undertaken to prioritize watersheds or stream reaches for management or aid the design of stream enhancement or restoration projects should be based on fluvial geomorphic principles.
- 5) Data Management: Data from stream assessments should be catalogued by designated entities in each region of the country. This is especially true of reference data.

Although most states, including Texas, include biological assessment as part of their water quality programs, biological variables tend to be seasonally variable and labor intensive to sample. Physical stream features are relatively stable over short-time frames in most stream environments, are relatively easy to measure in the field, and provide a tangible resource for decision making, management, and restoration plans. (Somerville and Pruitt, 2004). Habitat assessment is a nearly ubiquitous component of all stream assessment protocols. Geomorphological data is also increasingly being included. Evaluation of the parameters related to physical and geomorphological habitat allows the development of direct and indirect inference of functional capacity of the assessed stream for each of the functions identified in Table 1. This protocol utilizes measures of defined stream variables to quantify to the degree practicable the relative condition of the assessed stream.

The impoundment evaluation is designed to provide a qualitative assessment of the lentic habitat provided by these aquatic resources. The assessment, as with the stream assessment, incorporates geological and morphological habitat characteristics, riparian and watershed condition, biological components, and water chemistry into the protocol. The merging of these variable characteristics of an impoundment into an assessment provides a means to rapidly produce a reproducible, consistent, quality determination of habitat characteristics and ecological conditions based on observations and measurements taken at a single point in time.

Figure 2. SWAMPIM OVERVIEW



2.0 Streams and Rivers

Stream functions and interactions within a watershed basis were divided into three major function categories: hydrologic, water quality improvement/biogeochemical, and habitat. Table 1 provides a listing of the three major function categories and the individual functions identified within each major category.

TABLE 1. STREAM FUNCTIONS

Major Categories	Functions
1. Hydrologic	A. Groundwater Interactions – discharge/recharge
	B. Channel Condition and Energy Dissipation
	C. Flood Capacity/Flow Conveyance
	D. Flow Attenuation and Desynchronization of Peak
	Flows
	E. Dynamic surface water storage
2 Water Quality	A. Sediment Transport/Deposition
2. Water Quality Improvement/Biogeochemical	B. Nutrient cycling/Assimilation
Improvement/Biogeochemical	C. Removal/Assimilation of Imported Contaminants
	A. Maintains Spatial Structure of Habitat
	B. Maintains Distribution and Abundance of
	Vertebrates
	C. Maintains Distribution and Abundance of
3. Habitat	Invertebrates
	D. Production of Allochthonous Materials
	E. Supports Riparian Vegetation
	F. Maintains Interspersion and Connectivity with
	Terrestrial Habitats/supports Biological Diversity

SWAMPIM uses variables that are easily identified and evaluated in the field or with the use of mapping resources to determine the level of functions provided. Evaluation of these parameters allows the development of direct and indirect inference of functional capacity of the assessed stream reach for each of the function categories identified in Table 1. Selection of the function variables used in SWAMPIM was based primarily on physical criteria that were derived from existing peer-reviewed and field-tested protocols that assess stream and impoundment functions within a watershed context. Detailed descriptions of the function variables for assessment of streams and rivers are provided in Section 3 of this document.

2.1 Reach Length Determinations

Several protocols for rapid assessment of biological habitat such as the U.S. Environmental Protection Agency's (EPA) Rapid Bioassessment Protocols for Use In Streams and Rivers, Benthic Macroinvertebrates and Fish were designed and tested in wadeable fresh-water streams, rather than large rivers (Plafkin, et al., 1989). However, the fundamental approach was deemed applicable to large rivers as well, and portions of the Rapid Bioassessment Protocols were validated for both freshwater streams and large rivers. Assessment of stream classification should be conducted prior to determination of appropriate stream reaches to be evaluated. The stream reach encompasses the biological and chemical collection areas and includes as many different geomorphic channel units as possible. Examples of geomorphic units include riffles, runs, glides, and pools. Note that some of these geomorphic units may not be found in some streams.

Streams are considered wadeable if most of the stream channel is accessible by wading during normal flow conditions. Generally, these streams are third order or less based on a Strahler (1957) classification. Pool areas or high-flow conditions may cause the stream to be inaccessible to wading in certain places or at certain times; however, the stream would still be considered wadeable in determining reach length. A length of a Reference Reach (RR) should be about 40 times the average stream width in wadeable streams, but with a minimum of 150 m (492 feet). The maximum reach length for wadeable streams is 500 m (1640.5 feet) (TCEQ 2005).

Streams are considered non-wadeable if water depth in the stream channel prohibits wading and requires use of a floatation device (boat or tube) during normal flow conditions. Generally, these are fourth order streams or larger and are usually considered rivers. Riffle areas or low-flow conditions may cause the stream to be accessible to wading in certain places or at certain times; however, the stream would still be considered non-wadeable in determining reach length. The reach length of a non-wadeable stream is based on incorporating one full meander of the stream channel, if possible, and includes two examples of at least two types of geomorphic channel units. The minimum reach length for a non-wadeable stream is 500 m (1640.5 feet). The maximum length is 1 km (3,281 feet) (TCEQ 2005). On some rivers, one full meander may be longer than 1 km. In other rivers, the channel may be dominated by only one geomorphic unit,

such as a glide. In these cases, limit the reach length to 1 km with as many different types of geomorphic units represented as possible (TCEQ 2005).

Variation in results of stream order classification occurs when small scale maps are used (USGS 1:100,000 map) as opposed to larger scale maps (USGS 1:24,000 map) and use of actual channels mapped on ground results in larger stream orders due to identification of small ephemeral streams not typically identified on maps (Leopold 1994). [Since the majority of stream channels identified within the Lake Ralph Hall project area are ephemeral headwater streams, which are not typically considered in habitat assessment protocols, but which are considered jurisdictional under the Clean Water Act and require assessment under Section 404 permit review, the Strahler stream classification system was not used for this assessment. Instead, delineated stream channels are classified as ephemeral or intermittent. No perennial streams are located within the Lake Ralph Hall reservoir project area.]

2.2 General Instructions for Streams and Rivers Assessment Using SWAMPIM

- A. Determine the Stream Assessment Reach(s) (SAR) within the proposed project area. The SAR is the linear feet of stream channel of like characterization (i.e., ephemeral, intermittent, 1st order, 2nd order, major tributary, river channel) within the proposed project impact area. All stream reaches within the project area should be included in appropriate SARs.
- B. Determine Reference Reaches (RR) for each identified SAR. Number of RRs to be assessed for each identified SAR should be based on the quantity and variability of quality within the SAR as determined during initial reconnaissance so that all conditions within a SAR are adequately represented.
- C. Complete Stream Functions Assessment Forms for each major functions category based on measurements and assessment of conditions within all identified RRs. Certain variables (e.g., sinuosity, riparian continuity, land use) may be evaluated first through review of topographic maps and recent aerial photographs with subsequent verification based on field observations. The classification of

variables based on map or aerial photograph interpretation may be done on a SAR basis with the score applied to each RR within the SAR.

- D. Calculate the Function Condition Index (FCI) for each function category based on the scoring of variables for each RR. The scores for the variables for each Stream Function Category (e.g., hydrologic, water quality/biogeochemical, and habitat) are summed and divided by the highest total possible score to determine the FCI for each category. If multiple RRs are identified within a SAR, the FCIs for each function category for each RR are totaled and divided by the total number of RRs to determine the average FCI for each Stream Function Category for the SAR. Based on a total maximum FCI of 1.0 for each major Functions Category, the maximum Total FCI for the SAR is 3.0.
- E. The FCIs determined for the SAR are then multiplied by the linear feet of stream channel in the SAR and by a multiplication factor determined by the stream characterization (i.e., ephemeral, intermittent, or perennial) to determine the Functional Capacity (FC) for the SAR. The multiplication factor incorporates a typical width of stream channel and appropriate riparian buffer for each stream type so that when multiplied by the linear feet of stream channel, the result or FC represents an area comparable to acres. The typical width of stream channel and appropriate riparian buffer for each stream type used in determining the multiplication factors is comparable to those used for the Trinity River Mitigation Bank (Fort Worth, Texas) credit calculations for stream channels (i.e., ephemeral = 5-foot wide channel with 25-foot wide riparian buffers each side; intermittent = 10-foot wide channel with 50-foot wide riparian buffers each side; and perennial = 15-foot wide channel with 75-foot wide riparian buffers each side). The resulting calculation for FC is as follows:

FC = FCI * (Linear Feet of SAR) * Multiplication Factor

The Total FC for each SAR is the sum of the FCs for the three Stream Function Categories.

- F. The Project FC for streams and rivers is the summation of the Total FCs for all the identified SARs within the defined project area.
- G. Post-project FC for stream and rivers is determined by the same process as for the existing conditions within the project area except scoring of variables for each of the function categories is based on projections of changes in condition relative to proposed project activities, including compensatory mitigation activities, or resulting impacts of the proposed project.

3.0 Description of Function Category Variables for Streams and Rivers

3.1 Hydrologic Function Variables

3.1.1. Flow Regime. The stream flow regime identified by this variable indicates the importance of the stream to the aquatic community. Although ephemeral and intermittent drainages are essential to the function of a watershed, they are not as valuable as perennial streams due to the fact that they typically do not provide year-round habitat for aquatic organisms. Evaluators should take into account regional and site-specific climatic conditions (i.e., extended drought, recent heavy rains, etc.) when determining the flow characteristics of a stream. A scoring range is provided for various stream types to efficiently characterize differences in quality within stream types. For example, some intermittent streams have groundwater input that sustains flow at a higher rate and for a longer period of time than other streams. The evaluator may choose to provide a higher score within the stream type for this system.

<u>Ephemeral stream</u> – A drainageway that may or may not have a well-defined channel that carries flow only during periods of surface runoff. These drainages are not hydrologically connected to subsurface inputs (i.e., springs, subterranean flow, etc.) and often lack a well-defined channel with easily identifiable bed and banks.

Intermittent stream – A drainageway with a well-defined channel that generally flows only during a part of the year. It continues to flow after cessation of surface runoff, but effluent groundwater (springs/subterranean flow) will not sustain flows through moderate periods of little or no precipitation. It may contain reaches of perennial flow or have permanent pools that support aquatic wildlife. Some special conditions, such as the discharge from a wastewater treatment plant or irrigation flows, can cause portions of an

intermittent stream to have qualities of a perennial stream.

Perennial stream – A drainageway with a well-defined channel in which perennial flow persists throughout the length of the drainage during normal climate conditions. The permanency of flow is usually attributable to groundwater effluent.

Selected References: KDWP 2000

3.1.2. Channel Condition and Energy Dissipation

3.1.2a. Channel Condition/Alteration (natural, altered, or downcutting).

Stream meandering generally increases as the gradient of the surrounding valley decreases. Many streams in urban and agricultural areas have been straightened, deepened, or diverted into concrete channels, often for flood control or irrigation These changes in turn may affect stream functions, such as transport of sediment and the development and maintenance of habitat for fish, aquatic insects, and aquatic plants. Some modifications to stream channels have more impact on stream health than others. For example channelization and dams affect a stream more than the presence of pilings or other supports for road crossings. Signs of channelization or straightening of a stream may include an unnaturally straight section of the stream, high banks, dikes or berms, lack of flow diversity, and uniform-sized bed materials. Newly channelized reaches may have vegetation missing or vegetation different from reaches that were not channelized. Older channelized reaches may also have little or no vegetation or have grasses instead of woody vegetation. Drop structures (such as check dams), irrigation diversions, culverts, bridge abutments, and riprap also indicate changes to the stream channel.

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Active downcutting and excessive lateral cutting are serious impairments to stream function. Both conditions are indicative of an unstable stream channel. Indicators of downcutting in the stream channel include nickpoints associated with headcuts in the stream bottom and exposure of cultural features, such as pipelines that were initially buried under the stream. Exposed footings in bridges and culvert outlets that are higher than the water surface during low flows are other examples. A lack of sediment depositional features, such as regularly spaced point bars, is normally an indicator of incision. A low vertical scarp at the toe of the streambank may indicate downcutting, especially if the scarp occurs on the inside of a meander. Excessive bank erosion is indicated by raw banks in areas of the stream where they are not normally found, such as straight sections between meanders or on the inside of curves.

Selected References: Newton, et al., 1998; Barbour, et al., 1999

3.1.2b. Channel Capacity to Flow Frequency Ratio (for 2-year peak flow).

Channel capacity is the maximum flow that a given channel is capable of conveying without overtopping its banks. For evaluation purposes, the 2-year flow is considered the base condition for bankfull capacity when projected based on hydrological modeling of stream flow from watershed runoff. Optimal conditions fall within a 1.5 to 2.5 year frequency of storm events which causes flow to exceed bankfull stream capacity providing overflows into adjacent wetlands and floodplains. This frequency can be expressed as a ratio related to the 2 year flow as 0.75 to 1.25. Suboptimal conditions would have overbank flow events on a more frequent basis than every 1.5 years (ratios <0.75) or less frequent than 2.5 years (ratios >1.25). Conditions are considered marginal if overbank flow events are more frequent than every year (ratios <0.5) or less frequent than every 5 years (ratios >2.5). Conditions are considered poor if overbank flow events are more frequent than every 10 years (>5).

Selected References: Dr. Mike Harvey and Stu Travant, 2005

3.1.2c. Channel Bank Stability. This parameter evaluates the existence of or the potential for detachment of soil from the upper and lower stream banks and its movement into the stream. This parameter measures active stream bank erosion. Signs of erosion include raw, exposed soil on banks, or banks that are sloughing, crumbling, or otherwise unstable. Some banks may exhibit exposed soil, but are "crusted/healed over" and are not actively eroding. Such banks may exhibit early signs of stabilizing that include colonization by lichens and mosses, herbaceous vegetation establishing at the toe of the bank, etc. Eroded banks indicate a problem of sediment movement and deposition, and suggest a scarcity of cover and organic input to streams. Each bank is evaluated separately and the average score (left and right) is used for this parameter. For convention, right and left banks are determined when facing downstream.

Selected References: Newton, et al., 1998; Barbour, et al., 1999, USACE, Norfolk District, 2004

3.1.3. Channel Roughness Factors

3.1.3a. Channel Sinuosity. This parameter evaluates the meandering or sinuosity of the stream Sinuosity is used as an indication of how a river has adjusted to the slope of its valley (Rosgen, 1996) and is measured as Channel Length divided by Valley Length. The degree of sinuosity is related to channel dimensions, sediment load, stream flow, and the bed and bank materials. A sinuosity of 1 indicates the stream is flowing in a straight line and would typically be indicative of some anthropogenic activity such as channelization. Most low-gradient streams that are functioning efficiently in transportation of bedload will have a sinuosity value of 1.5 or greater (Rosgen, 1996; Cole, 1994; Gordon, et al., 1992).

A high degree of sinuosity provides for diverse habitat and fauna, and the stream is better able to handle surges when the stream flow fluctuates as a result of storms. The absorption of stream flow energy by bends protects the stream from excessive erosion and flooding and provides refugia for benthic invertebrates and fish during storm events. To gain an appreciation of this parameter in low gradient streams, a longer segment or

reach than that designated as a reference reach (RR) may be incorporated into the

evaluation. In some situations, this parameter may be rated on a macro-scale by

evaluation of the SAR by interpretation of accurate topographical maps or aerial

photographs and application of the results to all RRs within the SAR. The "sequencing"

pattern of the stream morphology is important in rating this parameter (Barbour, et al.,

1999). In "oxbow" streams of coastal areas and deltas, meanders are highly exaggerated

and transient. Natural conditions in these streams are shifting channels and bends, and

alteration is usually in the form of flow regulation and diversion.

Selected References: Barbour, et al., 1999; KDWP, 1996

3.1.3b. Substrate Composition. Substrate can vary significantly in a stream,

horizontally, vertically, and lengthwise throughout a reach, with frequent changes

relating to fluctuations in flow regimes. Both inorganic and organic materials are

included in substrate composition, and will vary spatially and temporally. Vertical

variations may occur seasonally as with the presence of leaf litter in the late fall through

the spring, covering gravel or cobble substrates that would be visible in the summer. In

addition, temporal variability related to sediment deposition and accumulation of detritus

during periods when spates have been absent (i.e., no "flush" effect) may influence the

evaluator's perception of substrate composition.

The deposition of substrate, and its composition can affect the hydrology of a stream.

Sediment accumulation can lead to channel enlargement or division. Further, unstable

substrates can lead to sediment accumulation downstream. The evaluator should note

any changes in stream hydrology based on the deposition or instability of a stream's

substrate.

Selected References: KDWP, 1996

3.1.3c. Instream Bottom Topography or Manning's n. Instream structure or

channel bottom topography influences flow within the channel by increasing roughness

and thereby, turbulence. Turbulent areas improve aeration and influence other water

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quality parameters as well as provide habitat features. Structural elements within a stream also impact water flow direction, which in turn influences erosional patterns that shape the channel. Instream bottom topography includes occurrence of deep pools, riffle zones, boulders/gravel, in-channel sediment bars, logs or large woody debris, backwater areas, connecting oxbows or other side-channel pools, overhanging vegetation, vegetated shallows, rootwads, or undercut banks. Manning's n is a roughness coefficient used as a factor in hydrologic and hydraulic modeling. The U.S. Geological Survey (USGS) has developed a guide for selecting Manning's n coefficients for natural channels and floodplains that is available at the following web address:

http://www.fhwa.dot.gov/bridge/wsp2339.pdf

In the event that Manning's n roughness coefficients are not available from hydrologic modeling conducted for the SAR or cannot be estimated using the USGS guidance, professional judgment from site evaluation of observed structural elements within the stream as described under the category conditions for instream bottom topography should be used to estimate the roughness coefficient of a RR based on observations of RR and comparison to described ranges for Manning's n.

Selected References: KDWP, 1996; Newton et al., 1998

3.1.3d. Channel I ncision. The degree of channel incision is evaluated by determining the Bank Height Ratio (BHR) of a representative section of the RR. The BHR is calculated by dividing the Top of Lowest Bank (TOLB) by the Maximum Bankfull Depth (BFD). Both the TOLB and BFD are measured in a riffle, from the thalweg, and at the same cross-section. The lowest bank refers to the lower of the left or right bank (where the bank intersects the floodplain or terrace) on any given cross-section, and is not a low bank or bar within the channel cross-section. There may be instances whereby an incised stream has reestablished a stable pattern, profile and dimension at a lower elevation and stable bankfull benches are apparent. In these instances, the bankfull bench should be considered as the new TOLB. Bankfull discharge is the discharge that fills a stable alluvial channel to the elevation of the active floodplain.

This discharge is morphologically significant because it identifies the point where the active channel stops and the floodplain begins. The height of water, or stage, during bankfull flow is the point at which flooding occurs on the floodplain. This may or may not be the top of the streambank. If the stream has downcut due to changes in the watershed or streamside vegetation, the floodplain stage indicator may be a small bench or scour line on the streambank. The top of the bank, which was formerly the floodplain, is called a terrace in this case. A stream with a terrace near the top of the banks is an incised, or entrenched, stream.

For actively incising streams, where BFD is difficult to locate, make your best estimate of bankfull based upon watershed size and condition, and in stream features. The Bank Full Depth is the average depth measured during a dominant channel forming flow with a recurrence interval averaging approximately 1.5 years. A good bankfull indicator is the uppermost scour line. Other bankfull indicators include the back of a point bar, the upper break in slope of the bank, and occasionally the top of the bank. Often, there is another prominent feature known as the inner berm. The Army Corps of Engineers refers to the inner berm as the mean high water mark. This feature is usually identified as a scour line or small bench halfway between the low flow water surface and the bankfull stage. Streams with large watersheds will have bankfull stage indicators at a higher elevation on the bank than streams with smaller watersheds. If necessary, walk upstream and downstream of the SAR and locate other indicators of bankfull stage.

Values will always be greater than or equal to one. A BHR ratio equal to 1 indicates a stream is not incised. Ratios greater than 1 indicate a stream is incised.

Additional guidance regarding the identification of field indicators of bankfull stage is found in Appendix 2 of the USACE, Norfolk District Stream Attribute Assessment Methodology Instruction Manual (2004).

Figures below are from the USACE, Norfolk District Stream Attribute Assessment Methodology Instruction Manual (2004)

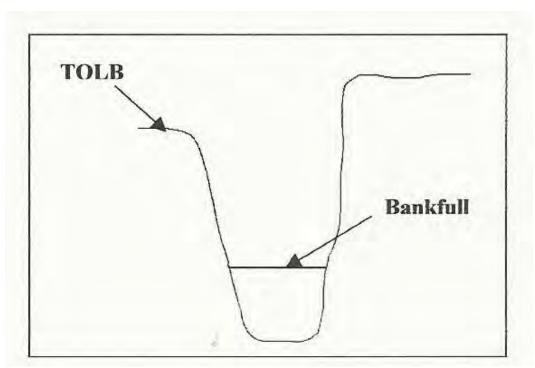


Figure 2. Relationship between Bankfull and TOLB in an incised channel without a bankfull bench.

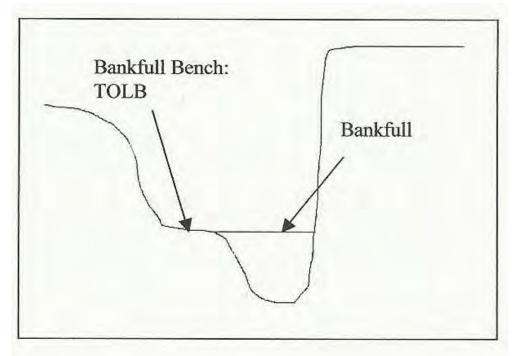


Figure 3. Relationship between Bankfull and TOLB in an incised channel with a bankfull bench.



Figure 4. Channel Incision: without bankfull bench - TOLB -

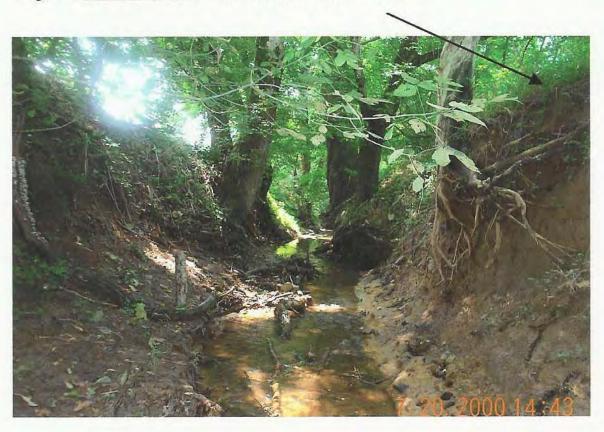




Figure 5. <u>Channel Incision</u>: Early channel evolution of bankfull bench within incised channel



Figure 6. <u>Channel Incision</u>: Channel has stabilized at a new base-elevation with an established bankfull bench



Figure 7. Channel Incision: Change in BHR due to head-cut



Figure 8. Looking upstream and downstream to establish bankfull stage from field indicators

Selected References: USACE Norfolk, 2004, Kline, et al., 2005.

3.1.4. Dynamic Surface Water Storage

3.1.4a. Pools. Pools are important resting and feeding sites for fish. A healthy

stream has a mix of shallow and deep pools. A stream with many pool types will support

a wide variety of aquatic species. Rivers with low sinuosity (few bends) and monotonous

pool characteristics do not have sufficient quantities and types of habitat to support a

diverse aquatic community. A deep pool is 1.6 to 2 times deeper than the prevailing

depth, while a shallow pool is less than 1.5 times deeper than the prevailing depth. Pools

are abundant if a deep pool is in each of the meander bends in the reach being assessed.

Generally, only 1 or 2 pools would typically form within a reach as long as 12 active

channel widths. In low order, high gradient streams, pools are abundant if there is more

than one pool every 4-channel widths.

Pool diversity and abundance are estimated based on walking the stream or probing from

the streambank. You should find deep pools on the outside of meander bends. In

shallow, clear streams a visual inspection may provide an accurate estimate.

Selected References: Newton, et al., 1998; Barbour, et al., 1999

3.1.4b. Channel Flow Status. Channel flow status is the degree to which water

covers the entire available channel substrate, from bank to bank. The flow status will

change as the channel enlarges (e.g., aggrading stream beds with actively widening

channels) or as flow decreases as a result of dams and other obstructions, diversion for

irrigation, or drought. When water does not cover much of the streambed, the amount of

suitable substrate for aquatic organisms is limited. In high-gradient streams, riffles and

cobble substrate are exposed; in low-gradient streams, the decrease in water level exposes

logs and snags, thereby reducing the areas of good habitat. Channel flow is especially

useful for interpreting biological condition under abnormal or lowered flow conditions.

This parameter becomes important when more than one biological index period is used

for surveys or the timing of sampling is inconsistent among sites or annual periodicity.

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When measuring this parameter you should consider the area from the toe of the streambank to the toe of the opposite streambank. Whether due to natural runoff patterns or human-induced impacts, streams have different flow characteristics ranging from intermittent, to perennial. A stream that is naturally intermittent is more likely to exhibit poorer channel flow status condition than a perennial stream. Evaluation of channel flow status should be made based on normal flow within a stream channel. Best professional judgment should be used to determine normal flow conditions. Review of climatic data for the local area of the stream assessment can provide indication of rainfall patterns prior to the field assessment work. Field indicators would include water levels relative to Ordinary High Water Mark (OHWM) for the stream channel.

Selected References: Barbour, et al., 1999; TCEQ 1999; Vermont Agency of Natural Resources, 2005.

3.2 Water Quality/Biogeochemical Function Variables

3.2.1. Sediment Transport/Deposition

3.2.1a. Channel Bank Erosion. As with channel bank stability (#2c variable under Hydrologic Functions), this parameter evaluates the existence of or the potential for detachment of soil from the upper and lower stream banks and its movement into the stream. Stream channels with poor riparian vegetation are subjected to accelerated streambank erosion and corresponding channel adjustments leading to instability and increased sedimentation within the channel, both at the point of bank erosion and downstream (Rosgen, 2001). Steep banks are more susceptible to collapse and suffer from erosion more than gently sloping banks, and are therefore considered to be unstable. A healthy riparian corridor with a vegetated floodplain contributes to bank stability. The roots of perennial grasses or small woody vegetation typically extend to the baseflow elevation of water in streams that have bank heights of 6 feet or less. Mature tree roots typically extend to deeper depths. The root masses help hold the bank soils together and physically protect the bank from scour during bankfull and flooding events.

Signs of erosion include crumbling, unvegetated banks, bank sloughing/slumping, recently exposed non-woody tree roots (e.g., fine hair-like roots and or smaller lateral roots less than 0.5 inch in diameter), the general absence of any vegetation within the lower one-third portion of the bank, recent tree falls, and exposed soil. Eroded banks indicate a problem of sediment movement and deposition, and suggest a scarcity of cover and organic input to streams. Each bank is evaluated separately and the average score

determined when facing downstream.

Selected References: Newton et al., 1998; Barbour, et al., 1999, Rosgen, 2001; Galli, 1996

(left and right) is used for this parameter. For convention, right and left banks are

3.2.1b. Channel Bottom Bank Stability. This parameter is a subset of Channel Bank Stability and the existence of or the potential for erosion of the lower stream bank and its movement into the stream. Resistant plant or soil material will prevent frequent compromise of the bank, increased erosion, or shifting of channel morphology. However, vegetation seldom becomes established below the elevation of the bankfull surface because of the frequency of inundation and the unstable bottom conditions as the stream moves its bedload, which facilitates the erosion of the bottom of the stream's bank. The more stable the channel bottom is the greater ability of the stream to provide or develop physical aquatic habitat.

Selected References: Galli, 1996

3.2.1c. Substrate Composition or Channel Sediments. Silt deposition may influence substrate composition and water quality and biogeochemical functions, if significant high-flow events have been absent during drought periods to provide a "flush" effect on the site. This often leads to deposition of fine sediments that become embedded within the interstitial spaces between substrate particles; thereby depleting the hyporheic zone of subsurface flow of oxygen-containing water through the interstitial spaces beneath the stream bed (Alan, 1995). This variable is evaluated by taking into consideration the amount of substrates that create interstitial spaces on the streambed

suitable for colonization by macroinvertebrates, and the amount of sediment that is

present in the streambed that may impact the availability of this habitat.

Selected References: Barbour, et al., 1999, Petersen, 1992.

3.2.2. Water Clarity. The clarity of water is evaluated by turbidity. The deeper

an object can be seen, the lower the amount of turbidity. This variable is determined

from color, clarity, and any other visual characteristics, such as oil sheen.. Soil or

organic matter in the stream may increase turbidity. Water may be colorless or naturally

colored (brown or green) due to the natural setting of the stream. Heavy sediment loads

or algae may affect water color and clarity. Other visual characteristics may be present

from pollutants, submerged objects, watershed usage or discharges.

Selected References: Newton et al., 1998

3.2.3. Presence of Aquatic Vegetation

3.2.3a. Nutrient Enrichment. Nutrient enrichment is often reflected by the types

and amounts of aquatic vegetation in the water. High levels of nutrients promote an

overabundance of algae and floating and rooted macrophytes. The presence of some

aquatic vegetation is normal in streams and beneficial for most stream life. Nutrient

enrichment in excess, however, is not beneficial to most stream life. Plant respiration and

decomposition of vegetation consume dissolved oxygen in the water. Lack of dissolved

oxygen creates stress for all aquatic organisms and can result in fish kills.

Healthy streams may have some aquatic vegetation including rooted macrophytes,

floating plants, and algae attached to substrates. Excess nutrients can cause excessive

growth of algae and macrophytes, which can create a greenish color to the water. More

intense nutrient loads lead to lusher aquatic vegetation and deeper green color. Intense

algal blooms, thick mats of algae, or dense stands of macrophytes degrade water quality

and habitat. Clear water and a diverse aquatic plant community without dense plant

populations are optimal for this parameter.

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Selected References: Newton et al., 1998

3.2.3b. Aquatic Vegetation. This variable is similar to Nutrient Enrichment, but

is a quick look measure of the amount of aquatic vegetation and algae present. The

intensity of vegetation and algae cover is scored based on presence and abundance of

aquatic vegetation.

Selected References: Petersen, et al., 1992

3.2.4. Composition of Organic Matter. The detritus present in streams affects

water quality. Detritus may consist of wood, leaves, organic debris, and sediment. The

size and amount of the detritus affects water quality by filling the channel, floating in the

stream, and causing the water to be more turbid. Excessive fine organic matter may

further degrade the water quality by consuming oxygen and causing anaerobic conditions

in the stream.

Selected References: Petersen, et al., 1992

<u>3.2.5. Land Use Pattern</u>. The land beyond the immediate riparian zone can

affect water quality based on its usage. If the land consists of forest or wetlands, the

riparian zone would be buffered against excessive runoff and sediment loads. If the land

is used for pasture or agriculture, the riparian zone and the stream may be required to

absorb or be impacted by nutrient, pollutant, or sediment laden inputs that can degrade

water quality. A stream with undisturbed or natural lands outside the immediate riparian

zone is better able to support an aquatic community and maintain more stable natural

conditions.

Selected References: Petersen, et al., 1992

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3.2.6. Riparian Zone Width and Continuity

3.2.6a. Riparian Zone Width. This variable measures the width of natural vegetation from the edge of the stream bank out through the riparian zone. The riparian vegetation zone provides a buffer from pollutants or sediment entering a stream from runoff, helps control erosion, dissipates energy during floods, provides habitat, and nutrients to the stream. An undisturbed and wider riparian zone that has not been impacted by human activities is optimal. Riparian zones may be impacted by human activities including roads, fields, lawns, bare soil, buildings, residential developments, golf courses, and rangeland.

The width of the riparian zone can determine the amount of buffer provided although depending on the size of the stream a specific width for one riparian zone on a stream may or may not be sufficient for another stream with larger or smaller dimensions and flow. The width specified under each condition category should be evaluated relative to the width of the stream within the RR first, but riparian zone width should be no less than 50 feet (each side) for streams characterized as intermittent for optimal condition. Optimal conditions for streams characterized as perennial should be at least 100-150 feet (each side). Each bank is evaluated separately. Score for this variable is calculated as an average of the scores for each bank.

Selected References: Barbour, et al., 1999, Petersen, et al., 1992, Newton, et al., 1999.

3.2.6b. Riparian Zone Vegetation Protection/Completeness. This variable measures the amount of vegetation protection along the stream banks. Banks with full native vegetation growth are best for water quality and habitat. The type of vegetation is also an important component when measuring the completeness of vegetative protection. Vegetation protection is important because root systems of plants hold soil in place reducing the amount of erosion that may occur along the bank and also providing buffering from anthropogenic activities outside the riparian zone.

Is the vegetation natural and diverse, and does it consist of all structural components appropriate for the locale? If exotics are present or have replaced native species, do they support the habitat structure and protect water quality? What activities are occurring outside the riparian zone and does the riparian zone buffer these activities or do these activities impact the riparian zone? If activities are impacting the riparian zone, the zone may need to be wider to provide protection. How complete is the vegetation zone along each bank? Each bank is evaluated as both sides will be affected and are important for the health of the stream. Score for this variable is calculated as an average of the scores for each bank.

Selected References: Barbour, et al., 1999, Petersen, et al., 1992.

3.3 Habitat Function Variables

3.3.1. Flow Regime. The stream flow regime identified by this variable indicates the importance of the stream to the aquatic community. Although ephemeral and intermittent drainages are essential to the function of a watershed, they are not provided a point value equal to perennial streams due to the fact that they typically do not provide year-round habitat for aquatic organisms. Evaluators should take into account regional and site-specific climatic conditions (i.e., extended drought, recent heavy rains, etc.) when determining the flow characteristics of a stream. A range of point values is provided for various stream types to efficiently characterize differences in quality within that stream type. For example, some intermittent streams have groundwater input that sustains flow at a higher rate and for a longer period of time than other streams. The evaluator may choose to provide a higher score within the stream type for this system.

<u>Ephemeral stream</u> – A drainageway that may or may not have a well-defined channel that carries flow only during periods of surface runoff. These drainages are not hydrologically connected to subsurface inputs (i.e., springs, subterranean flow, etc.) and often lack a well-defined channel with easily identifiable bed and banks.

<u>Intermittent stream</u> – A drainageway with a well-defined channel that generally flows only during a part of the year. It continues to flow after cessation of surface runoff, but effluent groundwater (springs/subterranean flow) will not sustain flows through moderate periods of little or no precipitation. It may contain reaches of perennial flow or have permanent pools that support aquatic wildlife. Some special conditions, such as the discharge from a wastewater treatment plant or irrigation flows, can cause portions of an intermittent stream to have qualities of a perennial stream.

<u>Perennial stream</u> – A drainageway with a well-defined channel in which perennial flow persists throughout the length of the drainage during normal climate conditions. The permanency of flow is usually attributable to groundwater effluent. Some streams considered perennial may cease surface flow during periods of seasonal drought.

Selected References: KDWP 2000.

3.3.2. Epifaunal Substrate/A vailable Cover. Substrate and available cover refer to the relative quantity and variety of natural structures in the stream, such as cobble, large rocks, fallen trees, logs and branches, persistent leaf packs, and undercut banks, available to aquatic habitat for hiding, feeding, spawning and nursery functions. A wide variety of substrate provides macroinvertebrates and fish with a large number of niches, thus increasing habitat diversity. As variety and abundance of cover decreases, habitat structure becomes monotonous, diversity decreases, and the potential for recovery following disturbance decreases. Riffles and runs are critical for maintaining a variety and abundance of insects and serving as spawning and feeding refugia for certain fish. Riffles and runs offer a diversity of habitat through variety of particle size. Less variety or scarcity of substrate leads to less diversity of aquatic species. Also, sedimentation in the stream channel can lead to decreased condition of the habitat. Snags and submerged logs are among the most productive habitat structure for macroinvertebrate colonization and fish populations in low-gradient streams. However, "new fall" will not yet be suitable for colonization.

The variable score is determined by visual observation of percent of substrate and features present. When evaluating epifaunal substrate and available cover look at the relative quantity and variety of natural structures in the stream. In general, consider the entire bankfull area of the channel, but give greater weight to the area of the channel that remains wetted during lower flow conditions (such as those during late summer).

Selected References: USACE Norfolk, 2004, Barbour, et al, 1999, Parsons, et al, 2001.

<u>3.3.3. Stream Bottom Substrate</u>. The type and condition of the substrate found in the pools of the channel is a factor in determining if the pools can support organisms. Firmer substrate (gravel and sand) and rooted aquatic plants provide better substrate than mud or bedrock with no plants. Also, more variety of substrate typically supports a more diverse community of organisms. Visual observance of the substrate materials in pools is used to determine the score. The evaluator should consider these variables and use professional judgment when scoring the components related to substrate.

Waters (1995) reports on several studies that have demonstrated that substrate and biological diversity are often correlated, with substrates having greater surface area and interstitial space (i.e., gravel, cobble) indicative of greater aquatic macroinvertebrate and vertebrate diversity. These habitats are particularly productive in riffles where numerous benthic macroinvertebrates inhabit these areas and require substrates unimpeded by excessive sedimentation. At sediment embeddedness levels greater than one-third (i.e., more than 33% of the substrate fixed by surrounding sediment) oxygen flow decreases and insect abundance can decline by approximately 50% for riffle inhabiting taxa.

In cases where a stream's substrate is monotypic, but not indicative of less-than-optimal habitat, the evaluator should provide a score that reflects the site's substrate quality in relation to the geographical region in which the evaluation is being performed. The evaluator should consider if the lack of substrate diversity is hindering the habitat quality of the stream for the geographical area the site is located in. If not, then exceptions can be made and appropriate points provided along with a brief explanation. Best professional judgment on the substrate parameters should address these dynamic

circumstances to provide the optimal score the habitat provides for aquatic organisms on a consistent basis.

Selected References: Barbour, et al, 1999, Parsons, et al, 2001, Petersen, 1992.

3.3.4. Pool Variability. For low gradient streams, this variable rates the overall mixture of pool types found in streams, according to size and depth. The four basic types of pools are large-shallow, large-deep, small-shallow, and small-deep. A stream with many pool types will support a wide variety of aquatic species. Rivers with low sinuosity (few bends) and monotonous pool characteristics do not have sufficient quantities and types of habitat to support a diverse aquatic community. General guidelines for determining large or small pools are any pool dimension (ie., length, width, oblique) greater than half the cross section of the stream qualifies as a large pool. In wadeable streams, a deep pool is 1.5 to 2 times deeper than the prevailing depth, while a shallow pool is less than 1.5 times deeper than the prevailing depth.

Selected References: Barbour, et al., 1999, Parsons, et al., 2001.

3.3.5. Sediment Deposition. Measures the amount of sediment that has accumulated in pools and the changes that have occurred to the stream bottom as a result of deposition. Deposition occurs from large-scale movement of sediment. Sediment deposition may cause the formation of islands, point bars (areas of increased deposition usually at the beginning of a meander that increase in size as the channel is diverted toward the outer bank) or shoals, or result in the filling of runs and pools. Usually deposition is evident in areas that are obstructed by natural or manmade debris and areas where the stream flow velocity decreases, such as bends. High levels of sediment deposition are symptoms of an unstable and continually changing environment that becomes unsuitable for many organisms.

Selected References: Barbour, et al., 1999, Parsons, et al., 2001, USACE Norfolk, 2004.

3.3.6. Channel Flow Status. Channel flow status is the degree to which water covers the entire available channel substrate, from bank to bank. The flow status will change as the channel enlarges (e.g., aggrading stream beds with actively widening channels) or as flow decreases as a result of dams and other obstructions, diversion for irrigation, or drought. When water does not cover much of the streambed, the amount of suitable substrate for aquatic organisms is limited. In high-gradient streams, riffles and cobble substrate are exposed; in low-gradient streams, the decrease in water level exposes logs and snags, thereby reducing the areas of good habitat. Channel flow is especially useful for interpreting biological condition under abnormal or lowered flow conditions. This parameter becomes important when more than one biological index period is used for surveys or the timing of sampling is inconsistent among sites or annual periodicity.

When measuring this parameter you should consider the area from the toe of the stream bank to the toe of the opposite stream bank. Whether due to natural runoff patterns or human-induced impacts, streams have different flow characteristics. A stream that is naturally intermittent is more likely to exhibit poorer channel flow status condition than a perennial stream. Evaluation of channel flow status should be made based on normal flow within a stream channel. Best professional judgment should be used to determine normal flow conditions. Review of climatic data for the local area of the stream assessment can provide indication of rainfall patterns prior to the field assessment work. Field indicators would include water levels relative to ordinary high water mark (OHWM) for the stream channel.

Selected References: TCEQ, 1999, Barbour, et al., 1999, Parsons, et al., 2001; Vermont Agency of Natural Resources, 2005.

3.3.7. Channel Alteration. Channel alteration is a measure of large-scale changes in the shape of the stream channel. Many streams in urban and agricultural areas have been straightened, deepened, or diverted into concrete channels, often for flood control or irrigation purposes. Such streams have far fewer natural habitats for fish, macroinvertebrates, and plants than do naturally meandering streams. Channel alteration is present when artificial embankments, riprap, and other forms of artificial bank

stabilization or structures are present; when the stream is very straight for significant distances; when dams and bridges are present; and when other such changes have occurred. Scouring is often associated with channel alteration.

Selected References: USACE Norfolk, 2004, Barbour, et al., 1999, Parsons, et al., 2001.

3.3.8. Channel Sinuosity. Evaluates the meandering or sinuosity of the stream. A high degree of sinuosity provides for diverse habitat and fauna, and the stream is better able to handle surges when the stream fluctuates as a result of storms. The absorption of stream flow energy by bends protects the stream from excessive downstream erosion and flooding and provides refugia for benthic invertebrates and fish during storm events. To gain an appreciation of this parameter in low gradient streams, a longer segment or reach than that designated for sampling may be incorporated into the evaluation. In some situations, this parameter may be rated from viewing accurate topographical maps or aerial photographs. The "sequencing" pattern of the stream morphology is important in rating this parameter. In "oxbow" streams of coastal areas and deltas, meanders are highly exaggerated and transient. Natural conditions in these streams are shifting channels and bends, and alteration is usually in the form of flow regulation and diversion. A stable channel is one that does not exhibit progressive changes in slope, shape, or dimensions, although short-term variations may occur during floods (Gordon et al. 1992).

Selected References: Barbour, et al., 1999, Parsons, et al., 2001.

3.3.9. Bank Stability. Measures whether the stream banks are eroded (or have the potential for erosion). Steep banks are more likely to collapse and suffer from erosion than are gently sloping banks, and are therefore considered to be unstable. Signs of erosion include crumbling, unvegetated banks, exposed tree roots, and exposed soil. Eroded banks indicate a problem of sediment movement and deposition, and suggest a scarcity of cover and organic input to streams. Each bank is evaluated separately and the cumulative score (right and left) is used for this parameter.

Selected References: Barbour, et al., 1999, Parsons, et al., 2001, USACE Norfolk, 2004.

3.3.10. Vegetation Protection. Measures the amount of vegetative protection afforded to the stream bank and the near-stream portion of the riparian zone. The root systems of plants growing on stream banks help hold soil in place, thereby reducing the amount of erosion that is likely to occur. This parameter supplies information on the ability of the bank to resist erosion as well as some additional information on the uptake of nutrients by the plants, the control of in-stream scouring, and stream shading. Banks that have full, natural plant growth are better for fish and macroinvertebrates than are banks without vegetative protection or those shored up with concrete or riprap. This parameter is made more effective by defining the native vegetation for the region and stream type (i.e., shrubs, trees, etc.). In some regions, the introduction of exotics has virtually replaced all native vegetation. The value of exotic vegetation to the quality of the habitat structure and contribution to the stream ecosystem must be considered in this parameter. In areas of high grazing pressure from livestock (or from uncontrolled wildlife populations) or where residential and urban development activities disrupt the riparian zone, the growth of a natural plant community is impeded and can extend to the bank vegetative protection zone. Damage may also result from exotic animals (e.g., nutria) that forage on both herbaceous and small diameter woody vegetation as well as burrow into banks. Each bank is evaluated separately and the average score (right and left) is used for this parameter.

Selected References: Barbour, et al., 1999, Parsons, et al., 2001, KDWP, 2000, Petersen, et al., 1992.

3.3.11. Riparian Zone Width. Measures the width of natural vegetation from the edge of the stream bank out through the riparian zone. The vegetative zone serves as a buffer to pollutants entering a stream from runoff, controls erosion, and provides habitat and nutrient input into the stream. A relatively undisturbed riparian zone supports a robust stream system; narrow riparian zones occur when roads, parking lots, fields, lawns, bare soil, rocks, or buildings are near the stream bank. Residential developments, urban centers, golf courses, and rangeland are the common causes of anthropogenic degradation of riparian zone. Conversely, the presence of "old field" (i.e., a previously

developed field not currently in use), paths, and walkways in an otherwise undisturbed riparian zone may be judged to be inconsequential to altering the riparian zone and may be given relatively high scores. For variable size streams, the specified width of a desirable riparian zone may also be variable and may be best determined by some multiple of stream width (e.g., 4X wetted stream width). The riparian zone is influenced by the depth to groundwater, and is related to the interaction of the stream and groundwater. As one moves landward, the groundwater may become deeper beneath the surface. At some point, the groundwater is of sufficient depth below the surface that it is not a source of water for trees. This point is the natural demarcation that defines the extent of the riparian zone. Since it is usually impractical to make this determination, default values of 25-foot wide buffers fro ephemeral streams, 50-foot buffers for intermittent streams, or 75-150-foot wide buffers for perennial stream are often used to evaluate this variable. Each bank is evaluated separately and the cumulative score (right and left) is used for this parameter.

Selected References: Barbour, et al., 1999, Parsons, et al., 2001.

3.3.12. Riparian Habitat Condition. Evaluate the riparian area condition within a 25-foot wide buffer for ephemeral streams, a 50-foot buffer for intermittent streams, or a 75-150 foot wide buffer for perennial streams. The buffer should be evaluated from the top of each bank and to the appropriate buffer width for the stream flow regime along the entire length of the SAR. The SAR Area may be homogeneous (for example: all pasture land on both banks) or heterogeneous (example: 33% forested, 33% cropland, and 33% pavement). It is possible that the SAR could contain multiple condition categories; each with one or more scores. In that case, each condition category present within the SAR is scored and weighted by the percent it occupies within the SAR.

Land use cover data from aerial photographs and other sources should be used to determine the land use cover within buffer zones of the SARs. Each Riparian Area condition category (Optimal, Suboptimal, Marginal, Poor) present should be categorized and scored accordingly, based upon the condition description in the Riparian Areas variable. An estimate of the condition categories may be made from aerial photographs

and land use maps, but visual verification of conditions based on observations during

field investigations for Reference Reaches should be made.

The score is calculated as a weighted Sub-Condition Index (SCI) for each bank and then

total Riparian Area Condition Index (CI) for the SAR. Percentages and scores are

determined separately for Right and Left banks. For example: Suboptimal comprises

30% of the Right Bank SAR and its score is 7; Marginal comprises the other 70% of the

Right Bank SAR and its score is 3. A weighted SCI for each bank is calculated by

multiplying the percentage by the score. Summing the SCI scores provides the CI for the

bank. The left and right bank CI are averaged together to obtain the CI for the entire

SAR. From the above example: $(0.3 \times 7) + (0.7 \times 0.3) = SCI 4.2$

Selected References: USACE Norfolk, 2004.

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4.0 Impoundments

Impoundments in Texas are man-made structures used for water supply, recreational, agricultural, or flood-control and grade stabilization purposes. These structures may be constructed to capture sheet runoff from the watershed (upland ponds) or as on-channel impoundments. On-channel impoundments are considered jurisdictional waters of the U.S. where the impoundment expands the breadth of ordinary high water mark (OHWM) of a defined stream and therefore, are protected under the Clean Water Act. Impacts to on-channel impoundments require a Section 404 permit, and potentially, compensatory mitigation since these structures provide a number of benefits to wildlife adapted to lentic habitat types. The parameters included in the SWAMPIM for on-channel impoundments are adapted from a similar evaluation system utilized by the Kansas Department of Wildlife and Parks (KDWP 2000). The impoundment evaluation is designed to provide a qualitative assessment of the habitat available to species, as well as water quality conditions. The impoundment assessment, as with the stream assessment, incorporates geological and morphological habitat characteristics, riparian and watershed condition, biological components, and water chemistry into the protocol. merging of these variable characteristics of an impoundment into an assessment protocol provides a means to rapidly produce a quality determination of habitat characteristics and ecological conditions based on observations and measurements taken at a single point in time.

Although on-channel impoundments are jurisdictional waters of the U.S., they function differently within a watershed than a stream. Therefore, evaluation of impoundments should be related to the aquatic functions provided in these lentic environments. Especially in areas dominated by ephemeral and intermittent streams, the more perennial nature provided by the pool of an on-channel impoundment increases both habitat availability and diversity, provides flood storage, captures sediment load, provides capture and degradation of organic loads from the watershed, and many of the other functions also related to streams. Detailed descriptions of the variables for assessment of impoundments are provided in Section 5 of this document.

4.1 Size Categories

Four size categories were identified for on-channel impoundments for this evaluation:

- Small ponds (≤ 1 acre);
- Ponds (>1 acre < 5 acres);
- Lakes (>5 acres < 500 acres); and
- Reservoirs (>500 acres)

For calculation of the Resource Capacity (RC) (similar to Functional Capacity (FC) for Streams and Rivers), a multiplication factor was developed for each impoundment size category to reflect the corresponding increase in overall habitat area provided with the addition of a representative buffer zone along the impoundment shoreline. The multiplication factor was determined by calculating the habitat area increase based on the increased radius provided by a buffer zone of 25 feet for a small pond, 25 feet for a pond, 100 feet for a lake, and 150 feet for a reservoir based on a hypothetical circular impoundment of median size for each category (i.e., 0.5 acre for small pond, 2.5 acres for pond, 250 acres for lake, and 5,000 acres for reservoir). The impoundment plus buffer zone area was divided by the impoundment area to determine the multiplication factor for each category.

4.2 General Instructions for Impoundments Assessment Using SWAMPIM

- A. Determine the On-Channel Impoundments present within the proposed project area. Categorize all identified on-channel impoundments based on the size categories listed in Section 4.1.
- B. Determine representative impoundments to be assessed within each category based on the quantity and variability of quality of the identified impoundments within each category (based on initial reconnaissance and studies).
- C. Complete Impoundment Resource Assessment Forms for each representative impoundment based on measurements and assessment of conditions. Certain variables (e.g. shoreline development, watershed land use) may be evaluated first through review of topographic maps and recent aerial photographs with subsequent verification based on field observations.

- D. Total the scores for physical, watershed/management, biological, and water quality variables.
- D. Calculate the Resource Condition Index (RCI) for each representative impoundment based on the total score for the impoundment divided by 100 (the maximum total score possible).
- E. If multiple representative impoundments are assessed for a category, add the RCIs calculated for all representative impoundments in the category and divide by the number of impoundments assessed to determine an average RCI score.
- F. The RCIs determined for the impoundment category are then multiplied by the total acreage of all impoundments within each category then multiplied by the multiplication factor (described in Section 4.1) for the specific category represented to determine the total Resource Capacity (RC) for the category.

The resulting calculation for RC is as follows:

RC = RCI * (Total Acreage of All Impoundments In Category) * Multiplication Factor

- G. The Project RC for impoundments is the summation of the total RCs for all Impoundment Categories within the defined project area.
- H. Post-project RC for impoundments is determined by the same process as for the existing conditions within the project area except scoring of physical, watershed/management, biological, and water quality variables for each impoundment category is based on projections of changes in condition relative to proposed project activities, including compensatory mitigation activities, or resulting impacts of the proposed project.

5.0 Description of Resource Variables for Impoundments

5.1 Physical Habitat

Shoreline Development. The Shoreline Development Index (SDI) is a common morphometric measurement used to calculate the amount of littoral zone present on a water body (McMahon et al., 1996). The littoral zone of a water body provides spawning and nursery habitat for the majority of lentic fish species, as well as being the area of greatest biological productivity and habitat use by other aquatic and semi-aquatic wildlife. The SDI incorporates the area of the impoundment and shoreline length, and is calculated from the following equation:

$$SDI = \frac{L}{(2)\sqrt{A\pi}}$$

Where L = shoreline length (feet) and A = surface area of the impoundment (square feet). The SDI represents the ratio of the circumference of an impoundment compared to a circle of the same area. A circular shaped impoundment would have an SDI of 1, offering the minimal amount of littoral zone compared to the surface area of the water body. Circumference and area measurements of an impoundment can be obtained from aerial photographs, topographical maps, or Global Positioning Systems (GPS).

<u>5.1.2 Average Depth</u>. Average depth of small impoundments can be estimated with the use of a weighted bobber with incremental depths identified or by measuring the depth with a depth stick. Increased average depth provides critical refugia during drought as water pools shrink as well as for various aquatic species that prefer deep-water areas.

<u>5.1.3 Annual Storage Ratio</u>. The annual storage ratio is a hydrodynamic variable commonly used to describe the rate at which water moves through an impoundment (McMahon et al. 1996). It is synonymous with other calculations such as flushing rate and turnover time, which describe water transport through impoundments. Storage ratio is measured as:

Storage Ratio = <u>Storage Volume (Acre feet)</u> Annual discharge rate (Acre feet)

For example, if the evaluator is calculating the storage ratio for the 3 acre impoundment listed above, and it is estimated the average depth is 5 feet, the impoundment would have a storage volume of 15 acre feet. If the average annual discharge is estimated at 0.01 cfs (approximately 5 gallons/minute), the annual discharge rate could be calculated as:

Annual Discharge =
$$0.01 \frac{\text{ft}^3}{\text{sec ond}} \times 60 \frac{\text{sec onds}}{\text{min ute}} \times 60 \frac{\text{min utes}}{\text{hour}} \times 24 \frac{\text{hours}}{\text{day}} \times 365 \frac{\text{days}}{\text{year}} \times \frac{1}{43560} \frac{\text{acre} \cdot \text{ft}}{\text{ft}^3}$$

= $7.28 \frac{\text{acre} \cdot \text{ft}}{\text{year}}$

Thus, storage ratio would be equal to $2.1(15 \div 7.2)$ and would receive a score of "3" on the evaluation form. Studies have indicated that there is an optimal rate of water movement through an impoundment that reduces the number of fish lost through discharge events (Willis and Stephen, 1987).

The following table will help describe discharge amounts when estimating storage ratio:

Average discharge Gallons/minute	CFS	Annual discharge rate (acre-feet)
4.5	0.01	7.2
45	0.1	72
450	1	720

Note: For impoundments that do not normally have a discharge except for short periods following substantial rainfall events that result in capture of sufficient water to allow variable spillage, this parameter can be deleted from the assessment with the corresponding adjustment to the calculation for RCI. Impoundments such as the ones within the Lake Ralph Hall project area which are sited on streams characterized as ephemeral would be in this category.

<u>5.1.4-6.</u> Substrate, Number of Substrate Types, and Amount of Cover. As in streams, substrate diversity is correlated to biological diversity and is an important habitat characteristic. When estimating the amount of cover for component #6 (Amount of Cover), the percentage of available cover should be estimated from the littoral zone, not the water body as a whole.

<u>5.1.7. Native Vegetative Buffer</u>. Native vegetation adjacent to the water body provides similar benefits to an impoundment as does a riparian zone along a stream. Benefits include protection against bank erosion, water quality benefits to surface runoff, aquatic habitat and nutrient input to the impoundment, and habitat to terrestrial species that may in turn provide resources to the aquatic community (i.e., terrestrial insects).

<u>5.1.8. Bank erosion</u>. Erosion of banks through sloughing from wave action and livestock trampling can degrade water quality and habitat for aquatic species, and decrease the sediment storage for the impoundment.

5.2. Watershed Land Use And Impoundment Management

5.2.1. Impoundment Management. Various strategies can be implemented to provide benefits to the aquatic habitat of an impoundment as well as enhancement of adjacent riparian habitat. Drawdowns in water elevation allows for areas in the littoral zone that are typically inundated to colonize with vegetation and invertebrates, thus providing excellent food resources and nursery habitat for fish species following subsequent inundation. Management of water levels can be implemented with drawdown valves and can be coupled with flow-augmentation for the downstream channel, thus reducing de-watering effects downstream or enhancing flow regimes for ephemeral or intermittent downstream waters. Fish fences around spillways prevent the escape of impoundment fishes and reduce their influence on stream fish communities. Excluding livestock from the impoundment will improve water quality and protect banks from trampling effects. Fish feeders can increase growth and vigor of many sport fishes, and along with supplemental stockings and managed harvest rates, the quality of the fishery can be improved and overpopulations and growth stunting reduced. Other management strategies that maintain a quality sport fishery such as following strict harvest guidelines

for large predators (i.e., Bass, Crappie, Catfish) and preventing the introduction of nuisance fish. Also, management strategies that control introduction of nuisance exotic species, including plant species, and enhance native habitat features should be awarded points when applicable.

<u>5.2.2. Watershed Land Uses</u>. Poorly implemented agricultural activities and human settlement are the two most influential factors that lead to degradation of an impoundment primarily by increasing sedimentation and degrading water quality. The evaluator should estimate the extent of minimal and significant impact land uses in the upstream watershed, as described in the stream evaluation guidelines, and provide the appropriate points.

5.3. Biological Diversity and Abundance

- 5.3.1. Fishery Characteristics. Impoundments are virtually all man-made structures in Texas, and as such, their fishery components typically consist of sport fishes stocked for recreational purposes. This fact is recognized in this component, and provides a higher habitat value to an impoundment that provides high-quality recreational fishing opportunities. In addition, most high-quality sport fisheries are an indication of a well-managed facility and upstream watershed, and can be considered an indicator of overall biological health for the aquatic community. Occasionally, exotic fish may be a detriment to the fishery potential of an impoundment. In these instances, the evaluator may deduct 5 points for this component. The negative aspects of impoundments on native stream fish communities are not considered in this component, but are addressed in the stream evaluation.
 - <u>5.3.2. Aquatic Insects</u>. Aquatic insects are imperative to the overall aquatic community of lentic systems. Since most aquatic insects native to the central plains evolved in streams, much of the habitat these organisms require does not exist in impoundments; therefore, macroinvertebrate assemblages found in lentic environments will differ from those found in lotic (swift flowing water) environments. This component of the impoundment evaluation addresses species richness (i.e., number of species) of

Phylogenetic Orders of macroinvertebrates, rather than the presence/absence of species indicative of antropogenic (habitat destruction, water quality impairment, etc.).

5.3.3-4. Mollusc/Crayfish and Aqua tic and Semi-Aquatic Vertebrates. These two components provide an estimation of various aquatic and semi-aquatic organisms that may exist in impoundments. As with aquatic insects, most of these organisms evolved in streams, and the majority of species that exist in impoundments evolved in lentic habitat types that exist in slow-moving streams, back-water oxbows, or wetlands. The evaluator should account for live or recently dead individuals to estimate existing populations for mussels and crayfish. Evaluators should check for the presence of nuisance exotic organisms (i.e., Zebra mussels (*Dreissena polymorpha*) or nutria (*Myocastor coypus*)) in or around the impoundment and deduct 5 points from the score if present. Other aquatic vertebrates may include amphibians, reptiles, birds, and mammals that live or breed in or near impoundments.

5.4. Water Quality

Water quality will affect an impoundment's ability to support aquatic life. Five main parameters (DO/BOD, Nutrient Enrichment, Pesticides, Turbidity, and Temperature) have been selected for the evaluator to assess based upon the effects degradation of these components can have on aquatic organisms; however, if it is determined other parameters are influencing aquatic life, those should be included along with a narrative description identifying their importance. The evaluator should determine if the parameter is frequently, occasionally, or rarely limiting aquatic life in the impoundment. Best professional judgment should be used when making this determination.

5.5. Impoundment Characteristics, Project Comments, and Species Information

This section is not included in the qualitative score for the impoundment, but rather allows the evaluator to provide data on physical characteristics, species observed during the evaluation, and any comments related to specific components that the evaluator modified during the assessment.

6.0 Glossary of Terms

Bankfull Depth (BFD): Maximum water depth as measured from the bottom of the channel in the thalweg (see below) portion of a riffle (that portion of the channel between an upstream pool and the next downstream pool) to bankfull stage elevation (Note: Measures of BFD should never be taken in a stream's pool zone).

<u>Bank Height Ratio (B HR)</u>: The relationship between the top of the lowest bank (TOLB) and maximum bankfull depth (see above). Bank Height Ratio is a measure of channel incision (see below). Bank Height Ratio is determined by dividing the TOLB height by the maximum bankfull depth.

Bankfull S tage (BFS): A physical and/or biological indicator on the stream bank or in the stream channel that marks the elevation of ordinary high flows. These flows generally have a reoccurrence interval of 1.5 to 1.8 years and are the primary channel-forming flows. Bankfull Stage can be determined by such features as the elevation associated with the highest point bars/mid-channel bars, break in slope on the banks, particle size distribution (finer material that is associated with over-flow rather than more coarse material deposited in the active channel), water staining on rocks, trees, bridge abutments, exposed root hairs below an intact soil layer, the lower limit of woody vegetation on the channel banks, shelving, etc.

Base flow: The sustained portion of stream discharge that is drawn from natural storage sources, and not affected by human activity or regulation.

Bed load: Sediment moving on or near the streambed and transported by jumping, rolling, or sliding on the bed layer of a stream.

Bed material: The sediment mixture that a streambed is composed of.

<u>Benthic invertebrates:</u> Aquatic animals without backbones that dwell on or in the bottom sediments of fresh or salt water. Examples: clams, crayfish, insect larvae, and worms.

Berms: Mounds of dirt, earth, gravel, or other fill built parallel to the stream banks designed to keep flood flows from entering the adjacent floodplain.

<u>Biota:</u> All living organisms of a region, as in a stream or other body of water.

<u>Buffer strip:</u> A barrier of permanent vegetation, either forest or other vegetation, between waterways and land uses such as agriculture or urban development, designed to intercept and filter out pollution before it reaches the surface water resource.

<u>Channel:</u> An area that contains continuously or periodically flowing water that is confined by banks and a streambed.

<u>Channel Incision</u>: The extent that a stream channel has down-cut through its floodplain. Bank Height Ratio, as described above, is a measure of channel incision. A BHR greater than 1 generally indicates that a stream has some degree of incision and that storm events in excess of 1.5 to 1.8 year events are necessary before the stream overtops its banks onto the floodplain.

<u>Channelization</u>: The process of artificially straightening a stream channel by using equipment to cut a new channel thereby eliminating a stream's natural meanders, or containing a stream by streambank filling or hardening. In some circumstances, channelized streams, over time, equilibrate to a new base elevation and re-establish stable dimension, pattern, and profile. As this occurs, new floodplains can evolve within the incised channel. While it may be evident that some streams were channelized in the past, they may not be considered channelized if they have evolved a new stable meander pattern and floodplain within a historic channelized section.

<u>Contiguous Habitat:</u> Habitat suitable to support the life needs of a species that is distributed continuously or nearly continuously across the landscape.

Detritus: Organic material such as leaves, twigs, and other dead plant matter, that collects on the stream bottom. It may occur in clumps, such as leaf packs at the bottom of a pool, or as single pieces, such as a fallen tree branch.

Epifaunal: "Epi" means surface, and "fauna" means animals. Thus "epifaunal substrate" is structures in the stream (on the stream bed) that provide surfaces on which animals can live. Animals such as aquatic invertebrates live on or under cobbles, boulders, logs, snags, and in cracks and crevices found in these structures.

Ephemeral Streams: Streams that flow only in direct response to precipitation and whose channel is at all times above the water table.

Eutrophication: A process through which excessive plant growth, typically algae, induced by excess nutrients is followed by the decomposition of vegetative material and the depletion of the water's oxygen supply.

<u>Floodplain:</u> The portion of the river valley adjacent to the active channel that is built of sediments deposited during the present regimen of the stream and is covered with water when the river overflows its banks at flood stages.

<u>Function Capacity Index (FCI)</u>: A numerical value representing the quantity and quality of a function present in a Reference Reach (RR). FCI is the sum of variable scores from the parameters of each function category divided by the maximum possible score for each function category. Where multiple RRs are evaluated for a SAR, the FCI for each function category is calculated as the average of the FCIs for the function category calculated for each RR.

<u>Functional Capacity (FC):</u> A numerical value that represents the quality and quantity of functional area (comparable to acres of stream and associated riparian corridor) affected by a project. The FC is derived from the FCI which qualitatively measures hydrological, water quality/biogeochemical, and habitat functions.

<u>Function Variables:</u> Stream Function Variables are physical, biological, and geomorphologic parameters selected to enable collection of uniform, consistent data when evaluating different aquatic resources (i.e. ephemeral vs. intermittent vs. perennial; small impoundments vs. large lakes) to provide a qualitative and quantitative value of Stream.

<u>Geomorphology:</u> The science that treats the general configuration of the earth's surface, including the classification, description, nature, origin, and development of landforms and their functional relationships to underlying structures.

Glide: A section of stream that has little or no turbulence.

Gradient: Vertical drop per unit of horizontal distance.

<u>Incised River:</u> A river that erodes its channel by the process of degradation to a lower base level than existed previously or is consistent with the current hydrology.

<u>Instream Cover:</u> The layers of vegetation, like trees, shrubs, and overhanging vegetation, that are in the stream or immediately adjacent to the wetted channel.

<u>Intermittent Stream:</u> Any nonpermanent flowing drainage feature having a definable channel and evidence of scour or deposition, but where evidence of groundwater inflows can be discerned along the stream bank.

<u>Large Woody Debris (LWD):</u> Pieces of wood at least 6 feet long and 1 foot diameter (at the large end) contained, at least partially, within the bankfull channel.

<u>Left Bank/Right Bank</u>: Left Bank and Right Bank designations are always determined while facing downstream.

<u>Littoral Zone</u>: Shallow area along or near a shoreline.

Low Gradient: Streams typically appear slow moving and winding and have poorly defined riffles and pools. Low gradient streams have wider and less rugged valleys, with a tendency for the stream to meander. These are older streams, in geological time.

<u>Nutrients:</u> The elements required to support the bodily structure and metabolism of biological organisms. These elements include nitrogen and phosphorus, which can become pollutants if

present in excessive quantities or result in the generation of adverse secondary effects, such as eutrophication in slow moving or standing water.

Perennial Stream: A stream that flows continuously throughout the year.

Pond: A body of water smaller than a lake, often artificially formed.

Pool: A reach of stream that is characterized by deep, low-velicity water and a smooth surface river (normally found in the bends of the stream or river).

Reach: An uninterrupted length of stream channel with similar physical characteristics, including discharge conveyance capacity, cross section geometry, and slope.

Reference Reach (RR): Reference reaches are segments of a Stream Assessment Reach (SAR) that are deemed representative of the entire Stream Assessment Reach so that evaluation of the Reference Reach is used to characterize the conditions for the Stream Assessment Reach. A Reference Reach should be 40 times the average stream width in wadeable streams with a minimum length of 150 m (492 feet) and maximum length of 500 m (1640.5 feet).

Reference Impoundment: An impoundment in the project area that is considered representative of other impoundments of like size and type within the project area.

Riffle: Riffles are the topographic highs between an upstream pool and a downstream pool generally characterized by "rapids" in a stream or river where shallow water flows swiftly over a rough or rocky surface.

<u>Riparian Area:</u> An area of land and vegetation adjacent to a stream that has a direct effect on the stream. This includes woodlands, other vegetation, and floodplains.

Riparian Buffer: The width of naturally vegetated land adjacent to the stream between the top of the bank (or top of slope, depending on site characteristics) and the edge of other land uses. A buffer is largely undisturbed and consists of the trees, shrubs, groundcover plants, duff layer, and

naturally uneven ground surface, which serve to protect the water body from the impacts of adjacent land uses.

<u>Riparian Corridor:</u> Includes lands defined by the lateral extent of a stream's meanders necessary to maintain a stable stream dimension, pattern, profile, and sediment regime. In addition, the riparian corridor typically corresponds to the land area surrounding and including the stream that supports (or could support if unimpacted) a distinct ecosystem, generally with abundant and diverse plant and animal communities (as compared with upland communities).

Riparian: Located on the banks of a stream or other body of water.

Roughness: Features that create resistance to the downstream movement of water in a channel. The features may include sediment particles, sediment deposits, bank irregularities, the type, amount, and distribution of living and dead vegetation, and other obstructions to flow. The term is modified to "relative roughness" when the scale of the roughness elements to the water depth is considered. Streambed roughness is commonly expresses as a Manning's "n" value.

Run (in stream or river): A reach of stream characterized by fast-flowing, low-turbulence water.

Runoff: Water that flows over the ground and reaches a stream as a result of rainfall (or other precipitation).

<u>Sediment:</u> Solid, fragmented material that is transported and deposited by wind, water, or ice, chemically precipitated from solution, or secreted by an organism, that forms in layers or a loose unconsolidated form.

<u>Sinuosity:</u> The amount of curvature in a channel defined as the ratio of the active channel length to the valley length.

<u>Stream Assessment Reach (SAR)</u>: Stream Assessment Reaches are stream systems of like characteristics within a project area. While many stream projects may be evaluated with one

Stream Assessment Reach being assessed, some projects may need to be split into several Stream Assessment Reaches depending on the differing stream characteristics within the project area.

Stream Gradient: The ratio of drop in a stream per unit distance, usually expressed as feet per mile or meters per kilometer.

<u>Thalweg:</u> The general meander line of deepest water in a stream when viewed from above. The thalweg is normally associated with the zone of greatest velocity and flow.

Top of Lowest Bank (TOLB): Bank height as measured from the bottom of the channel in the thalweg portion of a riffle (that portion of the channel between an upstream pool and the next downstream pool) to the top of the lowest bank. Top of Lowest Bank measurements in the stream channel are made at the same location in the thalweg as the Maximum Bankfull Depth. However, the location on the banks being measured may vary short distances up or down stream of the thalweg measurement location. The TOLB and the MBD are used to determine the bank height ratio; the BHR is a measure of channel incision as described above.

<u>Watershed:</u> The land area that drains water, sediment, and dissolved materials to a common outlet. The term is synonymous with drainage basin and catchment.

<u>Wetland:</u> Term used to describe areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated conditions, including swamps, marshes, bogs, and other similar areas.

7.0. References

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APPENDIX A

FIELD FORMS FOR ASSESSMENT OF STREAMS AND RIVERS

FLOW REGIM	E:		I. HYDRO	LOGIC FU	NCTIONS		1					SCORE	Source
TYPE		Perennia	ıl	Intermittent w/ Perennial Pools			Intermittent		Ephemeral				KDWP 2000 Kansas
Grade	10	9	8	7	6	5	4	3	2	1	0	0	Subjective
CHANNEL CO	NDITION: I	Measurem	ent or Obse	rvation of S	tream Chan	nel Condition	IS						
				СО	NDITION C	ATEGORY (SRADE or S	CORE					Barbour, 1
		Optimal		Suboptimal			Marginal			Poor			EPA RBA
		hannel; no s elization min	structures or	Some channelization (usually in bridge areas) or past channel			Altered channel; 40- 80% of the reach		Channel is actively downcutting or widening. >80% of the reach riprap or				5-21; Nev
2a.Channel		nce of down		alteration, but with significant recovery of channel bed and banks.			channelized or disrupted. Excess aggradation; braided			zed. Degrada		1998 USD NRCS SV/ page 7	
Condition/Alter			ting. Normal cal connection						levees	s prevent acce			
ation (natural,		channel and			Acceptable frequency of overbank flows onto floodplain.			channel with excessive frequency of overbank		floodplain.			
altered, or downcutting)													
downcutting)							flows onto the floodplain. Historical						
							incision,dik	es or levees					
							restrict fl	oodplain.					
Grade	10	9	8	7	6	5	4	3	2	1	0	0	
				CO	CONDITION CATEGORY G			RADE or SCORE					w/ assistan
2b.Channel	Channal Co	Optimal	ow Frequenc	v Channal C	Suboptimal Channel Capacity to Flow Frequency			Marginal		Poor Capacity to Flo	u Eroguese:		and input fr
Capacity to						ow Frequency overflow from				capacity to Fio sich that bank o			Dr. Mike Harvey and
Flow Frequency	1		a 1.25 to 2.5			frequent than	such that bank overflow		storm eve	nts are more f			Travant
Ratio (for 2-	, y	ear frequen 0.75-1.25			every 1.25 years or less frequent than every 2.5 years. <0.75 or >1.25			from storm events are more frequent than every year or less frequent than every 5 years.		every half year or less frequent than every 10 years. <0.24 or >2			l
year peak													
flow)													
								or >1.5					
Grade	10	9	8	7	6	5	4	3	2	1	0	0	
				CO	NDITION C	ATEGORY (SRADE or S	CORE					Newton, 19
		Optimal			Suboptima	al	Mar	ginal		Poor			USDA/ NR
			e of erosion of minimal; (<5%	Moderately stable; infrequent, small areas of erosion mostly healed over.			Moderately unstable; perennial vegetation to		Unstable; no perennial vegetation at waterline; severe erosion of both				SVAP page 10; Barbour
2c.Channel		k affected), ¡						waterline sparse (mainly					al., 1999 E
Bank Stability (score each			e; no raw or e erosion on	minor erosion and/or bank undercutting; perennial vegetation to			scoured or stripped by lateral erosion), bank		common; tree falls and/or severely undercut trees common; many eroded				RBA page
bank, left or			nds O.K.); no		waterline in most places; recently exposed tree roots rare but present.			held by hard points (trees, rock outcrops) and eroded back elsewhere; 30-60% of		areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.			26; USACE Norfolk Dis 2004
right facing	recently e	exposed root tree falls;	ts; no recent	exposed t									
downstream)		tiee ialis,											
								ch has areas	5				i
								n and bank ng; recently					
								e roots and					1
		9	8	7	6	5	tine root ha	irs common: 3	2	1	0		
Grade (East)	10												
Grade (East) Grade (West)	10	9	8	7	6	5	4	3	2	1	0 Avg.Score		
Grade (West)	10	9		7	6	5		3	2	1	0 Avg.Score		
	10	9		7			4		2	1			Porh
Grade (West) CHANNEL RO	10	9	3	CO		ATEGORY (4 GRADE or S		2	1 Poor			Barbour, 1: EPA RBA
CHANNEL RO 3a.Channel	UGHNESS The bends	9 FACTORS Optimal s in the street	am increase	The bend	NDITION C Suboptima	ATEGORY (GRADE or S Mar The bends i	SCORE ginal n the stream	Channel s	traight; waterv	Avg.Score		EPA RBA Chapter 5
Grade (West) CHANNEL RO 3a.Channel Sinuosity (bends in low	UGHNESS The bends the strea	9 FACTORS Optimal	am increase 5 to 4 times	The bend	NDITION C	ATEGORY (al am increase to 2.5 times	ABRADE or S Mar The bends i increase to	SCORE ginal n the stream the stream	Channel s	traight; waterv	Avg.Score vay has been distance.		EPA RBA Chapter 5 p 5-25; <i>KDW</i>
Grade (West) CHANNEL RO 3a.Channel Sinuosity (bends in low gradient	UGHNESS The bends the streat longer	Optimal s in the stream length 2.5 than if it was ngth/valley l	am increase 5 to 4 times	The bend the streat	NDITION C Suboptima ds in the stream length 1.5 an if it was a length/valley	ATEGORY (all am increase to 2.5 times straight line.	GRADE or S Mar The bends i increase I length 1 to longer tha	GCORE ginal n the stream the stream o 1.5 times n if it was a	Channel s	traight; waterv	Avg.Score vay has been distance.		Barbour, 19 EPA RBA Chapter 5 p 5-25; KDW 1996
Grade (West) CHANNEL RO 3a.Channel Sinuosity (bends in low	UGHNESS The bends the streat longer	Optimal s in the stream length 2.5 than if it was	am increase 5 to 4 times s straight.	The bend the streat	NDITION C Suboptima ds in the stream length 1.5 an if it was a	ATEGORY (all am increase to 2.5 times straight line.	GRADE or S Mar The bends i increase i length 1 to longer tha straight line	SCORE ginal n the stream the stream o 1.5 times	Channel s	traight; waterv	Avg.Score vay has been distance.		EPA RBA Chapter 5 5-25; <i>KDW</i>
Grade (West) CHANNEL RO 3a.Channel Sinuosity (bends in low gradient	UGHNESS The bends the streat longer	Optimal s in the stream length 2.5 than if it was ngth/valley l	am increase 5 to 4 times s straight.	The bend the streat	NDITION C Suboptima ds in the stream length 1.5 an if it was a length/valley	ATEGORY (all am increase to 2.5 times straight line.	GRADE or S Mar The bends i increase to length 1 to longer that straight line length/valled.	SCORE ginal n the stream the stream o 1.5 times n if it was a e. Channel	Channel s	traight; waterv	Avg.Score vay has been distance.		EPA RBA Chapter 5 5-25; <i>KDW</i>
Grade (West) CHANNEL RO 3a.Channel Sinuosity (bends in low gradient	UGHNESS The bends the streat longer	Optimal s in the stream length 2.5 than if it was ngth/valley l	am increase 5 to 4 times s straight.	The bend the streat	NDITION C Suboptima ds in the stream length 1.5 an if it was a length/valley	ATEGORY (all am increase to 2.5 times straight line.	GRADE or S Mar The bends i increase to length 1 to longer that straight line length/valled.	SCORE ginal n the stream the stream the stream of 1.5 times n if it was a e. Channel ey length 1.0	Channel s	traight; waterv	Avg.Score vay has been distance.		EPA RBA Chapter 5 p 5-25; <i>KDW</i>
Grade (West) CHANNEL RO 3a.Channel Sinuosity (bends in low gradient stream)	The bends the streat longer Channel let	Optimal s in the stream length 2.5 than if it was ngth/valley l	am increase 5 to 4 times s straight. ength at leas	The bend the streat longer the Channel	NDITION C Suboptima ds in the stree m length 1.5 an if it was a length/valley 1.5	ATEGORY (al am increase to 2.5 times straight line. length 1.2 to	GRADE or S Mar The bends i increase i length 1 tr longer tha straight line to 4	GCORE ginal n the stream to 1.5 times n if it was a e. Channel ty length 1.0 1.2.	Channel s channel Channel	traight; waterw lized for a long length/valley l	Avg.Score vay has been distance. ength ≤1.0		EPA RBA Chapter 5 5-25; KDW 1996
Grade (West) CHANNEL RO 3a.Channel Sinuosity (bends in low gradient stream)	The bends the streat longer Channel len	9 FACTORS Optimal s in the stream length 2.8 than if it was night/valley le >1.5.	am increase 5 to 4 times s straight. ength at leas	The bend the streat longer th Channel	NDITION C Suboptima ds in the strea m length 1.5 alength/valley 1.5 6 NDITION C Suboptima	ATEGORY (al am increase to 2.5 times straight line. length 1.2 to	GRADE or S Mar The bends i increase i length 1 to longer tha straight lin length/valle to 4 GRADE or S Mar	GCORE ginal n the stream the stream o 1.5 times n if it was a e. Channel ey length 1.0 1.2. 3 GCORE ginal	Channel s channel Channel	traight; waterw lized for a long length/valley I	Avg.Score vay has been distance. ength ≤1.0		EPA RBA Chapter 5 5-25; KDW 1996 KDWP, 19: Kansas
Grade (West) CHANNEL RO 3a.Channel Sinuosity (bends in low gradient stream)	The bends the streat longer Channel less that the streat longer Channel less than the streat longer Channel less than the streat longer Channel less than the streat less than th	9 FACTORS Optimal s in the strei m length 2.9 than if it was ngth/valley l >1.5. 9 Optimal to channel e	am increase 5 to 4 times s straight. ength at leas	The bend the streat longer the Channel 7	NDITION C Suboptime ds in the stree m length 1.5 an if it was a length/valley 1.5 6 NDITION C Suboptime vel bars of or	ATEGORY (al am increase to 2.5 times straight line. length 1.2 to 5 ATEGORY (al parse stones	GRADE or S Mar The bends i Increase i length 1 to longer tha straight lin length/valle to 4 GRADE or S Mar Sediment b	GCORE ginal n the stream the stream to 1.5 times n if it was a e. Channel ty length 1.0 1.2. 3 GCORE ginal ars of rocks,	Channel s channel Channel	traight; waterw lized for a long length/valley l	Avg.Score vay has been distance. ength ≤ 1.0		EPA RBA Chapter 5 p 5-25; KDW 1996 KDWP, 19 Kansas Subjective
Grade (West) CHANNEL RO 3a.Channel Sinuosity (bends in low gradient stream) Grade 3b. Bottom Substrate	The bending the streat longer Channel let the streat let the strea	9 FACTORS Optimal s in the stream length 2.8 than if it was night/valley le >1.5.	am increase 5 to 4 times s straight. ength at leas	The bend the streat longer the Channel 7	NDITION C Suboptime ds in the stree m length 1.5 an if it was a length/valley 1.5 6 NDITION C Suboptime vel bars of or	ATEGORY (all am increase to 2.5 times straight line. length 1.2 to	GRADE or S Mar The benease I length 1 to longer tha straight line to 4 GRADE or S Mar Sediment b sands, and	GCORE ginal n the stream the stream to 1.5 times n if it was a e. Channel ty length 1.0 1.2. 3 GCORE ginal ars of rocks,	Channel di si ch	traight; waterv lized for a long length/valley l	Avg.Score vay has been if distance. ength ≤ 1.0 0 ids or stream e is uniform		EPA RBA Chapter 5 p 5-25; KDW 1996 KDWP, 19 Kansas Subjective
Grade (West) CHANNEL RO 3a.Channel Sinuosity (bends in low gradient stream) Grade 3b. Bottom	The bending the streat longer Channel let the streat let the strea	9 Sparse of the street of the	am increase 5 to 4 times s straight. ength at leas	The bend the streat longer the Channel 7	NDITION C Suboptima ds in the stree m length 1.5 an if it was a length/valley 1.5 6 NDITION C Suboptima viel bars of ceashed debris	ATEGORY (all am increase to 2.5 times straight line. length 1.2 to	GRADE or S Mar The benease I length 1 to longer tha straight line to 4 GRADE or S Mar Sediment b sands, and	GCORE ginal n the stream the 1.5 tames n. if the stream on 1.5 tames n. if the stream on 1.5 tames on 1.2 3 GCORE ginal gins of rocks, silt common;	Channel di si ch	traight; waterw lized for a long length/valley I 1 Poor ivided into bra	Avg.Score vay has been if distance. ength ≤ 1.0 0 ids or stream e is uniform		EPA RBA Chapter 5 p 5-25; KDW 1996 KDWP, 199 Kansas Subjective Evaluation

	Grade	10	9	8	7	6	5	4	3	2	1	0	0						
		CONDITION CATEGORY GRADE or SCORE											KDWP, 1996;						
Enter Score for Only One Variable	3c. Instream Bottom Topography	Optimal Diverse bottom topography including >7 of the following: deep pools, boulders/gravel, logs/large woody debris, backwaters/oxbows, overhanging vegetation, riffles, vegetated shallows, rootwads, undercut banks, or side channel			Suboptimal Channel bottom includes 5-7 of the items listed in Optimal Category			Marginal Channel bottom includes < 5 of the items listed in Optimal Category		Poor Channel bottom includes <3 of the items listed in Optimal Category				Newton et al., 1998 USDA/NRCS SVAP page 13/					
or Onl			pools																
core fe	Grade	10	9	8	7	6	5	4	3	2	1 1	0	0	0					
Ñ	٥.		Optimal		CON		ATEGORY (Poor								
nte	or		0.05 to 0.09	g .	Suboptimal 0.035 to 0.05			Marginal 0.021 to 0.03 or >0.10		0.16+	o 0.20 due to	evcessive							
ш	3c. Manning's n	0.03 to 0.033			0.000 to 0.00			to 0.15		obstruction to flow or 0.01 to 0.02 due to channelization and clean, smooth channel.									
	Grade	10	9	8	7	6	5	4	3	2	1	0							
			0.000		CONDITION CATEGORY G						<u> </u>			USACE,					
	3d. Channel Incision (TLB/BFD=BH R; 1/BHR*Adj Factor =CI)	channel sl ratio >1.4	Optimal tio ≥1.0 <1.2 lope >2%; En 4; Where cha ntrenchment	ntrenchment Innel slope	Suboptimal Incision ratio ≥1.2 <1.4 and Where channel slope >2%, Entrenchment ratio >1.4; Where channel slope ≤2%, Entrenchment ratio >2.0					Poor Incision ratio ≥2.0 and Where channel slope >2%, Entrenchment ratio ≤1.4; Where channel slope ≤2%, Entrenchment ratio ≤2.0				Norfolk District, 2004 SAAM Form 1 #1 and VT Stream Geomorphic Assessment					
								Entrenchment ratio >2.0)				Phase 2					
	TLB =		15		BHR = 3														
	BFD = Grade	10	5 I 9	8	7	6	5	4	3	2	1 1	0	0						
	Grado	10			'				,				Ŭ						
4	DYNAMIC SUR	FACE WA	TER STOR	AGE															
		CONDITION CATEGORY GRADE or SCORE											Newton, et al.,						
			Optimal		Suboptimal			Marginal			Poor		1998 USDA/						
	4a.Pools	Deep and shallow pools abundant; greater than 30% of the pool bottom is obscure due to depth, or pools are			Pools present, but not abundant; from 10-30% of the pool bottom is			Pools present, but shallow; from 5-10% of			sent, or the en		NRCS SVAP						
	(abundant,									disce	mible. No wat		page 14;						
	present or absent)		least 5 feet d		obscure due to depth, or the pools are at least 3 feet deep.			the pool bottom is obscure due to depth, or the pools are less than 3 feet deep.						Barbour, et al., 1999					
	Grade	10	9	8	7	6	5	4	3	2	1	0	0						
	4b. Channel Flow Status		0.000		CONDITION CATEGORY O						D		Dankarın akal						
	(degree to	Optimal Water reaches base of both lower			Suboptimal Water fills >75% of the available			Marginal Water fills 25-75% of		Poor Very little water in channel and mostly				Barbour, et al., 1999 EPA RBA page 5-19 /A- 9#5; TCEQ 1999; VANR,					
	which channel is filled)	banks and minimal amount of channel substrate is exposed.			channel; or <25% of channel substrate is exposed.			the available channel, and /or riffle substrates are mostly exposed.		present as standing pools. No water =									
	Grade	10	9	8	7	6	5	4	3	2	1	0	0						
Calculation of Function Capacity Index = Total Score/Total Possible Score												0							
		FCI = #/100																	
	<u> </u>											0		L					

	TER QUALITY/E VARIABLES		IOALI	33110110									SCORE
	TYPE												1
	NOTES												-
1.	SEDIMENT TR	ANSPORT	I/DEPOSIT	ION									+
					CO	NDITION C	ATEGORY (SRADE or 9	SCORE				1
	10 Paril		Optimal			Suboptima			rginal		Poor		1
	1a. Bank Stability (score	Banks stat		e of erosion or	Moderatel		equent, small		unstable; 30-	Unstable; r		areas; "raw"	
	each bank, left			minimal; little			healed over.		k in reach has		equently alor		
	or right facing	potential fo	or future prol bank affect	olems. <5% of	5-30% of b		has areas of		erosion; high		and bends; o g; 60-100% o	bvious bank	
	downstream)		Darik allect	au.		erosion.			otential during oods.		erosional sca		
	Grade (East)	10	9	8	7	6	5	4	3	2	1	0	
	Grade (West)	10	9	8	7	6	5	4	3	2	1	0	
												Avg.Score	
					CO	NDITION C	ATEGORY (DADE or C	CODE				
	1b. Channel		Optimal			Suboptima			rginal		Poor		1
Φ	Bottom Bank	Bottom	1/3 of bank		Bottom	1/3 of bank i			/3 of bank is		1/3 of bank is		1
Only One Variable	Stability	highly res		soil matrix or	resistant p	lant/soil matr	ix or material.		nighly erodible			al; plant/soil	
ğ 			material.						lant/soil matrix romised.	matrix s	everely com	promised.	
Jue								СОПР	romacu.				
ر ج	Grade (East)	10	9	8	7	6	5	4	3	2	1	0	
5	Grade (West)	10	9	8	7	6	5	4	3	2	1	0	ļ
Score tor												Avg.Score	-
e e	or				CO	NDITION C	ATEGORY (GRADE or S	SCORE				
ž	1c. Channel		Optimal			Suboptima			rginal		Poor		
Enter	Sediments or >50% gravel or larger substrate;					ravel or large			ravel or larger			and, silt, clay,	
ш	Substrate			ers; dominant vel or larger;	dominant substrate type is mix of gravel with some finer sediments;				e; dominant pe is finer than		pedrock; uns	stable	
	Composition	Substrate	stable	vei oi iaigei,	-	noderately st			may still be a				
	Grade	10	9	8	7	6	5	4	3	2	1	0	
2	WATER APPEA	ARANCE:	Clarity or \	/isibility	•	•	•	•	•		•	•]
													1
			Optimal		CO	NDITION C Suboptima	ATEGORY (SCORE Irginal		Poor		-
		Verv clear		t tea-colored;	Occasions		specially after		ole cloudiness	Very turbid		earance most	1
				3-6 feet (less		vent, but clea			time; objects	the time; ob	jects visible to	depth <0.5 ft;	
	Water Clarity			oil sheen on			1.5-3 ft; may		epth 0.5-1.5 ft;			e bright-green; tants; floating	
	-		e;no noticea erged objects			ghtly green o			ns may appear bottom rocks			sheen or heavy lo water = zero.	
									ged objected	coat or toarn	on surface. IN	o water = zero.	
								covered	d with film.				
]			
	Grade	10	9	8	7	6	5	4	3	2	1	0	1
				1	•	1				•	•		1
3	PRESENCE OF	F AQUATION	C VEGETA	TION: Prese	ence and P	ercent Cove	erage						-
					СО	NDITION C	ATEGORY (GRADE or S	SCORE				
			Optimal			Suboptima			ırginal		Poor		1
	3a. Nutrient		ater along e	ntire reach; t community			reenish water oderate algal		ater along entire oundance of lush		gray, or brow reach; dense s	n water along stands of	
	Enrichment			ties of many	-	on stream s	-	green macrop	ohytes; abundant	macrophyte	es clog stream	; severe algal	
				es; little algal	3.2				especially during er months.		te thick algal r ae present due	mats in stream to unstable	
			growth pres	ent.							rate. No wate		
		<u> </u>								<u></u>			<u></u>
	Grade	10	9	8	7	6	5	4	3	2	1	0	
					CO	NDITION C	ATEGORY (GRADE or 9	SCORE				1
	or		Optimal			Suboptima			rginal		Poor		1
	3b. Aquatic		esent, aquat	ic vegetation	_	ominant in po	ools, larger	Algal mats	present, some		its cover bot		1
		conciete	of moss and	d patches of	pl	lants along e	dge.	larger plants	s, few mosses.			nannel or NO	
	Vegetation	COHSISIS											
		CONSISTS	algae.								resent due to ate. No wate		
		10		8	7	6	5	4	3		resent due to ate. No wate		

Optimal Suboptimal Marginal No leaves are or woody without sediment. No leaves or woody without sediment. No leaves are or woody without sediment. No leaves are wood without well without sediment. No leaves are wood without well without sediment. No leaves are wood without witho	ļ				CON	NDITION C	ATEGORY (GRADE or S	SCORE				F
Without sediment. Organic debris without sediment. debris: coarse and file organic matter with sediment present due to excessive scouring Strade 10 9 8 7 6 5 4 3 2 1 0			Optimal			Suboptima	ı	Ma	rginal		Poor		ϵ
CONDITION CATEGORY GRADE or SCORE								debris; coa organic	arse and fine matter with	color and fo	oul odor (ana present due	aerobic) or no	F
CONDITION CATEGORY GRADE or SCORE Suboptimal Marginal Poor Mixed row crops and pristine native prairie, and/or natural wetlands. Permanent pasture mixed with woodlots and swamps, few row crops and pasture; some wooded areas may be present but No strategory of the present pasture in the properties of the	Grade	10	9	8	7	6	5	4	3	2	1 1	0	
Width of riparian zone >18 meters (1-2 channel width with trees, shrubs, or tall grasses), human activities have not impacted zone. Width of riparian zone 6-12 meters (1/2-1 active channel width with trees, shrubs, or tall grasses), human activities have minimally impacted zone. Width of riparian zone 6-12 meters (1/3-1/2 active channel width vegetated), impacted by human activities. Width of riparian zone 6-12 meters (1/3-1/2 active channel width vegetated), impacted by human activities. Strade (East) 10 9 8 7 6 5 4 3 2 1 0 Avg.Score CONDITION CATEGORY GRADE or SCORE Suboptimal Zone on shrubs, prairie grasses, or marsh plants, riparian zone intact or disruption from grazing/mowing minimal. Strade (East) 10 9 8 7 6 5 4 3 2 1 0 Avg.Score Condition Category Grade or score shrubs, or meters (1/2-1 active channel width vegetated), impacted by human activities. Width of riparian zone 6-12 meters (1/3-1/2 active channel width vegetated), impacted by human activities. Width of riparian zone 6-12 meters (1/3-1/2 active channel width vegetated), impacted by human activities. Width of riparian zone 6-12 meters (1/3-1/2 active channel width vegetated), impacted by human activities. Width of riparian zone 6-12 meters (1/3-1/2 active channel width vegetated), impacted by human activities. Avg.Score CONDITION CATEGORY GRADE or SCORE Suboptimal Marginal Solvential Marginal Solvential Solv	Grade (East) Grade (West) RIPARIAN ZON	Undisturber pristine national 10 10	Optimal ed, consisting et, consisting wetlands. 9 9 9 AND CONT	g of forest, nd/or natural	Permani woodlots	Suboptima ent pasture r and swamp crops 6 6 NDITION C	Inixed with s, few row	Ma Mixed rov pasture; s areas may as isolat 4 4 GRADE or S	rginal w crops and ome wooded be present but ed patches 3 3	2	Mainly row cr	0 0	6 F F N U U I I I I I I I I I I I I I I I I I
Condition Protection Completeness Strade (West) 10 9 8 7 6 5 4 3 2 1 0	(from stream edge to field)	channel widt grasses), h i	arian zone >18 ths with trees, shuman activitie impacted zone	shrubs, or tall es have not e.	1 active char grasses), hur	nnel width w/tre nan activities h impacted zone	ees, shrubs, or nave minimally e.	Width of ripa meters (1 channel wid	arian zone 6-12 /3-1/2 active dth vegetated), numan activities.	vegation le width), little	ess than 1/3 a e riparian vege	ctive channel etation due to es.	F F
CONDITION CATEGORY GRADE or SCORE Optimal Suboptimal Some Vegetation Protection/ Completeness Completeness Condition Category Grade (East) Some Vegetation Protection/ Completeness Condition Category Grade (East) Suboptimal Su						_							
CONDITION CATEGORY GRADE or SCORE Suboptimal Subopti	3rade (West)	10	9	8	7	6	5	4	3	2	1		
Optimal Suboptimal Suboptimal Some Vegetation Protection/ Completeness Optimal Suboptimal Suboptimal 75-90% streambank vegetation, mixed young species along channel and mature trees behind; disruption evident with breaks occurring at intervals of >50 meters. Marginal 50-75% streambank vegetation of mixed grasses and sparse young tree or shrubs precise; breaks frequent with some gullies and scars every 50 meters. Suboptimal 75-90% streambank vegetation, mixed young species along channel and mature trees behind; disruption evident with breaks occurring at intervals of >50 meters. Suboptimal Marginal Less than 50% streambank vegetation coverage consisting mostly of pasture grasses, few trees & shrubs; low plant density; bank deeply scarred with gullies all along its length. Figure 1 Figure 1 Figure 2 Figure 2 Figure 3 Figure 3 Figure 3 Figure 3 Figure 4	ŀ				CON	IDITION C	ATEGORY (SRADE or S	SCORE			Avg.Score	
Some vegetation protection/sompleteness of the control of the cont	ŀ		Optimal		001						Poor		
Grade (West) 10 9 8 7 6 5 4 3 2 1 0 Avg. Score	Zone Vegetation Protection/	shrubs, prairi riparian zon	density of mar ie grasses, or ine intact or disi	marsh plants, ruption from	young specie trees behi	eambank vege es along chanr nd; disruption curring at inter	tation, mixed nel and mature evident with	50-75% s vegetation of and sparse shrub spe frequent wit	streambank f mixed grasses young tree or ecies; breaks th some gullies	coverage of grasses, fe density; ban	50% streamba consisting mosew trees & shruk deeply scar	stly of pasture ubs; low plant red with gullies	6 F F F
Avg.Score	O												
	\ /	10	9	8	7	6	5	4	3	2	1 1		
	\ /											Avg.50018	

Perennial Intermittent w/ Perennial Pools Intermittent Ephemeral 10 9 8 7 6 5 4 3 2 1 0	
STRATE/AVAILABLE COVER Optimal Suboptimal Marginal Poor	_
Within stream bed, greater than 50% Within stream bed, 30-50% coverage Within stream bed, 10-30% Less than 10% habitat features	
vorable for stream faunal colonization for stream faunal colonization and/or features favorable for stream substrate unstable or lacking;	
Wor fish/amphibian cover. Most habitat fish/amphibian cover. Many habitat eatures non transient. Features may features not transient. (See Excellent fish/amphibian cover; habitat features and pools buried or lackin	
lude snags, submerged logs, undercut lasf category for habitat feature availability may be less than channel bottom may be flat. desirable, substrate may be	
acks, pools and glides, or other stable abitat at a stage to allow colonization frequently disturbed. (See Excellent Category for habitat	
feature components.)	
10 9 8 7 6 5 4 3 2 1 0	
M SUBSTRATE: Pool Substrate Characterization	
Optimal Suboptimal Marginal Poor ture of substrate materials, with gravel Mixture of soft sand, mud, or clay, All mud or clay or sand bottom; Hard pan clay or bedrock; no roo	=
nd firm sand prevalent; root mats and mud may be dominant; some root submerged vegetation common. mats and submerged vegatation submerged vegetation. mats and submerged vegetation.	
present.	
10 9 8 7 6 5 4 3 2 1 0	
ITY	
Optimal Suboptimal Marginal Poor ven mix of large-shallow, large-deep, Majority of pools large-deep; very Shallow pools much more Majority of pools small-shallow or	7
mall-shallow, small-deep pools present few shallow. prevalent than deep pools pools absent majority of pools strain-shallow.	
10 9 8 7 6 5 4 3 2 1 0	
OSITION/SCOURING	
Optimal Suboptimal Marginal Poor 5% of channel bottom affected by scour or 5-30% affected by scour or deposition; 30-50% affected by scour or More than 50% of the bottom in a state	of
deposition. Scour at constrictions and wehre grades deposition. Deposits and scour at steepen. Some deposition in pools obstructions, constrictions and minimal or absent due to heavy deposit	
bends. Some filling of pools. or excessive scouring.	
10 9 8 7 6 5 4 3 2 1 0	
/ STATUS	
Optimal Suboptimal Marginal Poor Vater reaches the base of both lower Water fills >75% of the channel; or Water fills 25-75% of the Very little water in the channel an	_
banks; <5% of channel substrate is <25% of channel substrate is available channel and/or riffle mostly present in standing pools; or	
exposed exposed substrates are mostly exposed stream is dry	
10 9 8 7 6 5 4 3 2 1 0	_
RATION Optimal Suboptimal Marginal Poor	4
channelization, alteration, or dredging Some alteration or channelization Alteration or channelization Banks shored with gabion, riprap,	
ibsent or minimal; normal and stable present, usually adjacent to may be extensive; concrete. Concrete or riprap liner ream meander pattern. Alteration by structures, (such as bridge abutments embankments (including spoil	
stormwater inputs absent or minimal or culverts); evidence of past alteration, (I.e., channelization) may present on both banks; normal other inputs. Over 80% of the)r
be present, but stream pattern and stable stream meander pattern stream reach altered. stability have recovered; recent has not recovered. Alteration	
alteration from stormwater or other alteration from stormwater or other alteration from stormwater or other	
inputs. extensive. 40-60% of stream reach altered.	

	ay has been distance			channe	es	1 to 2 time in a straigh		ın if it			s longer ht line.		2 to 3 ti in a str				el tal is	channe n coas as. Th	Note ormal ng ar	4 time: t line. (n 3 to raigh consid other is no	in a str ng is co s and o	braiding plains		
	0	1		2		3			4	-	5		6			7		8	1	9		10	1	de	Gra
					_														ANUZ						
		oor	-		T	l	rginal	Mar				al	optima	Subo			1			optimal		CURI	111 (50	IK STAB	BAI
	egetation at on of both d tree roots or severely on; many as frequent and bends; 60-100% of scars.	e erosion exposed ls and/o commo lw" area ctions a	e; sevently tree fout tree reas; " aight s	waterlin banks; re common undered eroded a along str obvious b	y l	e; perennia line sparse stripped by nk held by es, rock ded back of bank in erosion and ; recently and fine roo th erosion floods	waterli ed or s n), bar s (tree id erod 0-60% as of e utting; bots a in; high	on to voccure rosior points os) an re; 30 s area nderco ree rosimmon	vegetation (mainly so lateral ero hard po outcrops elsewhere reach has bank und exposed tre hairs com	er. voor (iiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiii	s areas o bank	heal has or ba vege es; re	mostly n reach ion and rennial ost plac	osion mank in in erosior g; pere in mos	of ba nor e utting line i	areas of 5-30% o min undercut waterlii	nk ome s	of bar ion to inks (so er bend	l; (<5 regeta rcut b neand d root	minima ennial v or unde ide of m	nt or , pero raw o outs ently o	e abser ected), ne; no i ion on	waterline		
	0	1	Aug	2 2		3			4 4		5 5		6			7 7		8 8		9		10 10			Gra Gra
]		Score	AVÇ																						L
1		oor	1		T	ı	rginal	Mar		1		al	optima	Subo			ANK)	CH BA		(SCOR		ECTI	PROTE	SETATIV	VEC
	treambank egetation; x vegetation has been rs or less in eight.	of the st ed by ve ambank etation	n 50% s cove of stre igh; ve to 5 ce	surface disruption is very h removed	n; f c	eambank vegetation patches of r cropped r; less than ential plant	ne stre ed by rious; p closely mmon e pote	of the covered of the covered of the contract of the covered of th	50-70% surfaces co disruption bare soil	t su d ut v e c	rident but rowth ent; more tial plant	eank s getation s not n evidenti extendo tenti	treamb tive veg plants is sruption full pla great e	the street y natives of placed; dismo cting fue o any g	6 of to by class enter affectial to ne-h	one of represe not a potentia than on	by not	overed trees, voody ruption mal or	amba ones luding or non ive di ig mir allow	the stre arian zo ion, inco nrubs, co vegetat r mowin	% of ite rip getat ory sh rtes; ing or ost al	mediative ver ndersto crophy n grazi	unc		
	0	1	-	2		3	I		4		5	1	6			7		8		9	_	10			Gra
	0	1 Score	Avg	2 2		3			4 4		5 5		6			7		8		9		10 10			Gra Gra
		1	Avg		<u> </u>							<u> </u>				7 7			NK)	9	EEA	10	1		Gra
	0 <6 meters; ation due to	Score oor zone <	riparia riparia	2 Width of little or no		3 I one 6-12 vities have	n activ	f ripa numar	4	ne n	5 8 meters	12-18 npact	6 poptima zone 1	Subo arian z	f ripa activi	7 7 Width of human a	lear-	8 ers; hun peds, c	8 met	9 CH BA Optimal one >18 ting lots	ian z park or cre	CORE	1	de	Gra
	0 c6 meters; ation due to es.	Score oor zone < vegeta	riparia riparia	Width of little or no		I one 6-12 vities have reat deal.	rian zo n activ	f ripa numar	Width of meters; hu impacted	ne n	5 8 meters cted zone	12-18 npact	ooptima zone 1 have in ninimall	Subo arian z rities ha	f ripa activi	7 Width of	lear-	8 ers; hun beds, c impact	8 met	9 CH BA Optimal one >1: ing lots ops) ha zone.	ian z park or cre	CORE of riparis (I.e., awns, o	1 DNE (SC Width of activities cuts, lar	ARIAN Z	RIP
	0 <6 meters; ation due to ss.	1 Score	riparia riparia riparia numar	2 Width of little or no		I one 6-12 vities have reat deal.	rian zo n activ	f ripa numar	Width of meters; hu impacted	ne n	5 8 meters cted zon	12-18 npact	ooptima zone 1 have in ninimall	Subo arian z rities ha	f ripa activi	7 Width of human a	lear-	ers; hun beds, c impact	8 met	9 CH BA Optimal one >1: ing lots ops) ha zone.	ian z park or cre	CORE	1 DNE (SC Width of activities cuts, lar	ARIAN Z	RIP
	0 c6 meters; ation due to es.	Dor zone < vegeta activities	riparia riparia riparia numar	Width of little or no		I one 6-12 vities have reat deal.	rian zo n activ	f ripa numar	Width of meters; hu impacted	ne n	5 8 meters cted zone	12-18 npact	ooptima zone 1 have in ninimall	Subo arian z rities ha	f ripa activi	7 Width of human a	lear-	ers; hun beds, c impact	8 met	9 CH BADptimal one >1: ing lots ops) ha zone.	ian z , park or cr	CORE of riparis (I.e., awns, of the text)	ME (SC) Width of activities cuts, land	ARIAN Z	Gra Gra Gra
	0 c6 meters; ation due to s. 0 0 mpervious s spoil lands, owed and us areas, released and us areas, released areas.	1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	ripariaririp	2 Width of little or not littl	pyy survy st of	3 I one 6-12 vities have reat deal. 3 3 3 I -3 inches) tree canopy tional fores high end of ditional Score at lor layers are consists of naturalizers and/or	rginal zrginal arginal arginal arginal arginal arginal (dbh>30% t xceller f addit at the cent. Stational area c d and	Mar Mar atum With <- ee Ex ee Ex ee Ex orge if prese addit OR a tained	Width of meters; hu impacted 4 4 4 Tree strat prover. (See or example sayers.) Score resure sayers. I shall be present. I sha	ne nne nne nne nne nne nne nne nne nne	8 meters cted zoni 5 5 5 5 s) presen ppy cover ry for st layers, ood rang gers are nd if ≤1 p present	al ches): anopegory forest t layer we end are pitth stricts.	ooptima zone 1 have in have in ininimall 6 6 6	Subo arian z itites hanly mir Subo n (dbh: c subo	ratum watum	7 Width of human a 7 7 7 Tree stra with 30% (See example Score at if ≥2 a prese addition	H BA with al ub, core 22 low	8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	COR ees) pp s: sap iddy de lent r.	9 CH BA Onter >1: In glots On (S On	Control Contro	CORE of riparis s (i.e., s (i.e., awns, i to the second se	DNE (SC Width of activities cuts, land) Tree str. >60% forest la herba mosses as the la addition.	ARIAN Z	Gra Gra Gra
e sums of	0 c6 meters; ation due to s. 0 0 mpervious s spoil lands, wed and us areas, weld and us areas, telly grazed to.	1 Score Dor zone < vegeta to vegeta to the total to the total tot	Avg Avg I attum a add attum a surfaced streined h surfaced streined h surfaced pastur	Width of little or not little	py su	3 I one 6-12 vities have reat deal. 3 3 3 I -3 inches) tree canopy tional fores high end of ditional Score at lor layers are consists of naturalizers and/or	rginal (dbh> rginal (dbh> rginal title f add title f a	Mar Mar Mar atum with <- eles of core a nge if OR a tained herba	Width of meters; hu impacted 4 4 4 Tree strat present, which was a constant with the constant with th	nne n	8 meters cted zon	al ches) anopegory forest of Goods are pith strict.	6 booptima 6 6 6 6 booptima 6 ference 6 tree cateloristical il forestare cateloristare at low	Subo arian z itiles hanly mir Subo n (dbh.) xocellen f additil eitional itilororest li vver are rema	atum or activi or atum % Eo es of addi ent. nal focutor	7 Width of human a 7 7 7 Tree stra with 30% (See example to perform the second of the	H BA with al ub, core 22 low int.	8 8 8 8 8 8 EEAC seent, and a seent a seent, and a seent a seent, and a seent a seen	COR less) pp litter i lent r. ent. S	9 CH BA Optimal inig lots in inig lots in inig lots one. 9 9 9 ON (S Optimal inig lots in inig	IDITI C (dbh canc may us, ar ens ad dditio	of riparis of riparis of riparis of riparis of s(le., awns, of 10 10 CON con water con allayers baccoo shighe con allaying f ≤1 ac	1 NNE (SC Width of activities cuts, lar 1 1 Tree str. >60% forest la herbo: mosses at the laddition end if	de de de ARIAN H	Gra Gra Gra Gra
le sums of an Blocks	o cs meters; ation due to s. o o o o o o o o o o o o o o o o o o o	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Avg	Width of little or not little	py su py su py su py su p s p py su p s p p s p p s p p s p p s p p s p p s p	one 6-12 vities have reat deal. 3 3 3 3 1 1-3 inches) tree canopint Category to Category to Incomplete to diditional Score at low layers are consists of naturalize is and/or attion.	rginal (dbh> activing a griff and the angle of the angle	Maratum with <- ee Ex addit OR a addit press addit ody v ores IS ma	Width of meters; hu impacted 4 4 4 Tree strat prover. (See or example ayers.) Soc Fair ran, ayers are pend if ≤1 a present. woo	ne n	5 8 meters cted zon 5 5 5 s) presen st layers. zood rangi erers are and dif ≤1 p present stumps 5 and Coc width. L	al al ches) anopegory of Good t layer were are pitch strings are pitch strings are pitch strings.	6 cooptima a zone 1 have in	Subo arian z rities handle since subo arian z rities handle since subo arian z subo	ratum % to ee Exees of additionatin	7 Width of human a 7 7 7 Tree strawith 309 (See example Score at first 52 e press addition OR c	H BAAwith all ub, lore 22 low nt.	8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	COR ess) pper. (# saperiter i dydyd reletter i ch str	9 CH BA potimal and potential single state of the second s	Control of the contro	CORE of riparr s (l.e., s (l.	1 SBITAT (Tree str. >60% forest le herbor mosses at the la addition end if	de d	Gra Gra Gra 1. I
an Blocks	o cs meters; ation due to s. o o o o o o o o o o o o o o o o o o o	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Avg	Width of little or not little	py su py su py su py su p s p py su p s p p s p p s p p s p p s p p s p p s p	3 I one 6-12 vities have reat deal. 3 3 3 I one solution and solution	rginal (dbh> activing a griff and the angle of the angle	Maratum with <- ee Ex addit OR a addit press addit ody v ores IS ma	Width of meters; hu impacted 4 4 4 Tree strat prover. (See or example ayers.) Soc Fair ran, ayers are pend if ≤1 a present. woo	ne n	5 8 meters cted zon 5 5 5 s) presen st layers. zood rangi erers are and dif ≤1 p present stumps 5 and Coc width. L	al al ches) anopegory of Good t layer were are pitch strings are pitch strings are pitch strings.	6 cooptima a zone 1 have in have in	Subo arian z rities handle since subo arian z rities handle since subo arian z subo	ratum % to ee Exees of additionatin	7 Width of human a 7 7 7 Tree strawith 309 (See example Score at first 52 e press addition OR c	H BAAwith all ub, lore 22 low nt.	8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	COR ess) pper. (# saperiter i dydyd reletter i ch str	9 CH BA potimal and potential single state of the second s	Control of the contro	CORE of riparr s (l.e., s (l.	1 1 NNE (SC Width of activities cuts, lart 1 1 NNE (SC Width of activities cuts, lart 1 1 NNE (SC Width of activities act 1 1 NNE (SC Width of activities act 1 NNE (SC Width of activities activi	de d	Gra Gra Gra 1. I 2. I 3. I
an Blocks	o cs meters; ation due to s. o o o o o o o o o o o o o o o o o o o	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Avg	Width of little or not little	py su py su py su py su p s p py su p s p p s p p s p p s p p s p p s p p s p	3 I one 6-12 vities have reat deal. 3 3 3 I one solution and solution	rginal (dbh> activing a griff and the angle of the angle	Maratum with <- ee Ex addit OR a addit press addit ody v ores IS ma	Width of meters; hu impacted 4 4 4 Tree strat prover. (See or example ayers.) Soc Fair ran, ayers are pend if ≤1 a present. woo	ne n	5 8 meters cted zon 5 5 5 s) presen st layers. zood rangi erers are and dif ≤1 p present stumps 5 and Coc width. L	al al ches) anopegory of Good t layer were are pitch strings are pitch strings are pitch strings.	6 cooptima a zone 1 have in have in	Subo arian z rities handle since subo arian z rities handle since subo arian z subo	ratum % to ee Exees of additionatin	7 Width of human a 7 7 7 Tree strawith 309 (See example Score at first \$2 e press addition OR c	H BAAwith all ub, lore 22 low nt.	8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	COR ess) pper. (# saperiter i dydyd reletter i ch str	9 CH BA potimal and potential single state of the second s	IDITI C (dbh cancoman and and and and and and and and and a	CORE of riparis s (i.e., s (i.e., 10 110 110 110 110 110 110 110 110 110	1 1 NNE (SC Width of activities cuts, lar 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	de d	Gra Gra Gra 1. I 2. I 3. I
an Blocks	0 c6 meters; ation due to s. 0 0 mpervious s spoil lands, wed and us areas, rely grazed cc.	Oor Score Oor Oor Score Oor	Avg Avg Avg I I I I I I I I I I I I I	Width of little or not little	py supply	3 I one 6-12 vities have reat deal. 3 3 3 I one solution and solution	rginal (dbh> activing a griff and the angle of the angle	Maratum with <- ee Ex addit OR a addit press addit ody v ores IS ma	Width of meters; hu impacted 4 4 4 Tree strat prover. (See or example ayers.) Soc Fair ran, ayers are pend if ≤1 a present. woo	ne n	5 8 meters cted zon 5 5 5 s) presen st layers. zood rangi erers are and dif ≤1 p present stumps 5 and Coc width. L	al al ches) anopegory of Good t layer were are pitch strings are pitch strings are pitch strings.	6 cooptima a zone 1 have in have in	Subo arian z rities handle since subo arian z rities handle since subo arian z subo	ratum % to ee Exees of additionatin	7 Width of human a 7 7 7 Tree strawith 309 (See example Score at first \$2 e press addition OR c	H BAAwith all ub, lore 22 low nt.	8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	COR ess) pper. (# saperiter i dydyd reletter i ch str	9 CH BA potimal and potential single state of the second s	IDITI C (dbh cancoman and and and and and and and and and a	CORE of riparis s (i.e., s (i.e., 10 110 110 110 110 110 110 110 110 110	1 1 NNE (SC Width of activities cuts, law activities activi	de d	Gra Gra 1. I 2. Rigi
an Blocks	o cs meters; ation due to s. o o o o o o o o o o o o o o o o o o o	Oor Score Oor Oor Score Oor	Avg Avg I I I I I I I I I I I I I	Width of little or not little	by survey of seed week of seed of the land	3 I one 6-12 vities have reat deal. 3 3 3 I one solution and solution	rginal (dbh> activing a griff and the angle of the angle	Maratum with <- ee Ex addit OR a addit press addit ody v ores IS ma	Width of meters; hu impacted 4 4 4 Tree strat prover. (See or example ayers.) Soc Fair ran, ayers are pend if ≤1 a present. woo	ne n	5 8 meters cted zon 5 5 5 s) presen st layers. zood rangi erers are and dif ≤1 p present stumps 5 and Coc width. L	al al ches) anopegory of Good t layer were are pitch strings are pitch strings are pitch strings.	6 cooptima a zone 1 have in have in	Subo arian z rities handle since subo arian z rities handle since subo arian z subo	ratum % to ee Exees of additionatin	7 Width of human a 7 7 7 Tree strawith 309 (See example Score at first \$2 e press addition OR c	H BAAwith all ub, lore 22 low nt.	8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	COR ess) pper. (# saperited in the street i	9 CH BA potimal and potential single state of the second s	IDITI C (dbh cancomus, and a ddition a ddition and a ddition and a ddition a ddition and a ddition a	CORE of riparis s (i.e., s (i.e., 10 110 110 110 110 110 110 110 110 110	1 NNE (SC Width of activities cuts, lar 1 1 1 NBITAT 1 IT ree str. >60% forest la herbrista at the laddition, end if jiparian a square warm square %Riparia Score %Riparia Score	de d	Gra Gra 1. I 2. Rigi

Record of Functional Assessment Results

St	ream Functio	nal Capacity C	Calculation		
Date:					
Project:					
Assessment Area:					
Assessors:					
Project Status:	Preproje	ect	Postproject		
Major Function Categories	FCI	Stream Length (LF)*	Stream Characterization	Multiplication Factor**	FC
, ,	T	T Crigin (Li)	Ondractonzation	1 40.01	
Hydrologic					0
Water Quality Improvement					0
Habitat					0
Total					0
*Stream Length is the length of the Stre **Multiplication Factors Ephemeral = 0.00125 Intermittent = 0.0025 Perennial = 0.0038	am Assessme	ent Reach (SAF	R)		

APPENDIX B

FIELD FORMS FOR ASSESSMENT OF ON-CHANNEL IMPOUNDMENTS

Impoundment Habitat Evaluation SCORE

	ABITAT KEY										
.Shoreline		CONI	DITION CATEGORY O	SPADE or SCORE							
Developme				ter of circle of equal are	-a)						
nt	I	High > or = 2.5		Medium 1.5 - 2.4	Low 1.0-1.4						
Grade	10 9	8 7	6 5	4 3	2 1	0					
2.Average		CONI	DITION CATEGORY O	SRADE or SCORE							
Depth		00141	ONION OMIZOOMIC	SIVIDE OF COOKE							
		> 10 feet		3 - 10 feet	< 3 feet						
Grade	10 9	8 7	6 5	4 3	2 1	0					
3.Annual Storage		CONI	DITION CATEGORY (SRADE or SCORE							
Ratio	1 - 2	>	2		< 1						
Grade	5	4	3	2	1	0					
		•			•						
4.Substrate			DITION CATEGORY C		2222						
	Boulder/Cobble	Gravel	Sand (< 0.1")	zone and average the Bedrock	Mud/Detritus/Muck						
Grade	5	4	3	2	1	0					
5.Number											
of		CONI	DITION CATEGORY O	GRADE or SCORE							
substrate types in	4 or more	3 types	present	2 types present	1 type present	1					
Grade	5	4	3	2	1	0					
		•			•	•					
6.Amount			DITION CATEGORY O								
of Cover	(aquatic vegetation Extensive (>75%)	, flooded timber, woody d Abundant (50-75%)	ebris, large boulders, roo Moderate (25-50%)	Sparse (5-25%)	Little or none (0-5%)	tructures)					
Grade	10 9	8 7	6 5	4 3	2 1	0					
7.Native	•	1	•	'	1	•					
vegetation	CONDITION CATEGORY GRADE or SCORE										
buffer	> 50 meters 10 - 50 meters 5 - 10 meters 1 - 5 meters None										
Grade	5 4 3 2 1										
0.5		0011	NITION OF TEOORY	20005							
8.Bank erosion		CONL	DITION CATEGORY O	GRADE OF SCORE							
CIOSIOII	Stable banks v	v/little sloughing	Moderate erosio	on due to livestock	Severe active eros	ion along					
Grade	5	4	3	2	1	0					
	physical habitat co	<u> </u>									
WATERSHED T	D LAND USE AND M	ANAGEMENT KEY									
		CONI	DITION CATEGORY O	GRADE or SCORE							
1.Manage ment Strategies	Fish fences	Livestock exclusion	Drawdowns	Downstream flow augmentation	Fish feeders	Other (I.e. harvest restrictions, nuisance species control, etc)					
Grade	+1	+1	+1	+1	+1						
Total											
2. Watershed	Land Uses (Describe	e the extent of land use	in the upstream water	shed)							
2a.Minimal		CONI	DITION CATEGORY O	SRADE or SCORE							
mpact land		30141	practices.								
uses Entire Abundant Common Moderate S											
Grade	+5	+4	+3	+2	+1	0					
2b. Significa											
_		CONI		RADE or SCORE							
nt impact	Poor grazin		DITION CATEGORY Of air to poor conservation		al, commercial, residentia	l.					
_	Poor grazin Entire	CONI g practices, cropland w/ fa Abundant			al, commercial, residentia Sparse	I. None					

1.Fish											
haracterist						ATEGORY G					
ics						xotic fish don					
		ality sport	Pan & pre			Minnows/par				/roughfish	No fish
Brade	10	9	8	7	6	5	4	3	2	1	0
2.Aquatic				CONI	DITION CA	ATEGORY G	DADE as C	CODE			
insects				CON	DITION CF	ATEGORT G	KADE 01 3	CORE			
11130013		> 3 order	rs present	1 -3 orders present				None			
Grade		5	4			3		2		1	0
			•		•		•		•		
3.Mollusc/				CONI	DITION CA	ATEGORY G	RADE or S	CORE			
Crayfish	- 4										
) d.	Common/Abundant 2				Sp	oarse		one	Zebra	mussels p	resent
Grade 4.Other		3	2		l	1	l	0		-5	
aquatic/se				CONI	DITION CA	ATEGORY G	RADE or S	CORF			
mi-aquatic											
ertebrates		Common	/Abundant		Sp	oarse	No	one	N	lutria prese	nt
Grade		3	2			1		0		-5	
otal for the	biologica	I compone	nts (max 20)							
VATER QUA	LITY COM	//PONENT	KEY								
L											
.DO/BOD	CONDITION CATEGORY GRADE or SCORE										
I.DO/BOD				CONI	DITION CA	ATEGORY G	RADE or S	CORE			
1.DO/BOD	F	Rarely Limitir	na I	CONI	DITION CA			CORE		Frequent	lv Limitina
I.DO/BOD -	F	Rarely Limitin	ng	CONI	DITION CA		RADE or S	CORE 1			ly Limiting
	F		ng		2	Occasiona	ally Limiting	1			
Grade 2.Nutrient	F		ng		2		ally Limiting	1			
Grade		3			2	Occasiona	ally Limiting	1			0
Grade 2.Nutrient enrichment		3 Rarely Limitir			2 DITION CA	Occasiona	ally Limiting	1 CORE		Frequent	0 ly Limiting
Grade 2.Nutrient		3			2	Occasiona	ally Limiting	1		Frequent	0
Grade 2.Nutrient enrichment Grade		3 Rarely Limitir		CONI	2 DITION CA	Occasiona ATEGORY G Occasiona	RADE or S	1 CORE		Frequent	0 ly Limiting
Grade 2.Nutrient enrichment		3 Rarely Limitir		CONI	2 DITION CA	Occasiona	RADE or S	1 CORE		Frequent	0 ly Limiting
Grade 2. Nutrient enrichment Grade 3. Pesticide	F	3 Rarely Limitir	ng	CONI	2 DITION CA	Occasiona ATEGORY G Occasiona ATEGORY G	RADE or S	1 CORE		Frequent	0 ly Limiting
Grade 2. Nutrient enrichment Grade 3. Pesticide	F	3 Rarely Limitin 3	ng	CONI	2 DITION CA	Occasiona ATEGORY G Occasiona ATEGORY G	RADE or S	1 CORE		Frequent	ly Limiting
2.Nutrient enrichment Grade 3.Pesticide	F	3 Rarely Limitin 3	ng	CONI	2 DITION CA 2 DITION CA	Occasiona ATEGORY G Occasiona ATEGORY G Occasiona	RADE or Sally Limiting RADE or Sally Limiting RADE or Sally Limiting	1 CORE 1 CORE		Frequent	ly Limiting 0
2.Nutrient enrichment Grade 8.Pesticide s Grade	F	3 Rarely Limitin 3	ng	CONI	2 DITION CA 2 DITION CA	Occasiona ATEGORY G Occasiona ATEGORY G	RADE or Sally Limiting RADE or Sally Limiting RADE or Sally Limiting	1 CORE 1 CORE		Frequent	ly Limiting 0
2.Nutrient enrichment Grade 3.Pesticide	F	Rarely Limitir 3 Rarely Limitir 3	ng lig	CONI	2 DITION CA 2 DITION CA	Occasiona ATEGORY G Occasiona ATEGORY G Occasiona	RADE or S ally Limiting RADE or S ally Limiting RADE or S ally Limiting	1 CORE 1 CORE		Frequent	ly Limiting 0
Grade 2. Nutrient enrichment Grade 3. Pesticide s Grade 4. Turbidity	F	Rarely Limitin 3 Rarely Limitin 3	ng lig	CONI	2 DITION CA 2 DITION CA 2 DITION CA	Occasiona ATEGORY G Occasiona ATEGORY G Occasiona	RADE or Sally Limiting RADE or Sally Limiting RADE or Sally Limiting	1 CORE 1 CORE		Frequent	ly Limiting 0 ly Limiting 0
2.Nutrient enrichment Grade 8.Pesticide s Grade	F	Rarely Limitir 3 Rarely Limitir 3	ng lig	CONI	2 DITION CA 2 DITION CA	Occasiona ATEGORY G Occasiona ATEGORY G Occasiona	RADE or S ally Limiting RADE or S ally Limiting RADE or S ally Limiting	1 CORE 1 CORE		Frequent	ly Limiting 0
Grade 2. Nutrient enrichment Grade 3. Pesticide s Grade 4. Turbidity Grade	F	Rarely Limitin 3 Rarely Limitin 3	ng lig	CONI	2 DITION CA 2 DITION CA 2 DITION CA	Occasiona ATEGORY G Occasiona ATEGORY G Occasiona ATEGORY G Occasiona	RADE or S ally Limiting RADE or S ally Limiting RADE or S ally Limiting	1 CORE 1 CORE 1 CORE		Frequent	ly Limiting 0 ly Limiting 0
Grade 2. Nutrient enrichment Grade 3. Pesticide s Grade 4. Turbidity	F	Rarely Limitin 3 Rarely Limitin 3	ng lig	CONI	2 DITION CA 2 DITION CA 2 DITION CA	Occasiona ATEGORY G Occasiona ATEGORY G Occasiona	RADE or S ally Limiting RADE or S ally Limiting RADE or S ally Limiting	1 CORE 1 CORE 1 CORE		Frequent	ly Limiting 0 ly Limiting 0
Grade 2. Nutrient enrichment Grade 8. Pesticide s Grade 4. Turbidity Grade 5. Temperat	F	Rarely Limitin 3 Rarely Limitin 3	ng l	CONI	2 DITION CA 2 DITION CA 2 DITION CA	Occasiona ATEGORY G Occasiona ATEGORY G Occasiona ATEGORY G Occasiona	RADE or S ally Limiting RADE or S ally Limiting RADE or S ally Limiting	1 CORE 1 CORE 1 CORE		Frequent	ly Limiting 0 ly Limiting 0
Grade 2. Nutrient enrichment Grade 8. Pesticide s Grade 4. Turbidity Grade 5. Temperat	F	Rarely Limitin 3 Rarely Limitin 3 Rarely Limitin 3	ng l	CONI	2 DITION CA 2 DITION CA 2 DITION CA	Occasiona ATEGORY G Occasiona ATEGORY G Occasiona ATEGORY G Occasiona	RADE or S ally Limiting RADE or S ally Limiting RADE or S ally Limiting RADE or S	1 CORE 1 CORE 1 CORE		Frequent Frequent Frequent	ly Limiting 0 ly Limiting 0 ly Limiting 0
2.Nutrient enrichment 3.Pesticide s Grade 4.Turbidity Grade 5.Temperat ure Grade	F	Rarely Limitin 3 Rarely Limitin 3 Rarely Limitin 3	ng l	CONI	2 DITION CA 2 DITION CA 2 DITION CA 2 DITION CA 2	Occasiona ATEGORY G Occasiona ATEGORY G Occasiona ATEGORY G Occasiona ATEGORY G Occasiona	RADE or S ally Limiting RADE or S ally Limiting	1 CORE 1 CORE 1 CORE 1 CORE		Frequent Frequent Frequent	ly Limiting 0 ly Limiting 0 ly Limiting 0
Grade 2. Nutrient enrichment Grade 3. Pesticide s Grade 4. Turbidity Grade 5. Temperat ure Grade 6. Other (if	F	Rarely Limitin 3 Rarely Limitin 3 Rarely Limitin 3	ng l	CONI	2 DITION CA 2 DITION CA 2 DITION CA 2 DITION CA 2	Occasiona ATEGORY G Occasiona ATEGORY G Occasiona ATEGORY G Occasiona	RADE or S ally Limiting RADE or S ally Limiting	1 CORE 1 CORE 1 CORE 1 CORE		Frequent Frequent Frequent	ly Limiting 0 ly Limiting 0 ly Limiting 0
2.Nutrient enrichment 3.Pesticide s Grade 4.Turbidity Grade 5.Temperat ure Grade	F	Rarely Limitin 3 Rarely Limitin 3 Rarely Limitin 3	ng lig ligg	CONI	2 DITION CA 2 DITION CA 2 DITION CA 2 DITION CA 2	Occasiona ATEGORY G Occasiona ATEGORY G Occasiona ATEGORY G Occasiona ATEGORY G Occasiona	RADE or S ally Limiting RADE or S ally Limiting	1 CORE 1 CORE 1 CORE 1 CORE		Frequent Frequent Frequent	ly Limiting 0 ly Limiting 0 ly Limiting 0

TOTAL SCORE "RCI" = (PHYSICAL + WATERSHED/MANAGEMENT + BIOLOGICAL + WATER QUALITY)/100

E. Impoundment Characterisics (atta	ch to aquatic habitat	summary):					
Watershed Area =		Shoreline Perir	neter: =				
Impoundment Area = (permanent pool)		SDI (shoreline dev. Ratio) =					
Project Comments: alternatives pos	sible to accomplish p	roject goals & lessen	adverse impacts on habitat				
	seining;	dip-net;	electrofishing				
Species							
Other Aquatic/Semi-Aquatic Vertebra	tes:						
Mussels:							
T/E Species Known/Likely to Occur:							

Impoun	dments/Reservoir	Resource Ca	apacity Calcul	ation	
Date:					
Project:					
Location:					
Circle One: Small Pond (≤1 acre) F	ond (>1 <u><</u> 5 acres)	Lake (>5 < 5	500 acres) Re	servoir (>500 acres	s)
Represented Acreage:		Total acreage	of all impound	ments represented	by site
Assessors:					
Project Status:	Preprojed	ct	Postproje	ect	
•			. ,		
				Multiplication	
Major Function Categories	Score	RCI	Acreage	Factor*	RC
Physical Habitat					
Watershed/Management					
Biological					
Water Quality					
Total Score		0			(
*Multiplication Factors					
Small Pond = 1.5					
Pond = 1.3					
Lake = 1.1					
Reservoir = 1.04					

L

APPENDIX C-2

SWAMPIM DATA TABLES AND DATASHEETS

Note: For consistency, the following data tables and datasheets have been updated to reflect the stream and pond nomenclature presented in the SJD report dated June 21, 2017 which was approved by the USACE on July 27, 2017. The data were collected by APAI in 2006 and 2009, and data for representative locations were reviewed on September 16, 2009 by representatives from the agencies including: Ms. Mary Verwers, USACE; Mr. Sid Puder, USFWS; Ms. Donna Mullins, USEPA; Mr. Raul Gutierrez, USEPA; Ms. Beth Bendik, TPWD; Ms. Karen Hardin, TPWD; and Mr. John Trevino, TCEQ.

Based on the input received from the review team, upgrades and downgrades to various metrics were incorporated into the SWAMPIM datasheets. A summary of the input from the review team and data changes made in response to this input was submitted to the USACE in a technical memorandum dated November 10, 2009 which also included the revised SWAMPIM datasheets.

TABLE C-1
Streams Within Conservation Pool, Embankment, Spillway of LRH - Pre-Project FCI

	North Ephe						
			Str	eam Chann	els		
		N8 Trib 9	N6 Trib1 A3	N15 Trib 1	N11	N1 Trib 2	AVERAG E
	Flow Regime and Groundwater Interactions	2	0	2	0	0	0.8
	2a. Channel Condition/ Alteration	1	0	8	8	2	3.8
_	2b. Channel Capacity to Flow Frequency	0	0	8	0	0	1.6
itio	2c. Channel Bank Stability	0	1	9	0	0	2.0
Ĕ	3a. Channel Sinuosity	2	2	3	5	4	3.2
Hydrology Function	3b. Bottom Substrate Composition	3	0	2	2	0	1.4
Hydn	3c. In stream Bottom Topography OR Manning's Number	1	1	4	3	1	2.0
	3d. Channel Incision	1	1	8	2	0	2.4
	4a. Pools	0	0	0	0	0	0.0
	4b. Channel Flow Status	0	0	0	0	0	0.0
	TOTAL	10	5	44	20	7	17
	TOTAL/100	0.10	0.05	0.44	0.20	0.07	0.17
	1a. Bank Stability	0	1	9	0	0	2.0
	1b. Channel Bottom Bank Stability OR Channel Sediments or Substrate Composition	1	0	2	0	1	0.8
_	2. Water Clarity	0	0	0	0	0	0.0
Water Quality Function	3a. Nutrient Enrichment OR Presence of Aquatic Vegetation	0	0	0	0	0	0.0
)ualit	Composition of Organic Matter	5	0	8	5	0	3.6
Vater C	Land Use Pattern Beyond Immediate Riparian Zone	5	3	4	5	3	4.0
>	6a. Riparian Zone Width (from stream edge to field)	7	1	9	8	8	6.6
	6b. Riparian Zone Vegetation Protection/ Completeness	6	2	8	5	4	5.0
	TOTAL	24	7	40	23	16	22
	TOTAL/80	0.30	0.09	0.50	0.29	0.20	0.28
	Flow Regime	2	0	2	0	0	0.8
	Epifaunal Sustrate and Available Cover	0	0	0	0	2	0.4
	Stream Bottom Substrate	2	0	2	2	0	1.2
	4. Pool Variability	0	0	0	0	0	0.0
Habitat Function	Sediment Deposition and Scouring	2	0	7	2	0	2.2
Æ	6. Channel Flow Status	0	0	0	0	0	0.0
itat	7. Channel Alteration	1	1	9	5	5	4.2
Hat	8. Channel Sinuosity	2	0	3	5	3	2.6
	Bank Stability	0	1	9	0	0	2.0
	10. Vegetative Protection	6	2	8	5	4	5.0
	11. Riparian Zone	7	1	9	8	8	6.6
	12. Riparian Habitat Condition	5	2	9	7	5	5.6
	TOTAL TOTAL/120	27 0.23	7 0.06	58 0.48	34 0.28	27 0.23	31 0.26
	TOTAL/120	0.23	0.00	0.40	0.40	0.23	Final FCI
	GRAND TOTAL-FCI						Score

_	North Ephemeral 2.5 to	5.0' Pre	-Project	FCI
		Stream (Channels	
		N10	N5	AVERAG
	I	1110	-1.0	Е
	Flow Regime and Groundwater Interactions	2	0	1.0
	2a. Channel Condition/	2		5.0
	Alteration	2	8	5.0
	2b. Channel Capacity to Flow Frequency	7	0	3.5
uo	2c. Channel Bank Stability	7	5	6.0
ıncti	3a. Channel Sinuosity	3	7	5.0
Ϋ́	3b. Bottom Substrate			
Hydrology Function	Composition	2	2	2.0
lydru	3c. In stream Bottom			
	Topography OR Manning's Number	2	2	2.0
	3d. Channel Incision	4	1	2.5
	4a. Pools	1	0	0.5
	4b. Channel Flow Status	1	0	0.5
	TOTAL	31	25	28
	TOTAL/100	0.31 7	0.25 5	0.28
	1a. Bank Stability	/		6.0
	1b. Channel Bottom Bank	7	2	4.5
	Stability OR Channel Sediments	,	2	4.5
	or Substrate Composition 2. Water Clarity	1	0	0.5
ion	2. Water Charty			0.5
nuct	3a. Nutrient Enrichment OR	0	0	0.0
Ε	Presence of Aquatic Vegetation 4. Composition of Organic			
ila	Matter	0	2	1.0
Water Quality Function	5. Land Use Pattern Beyond	7	4	5.5
Wat	Immediate Riparian Zone 6a. Riparian Zone Width (from			
	stream edge to field)	7	2	4.5
	6b. Riparian Zone Vegetation			
	Protection/ Completeness	7	2	4.5
	TOTAL	36	17	27
	TOTAL/80	0.45	0.21	0.33
	Flow Regime	2	0	1.0
	Epifaunal Sustrate and Available Cover	4	2	3.0
	Stream Bottom Substrate	2	1	1.5
	4. Pool Variability	1	0	0.5
E.	Sediment Deposition and	2	2	2.0
nctic	Scouring			
Ē	Channel Flow Status	2	0	1.0
Habitat Functior	7. Channel Alteration	5	7	6.5 5.0
Η̈́	Channel Sinuosity Bank Stability	7	5	6.0
	Vegetative Protection	7	2	4.5
	11. Riparian Zone	7	2	4.5
	12. Riparian Habitat Condition	7	4	5.5
	TOTAL	49	33	41
	TOTAL/120	0.41	0.28	0.34 Final FCI
				Score
	GRAND TOTAL	1.17	0.74	0.95
		60-69	70-79	

Notes for Summary Tables and SWAMPIM datasheets:

⁽¹⁾ Stream identification corresponds to nomenclature used in Table A-1 of the SJD Report; (Ref: SJD Report included in Mitigation Plan, Appendix B)

⁽²⁾ Stream nomenclature abbreviations: "N" indicates northern tributary, "S" indicates southern tributary, "Trib" indicates tributary, NSR indicates North Sulphur River.

⁽³⁾ Calculation of Totals for each Function Category equals total # divided by maximum possible total #; for Hydrology (#/100), for Water Quality (#/80), for Habitat (#/120);

GRAND TOTAL equals the sum of Hydrology Total, Water Quality Total, and Habitat Total; Ref: SWAMPIM Documentation provided in Mitigation Plan, Appendix C-1 Detailed SWAMPIM datasheets following summary tables on pages noted under GRAND TOTAL-FCI.

TABLE C-1
Streams Within Conservation Pool, Embankment, Spillway of LRH - Pre-Project FCI

			Pre-Proj		
		Str	eam Chann	els	
		N6-TRIB1	N22 Trib 2	N20	AVERAG E
	Flow Regime and		2	2	
	Groundwater Interactions	1	2	2	1.7
	2a. Channel Condition/	1	1	0	0.7
	Alteration	1	1	U	0.7
	2b. Channel Capacity to Flow	0	0	0	0.0
=	Frequency				
ctio	2c. Channel Bank Stability	2	0	2	1.2
Hydrology Function	3a. Channel Sinuosity	2	3	3	2.7
55	3b. Bottom Substrate Composition	0	0	1	0.3
ğ					
Hyd	3c. In stream Bottom Topography OR Manning's	2	0	2	1.3
	Number	_	· ·	-	1.5
	3d. Channel Incision	2	0	3	1.7
	4a. Pools	0	0	0	0.0
	4b. Channel Flow Status	0	0	0	0.0
	TOTAL	10	6	13	10
	TOTAL/100	0.10	0.06	0.13	0.10
	1a. Bank Stability	2	0	2	1.2
	1b. Channel Bottom Bank				
	Stability OR Channel Sediments	0	0	1	0.3
	or Substrate Composition				
	Water Clarity	0	0	0	0.0
ion	-				
nuct	3a. Nutrient Enrichment OR	0	0	0	0.0
Ϋ́	Presence of Aquatic Vegetation 4. Composition of Organic				
alit	Matter	0	0	8	2.7
Water Quality Function	Land Use Pattern Beyond				
/ate	Immediate Riparian Zone	3	3	3	3.0
=	6a. Riparian Zone Width (from	4	3	8	5.0
	stream edge to field)	4	3	0	3.0
	6b. Riparian Zone Vegetation	4	1	5	3.3
	Protection/ Completeness	4		3	3.3
	TOTAL	13	7	27	16
	TOTAL/80	0.16	0.09	0.33	0.19
	Flow Regime	1	2	2	1.7
	Epifaunal Sustrate and	0	0	0	0.0
	Available Cover	0	0	0	0.0
	Stream Bottom Substrate Deal Variability	0	0	1	0.0
_	4. Pool Variability	U	J	1	0.3
tion	 Sediment Deposition and Scouring 	0	0	0	0.0
Habitat Functior	6. Channel Flow Status	0	0	0	0.0
at F	Channel Alteration	1	1	0	0.7
abit	Channel Sinuosity	2	3	3	2.7
Ξ	Bank Stability	2	0	1.5	1.2
	Vegetative Protection	4	1	5	3.3
	11. Riparian Zone	4	3	8	5.0
	12. Riparian Habitat Condition	4	2	6.5	4.2
	TOTAL	18	12	27	19
	TOTAL/120	0.15	0.10	0.23	0.16
					Final FC
	GRAND TOTAL	0.41	0.25	0.68	Score 0.45

	North Ephemeral	>16' P	re-Proje	ct FCI	
		Str	eam Chann	nels	
		N12	N1	N18	AVERAG E
	Flow Regime and Groundwater Interactions	2	1	1	1.3
	2a. Channel Condition/ Alteration	0	0	1	0.3
_	2b. Channel Capacity to Flow Frequency	0	0	0	0.0
ctio	2c. Channel Bank Stability	4	2	2	2.7
Æ	3a. Channel Sinuosity	1	1	4	2.0
Hydrology Function	3b. Bottom Substrate Composition	0	2	1	1.0
Hydr	3c. In stream Bottom Topography OR Manning's Number	3	5	1	3.0
	3d. Channel Incision	2	0	0	0.7
	4a. Pools	1	1	1	1.0
	4b. Channel Flow Status	1	0	1	0.7
	TOTAL	14	12	12	13
	TOTAL/100 1a. Bank Stability	0.14 4	0.12 2	0.12 2	0.1 2.7
	1b. Channel Bottom Bank Stability OR Channel Sediments	0	2	1	1.0
	or Substrate Composition 2. Water Clarity	2	1	1	1.3
Water Quality Function	3a. Nutrient Enrichment OR Presence of Aquatic Vegetation	0	1	1	0.7
Quality	Composition of Organic Matter	0	1	1	0.7
Nater (Land Use Pattern Beyond Immediate Riparian Zone	3	4	4	3.7
	6a. Riparian Zone Width (from stream edge to field)	5	7	3	5.0
	6b. Riparian Zone Vegetation Protection/ Completeness	5	1	2	2.7
	TOTAL	19	19	15	18
	TOTAL/80	0.24 2	0.24	0.19	0.22 1.3
	Flow Regime Epifaunal Sustrate and	1	1	1	1.0
	Available Cover	1	1	1	1.0
	Stream Bottom Substrate Pool Variability	1	1	1	1.0
tion	Sediment Deposition and Scouring	1	1	1	1.0
Habitat Function	Channel Flow Status	0	1	1	0.7
tat I	7. Channel Alteration	0	0	2	0.7
łabi	8. Channel Sinuosity	1	1	4	2.0
-	9. Bank Stability	4	2	2	2.7
	10. Vegetative Protection	5.5	1	3	3.2
	11. Riparian Zone	5	7	3	5.0
	12. Riparian Habitat Condition	7	4.8	3	4.9
	TOTAL	28.5	21.8	23.0 0.19	24 0.20
	TOTAL/120	0.24	0.18	0.19	
	TOTAL/120	0.24	0.18	0.19	Final FCI Score
	GRAND TOTAL	0.62	0.18	0.19	Final FCI

Notes for Summary Tables and SWAMPIM datasheets:

(1) Stream identification corresponds to nomenclature used in Table A-1 of the SJD Report; (Ref: SJD Report included in Mitigation Plan, Appendix B)

GRAND TOTAL equals the sum of Hydrology Total, Water Quality Total, and Habitat Total; Ref: SWAMPIM Documentation provided in Mitigation Plan, Appendix C-1 Detailed SWAMPIM datasheets following summary tables on pages noted under GRAND TOTAL-FCI.

⁽¹⁾ Stream nomenclature abbreviations: "N" indicates northern tributary, "S" indicates southern tributary, "Trib" indicates tributary, NSR indicates North Sulphur River.

⁽³⁾ Calculation of Totals for each Function Category equals total # divided by maximum possible total #; for Hydrology (#/100), for Water Quality (#/80), for Habitat (#/120);

TABLE C-1
Streams Within Conservation Pool, Embankment, Spillway of LRH - Pre-Project FCI

1. Flow Regime and Groundwater Interactions 2			Stream	Channels	
1. Flow Regime and Groundwater Interactions 2			S8 Trib 2	S10 Trib 2	AVERAG E
TOTAL 1			2	0	
2b. Channel Capacity to Flow Frequency 0 5 2.5		2a. Channel Condition/	0	8	4.0
Proguency Prog		2b. Channel Capacity to Flow	0	5	2.5
Number Standard	uo				
Number Standard	ncti				
Number Standard	Ē		Z	4	3.0
Number Standard	logy		0	1	0.5
Number Standard	dro/	3c. In stream Bottom			
3d. Channel Incision 0 3 1.5	H	Topography OR Manning's	0	4	2.0
4b. Channel Flow Status			0	3	1.5
TOTAL 4 30 17					
TOTAL/100 0.04 0.30 0.17		4b. Channel Flow Status	0	0	0.0
1a. Bank Stability				30	17
10.5 1.0					
Stability OR Channel Sediments		1a. Bank Stability	0	5	2.5
2. Water Clarity		Stability OR Channel Sediments	0	1	0.5
Section Sect			0	0	0.0
Section Color Co	Function	3a. Nutrient Enrichment OR Presence of Aquatic Vegetation	0	0	0.0
Section Color Co	uality	 Composition of Organic 	0	8	4.0
Section Color Co	/ater C		4	5	4.5
Protection/ Completeness 0 6 3.0 TOTAL 7 31 19 TOTAL 80 0.09 0.39 0.24 1. Flow Regime 2 0 1.0 2. Epifaunal Sustrate and 0 0 0.0 Available Cover 3. Stream Bottom Substrate 0 1 0.5 4. Pool Variability 0 0 0.0 5. Sediment Deposition and 0 2 1.0 Scouring 6. Channel Flow Status 0 0 0.0 7. Channel Simusity 2 4 3.0 9. Bank Stability 0 5 2.5 10. Vegetative Protection 0 6 3.0 11. Riparian Zone 3 6 4.5 12. Riparian Habitat Condition 4 7 5.5 TOTAL 11 39 25 TOTAL 120 0.09 0.33 0.21 Final F	>		3	6	4.5
TOTAL/80 0.09 0.39 0.24			0	6	3.0
TOTAL/80 0.09 0.39 0.24			7	31	19
2. Epifaunal Sustrate and Available Cover 0 0 0.0			0.09	0.39	
2. Epifaunal Sustrate and Available Cover 0		1. Flow Regime	2	0	1.0
3. Stream Bottom Substrate 0 1 0.5 4. Pool Variability 0 0 0.0 5. Sediment Deposition and Scouring 0 0 6. Channel Flow Status 0 0 0.0 7. Channel Alteration 0 8 4.0 8. Channel Simuosity 2 4 3.0 9. Bank Stability 0 5 2.5 10. Vegetative Protection 0 6 3.0 11. Riparian Zone 3 6 4.5 12. Riparian Habitat Condition 4 7 7 5.5 TOTAL 11 39 25 TOTAL 12 0.09 0.33 0.21 Final F			0	0	0.0
S. Sediment Deposition and Securing 0 2 1.0			0	1	0.5
S. Sediment Deposition and Scouring Scouring O O O O O O O O O			0	0	0.0
9. Bank Stability 0 5 2.5 10. Vegetative Protection 0 6 3.0 11. Riparian Zone 3 6 4.5 12. Riparian Habitat Condition 4 7 5.5 TOTAL 11 39 25 TOTAL/120 0.09 0.33 0.21 Final F Seor	ction	5. Sediment Deposition and	0	2	1.0
9. Bank Stability 0 5 2.5 10. Vegetative Protection 0 6 3.0 11. Riparian Zone 3 6 4.5 12. Riparian Habitat Condition 4 7 5.5 TOTAL 11 39 25 TOTAL/120 0.09 0.33 0.21 Final F Seor	Ē		0	0	0.0
9. Bank Stability 0 5 2.5 10. Vegetative Protection 0 6 3.0 11. Riparian Zone 3 6 4.5 12. Riparian Habitat Condition 4 7 5.5 TOTAL 11 39 25 TOTAL/120 0.09 0.33 0.21 Final F Seor	itat		0	8	4.0
9. Bank Stability 0 5 2.5 10. Vegetative Protection 0 6 3.0 11. Riparian Zone 3 6 4.5 12. Riparian Habitat Condition 4 7 5.5 TOTAL 11 39 25 TOTAL/120 0.09 0.33 0.21 Final F Seor	Tabi		2		
11. Riparian Zone	-	9. Bank Stability			
12. Riparian Habitat Condition 4 7 5.5 TOTAL 11 39 25 TOTAL/120 0.09 0.33 0.21 Final F Scorr		10. Vegetative Protection			
TOTAL 11 39 25 TOTAL/120 0.09 0.33 0.21 Final F Score		11. Riparian Zone			
TOTAL/120 0.09 0.33 0.21 Final F Score					
Final F Score		TOTAL			
GRAND TOTAL 0.22 1.01 0.62			0.09	0.33	Final FC

S	South Ephemeral 2.5 to	5.0' Pre	e-Project	FCI
		Stream	Channels	
		S12	S16-TRIB4	AVERAG E
	Flow Regime and Groundwater Interactions	1	1	1.0
	2a. Channel Condition/ Alteration	1	1	1.0
_	2b. Channel Capacity to Flow Frequency	0	0	0.0
tion	2c. Channel Bank Stability	6.5	2	4.3
ğ	3a. Channel Sinuosity	4	3	3.5
Hydrology Function	3b. Bottom Substrate Composition	1	0	0.5
Hydro	3c. In stream Bottom Topography OR Manning's Number	2	1	1.5
	3d. Channel Incision	2	0	1.0
	4a. Pools	1	1	1.0
	4b. Channel Flow Status	0	1	0.5
	TOTAL	19	10	14
	TOTAL/100	0.19	0.10	0.14
	1a. Bank Stability	6.5	2.0	4.3
	1b. Channel Bottom Bank Stability OR Channel Sediments or Substrate Composition	1	2	1.5
	2. Water Clarity	1	1	1.0
Water Quality Function	3a. Nutrient Enrichment OR Presence of Aquatic Vegetation	1	1	1.0
uality	Composition of Organic Matter	7	1	4.0
Vater C	Land Use Pattern Beyond Immediate Riparian Zone	3	8	5.5
>	6a. Riparian Zone Width (from stream edge to field)	8	8	8.0
	6b. Riparian Zone Vegetation Protection/ Completeness	6	2	4.0
	TOTAL	34	25	29
	TOTAL/80	0.42	0.31	0.37
	1. Flow Regime	1	1	1.0
	Epifaunal Sustrate and Available Cover	1	1	1.0
	Stream Bottom Substrate	1	1	1.0
	4. Pool Variability	1	1	1.0
Habitat Function	Sediment Deposition and Scouring	1	2	1.5
Fun	Channel Flow Status	0	1	0.5
itat	7. Channel Alteration	2	1	1.5
Tabi	8. Channel Sinuosity	2	3	2.5
-	9. Bank Stability	6.5	2.0	4.3
	10. Vegetative Protection	6	2	4.0
	11. Riparian Zone	8	8	8.0
	12. Riparian Habitat Condition	6	8	7.0
	TOTAL	36	31	33
	TOTAL/120	0.30	0.26	0.28
				Final FCI
	GRAND TOTAL	0.90	0.67	Score 0.79
		160-169	170-179	V.,,

Notes for Summary Tables and SWAMPIM datasheets:

⁽¹⁾ Stream identification corresponds to nomenclature used in Table A-1 of the SJD Report; (Ref: SJD Report included in Mitigation Plan, Appendix B)

⁽²⁾ Stream nomenclature abbreviations: "N" indicates northern tributary, "S" indicates southern tributary, "Trib" indicates tributary, NSR indicates North Sulphur River.

⁽³⁾ Calculation of Totals for each Function Category equals total # divided by maximum possible total #; for Hydrology (#/100), for Water Quality (#/80), for Habitat (#/120); GRAND TOTAL equals the sum of Hydrology Total, Water Quality Total, and Habitat Total; Ref: SWAMPIM Documentation provided in Mitigation Plan, Appendix C-1 Detailed SWAMPIM datasheets following summary tables on pages noted under GRAND TOTAL-FCI.

TABLE C-1
Streams Within Conservation Pool, Embankment, Spillway of LRH - Pre-Project FCI

	South Ephemeral 6 to 1 Pre-Project FCI	15.0'
		n Channel
		S25
	Flow Regime and Groundwater Interactions	1
	2a. Channel Condition/ Alteration	0
-	2b. Channel Capacity to Flow Frequency	0
ctio	2c. Channel Bank Stability	4
Æ	3a. Channel Sinuosity	8
56	3b. Bottom Substrate	2
ωg	Composition	
Hydrology Function	3c. In stream Bottom Topography OR Manning's Number	1
	3d. Channel Incision	1
	4a. Pools	1
	4b. Channel Flow Status	0
	TOTAL	18
	TOTAL/100	0.18
	1a. Bank Stability	4
	1b. Channel Bottom Bank Stability OR Channel Sediments or Substrate Composition	2
	2. Water Clarity	0
Water Quality Function	3a. Nutrient Enrichment OR Presence of Aquatic Vegetation	0
uality	Composition of Organic Matter	1
Vater C	Land Use Pattern Beyond Immediate Riparian Zone	3
	6a. Riparian Zone Width (from stream edge to field)	5
	6b. Riparian Zone Vegetation Protection/ Completeness	3
	TOTAL	18
	TOTAL/80	0.23
	Flow Regime Epifaunal Sustrate and Available Cover	0
	Stream Bottom Substrate	2
	Pool Variability	1
Habitat Function	Sediment Deposition and Scouring	0
Funk	Channel Flow Status	0
itat]	7. Channel Alteration	2
Hab	8. Channel Sinuosity	8
	9. Bank Stability	4
	10. Vegetative Protection	3
	11. Riparian Zone	5
	12. Riparian Habitat Condition	3
	TOTAL TOTAL/120	29
	1 O 1 AL/120	0.24
		Final FCI Score

	South Ephemeral >1	.6'
	Pre-Project FCI	n Channel
	Silvan	S21
	Г	321
	Flow Regime and Groundwater Interactions	0
	2a. Channel Condition/ Alteration	1
	2b. Channel Capacity to Flow Frequency	0
tion	2c. Channel Bank Stability	3
nuc	3a. Channel Sinuosity	3
3y F	3b. Bottom Substrate	1
golo	Composition	
Hydrology Function	3c. In stream Bottom Topography OR Manning's	1
	Number 3d. Channel Incision	2
	4a. Pools	0
	4b. Channel Flow Status	0
	TOTAL	11
	TOTAL/100	0.11
	1a. Bank Stability	3
	1b. Channel Bottom Bank Stability OR Channel Sediments or Substrate Composition	1
_	2. Water Clarity	0
Water Quality Function	3a. Nutrient Enrichment OR Presence of Aquatic Vegetation	0
uality	Composition of Organic Matter	2
ater Q	Land Use Pattern Beyond Immediate Riparian Zone	3
*	6a. Riparian Zone Width (from stream edge to field)	4
	6b. Riparian Zone Vegetation Protection/ Completeness	4
	TOTAL	17
	TOTAL/80	0.21
	Flow Regime	0
	Epifaunal Sustrate and Available Cover	0
	Stream Bottom Substrate	1
	4. Pool Variability	0
Habitat Function	Sediment Deposition and Scouring	1
Fun	6. Channel Flow Status	0
oitat	7. Channel Alteration	2
Hab	8. Channel Sinuosity	3
	9. Bank Stability	4
	10. Vegetative Protection	3
	11. Riparian Zone	3
	12. Riparian Habitat Condition	21
	TOTAL TOTAL/120	0.18
		Final FCI
	OR LAW MORELY	Score
	GRAND TOTAL	0.50

No	rth Sulphur River Inter	mittent
	Pre-Project FCI	
	Stream	n Channel
		HWY 34 BRIDGE
	Flow Regime and Groundwater Interactions	4
	2a. Channel Condition/ Alteration	0
	2b. Channel Capacity to Flow Frequency	0
Aydrology Function	2c. Channel Bank Stability	0
ū	3a. Channel Sinuosity	0
gy F	3b. Bottom Substrate	0
οlο	Composition	Ü
łyd	3c. In stream Bottom	1
	Topography OR Manning's Number	1
	3d. Channel Incision	0
	4a. Pools	1
	4b. Channel Flow Status	1
	TOTAL	7
	TOTAL/100	0.07
	1a. Bank Stability	0
	1b. Channel Bottom Bank Stability OR Channel Sediments or Substrate Composition	1
	Water Clarity	2.
Water Quality Function	3a. Nutrient Enrichment OR Presence of Aquatic Vegetation	1
ality]	Composition of Organic Matter	2
ater Q	Land Use Pattern Beyond Immediate Riparian Zone	0
≱	6a. Riparian Zone Width (from stream edge to field)	2
	6b. Riparian Zone Vegetation Protection/ Completeness	1
	TOTAL	9
	TOTAL/80	0.11
	Flow Regime	4
	Epifaunal Sustrate and Available Cover	1
	Stream Bottom Substrate	1
	Pool Variability	1
fabitat Function	Sediment Deposition and Scouring	1
Ĕ	Channel Flow Status	1
tat I	7. Channel Alteration	0
łabi	8. Channel Sinuosity	0
т	9. Bank Stability	0
	10. Vegetative Protection	1
	11. Riparian Zone	2
	12. Riparian Habitat Condition	3
	TOTAL	15
	TOTAL/120	0.13
		Final FCI
	GRAND TOTAL	Score 0.31
		200-209

1101	1	mittent
		n Channel
		FM 2990
	Flow Regime and Groundwater Interactions	5
Water Quality Function Hydrology Function Hydrology Function Hydrology Function	2a. Channel Condition/ Alteration	0
	1. Flow Regime and Groundwater Interactions 2a. Channel Condition/ Alteration 2b. Channel Capacity to Flow Frequency 2c. Channel Bank Stability 3a. Channel Sinuosity 3b. Bottom Substrate Composition Topography OR Manning's Number 3d. Channel Incision 4a. Pools 4b. Channel Flow Status TOTAL TOTAL/100 1a. Bank Stability 1b. Channel Bottom Bank Stability OR Channel Sediments or Substrate Composition 2. Water Clarity 3a. Nutrient Enrichment OR Presence of Aquatic Vegetation 4. Composition of Organic Matter 5. Land Use Pattern Beyond Immediate Riparian Zone Ga. Riparian Zone Ga. Riparian Zone Ga. Riparian Zone Vidth (from stream edge to field) 6b. Riparian Zone Vegetation Protection/ Completeness TOTAL	0
tion		0
, am	3a. Channel Sinuosity	0
logy F		0
Number 3d. Channel Incision 4a. Pools 4b. Channel Flow Status	Topography OR Manning's	0
	0	
	I. Flow Regime and Groundwater Interactions 2a. Channel Condition/ Alteration 2b. Channel Capacity to Flow Frequency 2c. Channel Bank Stability 0 3a. Channel Sinuosity 0 3a. Channel Sinuosity 0 3b. Bottom Substrate 0 0 0 0 0 0 0 0 0	
ty Function	1b. Channel Bottom Bank Stability OR Channel Sediments	0
		6
	3a. Nutrient Enrichment OR Presence of Aquatic Vegetation	2
uality	 Composition of Organic 	0
/ater Q		2
\$	Presence of Aquatic Vegetation 4. Composition of Organic Matter 5. Land Use Pattern Beyond Immediate Riparian Zone 6a. Riparian Zone Width (from stream edge to field)	2
		2
	TOTAL	14
	TOTAL/80	5 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
	1. Flow Regime	5
		1
		1
	4. Pool Variability	2
ction	Sediment Deposition and	1
Fun		1
itat	1	0
Labi		0
l	10. Vegetative Protection	
	11. Riparian Zone	
l	12. Riparian Habitat Condition	
	TOTAL	
	TOTAL/120	
	GRAND TOTAL	

210-219

North Sulphur River Intermittent

Detailed SWAMPIM datasheets on pgs 180-189

Notes for Summary Tables and SWAMPIM datasheets:

190-199

⁽¹⁾ Stream identification corresponds to nomenclature used in Table A-1 of the SJD Report; (Ref: SJD Report included in Mitigation Plan, Appendix B)

⁽²⁾ Stream nomenclature abbreviations: "N" indicates northern tributary, "S" indicates southern tributary, "Trib" indicates tributary, NSR indicates North Sulphur River.

⁽³⁾ Calculation of Totals for each Function Category equals total # divided by maximum possible total #; for Hydrology (#/100), for Water Quality (#/80), for Habitat (#/120); GRAND TOTAL equals the sum of Hydrology Total, Water Quality Total, and Habitat Total; Ref: SWAMPIM Documentation provided in Mitigation Plan, Appendix C-1 Detailed SWAMPIM datasheets following summary tables on pages noted under GRAND TOTAL-FCI.

TABLE C-2

Impoundment Resource Capacity Index Calculations for both within and above **Conservation Pool**

Small Pond (On-channel) ≤ 1 acre

OCP 5

Parameter	Key	Score
	Shoreline	2
	Development	2
	Average Depth	2
Physical Habitat Watershed Use and Mgmt Biological Component	Annual Storage Ratio	1
	Substrate	0
	Number of Substrate	
Filysical Habitat	Types in Littoral	1
Watershed Use and Mgmt	Zone	
	Amount of Cover	1
	Native Vegetation	0
	Buffer	U
	Bank Erosion	3
	Total (max 54)	10
	Management	0
Watershed Use and Mgmt	Strategies	0
	Watershed Land Uses	3
	Total (max 10)	3
	Fish Characteristics	3
	Aquatic Insects	3
Riological Component	Molluscs/Crayfish	1
Biological Component	Other aquatic/semi-	1
	aquatic vertebrates	1
	Total (max 21)	8
	Dissolved	
	Oxygen/Biological	2
	Oxygen Demand	
	Nutrient Enrichment	0
Water Quality Component	Pesticides	3
	Turbidity	0
	Temperature	2
	Other (If Applicable)	0
	Total (max 15)	7
Total Sum (max 1	.00)	28

RCI Formula (Physical + Watershed/Management + Biological + Water Quality) / 100

RCI Score 0.28

Open Water Area (Acres) 8.06 within CP 3.86 outside CP 221-225

Detailed SWAMPIM datasheets on pages:

Notes for Summary Tables and SWAMPIM datasheets:

- (1) Pond Nomenclature corresponds to nomenclature used in Table A-2 of the SJD Report; (Ref: SJD Report included in
- (2) Pond Nomenclature abbreviations: "OCP" indicates on-channel pond; "UP" indicates upland pond
- (3) Resource Capacity Index calculated as total sum of Physical Habitat Score, Water Use and Management Score, Biological Component, and Water Quality Component divided by the maximum possible sum of 100. Ref: SWAMPIM Documentation provided in Mitigation Plan, Appendix C-1

Detailed SWAMPIM datasheets following summary tables on pages noted above.

TABLE C-2

Impoundment Resource Capacity Index Calculations for both within and above Conservation Pool

Pond (On-channel) >1 <5 acres

OCP 10 **UP-67** Parameter Key Score Score Shoreline 2 2 Development 3 3 Average Depth 2 2 Annual Storage Ratio Substrate 1 1 Number of Substrate Physical Habitat 1 1 Types in Littoral Zone Amount of Cover 3 0 Native Vegetation 0 3 Buffer Bank Erosion 3 0 Total (max 54) 18 9 Management 0 0 Strategies Watershed Use and Mgmt Watershed Land Uses -1 -3 Total (max 10) -1 -3 7 3 Fish Characteristics Aquatic Insects 4 1 1 Molluscs/Crayfish 1 **Biological Component** Other aquatic/semi-1 1 aquatic vertebrates Total (max 21) 13 6 Dissolved Oxygen/Biological 3 0 Oxygen Demand 2 0 Nutrient Enrichment Water Quality Component Pesticides 3 3 0 Turbidity 3 Temperature 1 Other (If Applicable) 0 0 4 Total (max 15) 14 Total Sum (max 100) 16

Total RCI Score (Physical + Watershed/Management + Biological + Water Quality) / 100 RCI Scores 0.44 0.16

Average RCI Score 0.3

Open Water Area (Acres) 16.36 within CP 9.84 outside CP

Detailed SWAMPIM datasheets on pages:

226-231

232-237

Notes for Summary Tables and SWAMPIM datasheets:

- (1) Pond Nomenclature corresponds to nomenclature used in Table A-2 of the SJD Report; (Ref: SJD Report included in
- (2) Pond Nomenclature abbreviations: "OCP" indicates on-channel pond; "UP" indicates upland pond
- (3) Resource Capacity Index calculated as total sum of Physical Habitat Score, Water Use and Management Score, Biological Component, and Water Quality Component divided by the maximum possible sum of 100. Ref: SWAMPIM Documentation provided in Mitigation Plan, Appendix C-1

Detailed SWAMPIM datasheets following summary tables on pages noted above.

TABLE C-2

Impoundment Resource Capacity Index Calculations for both within and above Conservation Pool

Lake (On-channel) >5 <500 acres

Reservoir

OCP 17

No OCPs > 500 Acres

Parameter	Key	Score
	Shoreline	4
	Development	4
	Average Depth	9
	Annual Storage Ratio	4
Physical Habitat	Substrate	1
Dhysical Habitat	Number of Substrate	
Physical Habitat	Types in Littoral	1
	Zone	
	Amount of Cover	1
	Native Vegetation	1
	Buffer	1
	Bank Erosion	2
	Total (max 54)	23
	Management	1
Watershed Use and Mgmt	Strategies	
	Watershed Land Uses	-3
	Total (max 10)	-2
	Fish Characteristics	9
	Aquatic Insects	5
Biological Component	Molluscs/Crayfish	3
Biological Component	Other aquatic/semi-	1
	aquatic vertebrates	1
	Total (max 21)	18
	Dissolved	
	Oxygen/Biological	3
	Oxygen Demand	
	Nutrient Enrichment	2
Water Quality Component	Pesticides	3
water Quality Component	Turbidity	2
	Temperature	2
	Other (If Applicable)	3
	Total (max 15)	15
Total Sum (max 1	00)	54

Total RCI Score (Physical + Watershed/Management + Biological + Water Quality) / 100

RCI Score 0.54

Open Water Area (Acres) 31.78 within CP 0 outside CP

Detailed SWAMPIM datasheets on pages:

238-243

244

Notes for Summary Tables and SWAMPIM datasheets:

- (1) Pond Nomenclature corresponds to nomenclature used in Table A-2 of the SJD Report; (Ref: SJD Report
- (2) Pond Nomenclature abbreviations: "OCP" indicates on-channel pond; "UP" indicates upland pond
- (3) Resource Capacity Index calculated as total sum of Physical Habitat Score, Water Use and Management Score, Biological Component, and Water Quality Component divided by the maximum possible sum of 100. Ref: SWAMPIM Documentation provided in Mitigation Plan, Appendix C-1

Detailed SWAMPIM datasheets following summary tables on pages noted above.

STREAM CHANNELS SWAMPIM DATASHEETS

SWAMPIM DATASHEETS PRE-PROJECT	S – NORTH EPH	EMERAL 0.5 T	O 2.0'
• N8-TRIB9			

N8-TRIB9

PARAMET	ER]
	CONDITION CATEGORY GRADE or SCORE											
	Optimal			Suboptimal			Marginal		Poor			
Grade	10	9	8	7	6	5	4	3	2	1	0	Ш.

Right bank- Park area, Left bank leads directly to pasture, no trees.Reach crosses under road. Reach surrounded by pasture and road. Riparian zone is 0 on left bank and 70 m on right bank.

1

VARIABLES FLOW REGIM	F:					N8-TRI	D9					SCORE 1	Source																
TYPE		Perennial		Intermitte	ent w/ Perer	nnial Daala	Intore	mittent		Enhameral			KDWP 2																
Grade	10	9	8	7	6	5	4	3	2	Ephemeral 1	0	2	Subjectiv																
CHANNEL CO	NDITION:	Measureme	ent or Obser	vation of S	tream Char	nel Condition	ns	•	•	•	•																		
				CON	IDITION C	ATEGORY (2DADE or 9	SCORE					Barbour,																
		Optimal			Suboptima			rginal		Poor			EPA RB																
		hannel; no st			annelization	(usually in	Altered ch	nannel; 40-		is actively dow			5-21;																
		tion minimal. atting or exces			areas) or pas on, but with s			the reach elized or		>80% of the realized. Degradate			Newton,																
2a.Channel Condition/Alter		. Normal frequency		recovery of	f channel bed	and banks.		d. Excess		s prevent acces			USDA/ N SVAP p																
ation (natural,		ical connection			e frequency of sonto flood;			on; braided th excessive		floodplain.			O 17 11 P																
altered, or	Orial	inor and nooc	piani.	1104	is onto nood	Jidii i.	frequency	of overbank				Natural																	
downcutting)								onto the . Historical				Downcut.																	
								es or levees																					
							restrict f	loodplain.																					
Grade	10	9	8	7	6	5	4	3	2	1 1	0	1																	
J. Lucio	10	,		ı	l .	L	Į.	1		'			_																
01 01 :		Optimal		CON	IDITION CA Suboptima	ATEGORY (SCORE rginal	1	Poor		-	w/ assist																
2b.Channel Capacity to		apacity to Flo			pacity to Flo	w Frequency	Channel (Capacity to		Capacity to Flow		1	Dr. Mike																
Flow		ch that bank onts occur at a				overflow from requent than		ency Ratio is		uch that bank o ents are more fr			Harvey a																
Frequency		nts occur at a year frequenc			ts are more i 5 years or le:			ank overflow n events are		f year or less fr			Travant																
Ratio (for 2- year peak		0.75-1.25			n every 2.5 y <0.75 or >1.2			quent than		every 10 year	S.																		
flow)					<0.75 OF >1.2	(5)		ear or less nan every 5		<0.24 or >2																			
,							ye	ars.																					
	- 10			_				or >1.5		1 .																			
Grade	10	9	8	7	6	5	4	3	2	1	0	0																	
	CONDITION CATEGORY GRADE or SCORE								Newton,																				
	Banks stab	Optimal ole; evidence	of erosion or	Moderately	Suboptimal Moderately stable; infrequent, small			rginal ly unstable;	Poor able; Unstable; no perennial vegetation at		egetation at		USDA/ NI SVAP pa																
	bank failure	e absent or m	inimal; (<5%	areas of erosion mostly healed over.			perennial v	egetation to	waterlin	e; severe eros	ion of both		10; Bark																
2c.Channel Bank Stability		k affected), p			ank in reach erosion and/	has areas of	waterline sparse (mainly scoured or stripped by sourced or stripped by sourced or stripped by sourced or stripped by scoured or stripped by source				al., 1999																		
(score each	undercut	vegetation to waterline; no raw or undercut banks (some erosion on			undercut banks (some erosion on utside of meander bends O.K.); no		undercuttin	g; perennial	vegetation to	lateral ero	sion), bank	undercut trees common; many eroded			RBA pag 26; <i>USA</i>														
bank, left or		recently exposed roots; no recent					held by hard points (trees, rock outcrops)		areas; "raw" areas frequent along straight sections and bends; obvious			Norfolk																	
right facing downstream)	1000mily 0																						схрооса п	50 10013 1410	but prodent.	and ero	ded back	bank sloughing; 60-100% of bank has	
dominou dam,								; 30-60% of ch has areas		erosional scar	S.																		
								n and bank																					
									undercutting; recently exposed tree roots and																				
							fine root ha	irs common:																					
Grade (Left) Grade (Right)	10 10	9	8	7	6	5 5	4	3	2	1 1	0	0																	
Grade (Right)	10	3	·				1 4		2		Avg.Score	0																	
CHANNEL RO	LIGHNESS	SEACTORS																											
51 B 11 11 12 1 1 0																													
		Optimal		CON	IDITION CA Suboptima		GRADE or SCORE Marginal Poor					Barbour EPA RB																	
3a.Channel Sinuosity		in the stream			n the stream	increase the	The bends in the stream Channel straight; waterway has bee				1	Chapter																	
(bends in low		ngth 2.5 to 4 t was straight.				times longer ne. Channel		the stream o 1.5 times		lized for a long length/valley le			5-25; KI																
gradient		illey length at			a straight ii alley length		longer tha	n if it was a	Channe	iongui/valley li	ziigui <u>~</u> 1.0		1996																
stream)		-			-			e. Channel																					
								ey length 1.0 1.2.																					
Grade	10	9	8	7	6	5	4	3	2	1	0	2																	
				CON	IDITION CA	ATEGORY (SRADE or S	SCORF					KDWP,																
		Optimal			Suboptima	ıl	Mai	rginal		Poor			Kansas																
2h D-#		no channel en			el bars of co	arse stones	Sediment b	ars of rocks,		livided into brai			Subjectiv																
3b. Bottom Substrate		Ilting from sec lation; channe			shed debris moderately s	present, little stable		silt common; ly unstable		elized; substrat , clay, or bedro			Evaluation Aquatic																
Composition		. ,						,	,	,, ====0	,		Habitats																
				Ì			I		1			Ì	i																
Grade	10	9	8	7	I 6	5	4	3	2	1 1	T 0	3																	

				CON	NDITION C	ATEGORY (GRADE or	SCORE						KDWP, 1996
		Optimal			Suboptima			rginal		Poo	r			Newton et a
3c. Instream Bottom Topography	>7 of the boulders/ debris, overhan vegetate	ttom topogra e following: d gravel, logs/l , backwaters ging vegetat ed shallows,	large woody /oxbows, tion, riffles, rootwads,			es 5-7 of the	Channe includes < ! listed in	el bottom 5 of the items n Optimal regory		bottom inc sted in Opt	ludes			1998 USDA/NRC SVAP page
`	undercut	t banks, or si pools	de channel											
Grade	10	9	8	7	6	5	4	3	2	1		0	1	
Grade				CON	NDITION C	ATEGORY	SRADE or	SCORE						
or		Optimal		00.	Suboptima			rginal		Poo	r			
Or 3c. Manning's n		0.05 to 0.09	99		0.035 to 0.0	5		.03 or >0.10 0.15	obstructio	o 0.20 due n to flow or elization an chann	0.01 t d clea	o 0.02 due		
Grade	10	9	8	7	6	5	4	3	2	1		0		
				CON	NDITION C	ATEGORY	GRADE or	SCORE						USACE,
1		Optimal		Suboptimal				rginal		Poo	r			Norfolk
3d. Channel Incision (TLB/BFD=BH R; 1/BHR*Adj Factor =CI)	channel s ratio >1.4	atio ≥1.0 <1.2 lope >2%; Ei 4; Where cha ntrenchment	ntrenchment annel slope	channel slope >2%, Entrenchment ratio >1.4; Where channel slope ≤2%, Entrenchment ratio >2.0			and Whe slope Entrench >1.4; Who slope	io $\geq 1.4 < 2.0$ ere channel $e > 2\%$, enment ratio ere channel $e \leq 2\%$, ent ratio ≥ 2.0	slope >2% Whe Ent	tio <u>></u> 2.0 an %, Entrench re channel trenchment	nment slope	<2%,		District, 200 SAAM For #1 and VT Stream Geomorphi Assessmer Phase 2
TLB =		10		BHR = 1										
BFD =		10												
Grade	10	9	8	7	6	5	4	3	2	1		0	1	
DYNAMIC SU	RFACE WA	ATER STOR	RAGE											
				CON	NDITION C	ATEGORY	GRADE or	SCORE						Newton, et
		Optimal			Suboptima			rginal		Poo	r			1998 USDA
4a.Pools (abundant, present or absent)	greater that is obscure		pool bottom , or pools are	from 10-3 obscure d	esent, but no 10% of the po lue to depth, at least 3 fee	ool bottom is or the pools	shallow; from the pool obscure du the pools a	resent, but om 5-10% of I bottom is e to depth, or are less than of deep.	discer	sent, or the rnible. No				NRCS SVA page 14; Barbour, et 1999
Grade	10	9	8	7	6	5	4	3	2	1		0	0	
4b. Channel				CO1	IDITION C	ATEGORY	ODADE and	SCORE						
Flow Status		Optimal		CON	Suboptima			rginal	1	Poo	r			Barbour, et
(degree to which channel is filled)	banks a	aches base of and minimal a I substrate is	amount of	channe	ls >75% of the el; or <25% of ostrate is exp	e available f channel	Water fills the availa and /or riff	s 25-75% of ble channel, le substrates ly exposed.	Very little present as	water in ch	annel a	and mostly No water =		1999 EPA RBA page 5 /A-9#5; TC
Grade	10	9	8	7	6	5		3	2	1 1		0	0	1999; VAN 2005
Ciaac				7 6 5 4									-	_000
Ordae						•		_		ı	Poss			-
Olddo						•		pacity Index		ı			0.1	-

N8-TRIB9

I. HYDROLOGIC FUNCTIONS

TYPE													1
NOTE													1
		ANSPORT	/DEPOSIT	ON									7
			,,										Ť
					COI		ATEGORY (
	Bank		Optimal			Suboptima			ırginal		Poor		
	ability re each			of erosion or minimal; little		stable; infre			unstable; 30- k in reach has	Unstable; r	many eroded equently alon	areas; "raw"	
,	te each			lems. <5% of					erosion; high		and bends; of		
	t facing		bank affecte	d.		erosion.			tential during		g; 60-100% o		
down	stream)							flo	oods.	6	erosional sca	rs.	
S I .	(1 - 6)	40				1 0	-				1 4	1 0	_
	(Left) (Right)	10 10	9	8	7	6	5 5	4	3	2	1 1	0	0
naue	(Kigiii)	10	9	0		U)	4	3			Avg.Score	
												7119.00010	
					CON	NDITION CA	ATEGORY (GRADE or S	SCORE				1
1b ∩	Channel		Optimal			Suboptima	ıl	Ma	ırginal		Poor]
	m Bank		1/3 of bank is			1/3 of bank is			/3 of bank is		1/3 of bank is		
	ability	nighly res	istant plant/s material.	on matrix or	resistant pla	ant/soil matri:	x or material.		nighly erodible ant/soil matrix		dible materia everely comp		
			material.						romised.	matrix S	overery collip	oronniocu.	
	(Left)	10	9	8	7	6	5	4	3	2	1	0	1
<u> 3rade</u>	(Right)	10	9	8	7	6	5	4	3	2	1	0	1
												Avg.Score	1
	or				100	NDITION CA	ATEGORY (SRADE or S	SCORE				
	Channel		Optimal			Suboptima			rginal		Poor		
	ments or		avel or large			avel or large	r substrate;	10-29.9% g	ravel or larger		is uniform sa		
	ostrate		bble boulder			substrate typ			e; dominant		bedrock; uns	table	
Comp	position	substrate	type is grav	el or larger;		h some finer			pe is finer than				
								araval hut	may etill he a				
Grade	`	10	stable	ΙQ					may still be a	2	1 1	Ι ο	
		10	9	8	7	6	able 5	gravel, but	may still be a	2	1	0	
										2	1	0	
			9		7	6 NDITION CA	5 ATEGORY (4 GRADE or S	3 SCORE	2		0	
		ARANCE:	9 Clarity or V	isibility	7 CON	6 NDITION CA	5 ATEGORY (GRADE or S	3 SCORE Irginal		Poor	-	
		ARANCE:	9 Clarity or V Optimal , or clear but	risibility tea-colored;	7 CON	NDITION CA Suboptima ly cloudy, es	ATEGORY (GRADE or S Ma Considerab	3 SCORE urginal ole cloudiness	Very turbid	Poor or muddy appe	earance most	
WATE	R APPE	Very clear objects visi	9 Clarity or V Optimal , or clear but	tea-colored; 3-6 feet (less	CON Occasional storm ev	NDITION CA Suboptima ly cloudy, es rent, but clea	ATEGORY (GRADE or S Ma Considerate most of the	3 SCORE Irginal	Very turbid the time; ob, slow moving	Poor or muddy appe jects visible to g water may be	earance most depth <0.5 ft; b bright-green;	
WATE		Very clear objects visi if slightly of surface	Optimal, or clear but ible at depth colored); no oe; no noticeab	tea-colored; 3-6 feet (less oil sheen on ale film on	7 CON Occasional storm ev objects visi have slig	NDITION C/ Suboptima ly cloudy, es rent, but clea ble at depth shtly green co	ATEGORY (III) pecially after rrs rapidly; 1.5-3 ft; may plor; no oil	GRADE or S Ma Considerate most of the visible to de slow section	SCORE urginal ble cloudiness a time; objects apth 0.5-1.5 ft; hs may appear	Very turbid the time; ob slow moving other obvio	Poor or muddy appe jects visible to g water may be us water pollut	earance most depth <0.5 ft; bright-green; tants; floating	
WATE	R APPE	Very clear objects visi if slightly of surface	Optimal, or clear but ible at depth colored); no o	tea-colored; 3-6 feet (less oil sheen on ale film on	7 CON Occasional storm ev objects visi have slig	NDITION CA Suboptima ly cloudy, es rent, but clea ble at depth	ATEGORY (III) pecially after rrs rapidly; 1.5-3 ft; may plor; no oil	GRADE or S Ma Considerat most of the visible to de slow sectior pea-green;	SCORE urginal ble cloudiness e time; objects epth 0.5-1.5 ft; ns may appear bottom rocks	Very turbid the time; ob slow moving other obvio algal mats, s	Poor or muddy appe jects visible to g water may be us water pollut	earance most depth <0.5 ft; b bright-green; tants; floating sheen or heavy	
	R APPE	Very clear objects visi if slightly of surface	Optimal, or clear but ible at depth colored); no oe; no noticeab	tea-colored; 3-6 feet (less oil sheen on ale film on	7 CON Occasional storm ev objects visi have slig	NDITION C/ Suboptima ly cloudy, es rent, but clea ble at depth shtly green co	ATEGORY (III) pecially after rrs rapidly; 1.5-3 ft; may plor; no oil	GRADE or S Ma Considerat most of the visible to de slow section pea-green; or sumerg	SCORE urginal ble cloudiness a time; objects apth 0.5-1.5 ft; hs may appear	Very turbid the time; ob slow moving other obvio algal mats, s	Poor or muddy appe jects visible to g water may be us water pollut urface scum, s	earance most depth <0.5 ft; b bright-green; tants; floating sheen or heavy	
VATE	R APPE	Very clear objects visi if slightly of surface	Optimal, or clear but ible at depth colored); no oe; no noticeab	tea-colored; 3-6 feet (less oil sheen on ale film on	7 CON Occasional storm ev objects visi have slig	NDITION C/ Suboptima ly cloudy, es rent, but clea ble at depth shtly green co	ATEGORY (III) pecially after rrs rapidly; 1.5-3 ft; may plor; no oil	GRADE or S Ma Considerat most of the visible to de slow section pea-green; or sumerg	SCORE Irginal ole cloudiness time; objects epth 0.5-1.5 ft; ns may appear bottom rocks ged objected	Very turbid the time; ob slow moving other obvio algal mats, s	Poor or muddy appr jects visible to g water may be us water pollut urface scum, s am on surface.	earance most depth <0.5 ft; b bright-green; tants; floating sheen or heavy	
VATE	R APPE	Very clear objects visi if slightly of surface	Optimal, or clear but ible at depth colored); no oe; no noticeab	tea-colored; 3-6 feet (less oil sheen on ale film on	7 CON Occasional storm ev objects visi have slig	NDITION C/ Suboptima ly cloudy, es rent, but clea ble at depth shtly green co	ATEGORY (III) pecially after rrs rapidly; 1.5-3 ft; may plor; no oil	GRADE or S Ma Considerat most of the visible to de slow section pea-green; or sumerg	SCORE Irginal ole cloudiness time; objects epth 0.5-1.5 ft; ns may appear bottom rocks ged objected	Very turbid the time; ob slow moving other obvio algal mats, s	Poor or muddy appr jects visible to g water may be us water pollut urface scum, s am on surface.	earance most depth <0.5 ft; b bright-green; tants; floating sheen or heavy	
WATE	ER APPE	Very clear objects visi if slightly of surface	Optimal, or clear but ible at depth colored); no oe; no noticeab	tea-colored; 3-6 feet (less oil sheen on ale film on	7 CON Occasional storm ev objects visi have slig	NDITION C/ Suboptima ly cloudy, es rent, but clea ble at depth shtly green co	ATEGORY (III) pecially after rrs rapidly; 1.5-3 ft; may plor; no oil	GRADE or S Ma Considerat most of the visible to de slow section pea-green; or sumerg	SCORE Irginal ole cloudiness time; objects epth 0.5-1.5 ft; ns may appear bottom rocks ged objected	Very turbid the time; ob slow moving other obvio algal mats, s	Poor or muddy appr jects visible to g water may be us water pollut urface scum, s am on surface.	earance most depth <0.5 ft; b bright-green; tants; floating sheen or heavy	0
WATE Water	er Clarity	Very clear objects visi if slightly surface subme	9 Clarity or V Optimal , or clear but ible at depth colored); no o e; no noticeab rged objects	tea-colored; 3-6 feet (less oil sheen on le film on or rocks.	CON Occasional storm ev objects visi have slig sheei	NDITION C/ Suboptima ly cloudy, es rent, but clea ble at depth phtly green co n on water st	ATEGORY (III) pecially after rs rapidly; 1.5-3 ft; may polor; no oil urface.	GRADE or S Ma Considerat most of the visible to de slow sectior pea-green; or sumer covered	3 SCORE Irginal lole cloudiness time; objects pepth 0.5-1.5 ft; ns may appear bottom rocks ged objected d with film.	Very turbid the time; ob slow moving other obvio algal mats, s coat of foa	Poor or muddy appe jects visible to g water may be us water pollut urface scum, s am on surface. zero.	earance most depth <0.5 ft; bright-green; lants; floating sheen or heavy No water =	
WATE Water	er Clarity	Very clear objects visi if slightly surface subme	9 Clarity or V Optimal , or clear but ible at depth colored); no o e; no noticeab rged objects	tea-colored; 3-6 feet (less bil sheen on le film on or rocks.	CON Occasional storm ev objects visi have slig sheel	NDITION C/ Suboptima ly cloudy, es rent, but clea ble at depth shtty green con n on water su	ATEGORY (III) pecially after rs rapidly; 1.5-3 ft; may olor; no oil urface.	GRADE or S Ma Considerat most of the visible to de slow section pea-green; or sumer covered	3 SCORE Irginal ble cloudiness time; objects pepth 0.5-1.5 ft; sn may appear bottom rocks ged objected d with film.	Very turbid the time; ob slow moving other obvio algal mats, s coat of foa	Poor or muddy appe jects visible to g water may be us water pollut urface scum, s am on surface. zero.	earance most depth <0.5 ft; bright-green; lants; floating sheen or heavy No water =	
WATE Water	er Clarity	Very clear objects visi if slightly surface subme	9 Clarity or V Optimal , or clear but ible at depth colored); no circleat rged objects 9 C VEGETA	tea-colored; 3-6 feet (less oil sheen on le film on or rocks.	CON Occasional storm ev objects visi have slig sheel	NDITION C/ Suboptima ly cloudy, es rent, but clea beth to the clean high type on control on water so 6 ercent Cove	ATEGORY (III) III pecially after rs rapidly; 1.5-3 ft; may loor; no oil urface.	GRADE or S Ma Considerat most of the visible to de slow section pea-green; or sumer covered 4	3 SCORE Irginal ole cloudiness time; objects epth 0.5-1.5 ft; sns may appear bottom rocks ged objected d with film. 3 SCORE	Very turbid the time; ob slow moving other obvio algal mats, s coat of foa	Poor or muddy apper jects visible to go water may gwater may be us water pollut urface scum, s am on surface. zero.	earance most depth <0.5 ft; bright-green; lants; floating sheen or heavy No water =	
WATE Water	er Clarity	Very clear objects visit if slightly surface subme	Optimal , or clear but ible at depth colored); no of clear ged objects	tea-colored; 3-6 feet (less oil sheen on lee film on or rocks.	Occasional storm ev objects visi have slig sheel	Suboptima by cloudy, es ent, but clea ble at depth phty green can on water st 6 ercent Cove	5 ATEGORY (III) II pecially after rs rapidly; 1.5-3 ft; may olor; no oil urface.	GRADE or S Ma Considerat most of the visible to de slow section pea-green; or sumer covered 4 GRADE or S Ma	3 SCORE Irrginal ole cloudiness e time; objects opth 0.5-1.5 ft; sn may appear bottom rocks ged objected d with film. 3 SCORE Irrginal	Very turbid the time; ob slow moving other obvio algal mats, s coat of foa	Poor or muddy appejects visible to g water may be us water pollut urface scum, s am on surface. zero.	earance most depth <0.5 ft; bright-green; lants; floating sheen or heavy No water =	
WATE Water	er Clarity ENCE OF	Very clear objects visit if slightly surface subme	9 Clarity or V Optimal , or clear but ible at depth colored); no circleat rged objects 9 C VEGETA	tea-colored; 3-6 feet (less oil sheen on le film on or rocks.	CON Occasional storm ev objects visi have slig sheel 7 ence and Pe	Suboptima by cloudy, es ent, but clea ble at depth phty green can on water st 6 ercent Cove	ATEGORY (II pecially after rrs rapidly; 1.5-3 ft; may olor; no oil urface. 5 prage ATEGORY (II pecially after proper a proper service of the servic	GRADE or S Ma Considerat most of the visible to de slow section pea-green; or sumer covered 4 GRADE or S Ma GREENISH Wa Greenish wa reach; overale	3 SCORE urginal ble cloudiness time; objects epith 0.5-1.5 ft; sn may appear bottom rocks ged objected d with film. 3 SCORE urginal titer along entire pundance of lush	Very turbid the time; ob slow moving other obvio algal mats, s coat of for	Poor or muddy appeiets visible to go water may be us water pollut urface scum, s am on surface. zero.	earance most depth <0.5 ft; bright-green; cants; floating sheen or heavy No water =	
Water Water Grade PRESI	er Clarity	Very clear objects visit if slightly of surface subme	Optimal , or clear but ible at depth colored); no gen objects 9 C VEGETA Optimal ater along en low quantati	tea-colored; 3-6 feet (less oil sheen on lee film on or rocks. 8 FION: Prese tire reach; community es of many	CON Occasional storm ev objects visi have slig sheel 7 ence and Pe	NDITION C/Suboptima ly cloudy, escent, but cleable at depth ghtly green con on water state of the control of th	ATEGORY (II pecially after rs rapidly; 1.5-3 ft; may plor; no oil urface. 5 prage ATEGORY (II	GRADE or S Ma Considerat most of the visible to de slow section pea-green; or sumer covered 4 GRADE or S Ma Greenish wa green macrop;	3 SCORE Irrginal ole cloudiness e time; objects opth 0.5-1.5 ft; sn may appear bottom rocks ged objected d with film. 3 SCORE Irginal terunal congentire sundance of lush ohytes; abundant	Very turbid the time; ob slow moving other obvio algal mats, s coat of foa	Poor or muddy appejects visible to gwater may be us water pollut urface scum, s am on surface. zero.	earance most depth <0.5 ft; bright-green; lants; floating sheen or heavy No water =	
Water Water Grade PRESI	er Clarity ENCE OF	Very clear objects visi if slightly surface subme	Optimal , or clear but ible at depth colored); no e;no noticeat rged objects 9 C VEGETA Optimal ater along en aquatic plant low quantatif	tea-colored; 3-6 feet (less oil sheen on le film on or rocks. 8 FION: Prese tire reach; community se of many s; little algal	CON Occasional storm ev objects visi have slig sheel 7 ence and Pe	6 Suboptima ly cloudy, escent, but clea ble at depth shitly green con on water so 6 ercent Cove NDITION C/ Suboptima or slightly gre re reach; mo	ATEGORY (II pecially after rs rapidly; 1.5-3 ft; may plor; no oil urface. 5 prage ATEGORY (II	GRADE or S Ma Considerat most of the visible to de slow section pea-green; or sumerg covered 4 GRADE or S Ma Greenish wa reach; overat green macrog algal grow	3 SCORE urginal ble cloudiness time; objects epith 0.5-1.5 ft; sn may appear bottom rocks ged objected d with film. 3 SCORE urginal titer along entire pundance of lush	Very turbid the time; ob, slow moving other obvio algal mats, s coat of for 2 Pea green, entire macrophyte blooms created.	Poor or muddy appeiets visible to go water may be us water pollut urface scum, s am on surface. zero.	earance most depth <0.5 ft; bright-green; tants; floating sheen or heavy No water =	
Water Grade PRESI	er Clarity ENCE OF	Very clear objects visi if slightly surface subme	Optimal , or clear but ible at depth colored); no gen objects 9 C VEGETA Optimal ater along en low quantati	tea-colored; 3-6 feet (less oil sheen on le film on or rocks. 8 FION: Prese tire reach; community se of many s; little algal	CON Occasional storm ev objects visi have slig sheel 7 ence and Pe	6 Suboptima ly cloudy, escent, but clea ble at depth shitly green con on water so 6 ercent Cove NDITION C/ Suboptima or slightly gre re reach; mo	ATEGORY (II pecially after rs rapidly; 1.5-3 ft; may plor; no oil urface. 5 prage ATEGORY (II	GRADE or S Ma Considerat most of the visible to de slow section pea-green; or sumerg covered 4 GRADE or S Ma Greenish wa reach; overat green macrog algal grow	3 SCORE Irrginal Dele cloudiness time; objects epith 0.5-1.5 ft; sns may appear bottom rocks ged objected d with film. 3 SCORE Irrginal Iter along entire bundance of lush obytes; abundant th, especially	Very turbid the time; ob slow moving other obvio algal mats, s coat of for 2 Pea green, entire macrophyte blooms crea	Poor or muddy appejects visible to g water may be use water pollut urface scum, s am on surface. zero.	earance most depth <0.5 ft; bright-green; lants; floating sheen or heavy No water = 0	
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Water Water Water RESI 3a. N Enric	er Clarity SENCE OF Nutrient chment	Very clear objects visi if slightly surface subme	Optimal	tea-colored; 3-6 feet (less oil sheen on le film on or rocks. 8 FION: Prese tire reach; community es of many s; little algal nt. 8	7 CON Occasional storm ev objects visi have slig sheel 7 conce and Pe CON Fairly clear along entir growth 7 CON Algae do	6 NDITION C/ Suboptima ly cloudy, es ent, but clea ble at depth july green can n on water su 6 NDITION C/ Suboptima or slightly gr re reach; mo on stream su 6 NDITION C/ Suboptima	ATEGORY (II pecially after rrs rapidly; 1.5-3 ft; may olor; no oil urface. 5 ATEGORY (II eenish water derate algal ibstrates. 5 ATEGORY (II ols, larger	GRADE or S Ma Considerat most of the visible to de slow section pea-green; or sumere covered 4 GRADE or S Ma Greenish wa reach; overat green macrop algal grow during war 4 GRADE or S Ma Algal mats	3 SCORE striginal sole cloudiness at time; objects path 0.5-1.5 ft; sm any appear bottom rocks ged objected d with film. 3 SCORE striginal ster along entire pundance of lush ohytes; abundant th, especially mer months. 3 SCORE striginal	Very turbid the time; ob slow moving other obvio algal mats, s coat of foa 2 Pea green, entire macrophyte blooms crea or NO alga subst	Poor or muddy appeiets visible to g water may be us water pollut urface scum, s am on surface. zero. 1 Poor gray, or brown reach; dense ses clog stream; te thick algal in an epresent due rate. No water the chiral cover bott ininate the chiral cover better	earance most depth <0.5 ft; bright-green; lants; floating sheen or heavy No water = 0	
Water Water Water RESI 3a. N Enric	er Clarity BENCE OF Nutrient chment Or Aquatic	Very clear objects visi if slightly surface subme	Optimal , or clear but ible at depth colored); no e;no noticeat rged objects Optimal ater along en aquatic plant low quantati f macrophyte growth prese	tea-colored; 3-6 feet (less oil sheen on le film on or rocks. 8 FION: Prese tire reach; community es of many s; little algal nt. 8	7 CON Occasional storm ev objects visi have slig sheel 7 conce and Pe CON Fairly clear along entir growth 7 CON Algae do	6 NDITION C/ Suboptima ly cloudy, estent, but cleated to the clean to the cleated to the clean	ATEGORY (II pecially after rrs rapidly; 1.5-3 ft; may olor; no oil urface. 5 ATEGORY (II eenish water derate algal ibstrates. 5 ATEGORY (II ols, larger	GRADE or S Ma Considerat most of the visible to de slow section pea-green; or sumere covered 4 GRADE or S Ma Greenish wa reach; overat green macrop algal grow during war 4 GRADE or S Ma Algal mats	3 SCORE Irrginal lole cloudiness etime; objects epth 0.5-1.5 ft; has may appear bottom rocks ged objected d with film. 3 SCORE Irginal Iteration entire territorial territorial etimes and perfect of the second of	Very turbid the time; ob slow moving other obvio algal mats, s coat of foa 2 Pea green, entire macrophyte blooms crea or NO alga subst	Poor or muddy appei jects visible to g water may be us water pollut urface scum, s am on surface. zero. 1 Poor gray, or brown reach; dense s so clog stream; te thick algal n are present due rate. No water 1 Poor tts cover bott	earance most depth <0.5 ft; bright-green; lants; floating sheen or heavy No water = 0	

				CON	NDITION CA	ATEGORY (SRADE or S	CORE				F
		Optimal			Suboptima			rginal		Poor		e
		nsisting of le without sed			and wood so ebris without		debris; coa organic i	s or woody arse and fine matter with iment.	color and fo		at - black in erobic) or no to excessive	1 F
Grade	10	9	8	7	6	5	4	3	2	1	0	5
Grade (Left) Grade (Right) RIPARIAN ZOI 6a. Riparian Zone Width (from stream edge to field)	Undisturbe pristine nati	Optimal ed, consistin ve prairie, ar wetlands.	g of forest, nd/or natural 8 8 7 7 8 8 8 7 8 8 8 7 8 8 8 8 8 8 8	Perman-woodlots 7 7 Width of ripa 1 active char grasses), hur	Suboptima ent pasture n and swamp: crops 6 6 6 NDITION C/ Suboptima rian zone 12-1 nnel width w/tr man activities I impacted zone	Inixed with s, few row 5 5 8 MATEGORY (I 8 meters (1/2-ses, shrubs, or nave minimally	Mixed rov pasture; sr areas may b as isolate 4 4 4 4 GRADE or S Ma Width of ripe meters (1, channel wic hand)	rginal v crops and ome wooded be present but ed patches 3 3	2 2 Width of ripa vegation le width), little	Poor lainly row cro	0 0 Avg.Score	5 5 5 5 8 1 8 8 8 8 8
· /	10	9	8	7	6	5	4	3	2	1	0	7
· /	10 10	9	8	7	6	5 5	4	3	2 2	1	0	7
· /				7	6	5	4	3				7 7 7
· /		9		7	6 NDITION C	5 ATEGORY (4 GRADE or S	3 SCORE		1	0	7 7 7
6b. Riparian Zone Vegetation Protection/	>90% plant shrubs, prairi riparian zon		8 sture trees or marsh plants, ruption from	7 CON 75-90% stre young specie trees behi	6 NDITION CA Suboptima eambank vege	5 ATEGORY (I tation, mixed nel and mature evident with	ABRADE or S Ma 50-75% s vegetation of and sparse shrub spe frequent wit	3	Less than 5 coverage c grasses, fe density; ban	Poor 0% streambar onsisting mos w trees & shru	0 Avg.Score nk vegetation titly of pasture ubs; low plant ed with gullies	7 7 7
Grade (Right) 6b. Riparian Zone Vegetation Protection/ Completeness	>90% plant shrubs, prairi riparian zon	Optimal density of made grasses, or the intact or dis	8 sture trees or marsh plants, ruption from	7 CON 75-90% stre young specie trees behi	6 NDITION CA Suboptima eambank vege es along chann nd; disruption curring at inter	5 ATEGORY (I tation, mixed nel and mature evident with	ABRADE or S Ma 50-75% s vegetation of and sparse shrub spe frequent wit	GCORE rginal streambank mixed grasses young tree or cies; breaks h some gullies	Less than 5 coverage c grasses, fe density; ban	Poor 0% streambar onsisting mos w trees & shruk deeply scarr	0 Avg.Score nk vegetation titly of pasture ubs; low plant ed with gullies	7 7 7 8 6 1 8 7
6b. Riparian Zone Vegetation Protection/Completeness	>90% plant shrubs, prairi riparian zon grazii	9 Optimal density of ma ice grasses, or lee intact or disng/mowing mi	8 ture trees or marsh plants, ruption from nimal.	7 CON 75-90% strr young specie trees behir breaks oc	6 NDITION C/ Suboptima sambank vege sea along chanr nd; disruption ocurring at inter meters.	5 ATEGORY (I tation, mixed wel and mature evident with vals of >50	4 GRADE or S Ma 50-75%: vegetation of and sparse shrub spe frequent wit and scars ev	3 CCORE rginal streambank mixed grasses young tree or cies; breaks h some gullies very 50 meters.	Less than 5 coverage c grasses, fe density; ban al	Poor 0% streambal onsisting mos w trees & shruk k deeply scarr I along its leng	O Avg.Score nk vegetation tity of pasture ubs; low plant ed with gullies gth.	7 7 7 8 6 1 F 6 1
Zone Vegetation	>90% plant shrubs, prairi riparian zor grazii	Optimal density of ma e grasses, or le intact or dis ng/mowing mi	8 uture trees or marsh plants, ruption from nimal.	7 CON 75-90% stre young specie trees behi breaks oc	6 NDITION C/ Suboptima sambank vege se along chann d; disruption curring at inter meters. 6 6 6	5 ATEGORY (I I tation, mixed nel and mature evident with vals of >50	4 GRADE or S Ma 50-75%: vegetation of and sparse shrub spe frequent wit and scars ev	3 GCORE rginal streambank mixed grasses young tree or cies; breaks h some gullies very 50 meters.	Less than 5 coverage c grasses, fe density; ban al	Poor 0% streambai onsisting mos w trees & shr. I along its leng	O Avg.Score nk vegetation the vegetation the vegetation that the vegetation that the vegetation that the vegetation that the vegetation of the vegetation o	7 7 7 7 8 6 1 8 9 1 8 1 8 8 1 8 8 1 8 1 8 1 8 1 8 1

SCORE		39	N8-TRIE		
	Ephemeral	Intermittent	Intermittent w/ Perennial Pools	ME Perennial	FLOW REGII TYPE
	2 1 0	4 3	7 6 5	10 9 8	Grade
				SUBSTRATE/AVAILABLE COVER	EPIFAUNAL
	Poor Less than 10% habitat features	Marginal Within stream bed, 10-30%	Suboptimal Within stream bed, 30-50% coverage	Optimal Within stream bed, greater than 50%	
	present; lack of habitat is obvious; substrate unstable or lacking; concrete lined channels. Habitat features and pools buried or lacking, channel bottom may be flat.	coverage by stable habitat features favorable for stream faunal colonization and/or fish/amphibian cover; habitat availability may be less than desirable, substrate may be frequently disturbed. (See Excellent Category for habitat feature components.)	by stable habital features favorable for stream faunal colonization and/or fist/amphibian cover. Many habital features not transient. (See Excellent Category for habitat feature components.)	coverage by stable habitat features, favorable for stream faunal colonization and/or fish/amphibian cover. Most habitat features non transient. Features may include snags, submerged logs, undercut banks, roots, cobble, rocks, persistent leaf packs, pools and glides, or other stable habitat at a stage to allow colonization	Some features present but no water.
				40	
	2 1 0	4 3	7 6 5	10 9 8	Grade
	Door	Marsinal	naracterization Suboptimal	OTTOM SUBSTRATE: Pool Substrate C	STREAM BO
	Poor Hard pan clay or bedrock; no root mat or submerged vegetation.	Marginal All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegatation present.	Optimal Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	
	2 1 0	4 3	7 6 5	10 9 8	Grade
				ADII ITV	POOL VARIA
	Poor	Marginal	Suboptimal	Optimal	POOL VARIA
	Majority of pools small-shallow or pools absent	Shallow pools much more prevalent than deep pools	Majority of pools large-deep; very few shallow.	Even mix of large-shallow, large-deep, small shallow, small-deep pools present	
	2 1 0	4 3	7 6 5	10 9 8	Grade
	Poor	Marginal	Suboptimal	DEPOSITION/SCOURING Optimal	SEDIMENT D
•	More than 50% of the bottom in a state of flux or change nearly yearlong. Pools minimal or absent due to heavy deposition or excessive scouring.	30-50% affected by scour or deposition. Deposits and scour at	5-30% affected by scour or deposition; Scour at constrictions and wehre grades steepen. Some deposition in pools	<5% of channel bottom affected by scour or deposition.	
	2 1 0	4 3	7 6 5	10 9 8	Grade
				LOW STATUS	CHANNEL FI
1	Poor	Marginal	Suboptimal	Optimal	
	Very little water in the channel and mostly present in standing pools; or stream is dry	Water fills 25-75% of the available channel and/or riffle substrates are mostly exposed	Water fills >75% of the channel; or <25% of channel substrate is exposed	Water reaches the base of both lower banks; <5% of channel substrate is exposed	
	2 1 0	4 3	7 6 5	10 9 8	Grade CHANNEL A
	Poor	Marginal	Suboptimal	Optimal	CHAINNEL A
	Banks shored with gabion, riprap, or concrete. Concrete or riprap lined channels. Instream habitat significantly altered by stormwater or	Alteration or channelization may be extensive; embankments (including spoil piles) or shoring structures present on both	Some alteration or channelization present, usually adjacent to structures, (such as bridge abutments or culverts); evidence of past alteration, (I.e., channelization) may be present, but stream pattern and	Channelization, alteration, or dredging absent or minimal; normal and stable stream meander pattern. Alteration by stormwater inputs absent or minimal	
	other inputs. Over 80% of the stream reach altered.	banks; normal stable stream meander pattern has not recovered. Alteration from stormwater inputs may be extensive. 40-80% of stream reach altered.	stability have recovered; recent alteration is not present. Minor alteration from stormwater or other inputs.		
		meander pattern has not recovered. Alteration from stormwater inputs may be extensive. 40-80% of stream	stability have recovered; recent alteration is not present. Minor alteration from stormwater or other	10 9 8	Grade

8															
Ü		CHANNEL S		Optimal			Suboptima	al	Mar	ginal		Poor			
			The bends in the s		se the stream	The bends		increase the		n the stream	Channel str	aight; waterw	ay has been	İ	Barbour, e
			length 3 to 4 times			stream leng	th 2 to 3 time	es longer than		eam 1 to 2 times		zed for a long		İ	al. 1999
			straight line. (N			if it w	as in a straig	ht line.		was in a straight			l.	İ	RBA #7b;
			considered norm						li	ne			l.	İ	Parsons,
			other low-lying are										l.	İ	et al., 200
			easily rate	d in these ar	eas).								l.	İ	AUSRIVAS
													I.		
													I.		
													I.		
		Grade	10	9	8	7	6	5	4	3	2	1	0	2	
		Ordao				· · ·						L			
9	9	BANK STAB	ILITY (SCORE E	ACH BANK)										
				Optimal			Suboptima	al	Mar	ginal		Poor	-		
			Banks stable; evi		sion or bank	Moderately	y stable; infre			stable; perennial	Unstable; i	no perennial v	egetation at	İ	Barbour, et
			failure absent or				osion mostly			vaterline sparse		; severe erosi			al. 1999
			affected), perenni				ank in reach			d or stripped by		cently exposed			RBA #8;
			no raw or undercu outside of meande				erosion and/), bank held by (trees, rock		tree falls and/ t trees comm			Parsons,
			exposed roots				in most plac			d eroded back		eas; "raw" are			et al., 2001
						exposed tr	ee roots rare	but present.		-60% of bank in		ight sections			AUSRIVAS
										s of erosion and		nk sloughing;			; USACE
										utting; recently	bank	has erosional	scars.		Norfolk
										ots and fine root n; high erosion			I.		District, 2004 SAM
										uring floods			I.		#3; Scholz
										•			I.		and Booth
		1				1			l				l	ĺ	from
		1				1			l				l	ĺ	Henshaw,
		Grade	10	9	8	7	6	5	4	3	2	1	0	0	
		Grade	10	9	8	7	6	5	4	3	2	1	0	0	
			•	•					•	•	•	Avg.Score		0	
														ĺ	Ī
10	10	VEGETATIV	E PROTECTION	(SCORE E	ACH BANK)								1	
				Optimal			Suboptima			ginal		Poor		l	
			More than 90% of				the streamb			e streambank		50% of the s			Barbour, et
			and immediate ri					ation, but one		ed by vegetation;		covered by v			al. 1999
			native vegetation,					l-represented; t affecting full		ous; patches of osely cropped		f streambank h; vegetation			RBA #9;
			shrubs, or nor vegetative disru				vth potential			nmon; less than		o 5 centimete			Parsons,
			mowing minimal				ore than one			potential plant		age stubble h			et al., 2001
			plants allowe				al plant stubb			ht remaining.		•	Ü		AUSRIVAS
							remaining.						I.		; KDWP
													I.		2000;
														i	Petersen,
		Grade	10	9	8	7	6	5	4	3	2	1	0	6	
		Grade	10	9	8	7	6	5	4	3	2	1	0	6	
												Avg.Score	<u> </u>	6	
		DIDABIANT												i	
11	11	NIFANIAN Z	ONE (SCORE EA			1	Cubantim		Mor	ain al	ı	Door			
11	11	NIFARIAN 2	(Optimal		Width of rin	Suboptima			ginal	Width of rip	Poor	meters: little		Parhour o
11	11	KIFAKIAN Z	Width of riparian	Optimal zone >18 me	eters; human		oarian zone 1	2-18 meters;	Width of ripa	rian zone 6-12		arian zone <6			
11	11	NIFANIAN Z	(Optimal zone >18 me king lots, road	eters; human dbeds, clear-	human acti	oarian zone 1	2-18 meters; npacted zone	Width of ripa meters; humar		or no rip		ion due to		al., 1999
11	11	NEANIAN Z	Width of riparian activities (I.e., parl	Optimal zone >18 me king lots, road	eters; human dbeds, clear-	human acti	oarian zone 1 vities have in	2-18 meters; npacted zone	Width of ripa meters; humar	rian zone 6-12 n activities have	or no rip	arian zone <6 arian vegetati	ion due to		al., 1999 RBA #10;
11	11	KIFANIAN Z	Width of riparian activities (I.e., parl	Optimal zone >18 me king lots, road rops) have no	eters; human dbeds, clear-	human acti	oarian zone 1 vities have in	2-18 meters; npacted zone	Width of ripa meters; humar	rian zone 6-12 n activities have	or no rip	arian zone <6 arian vegetati	ion due to		al., 1999 RBA #10; Parsons,
11	11	NIFANIAN Z	Width of riparian activities (I.e., parl	Optimal zone >18 me king lots, road rops) have no	eters; human dbeds, clear-	human acti	oarian zone 1 vities have in	2-18 meters; npacted zone	Width of ripa meters; humar	rian zone 6-12 n activities have	or no rip	arian zone <6 arian vegetati	ion due to		al., 1999 RBA #10; Parsons, et al., 2001
11	11		Width of riparian activities (I.e., pari cuts, lawns, or ci	Optimal zone >18 me king lots, road rops) have no zone.	eters; human dbeds, clear- ot impacted	human acti	parian zone 1 vities have in only minimall	2-18 meters; npacted zone y).	Width of ripa meters; humar impacted zon	rian zone 6-12 n activities have e a great deal.	or no rip	arian zone <6 arian vegetati	ion due to	7	al., 1999 RBA #10; Parsons, et al., 2001
11	11	Grade	Width of riparian activities (I.e., part cuts, lawns, or co	Optimal zone >18 me king lots, road rops) have no zone.	eters; human dbeds, clear- ot impacted	human acti	parian zone 1 vities have in only minimall	2-18 meters; npacted zone y).	Width of ripa meters; humar	rian zone 6-12 n activities have e a great deal.	or no rip	arian zone <6 arian vegetati	ion due to es.	7 7	al., 1999 RBA #10; Parsons, et al., 2001 AUSRIVAS
11	11		Width of riparian activities (I.e., pari cuts, lawns, or ci	Optimal zone >18 me king lots, road rops) have no zone.	eters; human dbeds, clear- ot impacted	human acti	parian zone 1 vities have in only minimall	2-18 meters; npacted zone y).	Width of ripal meters; humal impacted zon	rian zone 6-12 n activities have e a great deal.	or no rip	arian zone <6 arian vegetati uman activitie 1 1	on due to es.	7 7 7 7	al., 1999 RBA #10; Parsons, et al., 2001 AUSRIVAS
11	11	Grade	Width of riparian activities (I.e., part cuts, lawns, or co	Optimal zone >18 me king lots, road rops) have no zone.	eters; human dbeds, clear- ot impacted	human acti	parian zone 1 vities have in only minimall	2-18 meters; npacted zone y).	Width of ripal meters; humal impacted zon	rian zone 6-12 n activities have e a great deal.	or no rip	arian zone <6 arian vegetati	on due to es.		al., 1999 RBA #10; Parsons, et al., 2001 AUSRIVAS
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		Grade Grade	Width of riparian activities (i.e., pari cuts, lawns, or cuts, lawns, l	Optimal zone >18 me kirops) have no zone. 9 9 9 ION (SCOR Optimal h-3 inches) p	eters; human dbeds, clear- ot impacted 8 8 RE EACH B/	human acti	oarian zone 1 vities have in only minimall 6 6 6 Suboptima m (dbh>3 ind	2-18 meters; npacted zone y). 5 5 5 hhes) present,	Width of ripal meters; human impacted zon	rian zone 6-12 nactivities have e a great deal. 3 3 ginal (dbh>3 inches)	or no rip	arian zone <6 arian vegetati uman activitie 1 1 Avg.Score Poor utum absent; i	0 0 mpervious		al., 1999 RBA #10; Parsons, et al., 2001 AUSRIVAS
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		Grade Grade	Width of riparian activities (i.e., pari cuts, lawns, or ci	Optimal Zone > 18 me king lots, roat opps have no zone. 9 9 9 ION (SCOF Optimal h-3 inches) p cover. (Add clude: sapling clud	eters; human dbeds, clear-ot impacted 8 8 8	ANK) Tree stratu with 30% to (See Excell)	Suboptima (dbh-3 ind o 60% tree o cent Category	2-18 meters; pacted zone y). 5 5 slate thes) present, anopy cover, for examples	Width of ripal meters; human impacted zon 4 4 4 4 Tree stratum present, with < cover. (See Ex co	rian zone 6-12 activities have e a great deal. 3 3 ginal (dbh>s inches) 30% tree canopy cellent Category	or no rip	arian zone <6 arian vegetati uman activitie 1 1 1 Avg.Score Poor utum absent; i roplands, min d streams, me	0 0 0 mpervious e spoil lands, owed and		al., 1999 RBA #10; Parsons, et al., 2001 AUSRIVAS Norfolk SAAM Form 1
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		Grade Grade	Width of riparian activities (I.e., pari cuts, lawns, or ci	Optimal Zone > 18 me king lots, road or ops) have no zone. 9 9 ON (SCOF Optimal h>3 inches) p over. (Adducted sapling and leaf litter d woody det d woody d woody det d woody d woody d woody d woody d woody d woody d woody d woody d woody d woody d woody	eters; human dbeds, clear- ot impacted 8 8 8 BE EACH B/ present, with ditional forest g, shrub, including info; Score at	7 7 7 ANK) Tree stratu with 30% to (See Excell of addition: the high of	sarian zone 1 vities have in only minimall 6 6 6 Suboptima m (dbh-3 inc o 60% tree cent Category al forest laye end of Good	2-18 meters; ppacted zone y). 5 5 5 hes) present, anopy cover. for examples rs., Score at range if 52	Width of ripal meters; humai impacted zon impacted zon 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	ginal gone 6-12 n activities have e a great deal. 3 3 3 3 ginal (dbh>3 inches) anow tree canopy cellent Category additional forest the high end of	or no rip	arian zone <6 arian vegetati uman activitie 1 1 Avg.Score Poor tum absent; i roplands, min- d streams, m- ed herbaceo surfaces, activ	on due to es. O O O Impervious e spoil lands, owed and usus areas, vely grazed		al., 1999 RBA #10; Parsons, et al., 2001 AUSRIVAS Norfolk SAAM Form 1
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		Grade Grade RIPARIAN H Grade 1. Delineate 2. Determin 3. Enter the	Width of riparian activities (Le, pari cuts, lawns, or cuts, lawns, law	Optimal Core >18 me In glots, roar Cops) have no Sone. 9 9 ION (SCOF Optimal Nos anches) p Cover. (Add Clude: saplin and leaf littler d woody det f Excellent re are present. Donal layers ar g or or of re Teld Optimal	eters, human ubeds, clear- timpacted 8 8 8 RE EACH B/ Dresent, with ditional forest g, including pris.) Score at ange if ≥2 Score at low e present.	ANK) Tree stratu with 30% to (See Excell of additional Score at low layers are pwith of conditions).	sarian zone 1 vities have in only minimall only minimall only minimall only minimall only minimall only minimall only minimall only minimall only minimal only mi	2-18 meters; npacted zone y). 5 5 5 1 hes) present, anopy cover. for examples rs. Score at range if ≥2 are present. Idditional fores zutover areas aining.	Width of ripa meters; humai impacted zon meters; humai impacted zon 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	ginal consection and	or no rip 2 2 2 Tree strr surfaces, c culverte maintai denuded f 2 e descriptor ed for this. e blocks b	arian zone - Sa arian vegetati uman activitie uman activitie 1 1 1 Avg. Score Poor titum absent; it opplands, mind distreams, med herbacee surfaces, activasture, and e	mpervious e spoil land well of the spoil of the spoil and spoil of the spoil and spoil of the sp	7 7 7	al., 1999 RBA #10; Parsons, et al., 2001 AUSRIVAS Norfolk SAAM Form 1
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		Grade Grade RIPARIAN H Grade 1. Delineate 2. Determin 3. Enter the	Width of riparian activities (i.e., pari cuts, lawns, or cuts, lawns, l	Optimal Cone > 18 me Graph (Stope of the Cone)	eters, human dheds, clear- the timpacted at magnetic timpacted at 8 8 RE EACH B/ Diresent, with ditional forest g, shrub, including oris.) Score at including oris.) Score at low re present. 8 8 8 8 8 8 8 8 8 8 8 8 8	ANK) Tree stratu with 30% to (See Excell of additional Score at low layers are pwith of conditions).	sarian zone 1 vities have in only minimall only minimall only minimall only minimall only minimall only minimall only minimall only minimal only min	2-18 meters; npacted zone y). 5 5 5 1 hes) present, anopy cover. for examples rs. Score at range if ≥2 are present. Idditional fores zutover areas aining.	Width of ripal meters; humai impacted zon impacted zon 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	ginal zone 6-12 nactivities have e a great deal. 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	Tree strasurfaces, c culverte maintail denuded f 2 2 2 descriptor def for this. ne blocks b P	arian zone -65 arian vegetati urman activitie 1	mpervious e spoil lands, owed and us areas, vely grazed tc. 0	e sums of an Blocks il 100	al., 1999 RBA #10; Parsons, et al., 2001 AUSRIVAS Norfolk SAAM Form 1
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III. HABITAT FUNCTIONS

N8-TRIB9

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Record of Functional Assessment Results

Str	eam Function	nal Capacity C	alculation		
	N8-TRIB9)			
Date:	5/19/2006				
Project:	Lake Ralph H	all			
Assessment Area:	WP 18				
Assessors:	Holmes Voigh	nt Capps			
Project Status:	XPreproj	ect	Postproject		
		Stream	Stream	Multiplication	
Major Function Categories	FCI	Length (LF)*	Characterization	Factor**	FC
Hydrologic	0.1	935	E	0.00125	0.12
Water Quality Improvement	0.3	935	E	0.00125	0.35
Habitat	0.23	935	Е	0.00125	0.27
Total	0.63	935			0.74
*Stream Length is the length of the Stre **Multiplication Factors Ephemeral = 0.00125 Intermittent = 0.0025 Perennial = 0.0038	am Assessme	nt Reach (SAF	₹)		

Pasture outside of riparian zone. Rip zone 20m or less.





SWAMPIM DATASHE PRE-PROJECT	EETS – NORTH	EPHEMERAL 0	0.5 TO 2.0'
• N6-TRIB1-A3			

N6-TRIB1-A3 (N1-TRIB1-A3)

PARAMET	ER]		
		CONDITION CATEGORY GRADE or SCORE												
		Optimal		CON	Suboptima			ginal		Poor		1		
	Optimal Subspiring Harginal 1991													
Grade	10	9	8	7	6	5	4	3	2	1	0			

Pasture outside of riparian zone. Rip zone 5 to 10 meters or less. Some trees. WP 17 $\,$

FLOW REGIME	E:			•				(IB1-A3)					WD:::
TYPE		Perennial		Intermitte	ent w/ Pere	nnial Pools	Interi	mittent		Ephemera	.l		KDWP Kansas
Grade	10	9	8	7	6	5	4	3	2	1	0	0	Subjecti
CHANNEL CO	NDI FION:	Measureme	ent or Obser	rvation of S	tream Char	nnei Conditio	ons					4	
				CON	NDITION CA	ATEGORY (Barbour
	NI=2 - 12	Optimal		0	Suboptima			rginal	Ch.	Poor		4	EPA RB
		hannel; no str tion minimal.			annelization areas) or pas			hannel; 40- the reach		is actively dow >80% of the re		_	5-21; Newton
2a.Channel		utting or exces			on, but with s			elized or		ized. Degrada		Vat	USDA/ I
Condition/Alter		. Normal frequ			f channel be			d. Excess	levee	s prevent acce	ess to the	<u>Jra</u>	SVAP p
ation (natural,		ical connection nel and flood			e frequency vs onto flood			on; braided th excessive		floodplain.		a a	'
altered, or	Cilai	inei anu noou	аріані.	liov	vs office floor	piaii i.		of overbank				ative	
downcutting)								onto the				ο.	
								n. Historical ces or levees				OW	
								loodplain.				1001	
												Natural, active, downcutting	
0 ! .	40		1 0	_				1 0			1 0	•	
Grade	10	9	8	7	6	5	4	3	2	1	0	0	
2h Channal		Optimal		CON	NDITION CA Suboptima	ATEGORY (al		SCORE rginal		Poor		-	w/ assis
2b.Channel Capacity to		apacity to Flor			apacity to Flo	w Frequency	Channel	Capacity to		Capacity to Flo		1	Dr. Mike
Flow		ch that bank onts occur at a		Ratio is such that bank overflow from Flow Frequency Ratio is Ratio is such that bank overflow								Harvey	
Frequency		year frequenc			5 years or le			n events are		f year or less f			Travant
Ratio (for 2- year peak		0.75-1.25		tha	n every 2.5 y <0.75 or >1.2	ears.		quent than]	every 10 yea			
flow)					<0.75 01 >1.2	25		ear or less han every 5		<0.24 or >2	1		
,							ye	ars.					
						_		or >1.5					
Grade	10	9	8	7	6	5	4	3	2	1	0	0	
		Optimal		CON	NDITION CA Suboptima	ATEGORY C		SCORE rginal	ı	Poor			Newton USDA/
ŀ	Banks stab	ole; evidence	of erosion or	Moderately	y stable; infre			ly unstable;	Unstable	; no perennial	vegetation at	1	SVAP I
0- 0		e absent or m			osion mostly			egetation to		e; severe eros			10; Bar
2c.Channel Bank Stability		k affected), po n to waterline			ank in reach erosion and			parse (mainly r stripped by		ecently expose ; tree falls and			al., 199
(score each	undercut l	banks (some	erosion on	undercuttin	g; perennial	vegetation to	lateral ero	sion), bank	undercut t	rees common;	many eroded		RBA pa 26; USA
bank, left or		meander bene exposed roots			in most place ee roots rare			nard points ck outcrops)		raw" areas free ections and be			Norfolk
right facing	recently e	tree falls;	s, no recent	exposed in	ee 100ts rare	but present.		ded back		ghing; 60-1009			District,
downstream)								; 30-60% of		erosional sca	rs.		
								ch has areas n and bank					
								ing; recently					
								ee roots and					
Grade (Left)	10	9	8	7	6	5	4	airs common:	2	1	0	1	
Grade (Right)	10	9	8	7	6	5	4	3	2	1	0	1	
											Avg.Score	1	
CHANNEL ROL	UGHNESS	FACTORS	1										
				CON		ATEGORY (ı				Barboui
3a.Channel	The hends	Optimal in the stream	increase the	The hends	Suboptima in the stream	al increase the		rginal in the stream	Channel	Poor straight; waterv	vav has heen	-	EPA RE Chapter
Sinuosity	stream len	ngth 2.5 to 4 ti	imes longer	stream leng	gth 1.5 to 2.5	times longer	increase	the stream	channe	elized for a long	g distance.		5-25; K
(bends in low gradient		was straight.				ine. Channel		o 1.5 times	Channe	l length/valley	length < 1.0		1996
stream)	iength/val	illey length at	ı⊎ası >1.5.	iengtn/\	alley length	1.∠ 10 1.5		n if it was a ne. Channel					
<i>'</i>							length/valle	ey length 1.0					
Orode	40	T 0		7	1 ^	T -		1.2.		1 ,	1 0		
Grade	10	9	8	7	6	5	4	3	2	1 1	0	2	
		Optimal		CON	NDITION CA Suboptima	ATEGORY (SCORE rginal	1	Poor			KDWP, Kansas
		no channel en			vel bars of co	arse stones		ars of rocks,	Channel of	divided into bra	ids or stream	1	Subjecti
3b. Bottom		Ilting from sed		and well-wa	ashed debris	present, little		silt common;		elized; substra			Evaluati
Substrate Composition	accumul	lation; channe	ei is stable	sılt;	moderately	stable	moderate	ely unstable	sand, silt	, clay, or bedro	оск; unstable		Aquatic
Composition													Habitats
1							1					1	

20 Subspiring					COI		ATEGORY									KDWP, 199
Sc. Instream Bottom Topography Doubterlyarve, logistary book of bookins/grave, logistary book of bookins/grave, logistary book of bookins/grave, logistary book of bookins/grave, logistary book of bookins/grave, logistary book of bookins/grave, logistary book of bookins/grave, logistary book of bookins, vegetated shallows, corewash, underected basis, or side charmer pooks Doubt of bookins of book in the pook of book in the pook of book in the pook of book in the pook of book in the pook of the pook bottom of absent) Doubt of book of b																Newton et
CONDITION CATEGORY GRADE or SCORE Por	Bottom	>7 of the follo boulders/grave debris, back overhanging vegetated sh undercut bank	owing: dee el, logs/lai kwaters/o vegetatio hallows, ro iks, or side	rep pools, arge woody oxbows, on, riffles, ootwads,				includes < :	5 of the items n Optimal							1998 USDA/NRO SVAP page
Off Cyptimal Suboptimal Marginal Poor	Grade	10	9	8	7	6	5	4	3	2	T -	1		0	1	
Off Cyptimal Suboptimal Marginal Poor				•		IDITION O				•						
3c. Manning's n	or)ntimal		COI					ı	Dr	oor				
Manning's n Manning's n Manning's n)						0.16 to			eyress	ive		
3d. Channel		5.55	, 10 0.000			0.000 10 0.0				obstruction	n to flow elization a	or 0.0 and cl)1 to 0.	.02 due		
Optimal Suboptimal Marginal Poor Morfolk District, 20 SAAM For Channel slope >2%, Entrenchment ratio ≤1.4; where channel slope >2%, Entrenchment ratio ≤1.4; where channel slope >2%, Entrenchment ratio ≤1.4; where channel slope >2%, Entrenchment ratio ≥2.0 ≤2%,	Grade	10	9	8	7	6	5	4	3	2	,	1		0		
Optimal Suboptimal Marginal Poor Morfolk District, 20 SAAM For Channel slope >2%, Entrenchment ratio ≤1.4; where channel slope >2%, Entrenchment ratio ≤1.4; where channel slope >2%, Entrenchment ratio ≤1.4; where channel slope >2%, Entrenchment ratio ≥2.0 ≤2%,					COI	NDITION C	ATEGORY	GRADE or	SCORE							USACE,
Channel slope >2%; Entrenchment ratio >1.4; Where channel slope >2%; Entrenchment ratio >1.4; Where channel slope >2%; Entrenchment ratio >1.4; Where channel slope >2%; Entrenchment ratio >1.4; Where channel slope >2%; Entrenchment ratio >1.4; Where channel slope >2%; Entrenchment ratio >2.0																
TLB	Incision (TLB/BFD=BH R; 1/BHR*Adj	channel slope : ratio >1.4; Wh	>2%; Ent here chan	trenchment nnel slope	channel slope >2%, Entrenchment ratio >1.4; Where channel slope ≤2%, Entrenchment ratio >2.0			and Whe slope Entrench >1.4; Who slope	ere channel e > 2%, nment ratio ere channel e <2%,	slope >2% Whe	%, Entren	nchme nel slo	ent ration pe <2%	o <u><</u> 1.4; %,		Stream Geomorphi Assessmer
Dep and shallow pools abundant, greater than 30% of the pool bottom is obscure due to depth, or pools are at least 5 feet deep.	TIR=		10		BHR = 1											Tidac Z
DYNAMIC SURFACE WATER STORAGE						·										
Aa.Pools (abundant, present or absent) Grade 10 9 8 7 6 5 40 CONDITION CATEGORY GRADE or SCORE Marginal Poor Suboptimal Marginal Poor Suboptimal Pools present, but not abundant; greater than 30% of the pool bottom is obscure due to depth, or pools are at least 5 feet deep. Grade	Grade	10	9	8	7	6	5	4	3	2		1		0	1	
Aa.Pools Deep and shallow pools abundant; greater than 30% of the pool bottom is obscure due to depth, or pools are at least 5 feet deep. Pools present, but shallow; from 5-10% of the pool bottom is obscure due to depth, or pools are at least 3 feet deep. Pools present, but shallow; from 5-10% of the pool bottom is obscure due to depth, or pools are least than 3 feet deep. Pools present, but shallow; from 5-10% of the pool bottom is obscure due to depth, or the pools are less than 3 feet deep. Pools present, but shallow; from 5-10% of the pool bottom is obscure due to depth, or the pools are less than 3 feet deep. Pools absent, or the entire bottom is obscure due to depth, or the pool bottom is obscure	DYNAMIC SUF	FACE WATER	R STOR	AGE												
Aa.Pools Deep and shallow pools abundant; greater than 30% of the pool bottom is obscure due to depth, or pools are at least 5 feet deep. Pools present, but shallow; from 5-10% of the pool bottom is obscure due to depth, or pools are at least 3 feet deep. Pools present, but shallow; from 5-10% of the pool bottom is obscure due to depth, or pools are least than 3 feet deep. Pools present, but shallow; from 5-10% of the pool bottom is obscure due to depth, or the pools are less than 3 feet deep. Pools present, but shallow; from 5-10% of the pool bottom is obscure due to depth, or the pools are less than 3 feet deep. Pools absent, or the entire bottom is obscure due to depth, or the pool bottom is obscure					COI	NDITION C	ATEGORY	GRADE or	SCORE							Newton et
(abundant, present or absent) Grade 10 9 8 7 6 5 4 3 2 1 0 0 4b. Channel Flow Status (degree to which channel is filled) Grade 10 9 8 7 6 5 4 3 2 1 0 0 Grade Total Reaction of the pool bottom is obscure due to depth, or the pools are at least 3 feet deep. CONDITION CATEGORY GRADE or SCORE Flow Status (degree to which channel is filled) Grade 10 9 8 7 6 5 4 3 2 1 0 0 0 Grade 10 9 8 7 6 5 4 3 2 1 0 0 0 Water reaches base of both lower banks and minimal amount of channel substrate is exposed. Grade 10 9 8 7 6 5 4 3 2 1 0 0 0 Grade 10 9 8 7 6 5 4 3 2 1 0 0 0 Grade 10 9 8 7 6 5 4 3 2 1 0 0 0 Grade 10 9 8 7 6 5 4 3 2 1 0 0 0 Grade 10 9 8 7 6 5 4 3 2 1 0 0 0 Grade 10 9 8 7 6 5 4 3 2 1 0 0 0 Grade 10 9 8 7 6 5 4 3 2 1 0 0 0 Grade 10 9 8 7 6 5 4 3 2 1 0 0 0		0	ptimal								Po	oor				1998 USD
Grade		greater than 309 is obscure due to)% of the p to depth, o	pool bottom or pools are	from 10-3 obscure of	30% of the poly lue to depth,	ool bottom is or the pools	shallow; fro the pool obscure du	om 5-10% of I bottom is e to depth, or	discer						NRCS SV. page 14; <i>Barbour,</i> e
4b. Channel Flow Status (degree to which channel is filled) Grade CONDITION CATEGORY GRADE or SCORE Suboptimal Suboptimal Suboptimal Suboptimal Suboptimal Suboptimal Suboptimal Suboptimal Suboptimal Suboptimal Suboptimal Suboptimal Suboptimal Suboptimal Suboptimal Suboptimal Water fills 25-75% of the available channel, present as standing pools. No water = zero. Are mostly exposed. Grade 10 9 8 CONDITION CATEGORY GRADE or SCORE Marginal Water fills 25-75% of the available channel, and virifle substrates are mostly exposed. Are mostly exposed. Grade 10 9 8 Barbour, 6 1999 EPA RBA page A-9#5; TO 1999; VAN 2005	(abundant, present or							3 fee	t deep.							
Flow Status (degree to Water reaches base of both lower which channel is filled) Grade Optimal Suboptimal Suboptimal Suboptimal Marginal Marginal Marginal Poor Very little water in channel and mostly the available channel, and or iffle substrate is exposed. Suboptimal Water fills 25-75% of the available channel, and or iffle substrate is exposed. Grade 10 9 8 The fill of the available channel and mostly the available channel, and or iffle substrates are mostly exposed. Grade 10 9 8 The fill of the available channel and mostly the available channel, and or iffle substrates are mostly exposed. Grade 10 9 8 The fill of the available channel and mostly the available channel and mostly the available channel, and or iffle substrates are mostly exposed. Grade 10 9 8 8 8 8 9 9 9 9 9 9 9 9	(abundant, present or															
Flow Status (degree to Water reaches base of both lower which channel is filled) Grade Optimal Suboptimal Suboptimal Suboptimal Marginal Marginal Marginal Poor Very little water in channel and mostly the available channel, and or iffle substrate is exposed. Suboptimal Water fills 25-75% of the available channel, and or iffle substrate is exposed. Grade 10 9 8 The fill of the available channel and mostly the available channel, and or iffle substrates are mostly exposed. Grade 10 9 8 The fill of the available channel and mostly the available channel, and or iffle substrates are mostly exposed. Grade 10 9 8 The fill of the available channel and mostly the available channel and mostly the available channel, and or iffle substrates are mostly exposed. Grade 10 9 8 8 8 8 9 9 9 9 9 9 9 9	(abundant, present or absent)	10	9	8	7	6	5	4	3	2	1 .	1		0		
which channel is filled) banks and minimal amount of channel; or <25% of channel substrate is exposed. the available channel, and /or riffle substrates are mostly exposed. present as standing pools. No water = zero. RBA page /A-9#5; TO 1999; VAN 2005 Grade 10 9 8 7 6 5 4 3 2 1 0 0	(abundant, present or absent) Grade	10	9	8	ı	L	1	ı	···	2] ·	1		0	0	
Are mostly exposed. 1999; VAN Grade 10 9 8 7 6 5 4 3 2 1 0 0 2005	(abundant, present or absent) Grade 4b. Channel Flow Status	-	-	8	COI	NDITION C	ATEGORY al	GRADE or	SCORE rginal	2				0	0	Barbour, e
	(abundant, present or absent) Grade 4b. Channel Flow Status (degree to which channel	O Water reaches banks and m	Optimal s base of minimal ar	both lower	COI Water fil	NDITION C Suboptimals >75% of the	ATEGORY al ne available of channel	GRADE or Ma Water fills the availa	SCORE rginal s 25-75% of ble channel,	Very little	Powater in o	oor chann		mostly	<u> </u>	1999 EPA RBA page
Calculation of Function Capacity Index = Total Score/Total Possible Score 0.05	(abundant, present or absent) Grade 4b. Channel Flow Status (degree to which channel is filled)	O Water reaches banks and m channel subs	Optimal s base of minimal ar ostrate is e	both lower mount of exposed.	COI Water fil channe sub	NDITION C Suboptimals >75% of the contract of	ATEGORY al ne available of channel oosed.	GRADE or Ma Water fills the availa and /or riffl are most	SCORE rginal s 25-75% of ble channel, le substrates ly exposed.	Very little present as	Powater in o	oor chann g pool		mostly water =		1999 EPA RBA page /A-9#5; TC 1999; VAN
	(abundant, present or absent) Grade 4b. Channel Flow Status (degree to which channel is filled)	O Water reaches banks and m channel subs	Optimal s base of minimal ar ostrate is e	both lower mount of exposed.	COI Water fil channe sub	NDITION C Suboptimals >75% of the contract of	ATEGORY al ne available of channel oosed.	GRADE or Ma Water fills the availa and /or riffl are most	SCORE rginal s 25-75% of ble channel, le substrates ly exposed.	Very little present as	Powater in o	oor chann g pool		mostly water =		1999 EPA RBA page /A-9#5; TC 1999; VAN

I. HYDROLOGIC FUNCTIONS N6-TRIB1-A3 (N1-Trib1-A3) (0.5-2)

	TER QUALITY/E VARIABLES	BIOGEOCH	HEMICAL F	UNCTIONS		_		N6-TRIB1-	A3 (N1-TRIB	1-A3)			SCORE F
ŀ	TYPE												† l
	NOTES												_
1.	SEDIMENT TR	ANSPORT	/DEPOSITI	ON									1
					001	IDITION	**************************************	DADE C	0005				
	1a. Bank		Ontimal		CON		ATEGORY (Door		
	Stability	Ranks stah	Optimal	of erosion or	Moderately	Suboptima stable; infre			rginal unstable; 30-	I Instable: r	Poor nany eroded	areas: "raw"	6
	(score each		e absent or r			osion mostly			k in reach has		equently alor		ا ار
	bank, left or			ems. <5% of	5-30% of ba	ank in reach	has areas of		erosion; high		ind bends; ol		
	right facing		bank affecte	d.		erosion.			tential during		j; 60-100% c		p
	downstream)							110	ods.		rosional sca	15.	E
													ϵ
ŀ	Crade (Left)	10			7	6	-	4	2	2	1 1	0	1
-	Grade (Left) Grade (Right)	10 10	9	8	7	6	5 5	4	3	2	1	0	1
ŀ	Grade (Right)	10	3	0				7	3		1	Avg.Score	+ 1
┪												Avg.ocoic	- '
	ŀ				100	NDITION CA	ATEGORY (SRADE or S	CORE				
J	1b. Channel		Optimal			Suboptima			rginal		Poor		1
<u>e</u>	Bottom Bank		1/3 of bank is			1/3 of bank is	generally	Bottom 1/	3 of bank is		1/3 of bank is		v
iac	Stability	highly resi	istant plant/s	oil matrix or	resistant pla	ant/soil matri:	x or material.		ighly erodible		dible materia		
Var	J		material.						ant/soil matrix	matrix s	everely comp	promised.	F
One Variable								compi	romised.				١
Õ	Grade (Left)	10	9	8	7	6	5	4	3	2	1	0	0
Only	Grade (Right)	10	9	8	7	6	5	4	3	2	1	0	
for C	(g)		<u> </u>		· ·			· · · · · · · · · · · · · · · · · · ·				Avg.Score	0
e t													
Score	or				CON	NDITION CA	ATEGORY (SRADE or S	CORE				E
S	1c. Channel		Optimal			Suboptima			rginal		Poor		ϵ
Enter	Sediments or		avel or larger			ravel or large			ravel or larger		s uniform sa		1
ш	Substrate		bble boulder			substrate typ			e; dominant be is finer than		edrock; uns	table	F
	Composition	Substrate	type is grave stable	er or larger,		h some finer oderately sta			may still be a				e
ŀ	Grade	10	9	8	7	6	5	4	3	2	1	0	0 1
2	WATER APPE				,	U	3	4	3		!	U	0
-	WAILK ALL LA	NANCE.	Clarity Of V	ioibility									†
	ŀ				100	NDITION CA	ATEGORY (SRADE or S	CORF				^
			Optimal			Suboptima			rginal		Poor		-
	İ	Very clear,	or clear but	tea-colored;	Occasional	lly cloudy, es			le cloudiness		or muddy app		1 1
				3-6 feet (less		ent, but clea			time; objects		ects visible to		l lu
	Water Clarity		colored); no o			ble at depth			epth 0.5-1.5 ft;		y water may be us water pollut		N
	•		;no noticeab rged objects			ghtly green co n on water si			ns may appear bottom rocks	algal mats, s	urface scum, s	sheen or heavy	
			9,						jed objected	coat of foa	m on surface. zero.	No water =	p
								covered	d with film.		2610.		
Į													
ļ	Grade	10	9	8	7	6	5	4	3	2	1	0	0
,	PRESENCE OF		NECETA:	TION: Dra-	nnoo cod D	aroont Cove	rago						
3	L VESENCE OF	AQUATIC	VEGETA	ION. Prese	ence and Pe	ercent Cove	iaye						
J	}				CON	NDITION C	ATEGORY (SRADE or S	CORE				
J	ŀ		Optimal			Suboptima			rginal		Poor		· · · · · · · · ·
J		Clear wa	ater along en	tire reach;	Fairly clear	or slightly gr			ter along entire	Pea green,	gray, or brown	n water along	1 1
J	3a. Nutrient	diverse a	quatic plant	community	along entir	re reach; mo	derate algal	reach; overab	undance of lush	entire i	reach; dense s	stands of	ال
	Enrichment		low quantation		growth	on stream su	bstrates.		hytes; abundant th, especially		s clog stream te thick algal r		N
J			macrophyte						mer months.		ae present due		5
		g	growth prese	ii.							rate. No water		p
.]													
ı	Grade	10	9	8	7	6	5	4	3	2	1	0	
j			•							•			
j	ļ				CON		ATEGORY (F
	or		Optimal			Suboptima			rginal		Poor		ϵ
)		14/1	sent, aquation	vegetation		minant in po		Algal mats					1
) -	3b. Aquatic							er Algal mats present, some larger plants, few mosses. Plants dominate the channe		annal cable			
Fire code of one variable	3b. Aquatic Vegetation		of moss and	patches of	pla	ants along ed	lge.	larger plants	s, few mosses.				F
				patches of	pla	ants along ed	lge.	larger plants	s, few mosses.	algae pr	ninate the ch resent due to ate. No wate	unstable	F
			of moss and	patches of	pla 7	ants along ed	lge.	larger plants	s, few mosses.	algae pr	esent due to	unstable	

				COI	NDITION C	ATEGORY (GRADE or S	CORE				F
		Optimal]	Suboptima			rginal		Poor		, e
	Mainly co	onsisting of le	eaves and	Leaves	and wood so			es or woody		anic sedimen		1 1
	wood	d without sedi	iment.	organic o	lebris withou	t sediment.	organic	arse and fine matter with liment.		oul odor (ana present due t scouring	erobic) or no o excessive	F
Grade	10	9	8	7	6	5	4	3	2	1	0	0
LAND USE PA	TTERN: Be	yond Imme	diate Ripari	an Zone								
				COI	NDITION C	ATEGORY (GRADE or S	SCORE				F
		Optimal			Suboptima	ıl	Ma	rginal		Poor		e
		ed, consisting tive prairie, ar wetlands.			ent pasture r and swamp crops		pasture; s	w crops and ome wooded be present but		lainly row cro	pps	1 F
							as isolat	ed patches				١
Grade (Left)	10	9	8	7	6	5	4	3	2	1	0	3
Grade (Right)	10	9	8	7	6	5	4	3	2	1	0 Avg.Score	3
				COI	NDITION C	ATEGORY (GRADE or S	SCORE				E
6a. Riparian		Optimal			Suboptima	ıl	Ma	rginal		Poor		a
Zone Width		parian zone >18				18 meters (1/2-		arian zone 6-12			neters (natural	1 F
(from stream edge to field)	grasses),	Iths with trees, s human activitie impacted zone	es have not	1 active channel width w/trees, shrubs, or grasses), human activities have minimally			channel wid	/3-1/2 active dth vegetated), numan activities.	width), little	ss than 1/3 ac riparian vege numan activitie	tation due to	e R
Grade (left)	10	9	8	7	6	5	4	3	2	1	0	1
Grade (Right)	10	9	8	7	6	5	4	3	2	1	0	1
` •			•	•			•		•	•	Avg.Score	1
				COI	NDITION C	ATEGORY (E
Ch Dinarian	200/	Optimal		== 000/	Suboptima			rginal		Poor		e
6b. Riparian Zone		it density of mar			eambank vege	etation, mixed nel and mature		streambank f mixed grasses		0% streambar onsisting most		1
Vegetation	riparian zo	ne intact or dis	ruption from	trees behi	nd; disruption	evident with	and sparse	young tree or	grasses, fe	w trees & shru	bs; low plant	F F
Protection/ Completeness	grazi	ing/mowing mir	nimal.	breaks occurring at intervals of >50 meters.				ecies; breaks th some gullies very 50 meters.		k deeply scarre I along its leng	ed with gullies gth.	1 F
												#
Grade (Left)	10	9	8	7	6	5	4	3	2	1	0	2
	10	9	8	7	6	5	4	3	2	1	0	2
Grade (Right)			•								Avg.Score	2

Type	1 FLOW REGI	ME.											1
EPIFALINAL SUBSTRATE/AVAILABLE COVER Optimal Within stream bod, goalest than 50%, controlled for terminal results of the controlled for terminal results of the controlled for terminal results of the controlled for terminal results of the controlled for terminal results of the controlled for terminal results of the controlled for terminal results of the controlled for the companies of the controlled for the			Perennial		Intermitte	ent w/ Perer	nnial Pools	Intern	nittent		Ephemera	l	
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February February								features favora	able for stream	substrat	e unstable o	r lacking;	
Exposed include snags, submerged logs, undercut bransher (See Excellent Calegos) water. Tools but no water. Orade 10 9 8 7 6 5 4 3 2 1 0 3 STREAM BOTTOM SUBSTRATE: Pool Substrate Characterization Optimal Musture of soft snag, must be received, substrate and firm sand prevalent; roof mats and submerged vegetation common. Todade 10 9 8 7 6 5 4 3 2 1 0 0 STREAM BOTTOM SUBSTRATE: Pool Substrate Characterization Optimal Musture of soft snag, must be received and firm sand prevalent; roof mats and submerged vegetation common. Total of the special submerged vege													
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STREAM BOTTOM SUBSTRATE: Pool Substrate Characterization					for habita	t feature cor	mponents.)	desirable, substrate may be					
STREAM BOTTOM SUBSTRATE: Pool Substrate Characterization	water.												
STREAM BOTTOM SUBSTRATE: Pool Substrate Characterization Optimal Misture of substrate materials, with gravel and firm sand prevalent, root mats and submerged vegetation common. Suboptimal Misture of substrate materials, with gravel and firm sand prevalent, root mats and submerged vegetation common. Misture of substrate materials, with gravel and firm sand prevalent, common submerged vegetation. Misture of substrate materials, with gravel and firm sand prevalent, common submerged vegetation. Misture of substrate is submerged vegetation. Marginal Poor Marginal Water reaches the base of both lower banks; c5% of channel substrate is exposed Poor Marginal Poor Marg		ł						feature cor	mponents.)				
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8	8	CHANNEL S	INUOSITY												
0				ptimal			Suboptima	al	Mar	ginal		Poor		1	
			The bends in the		crease the			m increase		n the stream	Channel	straight; wat	erway has	1	Barboui
			stream length 3 to				m length 2			stream 1 to 2	been ch	annelized f	or a long		al. 1999
			was in a straight			longer tha	n if it was ir	n a straight		an if it was in a		distance			RBA #7
			braiding is consid plains and other				line.		straig	ht line					Parsons
			parameter is not	t easily rate	d in these										al., 200 AUSRIV
			а	reas).											AUSKIN
	ŀ	Grade	10	9	8	7	6	5	4	3	2	1	0	()
	ŀ	Crade	10			'			-			-		†	4
9	9	BANK STAB	LITY (SCORE EA	CH BANK))										
	ĺ			ptimal			Suboptima			ginal		Poor		1	
			Banks stable; evide failure absent or r	ence of ero	sion or bank			equent, small healed over.		stable; perennial vaterline sparse			vegetation a sion of both	ŧ	Barboui
			affected), pere					has areas of	(mainly scoure	d or stripped by			ed tree roots		al. 1999 RBA #8
			waterline; no raw o				erosion and		lateral erosion), bank held by	common; ti	ee falls and	l/or severely		Parsons
			erosion on outsid					l vegetation		(trees, rock d eroded back		trees comn	non; many eas frequent		al., 200
			O.K.); no recently e	exposed 100 ee falls;	ns, no recent			ces; recently but present.		-60% of bank in			and bends;		AUSRI\
									reach has area	s of erosion and	obvious ban	k sloughing	; 60-100% o		; USAC
										utting; recently	bank h	as erosiona	al scars.		Norfolk
										roots and fine ommon; high					Distric t
										ial during floods					2004 S/ #3; Sch
															and Boo
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^	40	\/CCETATI\/I	E PROTECTION (S	CCODE E	ACLI DANIZI										
0	10	VEGETATIVI		otimal	HOR BANK)		Suboptima	al	Mar	ginal		Poor		4	
			More than 90%		ambank			ank surfaces		e streambank	Less than		streambank	1	Barbou
			surfaces and imn	nediate ripa	rian zones	covered by	y native veg	etation, but	surfaces of	covered by	surfaces of	covered by	vegetation;		al. 1999
			covered by native				s of plants is			ruption obvious;			k vegetation	1	RBA #9
			trees, understory					evident but		e soil or closely			n has been		Parsons
			macrophytes; v through grazing or				cting full pla	nt growth extent; more		ation common; ne-half of the		ge stubble l	ers or less in height		al., 200
			evident; almost all	plants allow	wed to grow	than one-h	alf of the po	tential plant		stubble height	avoia	ge stubble i	ioigiii.		AUSRI\
			na	aturally.	-	stubble	e height ren	naining.	rema	ining.					; KDWF
															2000;
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															et al., 1
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1	11	Grade	10 ONE (SCORE EAC	9 CH BANK)		7	6	5	4	3			0	_	et al., 1 RCE
1	11	Grade	ONE (SCORE EAC	9 CH BANK) Optimal	8	7	6 Suboptima	5 al	4 Mar	3 ginal	2	Poor	0	_	et al., 1 RCE
1	11	Grade	DNE (SCORE EAC	9 CH BANK) Optimal one >18 me ing lots, roa	8 eters; human adbeds, clear-	7 Width o	6 Suboptima f riparian zo	5 al ne 12-18 rities have	Mar Width of ripal meters; humar	ginal rian zone 6-12 activities have	Width of ri	Poor parian zone parian vege	0 c <6 meters;	2	et al., 1 RCE
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1	11	Grade	DNE (SCORE EAC	9 CH BANK) Optimal one >18 me ing lots, roa	8 eters; human adbeds, clear-	7 Width o	6 Suboptima f riparian zo	5 al ne 12-18 rities have	Mar Width of ripal meters; humar	ginal rian zone 6-12 activities have	Width of ri	Poor parian zone parian vege	0 c <6 meters;	2	et al., 1 RCE Barbour al., 199 RBA #1 Parsons
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	12	Grade Grade Grade Grade RIPARIAN H Grade 1. Delineate 2. Determine 3. Enter the Right Bank	DNE (SCORE EAC Width of riparian ze activities (I.e., park cuts, lawns, or crc 10 10 10 ABITAT CONDITIC OTes stratum (dbhs) >60% tree canopy layers may incl herbaceous, an at the high end o additional layers an end if ≤1 addition 10 riparian areas alor s square footage ft %Riparian Area (o %Riparian Area (o Score SubCI	9 Deliberation of the second o	8 Beters; human addbeds, clear of impacted of impacte	Width or meters; i impacted 7 7 7 Tree str present, canopy, Category fc forest layers of Good rar layers are p if ≤1 addit present. stu	Suboptima: If riparian 20 numan activ zone only r 6 6 6 Suboptima atum (dbhowith 30% to cover. (See or examples 3.) Score at 19.2 addressent. Scottional forest OR cutover mps remain glength an notate of the cover. (See of cover) (See of examples 3.) Score at 19.2 addressent. Scottional forest OR cutover mps remain glength an notate of the cover of the c	al ne 12-18 wittes have minimally). 5 5 5 5 5 6 7 5 60% tree Excellent of additional the high end distribution areas with largers are areas with largers are areas and Cone do width. Lan and Score fo do width. Lan and Score fo Score for	Mar Width of ripar meters; humar impacted zon 4 4 4 4 Tree stratum present, wii canopy cover. Category for additional fores additional fores additional fores additional fores additional fores additional fores deditional fores the high enc ≥2 addition present. Score additional fores additional fores the high enc ≥2 addition present. Score additional fores the high enc ≥3 addition present. Score additional fores the high enc dense herba woody vi 4 dition Scores us d Use GIS may e ach riparian Mar Mar 1 1	ginal rian zone 6-12 n activities have e a great deal. 3 3 3 ginal (dbh>3 inches) th <30% tree (See Excellent examples of st layers.) Score of Fair range if al layers are at low end if <1 error are reserved to result on the company of the compa	Width of ri little or no ri hu 2 2 2 Tree strat surfaces, lands, cult and mainta denuded s pe	Poor parian zone parian vege parian vege parian vege parian vege parian vege parian vege construction of the poor um absent; croplands, exerted strea inted herbac inted herbac inted herbac vurfaces, act issture, and on the parian vege	of meters; tation due to less. 0 0 0 0 0 0 0 0 0 0 0 eous areas, ively grazed etc. O Ensure t %Ripari equ 100 100 100	he sums of ian Blocks all 100	Barbou al., 199 RBA #1 Parson al., 200 AUSRIN
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	12	Grade Grade Grade Grade RIPARIAN H Grade 1. Delineate 2. Determine 3. Enter the Right Bank	DNE (SCORE EAC Width of riparian ze activities (I.e., park cuts, lawns, or crc 10 10 10 ABITAT CONDITIC OTes stratum (dbhs) >60% tree canopy layers may incl herbaceous, an at the high end o additional layers an end if ≤1 addition 10 riparian areas alor s square footage ft %Riparian Area (o %Riparian Area (o Score SubCI	9 Deliberation of the second o	8 Beters; human addbeds, clear of impacted of impacte	Width or meters; i impacted 7 7 7 Tree str present, canopy, Category fc forest layers of Good rar layers are p if ≤1 addit present. stu	Suboptima: If riparian 20 numan activ zone only r 6 6 6 Suboptima atum (dbhowith 30% to cover. (See or examples 3.) Score at 19.2 addressent. Scottional forest OR cutover mps remain glength an notate of the cover. (See of cover) (See of examples 3.) Score at 19.2 addressent. Scottional forest OR cutover mps remain glength an notate of the cover of the c	al ne 12-18 titles have minimally). 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	Mar Width of ripar meters; humar impacted zon 4 4 4 4 Tree stratum present, wit canopy cover. Category for additional fore: at the high enc ≥2 addition present. Score additional laye OR area co maintained a dense herba woody v.	ginal rian zone 6-12 n activities have e a great deal. 3 3 3 ginal (dbh>3 inches) th <30% tree (See Excellent examples of st layers.) Score of Fair range if al layers are at low end if <1 error are reserved to result on the company of the compa	Width of rigitation of the state of the stat	Poor parian zone parian vege geman activiti 1	<6 meters; tation due to es. 0 0 0 0 0 0 0 0 0 0 0 Ensure t %Ripari equ 100 100 *0.01) 2 2	he sums of an Blocks al 100	et al., 1 RCE Barbouadi, 198 RBA ### Parsonadi., 200 Norfolk SAAM Form 1 Field

Si	ream Function	nal Capacity C	alculation		
	N6-TRIB1-A3	(N1-Trib1-A3)	(0.5-2)		
Date:	5/19/2006				
Project:	Lake Ralph H	all			
Assessment Area:	WP 17				
Assessors:	Holmes Voigh	nt Capps			
Project Status:	XPrepro	ject	Postproject		
		Stream	Stream	Multiplication	
Major Function Categories	FCI	Length (LF)*	Characterization	Factor**	FC
Hydrologic	0.05	3015	E	0.00125	0.1884375
Water Quality Improvement	0.09	3015	E	0.00125	0.3391875
Habitat	0.06	3015	E	0.00125	0.226125
Total	0.20				0.75375
*Stream Length is the length of the Stream Length is the length of the Stream Length of the S	eam Assessme	nt Reach (SAF	₹)		





SWAMPIM DATASH PRE-PROJECT	EETS – NORTH	EPHEMERAL 0	.5 TO 2.0'
• N15-TRIB1			

N15-TRIB1

PARAMET	ER]
				CONI	DITION CA	TECOPY C	PADE or S	COPE				1
		Optimal		CON	Suboptima			ginal		Poor		
Grade	10	9	8	7	6	5	4	3	2	1	0	

Right bank- 10-15 meters of trees before row crops, Left bank10-15 meters of trees to pasture. Reach surrounded by pasture and row crops. WP 10 P 86, 85

Persential	VARIABLES FLOW REGIM						N15-TR	IID I					SCORE 1	Source
Chicken 10 9 8 7 6 5 4 3 2 1 0 2 Subjection			Perennial		Intermitte	ant w/ Para	nnial Pools	Interr	mittent		Enhameral			
CONDITION CATEGORY GRADE or SCORE Suboptimal Natural characteristics from control to the control of control	Grade	10		8						2			2	
Subspiration Subs	CHANNEL CO	NDITION:	Measureme	ent or Obse	rvation of S	tream Char	nnel Conditio	ns	•					
Subspiration Subs					CON	IDITION CA	TEGORY (SRADE or 9	SCORE					Rarbour
Accidence of the control of the cont			Optimal		001						Poor			
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Control of the contro														
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Strade	ation (natural,	riyarologi									floodplain.			
Since 10 9 8 7 6 5 4 3 2 1 0 8 Wassister for looppian.								frequency	of overbank					
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CONDITION CATEGORY GRADE or SCORE 2b. Channel Capacity to Thesine Capacity to The Service Capacity								incision,dik	es or levees					
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Condition Capacity to Plow Frequency Capacity to Plow Frequency Ratio (pr. 2-year peak flow) Port Po														
26. Channel Capacity to Flow Frequency Channel Capacity to Flow Frequency Ratio (for 2-types) Property Resistance (for 2-types) Resistance (for 2-	Grade	10	9	8	7	6	5	4	3	2	1	0	8	3
26. Channel Capacity to Flow Frequency Channel Capacity to Flow Frequency Ratio (for 2-types) Property Resistance (for 2-types) Resistance (for 2-					CON	IDITION CA	ATEGORY (GRADE or S	SCORE					w/ assist
Capacity to Flow Frequency Ratio is such mits table worknown for Mine Stable (1998). The state of the Stable (1998) and the stable (2b.Channel					Suboptima	ıl	Mai	rginal]	and input
Flow Prequency. Ratio (for 2- year peak flow) Grade 10 9 8 7 6 5 4 3 3 2 1 0 0 8 8	Capacity to													
year frequency. 0.75-1.25 Strade 10 9 8 7 6 5 4 3 2 1 0 8 1 1 0 8 1 0 8 1 0 8 1 0 8 1 0 8 1 0 8 1 0 8 1 0 8 1 0 8 1 0 1 0 8 1 0 1 0 1 0 1 0 1 0 1 0 0		storm ever	nts occur at a	a 1.25 to 2.5	storm even	ts are more f	requent than	such that b	ank overflow	storm eve	nts are more fr	equent than		
Strade 10 9 8 7 6 5 4 3 2 1 0 0 0 0 0 0 0 0 0		,		cy.						every hal				
Strade			0.70 1.20					every ye	ar or less					
Signade 10 9 8 7 6 5 4 3 2 1 0 Newton, SVAP p.	flow)													
Compited Compited Suboptimal Subopt														
Suboptimal Suboptimal Marginal Poor	Grade	10	9	8	7	6	5	4	3	2	1	0	8	3
Banks stable: evidence of erosion or of bank faller dashed or minimal; class areas of erosion mostly headed over, serious mostly headed over, serious mostly headed over, serious mostly headed over, serious mostly headed over, serious mostly headed over, serious mostly headed over, serious mostly headed over, serious mostly headed over, serious mostly headed over, serious mostly headed over, serious mostly headed over, serious mostly headed over, serious mostly headed over, serious mostly headed over, serious mostly headed over, serious mostly headed over, serious mostly headed over, serious mostly headed over, serious mostly header of serious mostly header or existing the part points waterline sparse (mainly source or stripped by hard points on the creatily exposed rose rosts and fine most places; recently exposed rece rosts and fine most places; recently exposed rece rosts and fine most places; recently exposed rece rosts and fine expectations and bends; obvious and solughing; 60-10% of bank has erosional scars. SVAP p. Substitute Symbol					CON	IDITION CA	ATEGORY (GRADE or S	SCORE					Newton,
2c. Channel Bank Stability (escore each bank, left or night facing downstream) 2c. Channel Bank Stability (escore each bank, left or night facing downstream) 2c. Channel Bank Stability (excore each bank, left or night facing downstream) 2c. Channel Bank Stability (excore each bank, left or night facing downstream) 2c. Channel Bank Stability (excore each bank, left or night facing downstream) 2c. Channel Bank Stability (excore each bank, left or night facing downstream) 2c. Channel Bank Stability (excore each bank, left or night facing downstream) 2c. Channel Bank Stability (excored rots; no recent tree falls; excored excored law excored to deach bank, left or night facing downstream) 2c. Channel Bank Stability (excored rots; no recent tree falls; excored excored) 2c. Channel Bank Stability (excored rots; no recent tree falls; excored rots; no recent tree falls; excored and bank undercutting; recently exposed tree rots and		Darelia etak		-fi	Madaztak					Unatable				
26. Channel Bank Stability (score each beank affected), perennial egatation to waterine; no raw or underout banks (some erosion on outseling; no recently egatation to waterine; no raw or underout banks (some erosion on outside of meander bends O.K), each or right facing downstream) and outside of meander bends O.K) or or ecently exposed rors; no recently exposed tree roots rare but present, or right facing downstream) and or roots and bank (left or roots and bank undercutting; perennial vegetation to be obtained in reach has areas frequent along daras; 'raw' areas frequent along straight sections and bank undercutting; recently exposed tree roots and bank undercutting; perently exposed tree roots and bank undercutting; recently exposed tree roots and bank undercutting; perently exposed tree roots and bank undercutting; perently exposed tree roots and bank undercutting; perently exposed tree roots and bank un														
decrete each bank, left or														al., 1999
bank, left or right facing downstream) outside of meander bends O.K.); no recently exposed tree roots rare but present, in the recently exposed roots; no recent tree falls; are falls; outside of meander bends O.K.); no recently exposed tree roots rare but present, it recently exposed roots; no recent tree falls; are falls; outside of meander bends O.K.); no recently exposed tree roots rare but present, it recently exposed roots; no recent tree falls; outside of meander bends O.K.); no recently exposed roots; no recently exposed roots on data for exposing and ended back elsewher; 30-06 to bank in reach has areas of erosion and bank undercutting; recently exposed tree roots and fine root hairs common: Grade (Left) 10 9 8 7 6 5 4 3 2 1 1 0 9 9 ECHANNEL ROUGHINESS FACTORS CONDITION CATEGORY GRADE or SCORE Suboptimal Marginal Propor than if it was straight. Channel length 1.5 to 2.5 to 4 times longer than if it was straight. Channel length 1.5 to 2.5 to 4 times longer than if it was straight. Channel length 1.5 to 1.5 times longer than if it was straight. Channel length 1.5 to 1.5 times longer than if it was straight. Channel length 1.5 to 1.5 times longer than if it was straight. Channel length 1.5 to 1.5 times longer than if it was straight. Channel length 1.5 to 1.5 times longer than if it was straight. Channel length 1.5 to 1.5 times longer than if it was straight. Channel length 1.5 to 1.5 times longer than if it was straight. Channel length 1.5 to 1.5 to 1.2 to 1.5 to 1.2 to 1.5 to 1.														
right facing downstream) The properties of the stream increase the stream increase the stream length 2.5 to 4 times longer than if it was straight. Channel length/valley length at least > 1.5. Condition Category Grabe or Score than if it was straight. Channel length/valley length at least > 1.5. Condition Category Grabe or Score than if it was straight. Channel length/valley length at least > 1.5. Condition Category Grabe or Score than if it was straight. Channel length/valley length 1.5 to 2.5 times longer than if it was straight. Channel length/valley length 1.5 to 1.5. Condition Category Grabe or Score than if it was straight. Channel length/valley length 1.5 to 1.5. Condition Category Grabe or Score than if it was straight. Channel length/valley length 1.5 to 2.5 times longer than if it was straight. Channel length/valley length 1.5 to 1.5. Condition Category Grabe or Score than if it was straight line. Channel length/valley length 1.5 to 1.5. Condition Category Grabe or Score than if it was straight line. Channel length/valley length 1.5 to 1.5. Condition Category Grabe or Score than if it was straight line. Channel length/valley length 1.5 to 1.5. Condition Category Grabe or Score than if it was straight line. Channel length/valley length 1.5 to 1.5. Condition Category Grabe or Score than if it was straight line. Channel length/valley length 1.5 to 1.5. Condition Category Grabe or Score than it was a straight line. Channel length/valley length 2.5. Condition Category Grabe or Score than it was a straight line. Channel length/valley length 2.5. Condition Category Grabe or Score than it was a straight line. Channel length/valley length 2.5. Condition Category Grabe or Score than it was a straight line. Channel length/valley length 2.5. Condition Category Grabe or Score than it was a straight line. Channel length/valley length 3.5. Condition Category Grabe or Score than it was a straight line. Channel length/valley length 3.5. Condition Category Grabe or Score than it wa	bank, left or													
Signate (Left) 10 9 8 7 6 5 4 3 2 1 0 9 9 9 9 9 9 9 9 9		recently e		s; no recent	exposed tre	ee roots rare	but present.							
Grade (Left) 10 9 8 7 6 5 4 3 2 1 0 9 9 8 7 6 5 4 3 2 1 0 9 9 9 8 7 6 5 4 3 2 1 0 9 9 9 8 7 6 5 4 3 2 1 0 0 9 9 9 8 7 6 5 4 3 2 1 0 0 9 9 9 8 7 6 5 4 3 2 1 0 0 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	downstream)		,					elsewhere	; 30-60% of					
Exposed tree roots and fine root hairs common:														
Grade (Left) 10 9 8 7 6 5 4 3 2 1 0 9 9 Grade (Right) 10 9 8 7 6 5 5 4 3 2 1 0 9 9 CHANNEL ROUGHNESS FACTORS CONDITION CATEGORY GRADE or SCORE Suboptimal Marginal Poor Channel stream increase the stream length 1.5 to 2.5 times longer than if it was straight. Channel length/valley length at least >1.5. Grade 10 9 8 7 6 5 4 3 2 1 0 3 9 CONDITION CATEGORY GRADE or SCORE Suboptimal Marginal Poor Channel stream increase the stream length 1.5 to 2.5 times longer than if it was a straight line. Channel length 1.5 to 1.5 length 1 to 1.5 times length 1 to 1.5 times a straight line. Channel length 1 to 1.5 times longer than if it was a straight line. Channel length 1 to 1.2 to 1.5 length 1 to 1.5 times longer than if it was a straight line. Channel length 1 to 1.5 times longer than if it was a straight line. Channel length 1 to 1.5 times longer than if it was a straight line. Channel length 1 to 1.5 times longer than if it was a straight line. Channel length 1 to 1.5 times longer than if it was a straight line. Channel length 1 to 1.5 times longer than if it was a straight line. Channel length 1 to 1.5 times longer than if it was a straight line. Channel length 1 to 1.5 times longer than if it was a straight line. Channel length 1 to 1.5 times longer than if it was a straight line. Channel length 1 to 1.5 times longer than if it was a straight line. Channel length 1 to 1.5 times longer than if it was a straight line. Channel length 1 to 1.5 times longer than if it was a straight line. Channel length 1 to 1.5 times longer than if it was a straight line. Channel length 1 to 1.5 times longer than if it was a straight line. Channel length 1 to 1.5 times longer than if it was a straight line. Channel length 1 to 1.5 times longer than if it was a straight line. Channel length 1 to 1.5 times longer than if it was a straight line. Channel length 1 to 1.5 times longer than if it was a straight line. Channel length 1 to 1.5 times longer than if it was a straight line. Channel length 1 to 1.5 times lo														
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Avg.Score 9 CHANNEL ROUGHNESS FACTORS 3a. Channel Sinuosity (bends in low gradient stream) The bends in the stream increase the increase the stream length 2.5 to 4 times longer than if it was a straight line. Channel length/valley length at least >1.5. Grade 10 9 8 7 6 5 4 3 2 1 0 3 CONDITION CATEGORY GRADE or SCORE Substrate (Composition) CONDITION CATEGORY GRADE or SCORE (Channel straight; waterway has been of channelized for a long distance. Channel length/valley length 1.0 to 1.2. CONDITION CATEGORY GRADE or SCORE (Channel length/valley length 1.0 to 1.2. CONDITION CATEGORY GRADE or SCORE (Channel divided into braids or stream sand, and silt common; moderately unstable) CONDITION CATEGORY GRADE or SCORE (Channel divided into braids or stream and well-washed debris present, little silt; moderately stable (Silt; moderately stable)	Grade (Left)				<u> </u>			4	3					
CHANNEL ROUGHNESS FACTORS 3a. Channel Sinuosity (bends in low gradient stream) Grade 10 9 8 7 6 5 4 3 2 1 0 3 CONDITION CATEGORY GRADE or SCORE Suboptimal Marginal Marginal Channel striaght; waterway has been channelized for a long distance. Channel length/valley length at least >1.5. Grade 10 9 8 7 6 5 4 3 2 1 0 3 CONDITION CATEGORY GRADE or SCORE Channel straight; waterway has been channelized for a long distance. Channel length/valley length ≤1.0 length 1 to 1.5 times longer than if it was a straight line. Channel length/valley length 1.0 to 1.2. Grade 10 9 8 7 6 5 4 3 2 1 0 3 CONDITION CATEGORY GRADE or SCORE Optimal Little or no channel enlargement resulting from sediment accumulation; channel is stable CONDITION CATEGORY GRADE or SCORE Marginal All 3 2 1 0 3 KDWP, 1 Kansas Suboptimal Little or no channel enlargement resulting from sediment accumulation; channel is stable Some gravel bars of coarse stones and well-washed debris present, little silt; moderately stable Substrate Composition	Grade (Right)	10	9	8	/	6	5	4	3	2	1 1			
Sinusity (bends in low gradient stream) 3a. Channel Sinusity (bends in low gradient stream length 2.5 to 4 times longer than if it was straight. Channel length/valley length at least >1.5. Grade 10 9 8 7 6 5 4 3 2 1 0 3 CONDITION CATEGORY GRADE or SCORE The bends in the stream increase the stream increase the stream length 1.2 to 1.5 Grade 10 9 8 7 6 5 4 3 2 1 0 3 CONDITION CATEGORY GRADE or SCORE Optimal Suboptimal Channel length/valley length 1.0 to 1.5 times longer than if it was a straight line. Channel length/valley length 1.0 to 1.2. Grade 10 9 8 7 6 5 4 3 2 1 0 3 CONDITION CATEGORY GRADE or SCORE Optimal Little or no channel enlargement resulting from sediment accumulation; channel is stable Some gravel bars of coarse stones and well-washed debris present, little silt; moderately stable CONDITION CATEGORY GRADE or SCORE Sediment bars of rocks, sands, and silt common; moderately unstable Sediment bars of rocks, sands, and silt common; moderately unstable Channel straight, waterway has been channelstraight, waterway has been channelized for a long distance. Channel length/valley length ≤ 1.0 Some gravel bars of coarse stones and well-washed debris present, little silt; moderately stable Some gravel bars of coarse stones and well-washed debris present, little sand, said, silt, clay, or bedrock; unstable Some gravel bars of coarse stones and well-washed debris present, little sand, said, silt, clay, or bedrock; unstable	CHANNEL DO	LICHNIESS	CACTORS											1
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gradient stream) length/valley length at least >1.5. length/valley length 1.2 to 1.5 length/valley length 1.2 to 1.5. length/valley length 1.2 to 1.5. length/valley length 1.2 to 1.5. length/valley length 1.2 to 1.5. length/valley length 1.2 to 1.5. length/valley length 1.2 to 1.5. length/valley length 1.2 to 1.5. length/valley length 1.2 to 1.5. length/valley length 1.2 to 1.5. length/valley length 1.2 to 1.5. length/valley length 1.2 to 1.5. length/valley length 1.2 to 1.5. length/valley length 1.2 to 1.5. length/valley length 1.2 to 1.5. length/valley length 1.2 to 1.5. length/valley length 1.2 to 1.5. length/valley length 1.2 to 1.5. length/valley length 1.2 to 1.5. length/valley length 1.2 to 1.5. longer than if it was a straight line. Channel length/valley length 1.0 to 1.2. CONDITION CATEGORY GRADE or SCORE Optimal Little or no channel enlargement resulting from sediment and well-washed debris present, little sands, and silt common; moderately unstable Some gravel bars of coarse stones and well-washed debris present, little sands, and silt common; moderately unstable Sediment bars of rocks, sands, and silt common; sand, silt, clay, or bedrock; unstable Habitats														
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Grade 10 9 8 7 6 5 4 3 2 1 0 3 CONDITION CATEGORY GRADE or SCORE Optimal Suboptimal Marginal Poor Subjective resulting from sediment accumulation; channel is stable Substrate Composition CONDITION CATEGORY GRADE or SCORE Marginal Poor Scient divided into braids or stream is channelized; substrate is uniform sand, silt, clay, or bedrock; unstable Subjective moderately unstable with the poor substrate is uniform sand, silt, clay, or bedrock; unstable Habitats	stream)	1			-			straight lin	e. Channel					
CONDITION CATEGORY GRADE or SCORE Optimal Little or no channel enlargement resulting from sediment accumulation; channel is stable Substrate Composition CONDITION CATEGORY GRADE or SCORE Marginal Sediment bars of rocks, Sediment bars of rocks, sands, and silt common; moderately unstable Sediment bars of rocks, sands, and silt common; moderately unstable Sediment bars of rocks, sands, and silt common; moderately unstable Substrate Subjective sand, silt, clay, or bedrock; unstable Aquatic Habitats														
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Optimal Suboptimal Suboptimal Poor 3b. Bottom Substrate Composition Optimal Little or no channel enlargement resulting from sediment accumulation; channel is stable optimal Suboptimal Suboptimal Suboptimal Suboptimal Suboptimal Some gravel bars of coarse stones and well-washed debris present, little sands, and silt common; moderately unstable optimal Some gravel bars of coarse stones and well-washed debris present, little sands, and silt common; moderately unstable optimal Some gravel bars of coarse stones and well-washed debris present, little sands, and silt common; moderately unstable optimal Poor Channel divided into braids or stream is channelized; substrate is uniform sand, silt, clay, or bedrock; unstable Aquatic Habitats					CON	IDITION CA	ATEGORY (GRADE or S	SCORE					KDWP. 1
3b. Bottom Substrate Composition resulting from sediment accumulation; channel is stable and well-washed debris present, little silt; moderately stable sands, and silt common; moderately unstable sand, silt, clay, or bedrock; unstable sand, silt, clay, or bedrock; unstable sand, silt, clay, or bedrock; unstable Habitats			Optimal											Kansas
Substrate Composition Substrate Composition Substrate Composition Substrate Composition Substrate Composition Substrate Composition Substrate Composition Substrate Composition Substrate Composition Substrate Substrat		1.10.7			Some grav							ds or stream	I	Subjectiv
Composition	3b. Bottom				and well-wa	shed dehris	present. little	Isangs, and	silt common.		elized: substrate	e is uniform		Evaluation
Grade 10 9 8 7 6 5 4 3 2 1 0 2	Substrate	resu	ılting from sec	diment										Aquatic
Grade 10 9 8 7 6 5 4 3 2 1 0 2	Substrate	resu	ılting from sec	diment										Aquatic
Grade 10 9 8 7 6 5 4 3 2 1 1 0 2	Substrate	resu	ılting from sec	diment										Aquatic
	Substrate	resu	ılting from sec	diment										

1	-					CO	NDITION C	CATE	GORY (GRADE or	SCORE								KDWP, 1996
	_		Optima	al			Suboptim				rginal			F	oor				Newton et al.
3c. Instrea	eam n	>7 of the boulders/ debris	ttom topog e following:	grapl g: de gs/la ers/o	rge woody oxbows,		oottom included ted in Optim	des 5-		Channe includes < : listed in	el bottom	ems	Channel bottom includes <3 of the items listed in Optimal Category			1998 USDA/NRCS SVAP page			
			ed shallow t banks, or pools	side															
Grade		10	9		8	7	6		5	4	3		2		1		0	4	1
Grade																	1		
3			0 11	<u> </u>		CO			GORY (GRADE or SCORE Marginal									
Or 3c.	F		Optima 0.05 to 0.0				Suboptim 0.035 to 0.			Marginal 0.021 to 0.03 or >0.10		0.404	0.20 c	oor					
i 3c. Manning's	's n		0.05 10 0.1	099	,		0.035 to 0.	05			0.15	.10	obstruction to channe	to flov lization	v or 0.0	01 to	0.02 due		
Grade		10	9		8	7	6		5	4	3		2		1		0		
		Optimal			CONDITION CATEGORY (USACE,		
3d. Chan	anal	Optimal Incision ratio ≥1.0 <1.2 and Where			Suboptimal				rginal				oor				Norfolk		
Incision (TLB/BFD=	n =BH	Incision ratio ≥1.0 <1.2 and Where channel slope >2%; Entrenchment ratio >1.4; Where channel slope		channel s ratio >1.	lope >2%, E 4; Where ch	Entrend nannel	chment slope		ere chanr e > 2%,	nel		, Entre e chan	nchme	ent ra ope <2	tio <u><</u> 1.4; 2%,		District, 2004 SAAM Form #1 and VT		
R; 1/BHR* Factor =0			<u><</u> 2%, E	ntrenchmen	it ratio	>2.0	Entrench >1.4; Who slope Entrenchm	ere chan e <u><</u> 2%,	nel	Enti	renchm	ent ra	tio <u><</u> 2	.0		Stream Geomorphic Assessment Phase 2			
TLB =	_		10	_		BHR =	1												
BFD =			10			B. II.C	•												
Grade		10	9		8	7	6		5	4	3		2		1		0	8	
4 DYNAMIC	SUR	FACE WA	TER ST	OR,	AGE														1
	-					CO	NDITION C	ΔTE	GORY (GRADE or	SCORE								Newton, et a
	-		Optima	al		00	Suboptim		001(1)		rginal			F	oor				1998 USDA
4a.Pools			shallow po	ools	abundant;		esent, but no	ot abu		Pools pr	esent, bu		Pools abs	ent, or	the en				NRCS SVA
(abundar	,				pool bottom or pools are		30% of the p due to depth			shallow; fro	om 5-109 bottom i		discer	nible. I	No wat	ter = z	ero.		page 14;
present (absent)	O.		least 5 fee				at least 3 fee			obscure du the pools a	e to dept	h, or							Barbour, et a 1999
			9		8	7	6		5	4	3		2		1		0	0	
Grade		10	9			CO	NDITION C	ΔTE	GORY (GRADE or	SCORE								
	nnel	10							GOICE		rginal			F	oor				Barbour, et a
Grade 4b. Chani		10	Optima	al		Suboptimal				Poor Wery little water in channel and mostly	Very little v								
4b. Chani Flow Stat (degree	tus to	Water rea	Optima	e of	both lower	Water fi	Suboptim ls >75% of t	he ava			25-75%		annel, present as standing pools. No water = strates zero.						1999 EPA
4b. Chani Flow Stat	tus to nnel	Water rea	Optima	e of al ar	mount of	Water fi chann	Suboptim	he ava	nnel	the availa and /or riffl	ble chani e substra	nel, ates		standir	ng poo				RBA page 5 /A-9#5; <i>TCE</i>
4b. Chani Flow Stat (degrees) which char	tus to nnel	Water rea	Optima aches base and minima	e of al ar	mount of	Water fi chann	Suboptim ls >75% of t el; or <25%	he ava	nnel	the availa	ble chani e substra	nel, ates ed.		standir	ng poo			0	RBA page 5 /A-9#5; <i>TCE</i>
4b. Chani Flow Stat (degree which char is filled)	tus to nnel	Water rea banks a channe	Optima aches base and minima Il substrate	e of al ar	mount of exposed.	Water fi chann su	Suboptim ls >75% of t el; or <25% postrate is ex	he ava of cha posed	nnel 5	the availa and /or riffl are most	ble chani le substra ly expose 3	nel, ates ed.	present as	standir z	ng poo ero.	ils. No	o water =	0.44	RBA page 5 /A-9#5; <i>TCE</i> 1999; <i>VANR</i> 2005

I. HYDROLOGIC FUNCTIONS N15 Trib 1 (.5-2)

TYPE	-												1
OTE													1
		ANSPORT	/DEPOSIT	ON									Ī
<u> </u>			722. 00										1
					COI		ATEGORY (
	Bank		Optimal			Suboptima			rginal		Poor		
	ability re each			of erosion or minimal; little		stable; infre			unstable; 30- k in reach has	Unstable; r	many eroded equently alon	areas; "raw"	
bank right	k, left or t facing nstream)	potential fo		lems. <5% of				areas of e	erosion; high stential during gods.	sections a	and bends; of g; 60-100% o erosional sca	bvious bank of bank has	
O	// aft)	40	Ι ο	Ι ο	7	1 0	T =	4	1 2	0	1 4	1 0	
	e (Left) e (Right)	10 10	9	8	7	6	5 5	4	3	2	1 1	0	9
Jiaue	(IXIGIII)	10	J 3	1 0	'		J	4			'	Avg.Score	
													_
	ŀ				CON	NDITION CA	ATEGORY (GRADE or S	SCORE				
1b (Channel		Optimal			Suboptima	ıl	Ma	rginal		Poor		
Botto	om Bank ability		1/3 of bank is istant plant/s material.			I/3 of bank is ant/soil matri:	s generally x or material.	generally h material; pl	/3 of bank is nighly erodible ant/soil matrix romised.	highly ero	1/3 of bank is odible materia severely comp	al; plant/soil	
Grade	e (Left)	10	9	8	7	6	5	4	3	2	1	0	0
	(Right)	10	9	8	7	6	5	4	3	2	1	0	
												Avg.Score	0
	or				CON		ATEGORY (
	Channel	F00/	Optimal		00.500/	Suboptima			rginal	0.1.1.1.1.	Poor		_
	ments or		avel or large bble boulder			avel or large substrate type			ravel or larger e; dominant		is uniform sa bedrock; uns		
	ostrate position		type is grav stable		gravel with	h some finer oderately sta	sediments;	substrate ty	pe is finer than may still be a		ocurous, uno	labio	
Grade	9												
		10	9	8	7	6	5	4	3	2	1	0	2
NATE	ER APPE		9 Clarity or V	_	7	6	5	4		2	1	0	2
NATE	ER APPEA		_	_					3	2	1	0	2
NATE	ER APPE		Clarity or V	_		NDITION CA	ATEGORY (GRADE or S	3 SCORE	2		0	2
NATE	ER APPE	ARANCE:	Clarity or V	risibility	CON	NDITION CA	ATEGORY (GRADE or S	3 SCORE Irginal		Poor	-	2
WATE	ER APPEA	Very clear	Optimal or clear but	risibility tea-colored;	CON	NDITION CA Suboptima ly cloudy, es	ATEGORY (GRADE or S Ma Considerate	3 SCORE Irginal Die cloudiness	Very turbid	Poor or muddy appe	earance most	2
		Very clear, objects visi	Optimal or clear but	tea-colored; 3-6 feet (less	CON Occasional storm ev	NDITION CA Suboptima ly cloudy, es rent, but clea	ATEGORY (GRADE or S Ma Considerate most of the	3 SCORE Irginal	Very turbid the time; ob, slow moving	Poor or muddy appe jects visible to g water may be	earance most depth <0.5 ft; bright-green;	2
	ER APPEA	Very clear, objects visi if slightly courface	Optimal or clear but ble at depth colored); no or	tea-colored; 3-6 feet (less bil sheen on te film on	CON Occasional storm ev objects visi have slig	NDITION CA Suboptima ly cloudy, es rent, but clea ble at depth phtly green co	ATEGORY (il pecially after irs rapidly; 1.5-3 ft; may plor; no oil	GRADE or S Ma Considerate most of the visible to de slow section	SCORE rrginal ble cloudiness time; objects epth 0.5-1.5 ft; ss may appear	Very turbid the time; ob slow moving other obvio	Poor or muddy appe jects visible to g water may be us water pollut	earance most depth <0.5 ft; bright-green; tants; floating	
		Very clear, objects visi if slightly courface	Optimal or clear but ble at depth colored); no c	tea-colored; 3-6 feet (less bil sheen on te film on	CON Occasional storm ev objects visi have slig	NDITION CA Suboptima ly cloudy, es rent, but clea ble at depth	ATEGORY (il pecially after irs rapidly; 1.5-3 ft; may plor; no oil	GRADE or S Ma Considerat most of the visible to de slow sectior pea-green; or sumere	SCORE programal ple cloudiness time; objects poth 0.5-1.5 ft;	Very turbid the time; ob slow moving other obvio algal mats, s	Poor or muddy appe jects visible to g water may be us water pollut	earance most depth <0.5 ft; b bright-green; tants; floating sheen or heavy	
Wate	er Clarity	Very clear, objects visi if slightly of surface subme	Optimal or clear but ble at depth colored); no o ;;no noticeat rged objects	tea-colored; 3-6 feet (less bil sheen on le film on or rocks.	CON Occasional storm ev objects visi have slig sheel	NDITION C/ Suboptima ly cloudy, es vent, but clea ble at depth shtly green con n on water su	ATEGORY (II pecially after rs rapidly; 1.5-3 ft; may olor; no oil urface.	GRADE or S Ma Considerat most of the visible to de slow sectior pea-green; or sumere covered	3 SCORE rginal le cloudiness time; objects pepth 0.5-1.5 ft; sn may appear bottom rocks ged objected d with film.	Very turbid the time; ob slow moving other obvio algal mats, s coat of foa	Poor or muddy appe jects visible to g water may be us water pollut urface scum, s am on surface. zero.	earance most depth <0.5 ft; bright-green; tants; floating sheen or heavy No water =	
Wate	er Clarity	Very clear objects visi if slightly c surface subme	Optimal , or clear but ble at depth colored); no o ;;no noticeab rged objects	tea-colored; 3-6 feet (less oil sheen on le film on or rocks.	Occasional storm ev objects visi have slig sheer	NDITION C/ Suboptima ly cloudy, es rent, but clea ble at depth shtly green con n on water su	ATEGORY (Il pecially after rs rapidly; 1.5-3 ft; may plor; no oil urface.	GRADE or S Ma Considerat most of the visible to de slow sectior pea-green; or sumere	3 SCORE rginal ble cloudiness time; objects epth 0.5-1.5 ft; hottom rocks ged objected	Very turbid the time; ob slow moving other obvio algal mats, s	Poor or muddy appr jects visible to g water may be us water pollut urface scum, s am on surface.	earance most depth <0.5 ft; b bright-green; tants; floating sheen or heavy	
Wate	er Clarity	Very clear objects visi if slightly c surface subme	Optimal , or clear but ble at depth colored); no o ;;no noticeab rged objects	tea-colored; 3-6 feet (less bil sheen on le film on or rocks.	Occasional storm ev objects visi have slig sheer	NDITION C/ Suboptima ly cloudy, es rent, but clea ble at depth shtly green con n on water su	ATEGORY (Il pecially after rs rapidly; 1.5-3 ft; may plor; no oil urface.	GRADE or S Ma Considerat most of the visible to de slow sectior pea-green; or sumere covered	3 SCORE rginal le cloudiness time; objects pepth 0.5-1.5 ft; sn may appear bottom rocks ged objected d with film.	Very turbid the time; ob slow moving other obvio algal mats, s coat of foa	Poor or muddy appe jects visible to g water may be us water pollut urface scum, s am on surface. zero.	earance most depth <0.5 ft; bright-green; tants; floating sheen or heavy No water =	
Wate	er Clarity	Very clear objects visi if slightly c surface subme	Optimal or clear but ble at depth colored); no cigar but ble at depth colored); no cigar ged objects	tea-colored; 3-6 feet (less oil sheen on le film on or rocks.	Occasional storm ev objects visi have slig sheel	NDITION C/ Suboptimally cloudy, estent, but cleated to depth highty green control on water subsection on water subsection of the control of t	ATEGORY (il pecially after rs rapidly; 1.5-3 ft; may lobr; no oil urface.	GRADE or S Ma Considerat most of the visible to de slow section pea-green; or sumer covered 4	3 SCORE rginal le cloudiness time, objects path 0.5-1.5 ft, sn may appear bottom rocks jed objected d with film. 3 SCORE	Very turbid the time; ob slow moving other obvio algal mats, s coat of foa	Poor or muddy apper jects visible to go water may go water may be us water pollut urface scum, s am on surface. zero.	earance most depth <0.5 ft; bright-green; tants; floating sheen or heavy No water =	
Wate	er Clarity	Very clear objects visi if slightly of surface subme	Optimal or clear but ble at depth colored); no ciceat; no noticeat; ged objects 9 VEGETA	tea-colored; 3-6 feet (less oil sheen on lee film on or rocks.	Occasional storm ev objects visi have slig sheel	NDITION C/ Suboptima ly cloudy, es- vent, but clea ble at depth shiftly green co n on water st 6 ercent Cove	ATEGORY (II pecially after rrs rapidly; 1.5-3 ft; may olor; no oil urface. 5 prage ATEGORY (II	GRADE or S Ma Considerat most of the visible to de slow section pea-green; or sumere covered 4 GRADE or S Ma	3 SCORE Irginal Iole cloudiness time; objects poth 0.5-1.5 ft; ss may appear bottom rocks ged objected d with film. 3 SCORE Irginal	Very turbid the time; ob slow moving other obvio algal mats, s coat of foa	Poor or muddy appejects visible to g water may be us water pollut urface scum, s am on surface. zero.	earance most depth <0.5 ft; bright-green; tants; floating sheen or heavy No water =	
Water Grade PRES	er Clarity SENCE OF	Very clear objects visi if slightly of surface subme	Optimal or clear but ble at depth colored); no cigar but ble at depth colored); no cigar ged objects	tea-colored; 3-6 feet (less oil sheen on le film on or rocks.	CON Occasional storm ev objects visi have slig sheei 7 ence and Pe	NDITION C/ Suboptima ly cloudy, es- vent, but clea ble at depth shiftly green co n on water st 6 ercent Cove	ATEGORY (II pecially after rs rapidly; 1.5-3 ft; may olor; no oil urface. 5 prage ATEGORY (II eenish water	GRADE or S Ma Considerat most of the visible to de slow section pea-green; or sumery covered 4 GRADE or S Ma Greenish wa reach; overati	3 SCORE rginal le cloudiness time; objects path 0.5-1.5 ft; sn may appear bottom rocks ged objected d with film. 3 SCORE rginal ter along entire unudance of lush	Very turbid the time; ob slow moving other obvio algal mats, s coat of for	Poor or muddy appeiets visible to go water may be us water pollut urface scum, s am on surface. zero.	earance most depth <0.5 ft; b pight-green; tants; floating sheen or heavy No water =	
Water Grade PRES	er Clarity	Very clear objects visi if slightly of surface subme	Optimal or clear but ble at depth colored); no ged objects Optimal Optimal ged objects Optimal ater along en low quantati	tea-colored; 3-6 feet (less oil sheen on lee film on or rocks. 8 FION: Prese tire reach; community es of many	Occasional storm ev objects visi have slig sheel	NDITION C/Suboptima ble at depth ghtly green con on water st 6 ercent Cove NDITION C/Suboptima or slightly gre	ATEGORY (II pecially after rs rapidly; 1.5-3 ft; may polor; no oil urface. 5 prage ATEGORY (II	GRADE or S Ma Considerat most of the visible to de slow section pea-green; or sumere covered 4 GRADE or S Ma Greenish wa green macrop;	3 SCORE Irginal lole cloudiness time; objects poth 0.5-1.5 ft; s may appear bottom rocks ged objected d with film. 3 SCORE Irginal Iter along entire bundance of lush hytes; abundant	Very turbid the time; ob slow moving other obvio algal mats, s coat of foa	Poor or muddy appejects visible to gwater may be us water pollut urface scum, s am on surface. zero.	earance most depth <0.5 ft; bright-green; tants; floating sheen or heavy No water =	
Water Grade PRES 3a. N Enrice	er Clarity BENCE OF Nutrient chment	Very clear objects visi if slightly of surface subme	Optimal or clear but ble at depth colored); no o ;;no noticeat ged objects Optimal Optimal ater along en quatic plant low quantati macrophyte growth prese	tea-colored; 3-6 feet (less oil sheen on le film on or rocks. 8 FION: Prese tire reach; community es of many s; little algal nt.	CON Occasional storm ev objects visi have slig sheel 7 ence and Pe	NDITION C/Suboptima ly cloudy, escent, but cleable at depth shiftly green control on water states and the control of the contr	ATEGORY (II pecially after rs rapidly; 1.5-3 ft; may olor; no oil urface. 5 erage ATEGORY (II eenish water derate algal ibstrates.	GRADE or S GRADE or S Considerat most of the visible to de slow section pea-green; or sumere covered 4 GRADE or S Ma Greenish wa reach; overata green macrop algal grow during war	3 SCORE Irginal lole cloudiness time; objects poth 0.5-1.5 ft; ss may appear bottom rocks ged objected d with film. 3 SCORE Irginal Iter along entire bundance of lush hytes; abundant th, especially rmer months.	Very turbid the time; ob slow moving other obvio algal mats, s coat of foa 2 2 Pea green, entire macrophyte blooms crea or NO alga subst	Poor or muddy appejects visible to gwater may be us water pollut urface scum, s am on surface. zero.	earance most depth <0.5 ft; bright-green; tants; floating sheen or heavy No water =	
Water Grade PRES 3a. N Enrice	er Clarity BENCE OF Nutrient chment	Very clear objects visi if slightly of surface subme	Optimal , or clear but ble at depth colored); no o clear but ble at depth colored); no o circo ab; no noticeab; no noticeab; no noticeab are along en quatic plant low quantatif macrophyte	tea-colored; 3-6 feet (less oil sheen on le film on or rocks. 8 FION: Prese tire reach; community es of many s; little algal	Occasional storm ev objects visi have slig sheel	NDITION C/ Suboptima ly cloudy, es ent, but clea bethe to depth ly the top the ly the ly the top the ly the top the ly the top the ly the ly the top the ly the ly the top the ly the l	ATEGORY (II pecially after rs rapidly; 1.5-3 ft; may polor; no oil urface. 5 prage ATEGORY (II	GRADE or S Ma Considerat most of the visible to de slow section pea-green; or sumere covered 4 GRADE or S Ma Greenish wa reach; overat green macrog- algal grow	3 SCORE rginal ble cloudiness time; objects pepth 0.5-1.5 ft; ss may appear bottom rocks ged objected d with film. 3 SCORE rginal ter along entire bundance of lush obytes; abundant th, especially	Very turbid the time; ob, slow moving other obvio algal mats, s coat of for 2 Pea green, entire macrophyte blooms crea	Poor or muddy appeiects visible to g water may be us water pollut urface scum, s am on surface. zero. 1 Poor gray, or brown reach; dense s se clog stream, ite thick algal n ae present due	earance most depth <0.5 ft; be bright-green; tants; floating sheen or heavy No water = 0	
Water Grade PRES 3a. N Enrice	er Clarity BENCE OF Nutrient chment	Very clear objects visi if slightly of surface subme	Optimal or clear but ble at depth colored); no o ;;no noticeat ged objects Optimal Optimal ater along en quatic plant low quantati macrophyte growth prese	tea-colored; 3-6 feet (less oil sheen on le film on or rocks. 8 FION: Prese tire reach; community es of many s; little algal nt.	CON Occasional storm ev objects visi have slig sheel 7 ence and Pe CON Fairly clear along entin growth	NDITION C/Suboptima ly cloudy, esent, but clea bethe to depth ly the top the t	ATEGORY (II pecially after rs rapidly; 1.5-3 ft; may polor; no oil urface. 5 prage ATEGORY (II eenish water derate algal ibstrates.	GRADE or S Ma Considerat most of the visible to de slow section pea-green; or sumere covered 4 GRADE or S Ma Greenish wa Greenish wa green macrop algal grow during war	3 SCORE rginal ble cloudiness time; objects papth 0.5-1.5 ft; sn may appear bottom rocks ged objected d with film. 3 SCORE rginal terralong entire turndance of lush hytes; abundant th, especially tmer months.	Very turbid the time; ob slow moving other obvio algal mats, s coat of foa 2 2 Pea green, entire macrophyte blooms crea or NO alga subst	Poor or muddy appejects visible to gwater may be us water pollut urface scum, sam on surface. zero. 1 Poor gray, or brows reach; destreach; destreach; destreach; destreach are present due rate. No water	earance most depth <0.5 ft; bright-green; tants; floating sheen or heavy No water =	
Grade RES 3a. N Enric	SENCE OF	Very clear objects visi if slightly of surface subme	Optimal or clear but ble at depth colored); no clear but ble at depth colored); no clear ged objects Optimal of the colored of the colored objects Optimal at colored objects Optimal at colored objects Optimal at colored objects Optimal objects Optimal objects Optimal objects Optimal objects Optimal objects Optimal objects Optimal objects Optimal objects Optimal objects	tea-colored; 3-6 feet (less oil sheen on le film on or rocks. 8 FION: Prese tire reach; community es of many s; little algal nt.	CON Occasional storm ev objects visi have slig sheel 7 ence and Pe CON Fairly clear along entin growth	NDITION C/ Suboptima ly cloudy, es ent, but clea ble at depth into year can n on water so 6 NDITION C/ Suboptima or slightly gr er leach; mo on stream su 6 NDITION C/ Suboptima C/ Suboptima Or slightly gr er leach; mo on stream su 6	ATEGORY (il pecially after res rapidly; 1.5-3 ft; may loter; no oil urface. 5 ATEGORY (il eeenish water derate algal libstrates.	GRADE or S Ma Considerat most of the visible to de slow section pea-green; or sumery covered 4 GRADE or S Ma Greenish wa Greenish wa green macrop algal grow during war	3 SCORE rginal le cloudiness time; objects path 0.5-1.5 ft; sn may appear bottom rocks ged objected d with film. 3 SCORE rginal ter along entire undance of lush bytes; abundant th, especially mer months. 3 SCORE	Very turbid the time; ob slow moving other obvio algal mats, s coat of foa 2 2 Pea green, entire macrophyte blooms crea or NO alga subst	Poor or muddy appeiects visible to g water may be us water pollut urface scum, s am on surface. zero. 1 Poor gray, or brown reach; dense s se clog stream, ite thick algal m hae present due rate. No water	earance most depth <0.5 ft; bright-green; tants; floating sheen or heavy No water =	
Grade 3a. N Enrice	er Clarity BENCE OF Nutrient chment	Very clear objects visi if slightly of surface subme	Optimal or clear but ble at depth colored); no o ; no noticeat ged objects Optimal Optimal over a colored ged objects Optimal over a colored over a color	tea-colored; 3-6 feet (less oil sheen on le film on or rocks. 8 FION: Prese tire reach; community es of many si; little algal nt.	CON Occasional storm ev objects visi have slig sheel 7 ence and Pe CON Fairly clear along entin growth	NDITION C/Suboptima ly cloudy, escent, but cleable at depth shiftly green control on water states or slightly green can be control or slightly green can be control or slightly green can be constructed by the control of the control	ATEGORY (II pecially after rrs rapidly; 1.5-3 ft; may olor; no oil urface. 5 ATEGORY (II eenish water derate algal ibstrates.	GRADE or S Ma Considerat most of the visible to de slow sectior pea-green; or sumere covered 4 GRADE or S Ma Greenish wa reach; overat green macrop algal grow during war 4 GRADE or S Ma Ma	3 SCORE Griginal Science S	Very turbid the time; ob slow moving other obvio algal mats, s coat of foa 2 Pea green, entire macrophyte blooms crea or NO alga subst	Poor or muddy appejects visible to gwater may be us water pollut urface scum, sam on surface. zero. 1 Poor gray, or brown reach; dense ses clostream, se present due rate. No water	earance most depth <0.5 ft; bright-green; tants; floating sheen or heavy No water = 0 n water along stands of severe algal mats in stream to to unstable r = zero.	
Grade PRESI 3a. N Enrice Grade	SENCE OF	Very clear objects visi if slightly of surface subme	Optimal or clear but ble at depth colored); no clear but ble at depth colored); no clear ged objects Optimal of the colored of the colored objects Optimal at colored objects Optimal at colored objects Optimal at colored objects Optimal objects Optimal objects Optimal objects Optimal objects Optimal objects Optimal objects Optimal objects Optimal objects Optimal objects	tea-colored; 3-6 feet (less oil sheen on le film on or rocks. 8 FION: Prese tire reach; community es of many s; little algal nt. 8	CON Occasional storm ev objects visi have slig sheer 7 ence and Pe CON Fairly clear along entir growth 7	NDITION C/ Suboptima ly cloudy, es ent, but clea ble at depth into year can n on water so 6 NDITION C/ Suboptima or slightly gr er leach; mo on stream su 6 NDITION C/ Suboptima C/ Suboptima Or slightly gr er leach; mo on stream su 6	ATEGORY (Il pecially after rrs rapidly; 1.5-3 ft; may oblor; no oil urface. 5 ATEGORY (Il eenish water derate algal ibstrates. 5 ATEGORY (Il ols, larger	GRADE or S Ma Considerat most of the visible to de slow section pea-green; or sumer covered 4 GRADE or S Ma Greenish wa reach; overata green macrop algal grow during war 4 GRADE or S Ma Algal mats	3 SCORE rginal le cloudiness time; objects path 0.5-1.5 ft; sn may appear bottom rocks ged objected d with film. 3 SCORE rginal ter along entire undance of lush bytes; abundant th, especially mer months. 3 SCORE	Very turbid the time; ob slow moving other obvio algal mats, s coat of foa 2 Pea green, entire macrophyte blooms crea or NO alga subst	Poor or muddy appeiects visible to g water may be us water pollut urface scum, s am on surface. zero. 1 Poor gray, or brown reach; dense s se clog stream, ite thick algal m hae present due rate. No water	earance most depth <0.5 ft; be bright-green; tants; floating sheen or heavy No water = 0	

Optimal Suboptimal Marginal Poor Fine organic sediment - black in organic debris without sediment. Suboptimal No leaves or woody debris; coarse and fine organic matter with sediment present due to excessive scouring Scouring Scouring Scouring Optimal Suboptimal Suboptimal Marginal Poor					CO	NDITION CA	ATEGORY (GRADE or S	SCORE				F
Mainly consisting of leaves and wood without sediment. Leaves and wood vacares: fine organic adebris without sediment. Leaves and wood scarces: fine organic matter with sediment organic matter with sediment present due to excessive sediment. Sediment present due to excessive sediment present due to excessive sediment. Sediment prese	İ		Optimal								Poor		
CONDITION CATEGORY GRADE or SCORE Optimal Suboptimal Marginal Poor Store Optimal Suboptimal Marginal Poor Store Optimal Suboptimal Marginal Poor Store Optimal Suboptimal Marginal Poor Store Optimal Suboptimal Optimal Suboptimal Optimal Suboptimal Optimal Suboptimal Optimal								debris; coa organic	arse and fine matter with	color and fo	oul odor (ana present due t	aerobic) or no	1 F
CONDITION CATEGORY GRADE or SCORE Suboptimal Marginal Poor Marginal Poor 19 19 19 19 19 10 10 10	Grade	10	9	8	7	6	5	4	3	2	1	0	8
Grade (Right) 10 9 8 7 6 5 4 3 2 1 0 9 9 8 Avg.Score 9 9 Avg.Score 9 Avg.Score 9 9 Avg.Score 9 Avg.Score 9 9 Avg.Score 9 Avg.Sco	Grade (Left) Grade (Right) RIPARIAN ZON 6a. Riparian Zone Width (from stream edge to field)	Undisturbs pristine nati	Optimal led, consistin very prairie, ar wetlands. 9 9 AND CONT Optimal learnan zone >18 ths with trees, human activitii impacted zone	g of forest, nd/or natural 8 8 FINUITY: B meters (1-2 shrubs, or tall es have not e.	CO Perman woodlots 7 7 Width of rips 1 active cha grasses), hu	Suboptima ent pasture n s and swamp crops 6 6 6 NDITION C/ Suboptima arian zone 12-1 nnel width w/tr man activities l impacted zone	Inixed with s, few row 5 5 ATEGORY (III 8 meters (1/2-ses, shrubs, or have minimally second secon	Ma Mixed rov pasture; s areas may l as isolat 4 4 4 GRADE or S Ma Width of ripe meters (1 channel wice impacted by h	rginal w crops and ome wooded be present but ed patches 3 3 3 SCORE urginal arian zone 6-12 (/3-1/2 active dth vegetated), numan activities.	2 2 Width of ripa vegation le width), little	Poor rian zone < 6 a span to year of the poor rian zone vege human activitie	0 0 Avg.Score	4 4 4 4
CONDITION CATEGORY GRADE or SCORE Optimal Suboptimal Optimal Suboptimal Suboptimal Suboptimal Suboptimal Suboptimal Soft-75% streambank vegetation of mixed grasses, or marsh plants, iparian zone intact or disruption from grazing/mowing minimal. Completeness Grade (Left) 10 9 8 CONDITION CATEGORY GRADE or SCORE Marginal Suboptimal Narginal Soft-75% streambank vegetation of mixed grasses and sparse young tree or shrub species; breaks frequent with some guillies and scars every 50 meters. Grade (Left) 10 9 8 7 6 5 4 3 2 1 0 8 8 Grade (Right) 10 8 8 9 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8													
CONDITION CATEGORY GRADE or SCORE Suboptimal Suboptimal So-75% streambank vegetation, mixed sparses, or marsh plants, riparian zone intact or disruption from grazing/mowing minimal. Completeness CONDITION CATEGORY GRADE or SCORE Suboptimal Marginal So-75% streambank vegetation of mixed grasses and sparse young tree or shrubs species; breaks frequent with some gullies and scars every 50 meters. Completeness CONDITION CATEGORY GRADE or SCORE Suboptimal Marginal So-75% streambank vegetation of mixed grasses and sparse young tree or shrub species; breaks frequent with some gullies and scars every 50 meters. Completeness Condition Category GRADE or SCORE Marginal So-75% streambank vegetation of mixed grasses and sparse young tree or shrub species; breaks frequent with some gullies and scars every 50 meters. Completeness Condition Category GRADE or SCORE Marginal Poor Less than 50% streambank vegetation coverage consisting mostly of pasture grasses, few trees & shrubs; low plant density; bank deeply scarred with gullies and scars every 50 meters. Completeness Condition Category GRADE or SCORE Marginal Poor Less than 50% streambank vegetation coverage consisting mostly of pasture grasses, few trees & shrubs; low plant density; bank deeply scarred with gullies and scars every 50 meters. Completeness Condition Of the condition of mixed grasses and sparse young tree or shrub species; breaks frequent with some gullies and scars every 50 meters. Completeness Condition Of the condition of mixed grasses and sparse young tree or shrub species; breaks frequent with some gullies and scars every 50 meters. Completeness Condition Of the condition of mixed grasses and sparse young tree or shrub species; breaks frequent with some gullies and sparse young tree or shrub species; breaks frequent with some gullies and sparse young tree or shrub species; breaks frequent with some gullies and sparse young tree or shrub species and sparse young tree or shrub species and sparse young tree or shrub species a	Stade (Right)	10	<u> </u>	0		0		4					
Optimal Suboptimal Suboptimal Suboptimal Suboptimal Soft Streambank vegetation, mixed Soft Streambank vegetation, mixed Soft Streambank vegetation of mixed grasses or marsh plants, riparian zone intact or disruption from grazing/mowing minimal. Optimal Suboptimal Suboptimal Soft Streambank vegetation, mixed Soft Streambank vegetation, mixed soft Soft Streambank vegetation of mixed grasses and sparse young tree or shrub species; breaks frequent with some gullies and scars every 50 meters. Optimal Suboptimal Soft Soft Soft Soft Soft Soft Soft Soft					CO	NDITION CA	ATEGORY (GRADE or S	SCORE			g.c.c.c	
A shrubs, prairie grasses, or marsh plants, riparian zone intact or disruption from grazing/mowing minimal. Sompleteness Sirade (Left) 10 9 8 7 6 5 4 3 2 1 0 8 REpart of the sprairie grasses, or marsh plants, riparian zone intact or disruption from grazing/mowing minimal. Sirade (Right) 10 9 8 7 6 5 4 3 2 1 0 8 8 8 8 8 8 8 8 8 8 8 8			Optimal								Poor		ϵ
Grade (Right) 10 9 8 7 6 5 4 3 2 1 0 8	Zone Vegetation Protection/	shrubs, prair riparian zor	rie grasses, or ne intact or dis	marsh plants, ruption from	young speci trees beh	es along chanr ind; disruption ccurring at inter	nel and mature evident with	vegetation of and sparse shrub spe frequent wit	f mixed grasses young tree or ecies; breaks th some gullies	coverage of grasses, fe density; ban	consisting mos ew trees & shru k deeply scarr	stly of pasture ubs; low plant red with gullies	F F 6 1 F
(g)	Grade (Left)					6	5				11		
Avg.Score 8	Stade (Lett)	10	9	8	7	6	5	4	3	2	1		
Calculation of Function Capacity Index = Total Score/Total Possible Score 0.5									· · · · · · · · · · · · · · · · · · ·				

1 FLOW REGII TYPE						N15-TR	IB1					-
		Perennial		Intermitte	nt w/ Peren	nial Daala	Intorn	nittent			al .	
Grade	10	9	8	7	6	5	4	3	2	Ephemera 1	0	
							•	•				
2 EPIFAUNAL	SUBSTRATE/A\		OVER		0 1			. ,				
		Optimal bed, greater th	an 50%	Within strea	Suboptimal m bed, 30-50		Mar Within stream		Less than	Poor n 10% habit	at features	4
		stable habitat fe			abitat feature		coverage by				at is obvious;	
	favorable for st				aunal coloniz		features favora			e unstable o		
	and/or fish/amph features non tr	hibian cover. M transient. Featu			pian cover. M transient. (Se		faunal coloni: fish/amphibian				els. Habitat ed or lacking,	
Features	include snags, s	submerged logs	, undercut		ry for habitat		availability ma	y be less than		l bottom ma		
present but	banks, roots, cob				components.))	desirable, sub					
no water.		and glides, or oth age to allow cold					frequently dis Excellent Cate					
							feature cor					
0 1											1 .	<u> </u>
Grade	10	9	8	7	6	5	4	3	2	1	0	
3 STREAM BO	TTOM SUBSTR		ubstrate Ch	aracterizati				. ,	ı	_		
	Mixture of substr	Optimal trate materials. v	with gravel	Mixture of	Suboptimal soft sand, mu		All mud or clay		Hard pan cla	Poor ov or bedroo	ck; no root mat	1
	and firm sand p	prevalent; root r	mats and	mud may	be dominant;	some root	little or no r	oot mat; no	or sub	merged veg	getation.	
	submerged	d vegetation com	nmon.	mats and	submerged v present.	egatation/	submerged	vegetation.				
					present.							
Grade	10	9	8	7	6	5	4	3	2	1	0	
						•	•	•			•	
4 POOL VARIA		Ontimal		ı	Cubantimal		Mor	nin al	ı	Door		-
	Even mix of large-	Optimal e-shallow, large-	deep, small-	Majority of r	Suboptimal ools large-de		Shallow pool	ginal s much more	Majority o	Poor f pools sma	II-shallow or	1
	shallow, sma	all-deep pools p	resent	,,,	shallow.		prevalent tha			pools abser		
Grade	10	9	8	7	6	5	4	3	2	1	0	1
	EPOSITION/SC	COURING			, ,	<u> </u>						
		Optimal			Suboptimal			ginal		Poor]
		bottom affected be deposition.	y scour or		ted by scour o strictions and v		30-50% affect deposition. Depo				om in a state of arlong. Pools	
		•			Some deposition		obstructions, co	onstrictions and	minimal or ab	sent due to h	neavy deposition	ı
							bends. Some	filling of pools.	or e	excessive sco	ouring.	
0 1			•			_						
Grade	10	9	8	7	6	5	4	3	2	1	0	
	OW STATUS											İ
6 CHANNEL F	ı	Optimal	th lower	Water fills	Suboptimal		Mar	ginal		Poor		
6 CHANNEL F								75% of the	Von little	untor in tho	channal and	
6 CHANNEL F	Water reaches		is exposed			channel; or	Water fills 25				channel and ding pools; or	
6 CHANNEL FI			is exposed		>75% of the annel substrat	channel; or		nel and/or riffle	mostly pres		ding pools; or	
6 CHANNEL FI	Water reaches		is exposed			channel; or	Water fills 25 available chan	nel and/or riffle	mostly pres	sent in stand	ding pools; or	
6 CHANNEL FI	Water reaches		is exposed			channel; or	Water fills 25 available chan	nel and/or riffle	mostly pres	sent in stand	ding pools; or	
6 <u>CHANNEL F</u> I	Water reaches		is exposed			channel; or	Water fills 25 available chan	nel and/or riffle	mostly pres	sent in stand	ding pools; or	
Grade	Water reaches banks; <5% of ch		s is exposed			channel; or	Water fills 25 available chan	nel and/or riffle	mostly pres	sent in stand	ding pools; or	
	Water reaches banks; <5% of ch	hannel substrate	·	<25% of cha	annel substrat	channel; or e is exposed	Water fills 25 available chant substrates are if	nel and/or riffle mostly exposed	mostly pres	sent in stand stream is di	ding pools; or ry	
Grade	Water reaches banks; <5% of ch	hannel substrate	8	<25% of cha	6 Suboptimal	channel; or e is exposed	Water fills 25 available chant substrates are if	nel and/or riffle mostly exposed	mostly pres	sent in stand stream is di	ding pools; or ry	
Grade	Water reaches banks; <5% of ch	Optimal n, alteration, or o	8 dredging able stream	7 Some alte	annel substrat	channel; or e is exposed	Water fills 25 available chant substrates are if	nel and/or riffle mostly exposed 3 ginal unnelization may	mostly pres	sent in stand stream is di	ding pools; or ry	
Grade	Water reaches banks; <5% of ch	9 Optimal n, alteration, or oal; normal and st	8 dredging able stream stormwater	7 Some alte presen structures, (:	6 Suboptimal eration or chart, usually adjesuch as bridges	channel; or le is exposed	Water fills 25 available chant substrates are to the substrates are the substrates are to the substrates are to the substrates are the substra	and/or riffle mostly exposed 3 ginal Innelization may embankments olles) or shoring	2 Banks shor concrete. channe	1 Poor ed with gab Concrete or	o ion, riprap, or r riprap lined m habitat	
Grade	Water reaches banks; <5% of ch	Optimal n, alteration, or o	8 dredging able stream stormwater	7 Some alter presen structures, (corculves)	6 Suboptimal eration or chart, usually adjasuch as bridgsuch so bridgsuch service or constitution of the suborate of the subor	5 nnelization acent to e abutments e of past	Water fills 25 available chan substrates are to the substrates are to the substrates are to the substrates are to the substrates are to the substrates or change substrates are the subs	and/or riffle mostly exposed 3 ginal nnelization may embankments piles) or shoring essent on both	2 Banks shor concrete. channe significantly	1 Poor ed with gab Concrete or els. Instrear altered by s	o ion, riprap, or r riprap lined m habitat stormwater or	-
Grade	Water reaches banks; <5% of ch	9 Optimal n, alteration, or oal; normal and st	8 dredging able stream stormwater	7 Some alte presen structures, (cor culve alteration, depresentation, depresentation).	6 Suboptimal Pration or chart, usually adjesuch as bridgerts); evidence; [l.e., channeli;], but stream p	channel; or e is exposed 5 nnelization acent to e abutments e of past zation) may battern and	Water fills 2t available chain substrates are if the substrates are if the substrates are if the substrates are if the substrates are if the substrates are including spoil structures probanks; normal meander patents.	and/or riffle mostly exposed 3 ginal innelization may embankments biles) or shoring esent on both stable stream term has not	2 Banks shor concrete. channe significantly other inputs.	1 Poor ed with gab Concrete or els. Instrear altered by s	o ion, riprap, or r riprap lined m habitat stormwater or of the stream	
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sums of	o meters; little ion due to ess. O O O O O O O O O O O O O O O O O O O	Poor arian zone < The second	Width of rip or no rip h	ginal an zone 6-12 activities have a great deal. 3 3 3 3 ginal dbh-3 inches) 0% tree canopy sellent Category additional forest the high end of ers are presun additional syers ore at low end if ers are presun sists of non- additional syers ore at low end if ers are presun sists of non- additional syers ore at low end if ers are presun sists of non- additional syers ore at low end if ers are presun sists of non- additional syers ore at low end if ers are presun sists of non- additional syers ore at low end in the syers and the syers are syers and the syers	Marr Width of ripar meters; human impacted zone 4 4 4 4 Tree stratum (present, with <3 cover. (See Ex. for examples of layers.) Score a Fair range if Seir and exe 1 additional lay OR area cor maintained an dense herbacee veget 4 dition Scores u nd Use GIS ma or each ripariar Marr	2-18 meters; pacted zone). 5 5 5 5 5 Sore at ange if ≥2 ret present, clitional forest utover areas ining.	Suboptimal arian zone 12 inties have imply minimally inties have imply minimally inties have imply minimally inties have imply inties have imply inties have imply interested in 1 category interest interest interest inties inties have inties	7 Width of righthway and the righthway and the righthway and the righthway and the righthway and the righthway and the righthway and righthway	8 s; human ds, clear- npacted 8 8 sent, with mal forest hrub, uding i Score at low resent. 8 am bank i easuring proses, er	ANK) ANK) ANK) Billianten	SACH BA Optima	(SCORE Edith of riparia vities (i.e., particular site	AN HABIT Tr. >60 mo: ad t f f f f f f f f f f f f f f f f f f	Grade Grade Grade Grade Grade RIPAI Grade Grade RIPAI Grade RIPAI Grade RIPAI Grade RIPAI

St	ream Function	nal Capacity C	alculation		
	N15-TRIB	3 1			
Date:	5/18/2006				
Project:	Lake Ralph H	all			
Assessment Area:	WP 10				
Assessors:	Holmes Voigh	nt capps			
Project Status:	XPreproj	ect	Postproject		
		Stream	Stream	Multiplication	
Major Function Categories	FCI	Length (LF)*	Characterization	Factor**	FC
Hydrologic	0.44	3,696	E	0.00125	2.03
Water Quality Improvement	0.5	3,696	E	0.00125	2.31
Habitat	0.48	3,696	E	0.00125	2.22
Total	1.42	3,696			6.56
*Stream Length is the length of the Stream Length is the length of the Stream Length of the Stream Length of the Stream Length is the length of the Stream Length is the length of the Stream Length is the length of the Stream Length is the length of the Stream Length is the length of the Stream Length is the length of the Stream Length is the length of the Stream Length is the length of the Stream Length is the length of the Stream Length is the length of the Stream Length is the length of the Stream Length is the length of the Stream Length is the length of the Stream Length is the length of the Stream Length is the length of the Stream Length is the length of the Stream Length is the length of the Stream Length is the l	eam Assessme	nt Reach (SAF	₹)		





SWAMPIM DATASHEETS – NORTH EPHEMERAL 0.5 TO 2.0),
PRE-PROJECT	

• N11

N11(0.5-2.0')

PARAMET	ER]
				CONI	DITION CA	TEGORY G	PADE or S	CORE				
		Optimal			Suboptima			ginal		Poor		1
0 1	40	_			•							1
Grade	10	9	8	7	6	5	4	3	2	1	0	Ш.

Park area, surrounded by pastures. Riparian zone is 100+ m. WP 4 P 95, 94 $\,$

PROLOGIC FUN VARIABLES FLOW REGIMI			I. HYDROL	OGIC FUN	ICTIONS	N11(0.5	5-2.0')					SCORE	Reference Source
TYPE		Perennial		Intermitte	ent w/ Perer	nnial Pools	Interr	nittent		Ephemeral			KDWP 2000 Kansas
Grade	10	9	8	7	6	5	4	3	2	1	0	(Subjective
CHANNEL CO	NDITION:	Measureme	nt or Obser	vation of St	ream Chanr	nel Condition	IS						
				CON	IDITION CA	ATEGORY (SRADE or S	CORE					Barbour, 19
		Optimal			Suboptima	d	Mar	ginal		Poor			EPA RBA p
2a.Channel Condition/Alter ation (natural, altered, or	channe eviden excessive frequency of	hannel; no str elization minir nce of downcu e lateral cuttin of hydrologica channel and t	mal. No utting or ug. Normal I connection	bridge a alteration recovery of Acceptable	annelization areas) or pas on, but with s channel bed e frequency as onto flood	t channel ignificant d and banks. of overbank	80% of the channel with	nannel; 40- the reach elized or d. Excess on; braided th excessive of overbank	widening. > channneli	is actively dow 80% of the reazed. Degradat prevent acces floodplain.	ach riprap or ion,dikes or		5-21; New 1998 USD NRCS SVA page 7
downcutting)							floodplain incision,dik	onto the . Historical es or levees loodplain.					
Grade	10	9	8	7	6	5	4	3	2	1	0	8	3
				201	DITION	TE0051/							1,
01.01		Optimal		CON	NDITION CA Suboptima	ATEGORY (GCORE ginal		Poor			w/ assistant and input from
2b.Channel Capacity to		apacity to Flow			pacity to Flo	w Frequency	Channel (Capacity to		apacity to Flov			Dr. Mike
Flow Frequency Ratio (for 2- year peak flow)	storm ever	th that bank o nts occur at a year frequenc 0.75-1.25	1.25 to 2.5	storm even every 1.2 that		ears.	such that be from storm more free every ye frequent the	ency Ratio is ank overflow events are quent than ar or less nan every 5 ars.	storm eve every half	ch that bank on this are more from year or less from every 10 years <0.24 or >2	equent than equent than		Harvey and Travant
Grade	10	9	8	7	6	5	4	or >1.5	2	1	0	(0
		•		CON	IDITION CA	ATEGORY (SRADE or S	CORE		•	•		Newton, 19
		Optimal			Suboptima			ginal		Poor			USDA/ NRO
2c.Channel Bank Stability (score each bank, left or right facing downstream)	bank failure of banl vegetation undercut l outside of r	le; evidence of absent or mit k affected), per n to waterline banks (some meander bene xposed roots tree falls;	inimal; (<5% erennial ; no raw or erosion on ds O.K.); no	areas of ero 5-30% of be minor undercutting waterline	osion mostly ank in reach erosion and/ g; perennial in most place	vegetation to	perennial v waterline sp scoured or lateral ero held by h (trees, roc and ero elsewhere bank in read of erosior undercuttii	y unstable; egetation to barse (mainly) storil, bank ard points k outcrops) ded back; 30-60% of ch has areas a and bank ng; recently	waterlind banks; re- common undercut tr- areas; "r straight se- bank sloug	no perennial vi s; severe erosic cently exposed tree falls and/ ees common; r aw" areas frequictions and ben hing; 60-100% erosional scars	on of both d tree roots or severely many eroded uent along ids; obvious of bank has		SVAP page 10; Barbour al., 1999 E RBA page 9 26; USACE Norfolk Dist 2004
								ee roots and					
Grade (Left) Grade (Right)	10 10	9	<u>8</u> 8	7	6	5	4	3	2	1 1	0	(
Grade (Right)	10	3	0	,		<u> </u>	4			'	Avg.Score	(
CHANNEL RO	IGHNESS	FACTORS											
OT IT WATER TO	OCI II VEGO	171010110											
		Ontine		CON		ATEGORY (Dana			Barbour, 19
3a.Channel Sinuosity (bends in low gradient stream)	the strea longer	Optimal s in the strear m length 2.5 than if it was e ngth/valley ler >1.5.	to 4 times straight.	the stream	Suboptima s in the strea n length 1.5 t n if it was a s ength/valley I 1.5	m increase to 2.5 times straight line.	The bends increase to length 1 to longer that straight line length/valled	n the stream the stream o 1.5 times n if it was a e. Channel by length 1.0	channe	Poor traight; waterwa lized for a long length/valley le	distance.		EPA RBA Chapter 5 p 5-25; KDW 1996
Grade	10	9	8	7	6	5	to 4	1.2.	2	1	0	5	5
		·	·		•	•		•	•	·			
		Optimal		CON	Suboptima	ATEGORY (GCORE rginal	1	Poor			KDWP, 199 Kansas
3b. Bottom Substrate Composition	resul	o channel en Iting from sed ation; channe	iment	and well-wa	el bars of co	arse stones present, little	Sediment b sands, and	ars of rocks,	is channe	ivided into braid lized; substrate clay, or bedroo	e is uniform		Subjective Evaluation of Aquatic Habitats
Grade	40	1 ^	1 0					I 0		1 4	1 ^		
	10	9	8	7	6	5	4	3	2	1	0	2	<u> </u>

Į				COI	NDITION C	ATEGORY (GRADE or	SCORE				l	KDWP, 19
		Optimal			Suboptima			ırginal		Poor		l	Newton et
c. Instream Bottom opography	>7 of the boulders/g debris, overhand vegetate	ttom topograp following: de gravel, logs/la backwaters/c ging vegetation ed shallows, ru banks, or sid pools	eep pools, arge woody oxbows, on, riffles, ootwads,		ottom includ ted in Optima	es 5-7 of the al Category	includes < listed i	el bottom 5 of the items n Optimal tegory		I bottom includ sted in Optima			1998 USDA/NR SVAP pag
ade	10	9	8	7	6	5	4	3	2	1	0	3	
					•			1					1
		0 11 1		COI		ATEGORY (ı			l	
or		Optimal 0.05 to 0.099	1		Suboptima 0.035 to 0.0			orginal 0.03 or >0.10	0.16+	Poor o 0.20 due to	oveceive	l	
. Manning's n		0.00 10 0.000	,		0.000 10 0.0			0.15	obstructio	n to flow or 0.	01 to 0.02 due clean, smooth		
ade	10	9	8	7	6	5	4	3	2	1	0	l	
				COI	NDITION C	ATEGORY (SRADE or	SCORE				1	USACE.
ŀ		Optimal			Suboptima			rginal		Poor			Norfolk Di
d. Channel Incision	Incision rat	tio <u>></u> 1.0 <1.2	and Where	Incision ra		and Where		tio <u>></u> 1.4 < 2.0	Incision ra		Where channel	l	2004 SAA
LB/BFD=BH 1/BHR*Adj Factor =CI)	ratio >1.4	ope >2%; Ent 4; Where char ntrenchment r	nnel slope	ratio >1.4	4; Where chantrenchment		slop Entrenc >1.4; Wh slop	ere channel e > 2%, hment ratio ere channel e <2%, hent ratio >2.0	Whe	re channel sk trenchment ra			Form 1 #1 VT Stream Geomorph Assessme Phase 2
TLB =		10		BHR =	1							l	
BFD =		10										l	
ade	10	9	8	7	6	5	4	3	2	1	0	2	
NAMIC SUR	FACE WA	TER STOR	AGE										1
				001	UDITION C	ATEGORY (CCORE					Newton, e
		Optimal			Suboptima			rginal		Poor		l	1998 USE
4a.Pools	Deep and	shallow pools	abundant;	Pools pre	esent, but no		Pools p	resent, but	Pools ab		ntire bottom is	l	NRCS SV
(abundant, present or absent)	is obscure of	n 30% of the due to depth, least 5 feet de	or pools are	obscure d	0% of the polue to depth, at least 3 fee	or the pools	the poo obscure of or the po	om 5-10% of il bottom is due to depth, iols are less feet deep.	disce	rnible. No wa	ter = zero.		page 14; Barbour, 6 1999
ade	10	9	8	7	6	5	4	3	2	1	0	0	
b. Channel					IDITION	ATEOODY	20405	00005					
low Status		Optimal		COI	Suboptima	ATEGORY (rginal		Poor		l	Barbour, e
(degree to	Water rea	ches base of	both lower	Water fill	s >75% of th			s 25-75% of	Very little		nel and mostly	l	1999 EPA
	banks a	and minimal ar	mount of	channe	el; or <25% o estrate is exp	f channel	the availa	ble channel, le substrates			ols. No water =		page 5-19 9#5; <i>TCE</i>
nich channel is filled)	onao.						are most	ly exposed.				ļ	1000-1/44
	10	9	8	7	6	5	are most	lly exposed.	2	1	0	0	1999; VAI 2005

I. HYDROLOGIC FUNCTIONS N11(0.5-2.0')

													<u> </u>
ŀ	TYPE NOTES												<u></u>
۱	SEDIMENT TR	ANSPOR	T/DEPOSIT	ION									T
]
					COI		ATEGORY (
	1a. Bank		Optimal	, .		Suboptima			rginal		Poor		4
	Stability			of erosion or minimal; little		/ stable; infre osion mostly	equent, small		unstable; 30- k in reach has		nany eroded equently alor	areas; "raw"	
	(score each bank, left or			lems. <5% of			has areas of		erosion; high		equently alor and bends; of		
	right facing	, , , , , , , , , , , , , , , , , , , ,	bank affecte			erosion.			tential during	sloughing	g; 60-100% c	of bank has	
	downstream)							flo	ods.	€	erosional sca	rs.	
Ļ			•	,		•							
	Grade (Left)	10	9	8	7	6	5	4	3	2	1	0	0
	Grade (Right)	10	9	8	7	6	5	4	3	2	1	0 Ava Cooro	0
												Avg.Score	0
					COI	NDITION C	ATEGORY (SRADE or S	SCORE				
	1b. Channel		Optimal			Suboptima			rginal		Poor		1
	Bottom Bank		1/3 of bank is			1/3 of bank is	generally	Bottom 1	/3 of bank is		1/3 of bank is		1
	Stability	highly res	sistant plant/s	soil matrix or	resistant pla	ant/soil matri	x or material.		ighly erodible		dible materia		
	,		material.						ant/soil matrix romised.	matrix s	everely comp	promised.	
					1			Somp					
	Grade (Left)	10	9	8	7	6	5	4	3	2	1	0	0
	Grade (Right)	10	9	8	7	6	5	4	3	2	1	0	
												Avg.Score	0
	or				001	UDITION	ATEGORY (PADE or C	CODE				1
	Or 1c. Channel		Optimal			Suboptima			rginal		Poor		
	Sediments or	>50% qı	ravel or large	r substrate;	30-50% q	ravel or large			ravel or larger	Substrate	is uniform sa	nd, silt, clay,	1
	Substrate	gravel, co	obble boulder	rs; dominant	dominant	substrate typ	pe is mix of	substrate	e; dominant	or l	pedrock; uns		
	Composition	substrate	e type is grav	el or larger;	_	h some finer			pe is finer than				
	0		stable	1 -		oderately sta			may still be a			_	ļ
	Grade	10	9 Clarity and	8 (:a:b:lita.	7	6	5	4	3	2	1	0	1
	WATER APPE	AKANUE:	Cianty of V	risibility									+
													•
					COI	NDITION C	ATEGORY (GRADE or S	SCORE				
	ŀ		Optimal		CON	NDITION CA Suboptima	ATEGORY (SCORE Irginal		Poor		
			r, or clear but	tea-colored;	Occasiona	Suboptima lly cloudy, es	al pecially after	Ma Considerat	rginal ole cloudiness		or muddy app		
		objects vis	r, or clear but ible at depth	3-6 feet (less	Occasional storm ev	Suboptima lly cloudy, es rent, but clea	al pecially after ars rapidly;	Ma Considerat most of the	rginal ble cloudiness time; objects	the time; ob	or muddy appo jects visible to	depth <0.5 ft;	
	Water Clarity	objects vis	r, or clear but	3-6 feet (less oil sheen on	Occasiona storm ev	Suboptima lly cloudy, es rent, but clea	pecially after rs rapidly; 1.5-3 ft; may	Ma Considerate most of the visible to de	rginal ole cloudiness	the time; ob slow moving other obvio	or muddy appo jects visible to g water may be us water pollut	depth <0.5 ft; e bright-green; tants; floating	
	Water Clarity	objects vis if slightly surfac	r, or clear but lible at depth colored); no	3-6 feet (less oil sheen on ole film on	Occasiona storm ev objects visi have sliç	Suboptima lly cloudy, es vent, but clea ible at depth	pecially after ars rapidly; 1.5-3 ft; may olor; no oil	Ma Considerate most of the visible to de slow section pea-green;	orginal ble cloudiness time; objects beth 0.5-1.5 ft; as may appear bottom rocks	the time; ob slow moving other obvio algal mats, s	or muddy appo jects visible to g water may be us water pollut urface scum, s	depth <0.5 ft; bright-green; tants; floating sheen or heavy	,
	Water Clarity	objects vis if slightly surfac	r, or clear but lible at depth colored); no e;no noticeat	3-6 feet (less oil sheen on ole film on	Occasiona storm ev objects visi have sliç	Suboptima lly cloudy, es vent, but clea ible at depth ghtly green co	pecially after ars rapidly; 1.5-3 ft; may olor; no oil	Ma Considerat most of the visible to de slow section pea-green; or sumerg	orginal ble cloudiness time; objects epth 0.5-1.5 ft; ns may appear bottom rocks ged objected	the time; ob slow moving other obvio algal mats, s	or muddy appo jects visible to g water may be us water pollut	depth <0.5 ft; bright-green; tants; floating sheen or heavy	,
	Water Clarity	objects vis if slightly surfac	r, or clear but lible at depth colored); no e;no noticeat	3-6 feet (less oil sheen on ole film on	Occasiona storm ev objects visi have sliç	Suboptima lly cloudy, es vent, but clea ible at depth ghtly green co	pecially after ars rapidly; 1.5-3 ft; may olor; no oil	Ma Considerat most of the visible to de slow section pea-green; or sumerg	orginal ble cloudiness time; objects beth 0.5-1.5 ft; as may appear bottom rocks	the time; ob slow moving other obvio algal mats, s	or muddy apports visible to go water may be us water pollut urface scum, sam on surface.	depth <0.5 ft; bright-green; tants; floating sheen or heavy	,
	Water Clarity	objects vis if slightly surfac	r, or clear but lible at depth colored); no e;no noticeat	3-6 feet (less oil sheen on ole film on	Occasiona storm ev objects visi have sliç	Suboptima lly cloudy, es vent, but clea ible at depth ghtly green co	pecially after ars rapidly; 1.5-3 ft; may olor; no oil	Ma Considerat most of the visible to de slow section pea-green; or sumerg	orginal ble cloudiness time; objects epth 0.5-1.5 ft; ns may appear bottom rocks ged objected	the time; ob slow moving other obvio algal mats, s	or muddy apports visible to go water may be us water pollut urface scum, sam on surface.	depth <0.5 ft; bright-green; tants; floating sheen or heavy	,
•	·	objects vis if slightly surfac	r, or clear but lible at depth colored); no e;no noticeat	3-6 feet (less oil sheen on ole film on	Occasiona storm ev objects visi have sliç	Suboptima lly cloudy, es vent, but clea ible at depth ghtly green co	pecially after ars rapidly; 1.5-3 ft; may olor; no oil	Ma Considerat most of the visible to de slow section pea-green; or sumerg	orginal ble cloudiness time; objects epth 0.5-1.5 ft; ns may appear bottom rocks ged objected	the time; ob slow moving other obvio algal mats, s	or muddy apports visible to go water may be us water pollut urface scum, sam on surface.	depth <0.5 ft; bright-green; tants; floating sheen or heavy	,
	Grade	objects vis if slightly surfac subme	r, or clear but ible at depth colored); no e;no noticeat erged objects	3-6 feet (less oil sheen on ole film on or rocks.	Occasiona storm ev objects visi have slig shee	Suboptima Ily cloudy, es vent, but clea ible at depth ghtly green on n on water so	al pecially after user rapidly; 1.5-3 ft; may olor; no oil urface.	Ma Considerat most of the visible to de slow section pea-green; or sumero covered	orginal ble cloudiness a time; objects spth 0.5-1.5 ft; ss may appear bottom rocks ged objected d with film.	the time; ob, slow moving other obvio algal mats, s coat of foa	or muddy apports visible to go water may be us water pollut urface scum, sam on surface.	depth <0.5 ft; bright-green; tants; floating sheen or heavy No water =	
(Grade	objects vis if slightly surfac subme	r, or clear but ible at depth colored); no e;no noticeat erged objects	3-6 feet (less oil sheen on ole film on or rocks.	Occasiona storm ev objects visi have slig shee	Suboptima Ily cloudy, es vent, but clea ible at depth ghtly green on n on water so	al pecially after user rapidly; 1.5-3 ft; may olor; no oil urface.	Ma Considerat most of the visible to de slow section pea-green; or sumero covered	orginal ble cloudiness a time; objects spth 0.5-1.5 ft; ss may appear bottom rocks ged objected d with film.	the time; ob, slow moving other obvio algal mats, s coat of foa	or muddy apports visible to go water may be us water pollut urface scum, sam on surface.	depth <0.5 ft; bright-green; tants; floating sheen or heavy No water =	
	Grade	objects vis if slightly surfac subme	r, or clear but ible at depth colored); no e;no noticeat erged objects	3-6 feet (less oil sheen on ole film on or rocks.	Occasiona storm ev objects visi have slig shee	Suboptima Ily cloudy, es vent, but clea ible at depth jhtly green ci n on water si	nl pecially after pecially after provided the pecially after provided the pecial	Ma Considerat most of the visible to de slow section pea-green; or sumero covered	rginal ole cloudiness et ime; objects spth 0.5-1.5 ft; ns may appear bottom rocks ged objected d with film.	the time; ob, slow moving other obvio algal mats, s coat of foa	or muddy apports visible to go water may be us water pollut urface scum, sam on surface.	depth <0.5 ft; bright-green; tants; floating sheen or heavy No water =	
	Grade	objects vis if slightly surfac subme	r, or clear but ible at depth colored); no e;no noticeat erged objects	3-6 feet (less oil sheen on ole film on or rocks.	Occasiona storm ev objects visi have slig shee	Suboptima Illy cloudy, es vent, but clea tible at depth ghtly green on n on water si 6 ercent Cove	pecially after are rapidly; 1.5-3 ft; may olor; no oil urface.	Ma Considerat most of the visible to de slow section pea-green; or sumerg covered 4	rginal ole cloudiness et ime; objects spth 0.5-1.5 ft; ns may appear bottom rocks ged objected d with film. 3	the time; ob, slow moving other obvio algal mats, s coat of foa	or muddy appiects visible to go water may go water may be us water pollul urface scum, sm on surface.	depth <0.5 ft; bright-green; tants; floating sheen or heavy No water =	
	Grade PRESENCE OF	objects vis if slightly surface subme	r, or clear but ible at depth colored); no e;no noticeat erged objects	3-6 feet (less oil sheen on ole film on or rocks.	Occasiona storm ev objects visi have slig shee	Suboptima Illy cloudy, es vent, but clea tible at depth ghtly green on n on water si 6 ercent Cove	pecially after are rapidly; 1.5-3 ft; may olor; no oil urface.	Ma Considerat most of the visible to de slow sectior pea-green; or sumere covered 4 GRADE or S Ma Greenish was	rginal ole cloudiness be time; objects opth 0.5-1.5 ft; ss may appear bottom rocks ged objected d with film. 3 SCORE urginal ter along entire	the time; ob slow moving other obvio algal mats, s coat of for	or muddy apports visible to go water may be us water pollut urface scum, sam on surface.	depth <0.5 ft; bright <0.5 ft; bright-green; tants; floating sheen or heavy No water =	
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	Grade PRESENCE OF 3a. Nutrient	objects vis if slightly surface subme 10 F AQUATI Clear w diverse includes species c	r, or clear but ible at depth ible at depth colored); no e;no noticeat greed objects 9 C VEGETA Optimal ater along er aquatic plant low quantatilous depth colored to the colored at th	3-6 feet (less oil sheen on ole film on or rocks. 8 TION: Prese	Occasiona storm ev objects visi have slig shee	Suboptima Illy cloudy, es vent, but clea ible at depth ghtly green on n on water si 6 ercent Cove NDITION C, Suboptima or slightly green er re reach; mo	al pecially after pecially after pecially; 1.5-3 ft; may olor; no oil urface. 5 erage ATEGORY (all eenish water derate algal	Considerate most of the visible to de slow section pea-green; or sumero covered 4 GRADE or S Ma Greenish wa reach; overate green macrogalgal grow	rginal le cloudiness be time; objects pyth 0.5-1.5 ft; ss may appear bottom rocks ged objected d with film. 3 SCORE urginal ter along entire pundance of lush obytes; abundant th, especially	the time; ob slow moving other obvio algal mats, s coat of for 2 Pea green, entire macrophyte blooms crea or NO alga	or muddy apprijects visible to y water may be us water pollul urface scum, sum on surface. zero. 1 Poor gray, or browneach; dense ses clog stream te thick algal from the sistem of the series of th	depth <0.5 ft; bright <0.5 ft; bright-green; tants; floating sheen or heavy No water = 0	0
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F	Grade PRESENCE OF 3a. Nutrient Enrichment	objects vis if slightly surface subme 10 F AQUATI Clear w diverse includes species c	r, or clear but ible at depth ible at depth colored); no e;no noticeaterged objects 9 C VEGETA Optimal ater along er aquatic plant low quantatiof macrophyte	3-6 feet (less oil sheen on ole film on or rocks. 8 TION: Prese	Occasiona storm ev objects visi have slig shee	Suboptima Illy cloudy, es vent, but clea ible at depth ghtly green on n on water si 6 ercent Cove NDITION C, Suboptima or slightly green er re reach; mo	al pecially after pecially after pecially; 1.5-3 ft; may olor; no oil urface. 5 erage ATEGORY (all eenish water derate algal	Considerate most of the visible to de slow section pea-green; or sumero covered 4 GRADE or S Ma Greenish wa reach; overate green macrogalgal grow	rginal le cloudiness be time; objects pyth 0.5-1.5 ft; ss may appear bottom rocks ged objected d with film. 3 SCORE urginal ter along entire pundance of lush obytes; abundant th, especially	the time; ob slow moving other obvio algal mats, s coat of for 2 Pea green, entire macrophyte blooms crea or NO alga	or muddy appriects visible to y water may be us water pollul urface scum, sim on surface. zero. Poor gray, or brown reach; dense se sclog stream te thick algal re present due present due persent due	depth <0.5 ft; bright <0.5 ft; bright-green; tants; floating sheen or heavy No water = 0	0
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	Grade PRESENCE OF 3a. Nutrient	objects vis if slightly surface subme 10 FAQUATI Clear w diverse includes species c	r, or clear but ible at depth ible at depth colored); no e;no noticeat greed objects 9 C VEGETA Optimal ater along er aquatic plant low quantati of macrophyte growth prese	3-6 feet (less oil sheen on ole film on or rocks. 8 TION: Prese titire reach; ccommunity es of many es; little algal ent.	Occasiona storm ev objects visi have slig shee	Suboptima Illy cloudy, es vent, but clea ble at depth ghtly green on n on water si 6 ercent Cove Suboptima or slightly green so or slightly green so on stream su	pecially after pecially after provided in pecially after provided in pecial pec	Considerat most of the visible to de slow section pea-green; or sumerç covered 4 GRADE or S Ma Greenish war reach; overat green macrop algal grow during war	rginal ole cloudiness bet me, objects opth 0.5-1.5 ft; ns may appear bottom rocks ged objected d with film. 3 SCORE rginal ter along entire oundance of lush hytes; abundant th, especially tmer months.	the time; ob slow moving other obvious algal mats, s coat of foa 2 Pea green, entire macrophyte blooms crea or NO algal substi	or muddy appriects visible to go water may be us water pollulurface scum, sum on surface. zero. Poor gray, or brown reach; dense set clog stream te thick algal rie present due rate. No water	depth <0.5 ft; bright <0.5 ft; bright-green; bright-green; bright-green or heavy No water = 0	0
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	Grade PRESENCE OF 3a. Nutrient Enrichment Grade Or 3b. Aquatic	objects vis if slightly surface subme 10 FAQUATI Clear w diverse includes species c	r, or clear but ible at depth ible at depth colored); no e; no noticeat erged objects 9 C VEGETA Optimal ater along er aquatic plant low quantati low quantati growth prese	3-6 feet (less oil sheen on ole film on or rocks. 8 TION: Prese attire reach; community es of many es; little algal ent. 8	Occasiona storm ev objects visi have slig shee	Suboptima Ily cloudy, es yent, but clea ble at depth phtly green on n on water si 6 ercent Cove NDITION C, Suboptima or slightly gree reach; mo on stream su 6 NDITION C, Suboptima or slightly green stream su	al pecially after pecially after pecially after trans rapidly; 1.5-3 ft; may olor; no oil urface. 5 perage ATEGORY (a) leenish water derate algal abstrates. 5 ATEGORY (b) leonish il leonish water derate algal abstrates.	Considerate most of the visible to de slow section pea-green; or sumerg covered 4 GRADE or S Ma Greenish wa reach; overate green macrop algal grow during war 4 GRADE or S Ma Algal mats	rginal ole cloudiness be time; objects spth 0.5-1.5 ft; sn may appear bottom rocks ged objected d with film. 3 SCORE urginal ter along entire sundance of lush shytes; abundant th, especially rmer months. 3 SCORE urginal gresent, some	the time; ob slow moving other obvious algal mats, s coat of for the second of the sec	or muddy appriects visible to y water may be us water pollul urface scum, s am on surface. zero. 1 Poor gray, or browneach; dense s es clog stream te thick algal rae present due rate. No water 1 Poor tts cover bott	depth <0.5 ft; bright <0.5 ft; bright-green; lants; floating sheen or heavy No water = 0	0

				CON	NDITION C	ATEGORY (SRADE or S	SCORE			_	F
		Optimal			Suboptima		Ma	rginal		Poor		e
		onsisting of le I without sed			and wood so ebris without		debris; coa organic	es or woody arse and fine matter with liment.	color and fo		at - black in erobic) or no to excessive	1 F N
Grade	10	9	8	7	6	5	4	3	2	1	0	5
AND USE PA		Optimal	•	CON	Suboptima		Ma	rginal		Poor		F
	pristine nati	ed, consisting we prairie, ar wetlands.	nd/or natural	woodlots	ent pasture r and swamp crops	s, few row	pasture; s areas may l as isolat	w crops and ome wooded be present but ed patches		lainly row cro		1 F N
Grade (Left)	10	9	8	7	6	5	4	3	2	1	0	5
Grade (Right)	10	9	8	7	6	5	4	3	2	1	0 Avg.Score	5 5
(from stream		hs with trees,	shrubs, or tall es have not	grasses), hur	nan activities	ees, shrubs, or have minimally	channel wid	/3-1/2 active th vegetated),		ss than 1/3 ac riparian vege		F e
edge to field)		impacted zone).		impacted zone	9.	impacted by h	numan activities.	ŀ	numan activitie	es.	R
,				7	Impacted zone	e. 5	impacted by h	numan activities.		numan activitie	0	Ų.
Grade (left)	i	impacted zone	8 8						2 2			u
Grade (left)	10	impacted zone	8	7 7	6	<u>5</u>	4 4	3	2	1	0	8 8 8
Grade (left)	10	9 9	8	7 7	6 6 NDITION CA	5 5 ATEGORY (4 4 GRADE or S	3 3 SCORE	2	1 1	0 0	8 8 8
Grade (left) Grade (Right)	10 10	9 9 9	8 8	7 7 7 COM	6 6 NDITION CA	5 5 ATEGORY (4 4 GRADE or S	3 3 SCORE	2 2	1 1 Poor	0 0 Avg.Score	8 8 8 8
Grade (left) Grade (Right) 6b. Riparian Zone Vegetation Protection/	10 10 10 >90% plant shrubs, prairir riparian zon	9 9	8 8 ture trees or marsh plants, ruption from	7 7 CON 75-90% strr young specie trees behi	6 6 NDITION CA Suboptima eambank vege	5 5 ATEGORY (4 4 4 SRADE or S Ma 50-75% vegetation of and sparse shrub spe	3 3 SCORE	2 2 Less than 5 coverage c grasses, fe density; bani	Poor 0% streambar onsisting mosi	0 0 Avg.Score	8 8 8
6b. Riparian Zone Vegetation Protection/ Completeness	10 10 10 >90% plant shrubs, prairir riparian zon	9 9 Optimal density of ma	8 8 ture trees or marsh plants, ruption from	7 7 CON 75-90% strr young specie trees behi	6 NDITION C/ Suboptima sambank vege sa along chann nd; disruption curring at inter	5 5 ATEGORY (4 4 4 SRADE or S Ma 50-75% vegetation of and sparse shrub spe	3 3 SCORE Irginal streambank f mixed grasses young free or scies; breaks h some gullies	2 2 Less than 5 coverage c grasses, fe density; bani	Poor Ow streambar onsisting mosi w trees & shru k deeply scarm	0 0 Avg.Score	8 8 8 8 6 1 1 F
Grade (left) Grade (Right) 6b. Riparian Zone Vegetation Protection/ Completeness	10 10 10 >90% plant shrubs, prairi riparian zor grazii	Optimal density of male grasses, or ne intact or dis ng/mowing min	8 8 ture trees or marsh plants, ruption from nimal.	7 7 7 75-90% strr young specie trees behil breaks oc	6 6 Suboptima suboptima sambank vege es along chann d; disruption curring at inter meters.	5 5 ATEGORY (IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII	4 4 GRADE or S Ma 50-75% vegetation of and sparse shrub spe frequent wit and scars en	3 3 3 SCORE Irginal Istreambank f mixed grasses young tree or cites; breaks h some gullies very 50 meters.	Less than 5 coverage c grasses, fe density; bani	Poor 0% streambar onsisting mosi w trees & shru t deeply scarn I along its leng	0 0 Avg.Score nk vegetation tity of pasture ubst; low plant ed with gullies gth.	8 8 8 8 6 1 1 1 1 1 1 1 1 1 1
Zone Vegetation	10 10 290% plant shrubs, prairi riparian zon grazii	Optimal density of ma le grasses, or le intact or dis ng/mowing min	8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	7 7 CON 75-90% stre young specie trees behit breaks oc	6 6 SUDITION C/ Suboptima sambank vege sa along chann d; disruption curring at inter meters.	5 5 ATEGORY (IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII	4 4 A GRADE or S Ma 50-75% vegetation of and sparse shrub spe frequent wit and scars ev	3 3 SCORE riginal streambank rinixed grasses young free or scies; breaks h some gullies very 50 meters.	Less than 5 coverage c grasses, fe density; banl al	Poor 0% streambar onsisting mosi w trees & shru I along its leng	0 0 Avg.Score nk vegetation the vegetation the vegetation the vegetation the vegetation the vegetation the vegetation that vegetation the vegetation that vegetation the vegetation that vegetation v	8 8 8 8 6 1 6 7 6 1 7 8

			III. HABITA	T FUNCTIO	ONS		N20(0.5	5-2.0')					SCORE
	LOW REGIN		Perennial		Intermitte	nt w/ Peren	nial Pools	Interm	ittent	1	Ephemera	al	4
	Grade	10	9	8	7	6	5	4	3	2	1	0	0
. =	DIE ALIBIAL (OLIDOTO ATE (A)	A II A B I E O C										
2 EI	PIFAUNAL S	SUBSTRATE/AV	Optimal	IVER	ı	Suboptimal		Marg	rinal	1	Poor		4
		Within stream I		nan 50%		m bed, 30-50		Within stream		Less tha	n 10% habita	at features	1
		coverage by st	stable habitat fe	eatures,	by stable h	abitat feature	s favorable	coverage by	stable habitat	present; la	ick of habita	it is obvious;	
		favorable for stre				aunal coloniza ian cover. M		features favora faunal colonia			e unstable o		
	Habitat	and/or fish/amphi features non tra				transient. (Se		fish/amphibian			lined channe d pools burie	ed or lacking,	.
	features	include snags, su	ubmerged logs	s, undercut	Catego	ry for habitat	feature	availability ma	y be less than		l bottom ma		
	present but	banks, roots, cobl packs, pools and			١ '	components.))	desirable, sub- frequently dis-					
n	no water so	habitat at a stac						Excellent Cated					
	0.		•					feature con					
		Ī											
		Ī											
6	ro do	10	T 0 I		7	-	-	4	2	2		1 0	
G	Brade	10	9	8	7	6	5	4	3		1 1	0	0
3 <u>S</u>	TREAM BO	TTOM SUBSTRA		bstrate Cha				N 4	rinal	1	Daas		4
	}	Mixture of substra	Optimal ate materials.	with gravel		Suboptimal soft sand, mu		All mud or clay		Hard pan	Poor clay or bedro	ock; no root	-
		and firm sand p	prevalent; root	mats and	mud may l	be dominant;	some root	little or no re	oot mat; no		ubmerged v		
		submerged v	vegetation con	nmon.	mats and	submerged v	egatation/	submerged	vegetation.				
		Ì				present.							
		i											
G	Grade	10	9	8	7	6	5	4	3	2	1	0	2
. 🖵													
4 <u>P</u> C	POOL VARIA		Optimal		l	Suboptimal		Marg	inal		Poor		4
		Even mix of larg	ge-shallow, lar		Majority of	f pools large-		Shallow pools	much more	Majority o		Il-shallow or	1
		small-shallow, sr	mall-deep poo	ls present		few shallow.		prevalent that	n deep pools		pools abser	nt	
		Ì											
		Ī											
		Ì											
	Grade	10	9	8	7	6	5	4	3	2	1	0	0
5 <u>SI</u>	EDIMENT D	EPOSITION/SCO				0.1							4
		<5% of channel be	Optimal oottom affected b	ov scour or		Suboptimal ted by scour or		Marg 30-50% affecte		More than 50	Poor 0% of the botto	om in a state of	-
			deposition.	,	Scour at con	strictions and v	vehre grades	deposition. Depo	sits and scour at	flux or char	nge nearly yea	arlong. Pools	
		Ì			steepen.	Some deposition	on in pools	obstructions, co bends. Some			sent due to hi excessive sco	eavy deposition uring.	
												-	
													1
G	Grade	10	9	8	7	6	5	4	3	2	1	0	2
			9	8	7	6	5	4	3	2	1	0	2
		OW STATUS	9 Optimal	8	7	6 Suboptimal		4 Marg	v	2	1 Poor	I 0	2
		OW STATUS (Water reaches	Optimal sthe base of bo	oth lower	Water fills	Suboptimal >75% of the	channel; or	Marg Water fills 25	ginal i-75% of the		water in the	channel and	2
		OW STATUS	Optimal sthe base of bo	oth lower	Water fills	Suboptimal >75% of the of	channel; or	Març Water fills 25 available chann	ginal i-75% of the nel and/or riffle	mostly pres	water in the sent in stand	channel and	2
		OW STATUS (Water reaches	Optimal sthe base of bo	oth lower	Water fills	Suboptimal >75% of the	channel; or	Marg Water fills 25	ginal i-75% of the nel and/or riffle	mostly pres	water in the	channel and	
		OW STATUS (Water reaches	Optimal sthe base of bo	oth lower	Water fills	Suboptimal >75% of the of	channel; or	Març Water fills 25 available chann	ginal i-75% of the nel and/or riffle	mostly pres	water in the sent in stand	channel and	2
6 <u>C</u> I	CHANNEL FL	OW STATUS (Water reaches banks; <5% of cha	Optimal s the base of bo annel substrate	oth lower e is exposed	Water fills <25% o	Suboptimal >75% of the of f channel sub exposed	channel; or strate is	Marg Water fills 25 available chanr substrates are r	ginal i-75% of the nel and/or riffle nostly exposed	mostly pre	water in the sent in stand stream is dr	channel and ding pools; or ry	
6 <u>C</u>	CHANNEL FL	OW STATUS (Water reaches banks; <5% of cha	Optimal sthe base of bo	oth lower	Water fills	Suboptimal >75% of the of	channel; or	Març Water fills 25 available chann	ginal i-75% of the nel and/or riffle	mostly pres	water in the sent in stand	channel and	
6 <u>C</u>	CHANNEL FL	OW STATUS (Water reaches banks; <5% of cha	Optimal sthe base of boannel substrate	oth lower e is exposed	Water fills <25% o	Suboptimal >75% of the control of channel sub- exposed 6 Suboptimal	channel; or estrate is	Marry Water fills 25 available chann substrates are r	jinal -75% of the lel and/or riffle nostly exposed	mostly pres	water in the sent in stand stream is dr	channel and ding pools; or ry	0
6 <u>C</u>	CHANNEL FL	OW STATUS Water reaches banks; <5% of cha	Optimal s the base of brannel substrate 9 Optimal , alteration, or	oth lower e is exposed 8	Water fills <25% o	Suboptimal >75% of the of channel sub exposed 6 Suboptimal reation or char	channel; or strate is	Marg Water fills 25 available chans substrates are r	ginal -75% of the nel and/or riffle nostly exposed 3 ginal nnelization may	mostly pres	water in the sent in stand stream is dr	channel and fing pools; or ry 0	0
6 <u>C</u>	CHANNEL FL	OW STATUS (Water reaches banks; <5% of cha	Optimal the base of bannel substrate 9 Optimal a, alteration, or mat; normal ar	oth lower e is exposed 8 dredging nd stable	Water fills <25% o	Suboptimal >75% of the control of channel sub- exposed 6 Suboptimal	channel; or strate is	Marry Water fills 25 available chann substrates are r	ginal -75% of the let and/or riffle nostly exposed 3 ginal nnelization may	2 Banks shor concrete. channel	vater in the sent in stand stream is dr	channel and ding pools; or ry 0 ion, riprap, or r riprap lined n habitat	0
6 <u>C</u>	CHANNEL FL	.OW STATUS (Water reaches banks; <5% of cha	Optimal the base of beannel substrate 9 Optimal , alteration, or mal; normal ar er pattern. Alte	oth lower e is exposed 8 dredging nd stable eration by	Water fills <25% o 7 Some alte present structu abutments	Suboptimal >75% of the eff channel sub- exposed 6 Suboptimal ration or chart, usually adja- res, (such as or culverts); e (such as	channel; or strate is 5 nnelization acent to bridge evidence of	Marr fills 25 available chann substrates are r 4 Marr Alteration or chabe extensive; (including spoil jr structures pre	ginal -75% of the lel and/or riffle nostly exposed 3 ginal nnelization may embankments illes) or shoring sent on both	2 Banks shor concrete. channe significantly	Poor ed with gabic concrete or else. Instread attered by s	channel and ding pools; or ry 0 ion, riprap, or r riprap lined n habitat stormwater or	0
6 <u>C</u>	CHANNEL FL	.OW STATUS Water reaches banks; <5% of cha	Optimal the base of beannel substrate 9 Optimal , alteration, or mal; normal ar er pattern. Alte	oth lower e is exposed 8 dredging nd stable eration by	Water fills <25% o 7 Some alte present structus abutments past alterat	Suboptimal >75% of the to f channel sub- exposed 6 Suboptimal rration or chart, usually adjares, (such as or culverts); con culverts); con (i.e., channel)	channel; or strate is 5	Marr, Water fills 25 available chann substrates are r 4 Alteration or cha be extensive; (including spoil i structures pre banks; normal	ginal -75% of the nel and/or riffle nostly exposed 3 ginal nnelization may mbankments illes) or shoring sent on both stable stream	Banks shor concrete. channe significantly other inp	Poor red with gabic Concrete or eals. Instream altered by souts. Over 8	channel and ding pools; or ry 0 ion, riprap, or riprap lined n habitat statument or store to the color of t	0
6 <u>C</u>	CHANNEL FL	.OW STATUS Water reaches banks; <5% of cha	Optimal the base of beannel substrate 9 Optimal , alteration, or mal; normal ar er pattern. Alte	oth lower e is exposed 8 dredging nd stable eration by	Vater fills <25% o 7 Some alte preseni structu abutments past alterat may be pre and stability	Suboptimal 775% of the if channel sub exposed 6 Suboptimal rration or char it, usually adjar res, (such as or culverts); eion, (I.e., chansent, but stre year, but stre year, but stre year, but stre year, but stre	channel; or strate is 5 5 nnelization scent to bridge syvidence of nnelization) rate and pattern erect; recent	Marr fills 25 available chann substrates are number of the substrates are number of the substrates are number of the substrates are number of the substrates are number of the substrates of the substrates of the substrates of the substrate of th	ginal -75% of the el and/or riffle nostly exposed 3 ginal nnelization may embankments illes) or shoring sent on both stable stream tern has not tern thas not	Banks shor concrete. channe significantly other inp	Poor ed with gabic concrete or else. Instread attered by s	channel and ding pools; or ry 0 ion, riprap, or riprap lined n habitat statument or store to the color of t	0
6 <u>C</u>	CHANNEL FL	.OW STATUS Water reaches banks; <5% of cha	Optimal the base of beannel substrate 9 Optimal , alteration, or mal; normal ar er pattern. Alte	oth lower e is exposed 8 dredging nd stable eration by	7 Some alte present structu abutments past alterat may be pre and stability alteration	Suboptimal >75% of the it channel sub exposed 6 Suboptimal ration or chan, u, usually adjaint res, (such as or culverts); (ion, (i.e., chaissen, but stree recover, have recover is not properly in the prope	channel; or strate is 5 5 nnelization acent to bridge evidence of nnelization nnelization; nam pattern errent. Minor	Marr fills 25 available chann substrates are r 4 Marr Alteration or chabe extensive; (including spoil including spoil structures prebanks; normal meander pat recovered. A stormwater in	ginal -75% of the lel and/or riffle nostly exposed 3 ginal nnelization may mbankments jelles) or shoring sent on both stable stream terration from puts may be	Banks shor concrete. channe significantly other inp	Poor red with gabic Concrete or eals. Instream altered by souts. Over 8	channel and ding pools; or ry 0 ion, riprap, or riprap lined n habitat statument or store to the color of t	0
6 <u>C</u>	CHANNEL FL	.OW STATUS Water reaches banks; <5% of cha	Optimal the base of beannel substrate 9 Optimal , alteration, or mal; normal ar er pattern. Alte	oth lower e is exposed 8 dredging nd stable eration by	7 Some alte present structu abutments past alterat may be pre and stability alteration	Suboptimal 775% of the if channel sub exposed 6 Suboptimal rration or char it, usually adjar res, (such as or culverts); eion, (I.e., chansent, but stre year, but stre have recover.	channel; or strate is 5 5 nnelization acent to bridge evidence of nnelization nnelization; nam pattern errent. Minor	Marr fills 25 available chann substrates are number of the substrates are number of the substrates are number of the substrates are number of the substrates are number of the substrates of the substrates of the substrates of the substrate of th	ginal -75% of the lel and/or riffle nostly exposed 3 ginal nnelization may mbankments illes) or shoring sent on both stable stream tern has not terration from puts may be 30% of stream	Banks shor concrete. channe significantly other inp	Poor red with gabic Concrete or eals. Instream altered by souts. Over 8	channel and ding pools; or ry 0 ion, riprap, or riprap lined n habitat statument or store to the color of t	0
6 <u>C</u>	CHANNEL FL	.OW STATUS Water reaches banks; <5% of cha	Optimal the base of beannel substrate 9 Optimal , alteration, or mal; normal ar er pattern. Alte	oth lower e is exposed 8 dredging nd stable eration by	7 Some alte present structu abutments past alterat may be pre and stability alteration	Suboptimal 275% of the it channel sub- exposed 6 Suboptimal ration or chart, usually adja- res, (such as or culverts); sorn, (I.e., chansent, but were years or the common or the common or control	channel; or strate is 5 5 nnelization acent to bridge evidence of nnelization nnelization; nam pattern errent. Minor	Marg Water fills 25 available cham substrates are resulting to the control of the	ginal -75% of the lel and/or riffle nostly exposed 3 ginal nnelization may mbankments illes) or shoring sent on both stable stream tern has not terration from puts may be 30% of stream	Banks shor concrete. channe significantly other inp	Poor red with gabic Concrete or eals. Instream altered by souts. Over 8	channel and ding pools; or ry 0 ion, riprap, or riprap lined n habitat statument or store to the color of t	0
6 <u>C</u>	CHANNEL FL	.OW STATUS Water reaches banks; <5% of cha	Optimal the base of beannel substrate 9 Optimal , alteration, or mal; normal ar er pattern. Alte	oth lower e is exposed 8 dredging nd stable eration by	7 Some alte present structu abutments past alterat may be pre and stability alteration	Suboptimal 275% of the it channel sub- exposed 6 Suboptimal ration or chart, usually adja- res, (such as or culverts); sorn, (I.e., chansent, but were years or the common or the common or control	channel; or strate is 5 5 nnelization acent to bridge evidence of nnelization nnelization; nam pattern errent. Minor	Marg Water fills 25 available cham substrates are resulting to the control of the	ginal -75% of the lel and/or riffle nostly exposed 3 ginal nnelization may mbankments illes) or shoring sent on both stable stream tern has not terration from puts may be 30% of stream	Banks shor concrete. channe significantly other inp	Poor red with gabic Concrete or eals. Instream altered by souts. Over 8	channel and ding pools; or ry 0 ion, riprap, or riprap lined n habitat statument or store to the color of t	0
6 <u>Cl</u>	CHANNEL FL	.OW STATUS Water reaches banks; <5% of cha	Optimal the base of beannel substrate 9 Optimal , alteration, or mal; normal ar er pattern. Alte	oth lower e is exposed 8 dredging nd stable eration by	7 Some alte present structu abutments past alterat may be pre and stability alteration	Suboptimal 275% of the it channel sub- exposed 6 Suboptimal ration or chart, usually adja- res, (such as or culverts); sorn, (I.e., chansent, but were years or the common or the common or control	channel; or strate is 5 5 nnelization acent to bridge evidence of nnelization nnelization; nam pattern errent. Minor	Marg Water fills 25 available cham substrates are resulting to the control of the	ginal -75% of the lel and/or riffle nostly exposed 3 ginal nnelization may mbankments illes) or shoring sent on both stable stream tern has not terration from puts may be 30% of stream	Banks shor concrete. channe significantly other inp	Poor red with gabic Concrete or eals. Instream altered by souts. Over 8	channel and ding pools; or ry 0 ion, riprap, or riprap lined n habitat statument or store to the color of t	0

	CHANNEL S					Cubontin	201							
		The bends in the	Optimal he stream i	ncrease the	The bende	Suboptim in the strea	m increase the	Mar The bends i		Channel et	Poor traight; waterv	way has heen	ł	Barbour, et
		stream length 3 t	to 4 times lo	onger than if it	stream le	ngth 2 to 3	times longer	increase the	stream 1 to 2		lized for a long			al. 1999
		was in a straigh			than if i	t was in a s	traight line.		an if it was in a					RBA #7b;
		braiding is consi plains and othe						straig	nt line					Parsons, et
		parameter is n	not easily rai											al., 2001
		İ	areas).					1						AUSRIVAS
		İ						1						1
	Grade	10	9	8	7	6	5	4	3	2	1	0		5
	DANIK OTABI	UTV (000DE E	AOLLDANI	^										
9	BANK STABI	LITY (SCORE EA	Optimal	()	1	Suboptim	nal	Mar	ginal	ı	Poor			
		Banks stable; evi		rosion or bank	Moderately		requent, small	Moderately uns		Unstable;	no perennial	vegetation at	i	Barbour, et
		failure absent or					ly healed over. th has areas of		aterline sparse		e; severe eros			al. 1999
		affected), perenni no raw or undercu				erosion an			d or stripped by), bank held by		cently expose tree falls and			RBA #8;
		outside of mea					al vegetation to		(trees, rock		ut trees comm			Parsons, et al., 2001
		recently exposed	roots; no re	cent tree falls;			ices; recently re but present.	outcrops) and elsewhere: 30-	60% of bank in		reas; "raw" are aight sections			AUSRIVAS;
					· ·				s of erosion and	obvious ba	ank sloughing;	; 60-100% of		USACE
								bank undercu	tting; recently ots and fine root	bank	has erosiona	al scars.		Norfolk District,
								hairs commor						2004 SAM
								potential de	uring floods					#3; Scholz
														and Booth
		İ						1						from Henshaw,
		<u> </u>			<u> </u>			<u> </u>		<u> </u>			<u> </u>	1999)
	Grade	10	9	8	7	6	5	4	3	2	1	0		0
	Grade	10	9	8	7	6	5	4	3	2	1 1	0		0
											Avg.Score	*['	0
10	VEGETATIVE	E PROTECTION	(SCORE E	EACH BANK)									1	
			Optimal	•		Suboptin			ginal		Poor			L.
		More than 90% of and immediate ri					bank surfaces etation, but one		e streambank d by vegetation:		n 50% of the s s covered by v			Barbour, et al. 1999
		native vegeta	ation, includ	ling trees,	class	of plants is	not well-	disruption obvi	ous; patches of	disruption	of streamban	nk vegetation		al. 1999 RBA #9;
		understory s macrophytes; veg					on evident but lant growth	bare soil or cl	osely cropped mon: less than		igh; vegetation to 5 centimeter			Parsons, et
		grazing or mowin					lant growth t extent; more	one-half of the	potential plant		to 5 centimete rage stubble l			al., 2001
		almost all plants a			than one-	half of the p	ootential plant	stubble heig				-		AUSRIVAS; KDWP
		1			stubb	le height re	emaining.							KDWP 2000;
	1							i		Ī				
	1													Petersen,
	Grade	10	9	8	7	6	5	4	3	2	1 .	0		Petersen, et al., 1992
	Grade Grade	10 10	9	8 8	7 7	6	5 5	4 4	3 3	2 2	1 1 Avg Score	0		Petersen, et al., 1992 5
	Grade	10	9	8							1 1 Avg.Score	0		Petersen, et al., 1992
11	Grade	10 ONE (SCORE EA	9 ACH BANK	8		6	5	4	3			0		Petersen, et al., 1992 5
11	Grade	10 ONE (SCORE EA	9 ACH BANK Optimal	8	7	6 Suboptim	5 nal	4 Mar	3 ginal	2	Poor	0		Petersen, et al., 1992 5 5 5
11	Grade	ONE (SCORE EA	9 ACH BANK Optimal zone >18 n	8 neters; human hadbeds, clear-	7 Width of rip	Suboptimoarian zone vities have i	nal 12-18 meters; impacted zone	4 Mar Width of ripar meters; humar	ginal ian zone 6-12 activities have	Width of little or no	Poor riparian zone riparian vege	0 0 e < 6 meters; station due to		Petersen, et al., 1992 5
11	Grade	ONE (SCORE EA	9 ACH BANK Optimal zone >18 n king lots, ro	8 neters; human hadbeds, clear-	7 Width of rip	Suboptimoarian zone	nal 12-18 meters; impacted zone	4 Mar Width of ripar	ginal ian zone 6-12 activities have	Width of little or no	Poor riparian zone	0 0 e < 6 meters; station due to		Petersen, et al., 1992 5 5 5 5 Barbour, et al., 1999 RBA #10;
11	Grade	ONE (SCORE EA	9 ACH BANK Optimal zone >18 n	8 neters; human hadbeds, clear-	7 Width of rip	Suboptimoarian zone vities have i	nal 12-18 meters; impacted zone	4 Mar Width of ripar meters; humar	ginal ian zone 6-12 activities have	Width of little or no	Poor riparian zone riparian vege	0 0 e < 6 meters; station due to		Petersen, et al., 1992 5 5 5 5 Barbour, et al., 1999 RBA #10; Parsons, et
11	Grade	ONE (SCORE EA	9 ACH BANK Optimal zone >18 n king lots, ro	8 neters; human hadbeds, clear-	7 Width of rip	Suboptimoarian zone vities have i	nal 12-18 meters; impacted zone	4 Mar Width of ripar meters; humar	ginal ian zone 6-12 activities have	Width of little or no	Poor riparian zone riparian vege	0 0 e < 6 meters; station due to		Petersen, et al., 1992 5 5 5 Barbour, et al., 1999 RBA #10; Parsons, et al., 2001
11	Grade RIPARIAN ZO	ONE (SCORE EA Width of riparian activities (I.e., pari cuts, lawns, or c	9 ACH BANK Optimal zone >18 n king lots, ro crops) have zone.	8 neters; human adbeds, clearnot impacted	Width of rip	Suboptimoarian zone vities have ionly minima	nal 12-18 meters; impacted zone ally).	Mar Width of ripar meters; humar impacted zon	ginal ian zone 6-12 activities have e a great deal.	Width of little or no	Poor riparian zone riparian vege human activiti	0 < 6 meters; tation due to ies.		Petersen, et al., 1992 5 5 5 Barbour, et al., 1999 RBA #10; Parsons, et al., 2001 AUSRIVAS
11	Grade	ONE (SCORE EA	9 ACH BANK Optimal zone >18 n king lots, ro	8 neters; human hadbeds, clear-	7 Width of rip	Suboptimoarian zone vities have i	nal 12-18 meters; impacted zone	4 Mar Width of ripar meters; humar	ginal ian zone 6-12 activities have	Width of little or no	Poor riparian zone riparian vege	0 0 e < 6 meters; station due to	:	Petersen, et al., 1992 5 5 5 5 Barbour, et al., 1999 RBA #10; Parsons, et al., 2001 AUSRIVAS 8
11	Grade Grade	ONE (SCORE EA Width of riparian activities (I.e., pari cuts, lawns, or c	9 ACH BANK Optimal zone >18 n king lots, ro rrops) have zone.	8 (c) meters; human hadbeds, clearnot impacted	7 Width of right human action	Suboptimo arian zone vities have ionly minima	nal 12-18 meters; impacted zone ally).	Mar Width of ripar meters; humar impacted zon	ginal ginal gina zone 6-12 activities have e a great deal.	Width of little or no	Poor riparian zone riparian vege human activiti	<6 meters; tation due to eles.		Petersen, et al., 1992 5 5 5 Barbour, et al., 1999 RBA #10; Parsons, et al., 2001 AUSRIVAS
	Grade Grade Grade Grade	10 ONE (SCORE EA Width of riparian activities (i.e., par cuts, lawns, or c	9 ACH BANk Optimal zone >18 n rking lots, ro rops) have zone.	8 neters; human adbeds, clearnot impacted 8 8 8	7 Width of rightness action of the second of	Suboptimo arian zone vities have ionly minima	nal 12-18 meters; impacted zone ally).	Mar Width of ripar meters; humar impacted zon	ginal ginal gina zone 6-12 activities have e a great deal.	Width of little or no	Poor riparian zone riparian vege human activiti	<6 meters; tation due to eles.		Barbour, et al., 1992 Barbour, et al., 1999 RBA #10; Parsons, et al., 2001 AUSRIVAS 8 8
	Grade Grade Grade Grade	10 ONE (SCORE EA Width of riparian activities (i.e., pari cuts, lawns, or c 10 10 ABITAT CONDITI	9 ACH BANK Optimal zone >18 n king lots, ro rops) have zone. 9 9	8 neters; human adbeds, clearnot impacted 8 8 8	7 Width of rightness action of the second of	Suboptim parian zone vities have is only minima 6 6 6	nal 12-18 meters; impacted zone ally).	Mar Width of ripar meters; humar impacted zon	ginal ian zone 6-12 activities have e a great deal.	Width of little or no	Poor riparian zone riparian vege human activiti 1 1 Avg.Score	<6 meters; tation due to eles.		Petersen, et al., 1992 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5
	Grade Grade Grade Grade	10 ONE (SCORE EA Width of riparian activities (i.e., pari cuts, lawns, or c 10 10 ABITAT CONDITI	9 ACH BANk Optimal zone >18 n king lots, rorrops) have zone. 9 9 9 ION (SCO Optimal	meters; human adbeds, clear-not impacted 8 8 8	Width of righthuman actif	Suboptim parian zone vities have in only minima 6 6 6 Suboptim	nal 12-18 meters; impacted zone ally).	Mar Width of ripar meters; humar impacted zon	ginal ginal gina zone 6-12 activities have e a great deal.	Width of little or no	Poor riparian zone riparian vege human activiti	<6 meters; etation due to les.		Petersen, et al., 1992 5 5 5 5 Barbour, et al., 1999 RBA #10; Parsons, et al., 2001 AUSRIVAS 8 8 8
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	Grade Grade Grade Grade Grade 1. Delineate 2. Determine 3. Enter the Grade	Udth of riparian activities (I.e., pari cuts, lawns, or cuts, lawns, or cuts, lawns, or cuts, lawns, or cuts, lawns, or cuts, lawns, or cuts, lawns, or cuts, lawns, or cuts, lawns, or cuts, lawns, or cuts, lawns, or cuts, lawns, or cuts, lawns, or cuts, lawns, or cuts, lawns, or cuts, lawns, lawns, or cuts, lawns,	9 ACH BANK Optimal zone >18 in king lots, recrops) have zone. 9 9 9 ION (SCO Optimal shall sh	RE EACH BA RE EACH BA Research with dditional forest including ebris.) Score at arrange if ≥2 Score at low are present.	Tree stratu with 30% b (See E examples c) Score at th if ≥2 add present. OR cuto or estimation or estimation	Suboptim parian zone vities have ionly minima 6 6 6 Suboptim (dibh-3 ir o 60% tree cixcellent Ca of additional fore score at the forest layer over areas or remaining 6 n Categor g length at and width), Suboptim 100 7 7	aal 12-18 meters, impacted zone 12-18 meters, impacted zone ally). 5 5 5 nal Inches) present. Inches) present canopy cover, ategory for I forest layers, of Good range st with stumps good and good state of the cover of the co	Mar Width of ripar meters; humar impacted zon 4 4 4 4 Tree stratum present, with <2 for examples of layers,) Score a Fair range if ≥2 are present. Score are present. Score are present. Score 4 4 ittion Scores usid Use GIS map each riparian of Mar	ginal lan zone 6-12 activities have a a great deal. 3 3 3 3 ginal dbh>3 inches) 0% tree canopy cellent Category additional forest t the high end of additional forest t the high end of additional forest t the high end of additional forest the high end of additional forest the high end of additional forest the high end of additional forest the high end of additional forest the high end of additional forest the high end of additional forest the high end of additional forest the high end of additional forest the high end of additional forest the high end of additional forest the high end of additional forest the high end of additional forest the high end additional forest the	Width of little or no little or	Poor riparian zone riparian zone riparian vege human activiti 1 1 Avg. Score Poor atum absent; roplands, mirad streams, mined herbace surfaces, act pasture, and 6	o meters; tation due to ess. o o o o o o o o o o o o o o o o o o o	e sums of	Petersen, et al., 1992 5 5 5 5 Barbour, et al., 1999 RBA #10; Parsons, et al., 2001 AUSRIVAS 8 Norfolk SAAM Form 1 Field
	Grade Grade Grade Grade Grade 1. Delineate 2. Determine 3. Enter the Grade	10 ONE (SCORE EA Width of riparian activities (I.e., pari cuts, lawns, or c 10 10 10 ABITAT CONDIT Tree stratum (db >60% tree canopy layers may in herbaceous, amosses/lichens ar the high end o additional layers end if ≤1 additivities additional layers end if ≤8 square footage if %Riparian Area (www.parian areas alc square footage if %Riparian Area (score SubCi	9 ACH BANK Optimal zone >18 in king lots, recrops) have zone. 9 9 9 ION (SCO Optimal shall sh	8 neters; human adbeds, clear-not impacted 8 8 RE EACH B/ present, with diditional forest ng, shrub, ri ncluding ebris,) Score at low are present. 8 8 tream bank it y measuring o purposes, er	Tree stratu with 30% to (See E examples of Score at the fire 2 add present. OR cuto or estimation or estimation.	Suboptim parian zone vities have ionly minima 6 6 6 Suboptim (dhb-3 ir 6 66 Suboptim (dhb-3 ir 6 67 6 Suboptim (dhb-3 ir 6 67 6 Suboptim (dhb-3 ir 6 67 6 Suboptim (dhb-3 ir 6 6 6 Suboptim (dhb-3 ir 6 6 6 Suboptim (dhb-3 ir 6 6 6 Suboptim (dhb-3 ir 6 6 6 Suboptim (dhb) 3 ir 6 6 6 Termainin (dhb) 7 7 7 100 7	aal 12-18 meters, impacted zone ally). 5 5 5 nal nches) present canopy cover, ategory for I forest layers, of Good range st with stumps g. S. S. S. S. S. S. S. S. S. S. S. S. S.	Mar Width of ripar meters; humar impacted zon 4 4 4 4 Tree stratum present, with <2 for examples of layers,) Score a Fair range if ≥2 are present. Score are present. Score are present. Score 4 4 ittion Scores usid Use GIS map each riparian of Mar	ginal lan zone 6-12 activities have e a great deal. 3 3 3 ginal dbh-3 inches) 0% tree canopy cellent Category additional forest the high end of additional layers ore at low end if vers are present. neists of non- nd naturalized ceous and/or ggetation. 3 ng the above of s may be used category in the ginal	Width of little or no little or	Poor riparian zone riparian zone riparian vage human activiti 1 1 1 Avg.Score Poor atum absent; roplands, mired streams, mined herbace surfaces, act pasture, and e or RA*Scores	o meters; tation due to ess. o o o o o o o o o o o o o o o o o o o	e sums of	Petersen, et al., 1992 5 5 5 5 Barbour, et al., 1999 RBA #10; Parsons, et al., 2001 AUSRIVAS 8 Norfolk SAAM Form 1 Field

III. HABITAT FUNCTIONS N20(0.5-2.0')

	Stream Function	nal Capacity C	alculation		
	N11(0.5-2	2.0')			
Date:	5/17/2006	•			
Project:	Lake Ralph H	lall			
Assessment Area:	WP 4				
Assessors:	Holmes Voigh	nt Capps			
Project Status:	XPrepro	ject	Postproject		
		Stream	Stream	Multiplication	
Major Function Categories	FCI	Length (LF)*	Characterization	Factor**	FC
Hydrologic	0.20	3,470	E	0.00125	0.87
Water Quality Improvement	0.29	3,470	E	0.00125	1.26
Habitat	0.28	3,470	E	0.00125	1.23
Total	0.77	3,470			3.35
*Stream Length is the length of the S **Multiplication Factors Ephemeral = 0.00125 Intermittent = 0.0025 Perennial = 0.0038	tream Assessme	ent Reach (SAF	R)		





SWAMPIM DATAS PRE-PROJECT	SHEETS – NOF	КТН ЕРНЕМЕ	CRAL 0.5 TO	2.0'
• N1-TRIB2				

N1-Trib2 (0.5-2)

PARAMET	ER											
				CONI		TEGORY G						
		Optimal			Suboptima	<u> </u>	Mar	ginal		Poor]
Grade	10	9	8	7	6	5	4	3	2	1	0	

Pasture outside of riparian zone. Rip zone 20 to 30m or less. Few trees. WP 1 P 98, 97 $\,$

1

Young trees, Burr Oak, Elm, Red Cedar, Green Ash, Hackberry

VARIABLES FLOW REGIME	E:	II. HYDRO	LOGIC FUN	ICTIONS		N1-Trib2 (0.5-2)					SCORE	Source
TYPE		Perennial		Intermitte	ent w/ Pere	nnial Pools	Interi	mittent		Ephemera	l		KDWP 2 Kansas
Grade	10	9	8	7	6	5	4	3	2	1	0	0	Subjectiv
CHANNEL CO	NDITION:	Measureme	ent or Obse	rvation of S	tream Char	nnel Condition	ons						
				CON	IDITION C	ATEGORY (GRADE or	SCORE					Barbour,
		Optimal			Suboptima	al	Mai	rginal		Poor			EPA RB
		channel; no sta tion minimal.			annelization areas) or pas			hannel; 40- the reach		l is actively dov >80% of the re			5-21;
2a.Channel		utting or exces			on, but with s			elized or		lized. Degrada			Newton, USDA/ N
Condition/Alter		. Normal freq				d and banks.		d. Excess	levee	s prevent acce	ss to the		SVAP p
ation (natural,		ical connection			vs onto flood	of overbank plain.		on; braided th excessive		floodplain.			
altered, or			•			•	frequency	of overbank					
downcutting)								onto the n. Historical					
								es or levees					
							restrict f	loodplain.					
Grade	10	9	8	7	6	5	4	3	2	1	0	2	
				000	IDITION C	ATECORY (PADE or	SCODE					w/ againt
2b.Channel		Optimal		CON	Suboptima	ATEGORY (al		rginal		Poor		1	w/ assist and input
Capacity to		apacity to Flo			apacity to Flo	w Frequency	Channel	Capacity to		Capacity to Flo			Dr. Mike
Flow		ch that bank o ents occur at a				overflow from frequent than		ency Ratio is ank overflow		uch that bank on ents are more f			Harvey a
Frequency		year frequenc		every 1.2	5 years or le	ss frequent	from storn	n events are		If year or less f	requent than		Travant
Ratio (for 2- year peak		0.75-1.25			n every 2.5 y <0.75 or >1.2			quent than ear or less		every 10 year <0.24 or >2			
flow)					CO.10 OI > 1.2			han every 5		10.24 OI 22			
								ears. or >1.5					
Grade	10	9	8	7	6	5	4	3	2	1 1	0	0	_
Orade	10			I	1	-10			, -			Ĭ	_
		Optimal		CON	Suboptima	ATEGORY (al		SCORE rginal		Poor			Newton, USDA/ N
		ble; evidence				equent, small		ly unstable;		; no perennial v			SVAP p
2c.Channel		e absent or m nk affected), p				healed over. has areas of		egetation to parse (mainly		ne; severe eros ecently expose			10; Barb
Bank Stability	vegetatio	on to waterline	; no raw or	minor	erosion and/	or bank	scoured or	r stripped by	common	n; tree falls and	or severely		al., 1999 RBA pag
(score each		banks (some meander ben			g; perennial in most place	vegetation to		osion), bank nard points		rees common; raw" areas free			26; USA
bank, left or right facing		exposed roots				but present.		ck outcrops)		ections and be			Norfolk
downstream)		tree falls;						ded back ; 30-60% of	bank slou	ghing; 60-100% erosional sca			District,
								ch has areas		erosionai sca	15.		
								n and bank					
								ng; recently ee roots and					
Grade (Left)	40	9	1 0	7	1 0	T -	fine root ha	airs common:		1 4	0	0	
Grade (Leit) Grade (Right)	10 10	9	8	7	6	5 5	4	3	2	1 1	0	0	
											Avg.Score	0	
CHANNEL RO	UGHNESS	FACTORS	1									1	
				CON		ATEGORY (Barbour,
3a.Channel	The band-	Optimal in the stream	inorocco #	The band-	Suboptima			rginal	Channel	Poor	you has been	4	EPA RB
Sinuosity		in the stream ngth 2.5 to 4 t				increase the times longer		in the stream the stream		straight; waterv			Chapter 5-25; KE
(bends in low gradient	than if it	t was straight.	Channel	than if it wa	s a straight l	ine. Channel	length 1 t	to 1.5 times		l length/valley l			1996
gradient stream)	length/va	alley length at	ıeast >1.5.	length/v	alley length	1.2 to 1.5		n if it was a ne. Channel					
,							length/valle	ey length 1.0					
			T			T =		1.2.		T .	T -		
	10	9	8	7	6	5	4	3	2	1	0	4	1
Grade		Ontimal		CON		ATEGORY (1	Door			KDWP,
Grade		Optimal	lorgomont	Some grav	Suboptima el bars of co	arse stones		rginal pars of rocks,	Channel o	Poor divided into bra	ids or stream	1	Kansas Subjectiv
Grade	Little or r	no channel en	nargement									1	
3b. Bottom	resu	no channel en ulting from sec	diment			present, little	sands, and				te is uniform		
3b. Bottom Substrate	resu		diment		shed debris moderately s			ely unstable		elized; substrat , clay, or bedro			Aquatic
3b. Bottom	resu	ulting from sec	diment										Evaluation Aquatic Habitats
3b. Bottom Substrate	resu	ulting from sec	diment										Aquatic

	Grade	10		9	8	7	6		5	4		3	2				C	<u> </u>
ı						CO	NDITION (CATEGO	ORY (SRADE or	SCOF	RE						KDWP, 199
ı			0	ptimal			Suboptim				arginal			Р	oor			Newton et a
,					phy includino		bottom inclu			Chann						s <3 of the		1998
iol offin office variable	3c. Instream				eep pools,	items lis	sted in Optim	nal Categ	gory	includes <			items I	isted in (Optimal	Category		USDA/NRC
3	Bottom				arge woody oxbows,					listed i	n Optii tegory							SVAP page
3	Topography				ion, riffles,					Ca	tegory							
5					rootwads,													
È					de channel													
5			- 1	pools														
2	Grade	10		9	8	7	6	,	5	4		3	2		1	0	1	
2000						CO	NDITION (NTEGO		PADE or	SCO!	DE						
2	or		0	ptimal		1	Suboptim				arginal			Р	oor			
2	3c.			to 0.09	9		0.035 to 0.			0.021 to 0			0.16 t			xcessive		
Ί	Manning's n									to	0.15					1 to 0.02 du		
ı	Mailing 5 II												to chann			ean, smootl	n	
L															nnel.			
_'	Grade	10		9	8	7	6		5	4		3	2		1	0		
						CO	NDITION (CATEGO	ORY (SRADE or	SCOF	RE						USACE,
			0	ptimal			Suboptim				arginal				oor			Norfolk
	3d. Channel				and Where		atio <u>></u> 1.2 <1.			Incision ra						here chann		District, 20
	Incision				ntrenchment		slope >2%, E			and Wh						nt ratio <1.4	1;	SAAM Fo
	(TLB/BFD=BH R; 1/BHR*Adj				nnel slope ratio >2.0		.4; Where chenter of the character of th			siop Entrenc	e > 2%			ere chan				#1 and VT
	Factor =CI)	<u><</u> 2 /0, L	.iiu eii	CHILIETT	1alio >2.0	<u><</u> 2 /0, I	-intrenciane	ii ialio >2	2.0	>1.4; Wh			LII	uenciini	eni rau	J <u><</u> 2.0		Stream
	1 actor =01)										e <2%							Geomorph Assessme
										Entrenchm	nent ra	tio >2.0						Phase 2
ŀ	TLB =			10		BHR =	1											
ı	BFD =			10														
	Grade	10		9	8	7	6	,	5	4		3	2		1	0	C)
4 lī	DYNAMIC SUR	REACE WA	ATFF	STOR	RAGE													1
Ť	21111111110001																	
						CO	NDITION (ORY (ı					Newton, et
				ptimal			Suboptin		lonti	Pools p	arginal		Doolo ob		oor	re bottom is	_	1998 USD
	4n Poole	Doon one			o obundonti	Doolo p				Pools p						r = zero.	5	NRCS SV page 14;
	4a.Pools		shall	low pool	s abundant;	Pools p			nm is	shallow: fr	rom 5-1			rnible N				
	(abundant,	greater tha	d shall an 30	low pool % of the	s abundant; pool bottom , or pools are	from 10-	resent, but n 30% of the p due to depth	ool botto		shallow; fr			disce	rnible. N				
	(abundant, present or	greater that is obscure	d shall an 30 due t	low pool % of the	pool bottom or pools are	from 10- obscure	30% of the p	ool botto , or the p		the poo	l botto ue to d	m is lepth, or	disce	rnible. N				
	(abundant,	greater that is obscure	d shall an 30 due t	low pool % of the to depth,	pool bottom or pools are	from 10- obscure	30% of the p	ool botto , or the p		the pools	ol botto ue to de are les	om is lepth, or ss than	disce	rnible. N				1999
	(abundant, present or	greater that is obscure	d shall an 30 due t	low pool % of the to depth,	pool bottom or pools are	from 10- obscure	30% of the p	ool botto , or the p		the pools	l botto ue to d	om is lepth, or ss than	aisce	rnible. N				
	(abundant, present or	greater that is obscure	d shall an 30 due t	low pool % of the to depth,	pool bottom or pools are	from 10- obscure	30% of the p	oool botto , or the p et deep.		the pools	ol botto ue to de are les	om is lepth, or ss than	alsce 2	rnible. N	1	0	C	1999
	(abundant, present or absent) Grade	greater that is obscure at	d shall an 30 due t	low pool % of the to depth, 5 feet d	pool bottom , or pools are leep.	from 10- obscure are	30% of the p due to depth at least 3 fe	oool botto , or the p et deep.	pools	the pool obscure du the pools 3 fee	ol botto ue to de are les et deep	om is lepth, or ss than p.		rnible. N	1	0	C	1999
	(abundant, present or absent) Grade 4b. Channel	greater that is obscure at	d shall an 30° due t least	low pool % of the to depth, 5 feet d	pool bottom , or pools are leep.	from 10- obscure are	30% of the pdue to depth at least 3 fe	cool botto i, or the p et deep.	pools	the pool obscure du the pools 3 fee	ol botto ue to d are les et deep	om is lepth, or ss than p. 3		<u> </u>		0	C	1999
3	(abundant, present or absent) Grade	greater that is obscure at	d shall an 30' due t least	low pool % of the to depth, 5 feet d	pool bottom , or pools are leep.	from 10- obscure are	30% of the p due to depth at least 3 fe	cool botton, or the pet deep.	pools 5 ORY (the pool obscure du the pools 3 fee	ol botto ue to de are les et deep	om is lepth, or ss than p. 3	2	I P	oor	0 el and most		1999 Barbour, e
	(abundant, present or absent) Grade 4b. Channel Flow Status	greater that is obscure at at at at at at at at at at at at at	d shall an 30' due t least	low pool % of the to depth, 5 feet d 9 Potimal s base of ninimal a	pool bottom, or pools are eep. 8 f both lower amount of	from 10- obscure are 7 CO Water f chann	30% of the p due to depth at least 3 fe 6 NDITION (Suboptim lls >75% of el; or <25%	cool botton, or the pet deep. CATEGO nal the availation of chann	5 ORY (the pools obscure du the pools 3 fee 4 GRADE or Ma Water fill the availation of the pools when the pools 1 fee 1	SCOF arginal s 25-7 able ch	om is depth, or iss than p. 3 RE	2 Very little	P water in	oor channe		ily	1999 Barbour, e 1999 EPA
	(abundant, present or absent) Grade 4b. Channel Flow Status (degree to	greater that is obscure at at at at at at at at at at at at at	d shall an 30' due t least	low pool % of the to depth, 5 feet d 9 Potimal s base of ninimal a	pool bottom, or pools are eep.	from 10- obscure are 7 CO Water f chann	30% of the p due to depth at least 3 fe 6 NDITION (Suboptim lls >75% of t	cool botton, or the pet deep. CATEGO nal the availation of chann	5 ORY (the pool obscure du the pools 3 fee 4 GRADE or Ma Water fill the availa and /or riff	SCOP arginal s 25-7 able ch	om is elepth, or iss than p. 3 RE I 75% of nannel, estrates	2 Very little	P water in	oor	el and most	ily	1999 Barbour, e 1999 EPA RBA page /A-9#5; TC
	(abundant, present or absent) Grade 4b. Channel Flow Status (degree to which channel is filled)	greater that is obscure at 10 Water rea banks a channe	d shall an 30' due t least	low pool % of the to depth, 5 feet d 9 Optimal s base of ninimal a strate is	pool bottom, or pools are eep. 8 f both lower amount of exposed.	from 10- obscure are 7 CO Water f chann su	30% of the pdue to depth at least 3 fe 6 NDITION (Suboptim Ills >75% of t el; or <25% bstrate is ex	cool botton, or the pet deep. CATEGO al the availation channed posed.	5 ORY (the pool obscure du the pools 3 fee 4 GRADE or Ma Water fill the availa and /or riff are most	SCOP arginal s 25-7 able ch	om is depth, or iss than p. 3 RE I 75% of nannel, sistrates lossed.	Very little present as	P water in	channe g pools	el and most	ly '=	Barbour, e 1999 EPA RBA page /A-9#5; TC 1999; VAN
	(abundant, present or absent) Grade 4b. Channel Flow Status (degree to which channel	greater that is obscure at at at at at at at at at at at at at	d shall an 30' due t least	low pool % of the to depth, 5 feet d 9 Potimal s base of ninimal a	pool bottom, or pools are eep. 8 f both lower amount of	from 10- obscure are 7 CO Water f chann	30% of the p due to depth at least 3 fe 6 NDITION (Suboptim lls >75% of el; or <25%	cool botton, or the pet deep. CATEGO al the availation channed posed.	5 ORY (the pool obscure du the pools 3 fee 4 GRADE or Ma Water fill the availa and /or riff	SCOP arginal s 25-7 able ch	om is elepth, or iss than p. 3 RE I 75% of nannel, estrates	2 Very little	P water in	oor channe	el and most	ily	Barbour, e 1999 EPA RBA page /A-9#5; TC 1999; VAN
	(abundant, present or absent) Grade 4b. Channel Flow Status (degree to which channel is filled)	greater that is obscure at 10 Water rea banks a channe	d shall an 30' due t least	low pool % of the to depth, 5 feet d 9 Optimal s base of ninimal a strate is	pool bottom, or pools are eep. 8 f both lower amount of exposed.	from 10- obscure are 7 CO Water f chann su	30% of the p due to depth at least 3 fe 6 NDITION (Suboptim lls >75% of 1 el; or <25% bstrate is ex	cool botton, or the pet deep. CATEGO and the availation posed.	5 ORY Cable nel	the pocobscure du the pools 3 fee 4 GRADE or Ma Water fill the availa and /or riff are most	SCOP arginal s 25-7 able ch	om is lepth, or ss than p. 3 RE I 75% of nannel, sstrates lossed. 3	Very little present as	P water in s standin zo	channe g pools ero.	el and most		Barbour, e 1999 EPA RBA page /A-9#5; TC 1999; VAN 2005
	(abundant, present or absent) Grade 4b. Channel Flow Status (degree to which channel is filled)	greater that is obscure at 10 Water rea banks a channe	d shall an 30' due t least	low pool % of the to depth, 5 feet d 9 Optimal s base of ninimal a strate is	pool bottom, or pools are eep. 8 f both lower amount of exposed.	from 10- obscure are 7 CO Water f chann su	30% of the p due to depth at least 3 fe 6 NDITION (Suboptim lls >75% of 1 el; or <25% bstrate is ex	cool botton, or the pet deep. CATEGO and the availation posed.	5 ORY Cable nel	the pool obscure du the pools 3 fee 4 GRADE or Ma Water fill the availa and /or riff are most	SCOP arginal s 25-7 able ch	om is lepth, or ss than p. 3 RE I 75% of nannel, sstrates lossed. 3	Very little present as	P water in s standin zo	channe g pools ero.	el and most		Barbour, e 1999 EPA RBA page /A-9#5; TC 1999; VAN 2005

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													1	
	YPE												İ	
	NOTES SEDIMENT TR	ANCDODT	/DEDOCITI	ON									7	
	SEDIMENT IK	ANSPURI	DEPUSITI	ON									1	
					CON	NDITION CA	ATEGORY (SRADE or S	CORE					
	1a. Bank		Optimal			Suboptima			rginal		Poor			
	Stability			of erosion or		stable; infre			unstable; 30-		nany eroded			
	(score each			minimal; little lems. <5% of		osion mostly	healed over. has areas of		k in reach has rosion; high		equently alon and bends; ob			
	bank, left or right facing		bank affecte		3-30 /0 OI D	erosion.	rias areas or		tential during		g; 60-100% o			
	downstream)							flo	ods.	e	erosional sca	rs.		
	,													
_	2 1 4 6		1 .						_			T .		
	Grade (Left) Grade (Right)	10 10	9	8	7	6	5 5	4	3	2	1	0	0	
	stade (Right)	10	3		'	U	J J	4		2	'	Avg.Score		
												<u> </u>		
					CON		ATEGORY (
	1b. Channel	Dettern	Optimal		Dettern	Suboptima			rginal	Dattana	Poor			
	Bottom Bank		1/3 of bank is istant plant/s			I/3 of bank is ant/soil matrix			3 of bank is ighly erodible		1/3 of bank is dible materia			
	Stability	5, . 50.	material.					material; pla	ant/soil matrix		everely comp			
								compr	omised.					
(Grade (Left)	10	9	8	7	6	5	4	3	2	1	0	1	
	Grade (Right)	10	9	8	7	6	5	4	3	2	1	0	1	
				•	• •	-	-			·	•	Avg.Score	1	
	or					IDITION C	ATECORY	PADE or O	CODE					
	1c. Channel		Optimal		CONDITION CATEGORY G Suboptimal				rginal		Poor			
	Sediments or	>50% gra	avel or larger	substrate;					ravel or larger	Substrate i	1			
	Substrate		bble boulder			dominant substrate type is mix of			substrate; dominant		pedrock; unst	table		
	Composition	substrate	type is grav stable	el or larger;	gravel with some finer sediments; moderately stable				oe is finer than may still be a					
(Grade	10	9	8	7 6 5			4	3	2				
	VATER APPE							•			1	0		
			Ontinon		CON		ATEGORY (D			
		Very clear	Optimal or clear but	tea-colored:	Occasional	Suboptima	pecially after		rginal le cloudiness	Very turbid	Poor or muddy appe	earance most	_	
				3-6 feet (less		ent, but clea			time; objects	the time; obj	jects visible to	depth <0.5 ft;		
	Water Clarity		colored); no				1.5-3 ft; may		pth 0.5-1.5 ft;		g water may be us water pollut			
	Water Clarity		;no noticeab rged objects			jhtly green co n on water su			s may appear bottom rocks			theen or heavy	,	
		Subme	iged objects	or rocks.	311001	ii oii watei st	unace.		ed objected	coat of foa	m on surface.	No water =		
								covered	l with film.		zero.			
	Grade	10	9	8	7	6	5	4	3	2	1	0	0	
											<u> </u>		Ĭ	
İ	PRESENCE OF	AQUATIO	C VEGETA	ΓΙΟΝ: Prese	ence and Pe	ercent Cove	erage						4]	
					CON	NDITION CA	ATEGORY (SRADE or S	CORE					
			Optimal			Suboptima	ıl	Ma	rginal		Poor			
	3a. Nutrient		ater along en iquatic plant			or slightly gre re reach; mod	eenish water		ter along entire undance of lush		gray, or browr reach; dense s			
	Enrichment		low quantati			on stream su		green macrop	hytes; abundant	macrophyte	s clog stream;	severe algal		
		species of	macrophyte	s; little algal	Ů				th, especially mer months.		te thick algal n ae present due			
		ç	growth prese	nt.				uuiiig wal	mei moiluis.		rate. No water			
	Grade	10	9	8	7	6	5	4	3	2	1	0		
					CON	NDITION C	ATEGORY (SRADE or 9	CORE					
	or		Optimal			Suboptima			rginal		Poor			
	3b. Aquatic		sent, aquation			minant in po	ols, larger	Algal mats	present, some		ts cover bott			
	Vegetation	consists	of moss and	patches of	pla	ants along ed	dge.	larger plants	, tew mosses.		Algal mats cover bottom, larger plants dominate the channel or NO			
	Vegetation		alcas								unctable			
	vegetation		algae.								resent due to ate. No wate			

				CON	NDITION C	ATEGORY (GRADE or S	CORE				F
		Optimal			Suboptima	ıl	Ma	rginal		Poor		ϵ
		onsisting of le d without sedi			and wood so ebris withou		debris; coa	es or woody arse and fine matter with iment.	color and fo	anic sediment oul odor (ana present due t scouring	erobic) or no	f N
Grade	10	9	8	7	6	5	4	3	2	1	0	0
_AND USE PA	L TTERN: Be	yond Imme	diate Ripari	an Zone								
				CON	NDITION C	ATEGORY (GRADE or S	CORE				
		Optimal			Suboptima			rginal		Poor		ϵ
		ed, consisting ive prairie, ar wetlands.			ent pasture r and swamp crops		pasture; sareas may l	w crops and ome wooded be present but ed patches	M	lainly row cro	ops	F N
Grade (Left)	10	9	8	7	6	5	4	3	2	1	0	3
Grade (Right)	10	9	8	7	6	5	4	3	2	1	0 Avg.Score	3
6a. Riparian Zone Width (from stream edge to field)	channel wid	arian zone >18 ths with trees, s human activitie	shrubs, or tall es have not	Width of ripa 1 active char grasses), hur	Suboptima rian zone 12- nnel width w/tr nan activities	8 meters (1/2- ees, shrubs, or have minimally	Width of ripa meters (1 channel wid	rginal arian zone 6-12 /3-1/2 active Ith vegetated),	vegation le width), little	ess than 1/3 ac riparian vege	tation due to	E a 1 F e
Zone Width	channel wid	arian zone >18 ths with trees, s	shrubs, or tall es have not	Width of ripa 1 active char grasses), hur	Suboptima rian zone 12- nnel width w/tr	8 meters (1/2- ees, shrubs, or have minimally	Ma Width of ripa meters (1 channel wid	rginal arian zone 6-12 /3-1/2 active	vegation le width), little	rian zone < 6 r ess than 1/3 ac	tive channel tation due to	a 1 F 6 R L
Zone Width (from stream	channel wid grasses),	arian zone >18 ths with trees, s human activitie impacted zone	shrubs, or tall es have not e.	Width of ripa 1 active char grasses), hur	Suboptima rian zone 12- nnel width w/tr nan activities impacted zon	8 meters (1/2- ees, shrubs, or have minimally e.	Ma Width of ripa meters (1 channel wid impacted by h	rginal arian zone 6-12 //3-1/2 active Ith vegetated), numan activities.	vegation le width), little h	rian zone < 6 i iss than 1/3 ace riparian vege numan activitie	etive channel station due to es.	a 1 F 6 R L
Zone Width (from stream edge to field)	channel wid grasses),	arian zone >18 ths with trees, s human activitie impacted zone	shrubs, or tall es have not	Width of ripa 1 active char grasses), hur	Suboptima rian zone 12- nnel width w/tr nan activities impacted zon	II 8 meters (1/2- ees, shrubs, or have minimally e.	Ma Width of ripa meters (1 channel wid impacted by h	rginal arian zone 6-12 /3-1/2 active tth vegetated), numan activities.	vegation le width), little h	rian zone < 6 r ess than 1/3 ac e riparian vege numan activitie	etive channel station due to es.	1 F 6 F U
Zone Width (from stream edge to field)	channel wid grasses),	arian zone >18 ths with trees, s human activitie impacted zone	shrubs, or tall es have not e.	Width of ripa 1 active char grasses), hur 7	Suboptima rian zone 12-1 nnel width w/tr nan activities impacted zon	8 meters (1/2-ees, shrubs, or have minimally e.	Ma Width of ripa meters (1 channel wid impacted by h	rginal arian zone 6-12 /3-1/2 active tht vegetated), numan activities.	vegation le width), little h	rian zone < 6 i iss than 1/3 ace riparian vege numan activitie	etive channel station due to es.	8 8 8
Zone Width (from stream edge to field)	channel wid grasses),	arian zone >18 ths with trees, s human activitie impacted zone	shrubs, or tall es have not e.	Width of ripa 1 active char grasses), hur 7	Suboptima rian zone 12- rianel width w/tr nan activities impacted zon 6 6 NDITION C.	8 meters (1/2-ees, shrubs, or have minimally e.	Ma Width of ripa meters (1 channel wic impacted by h	rginal arian zone 6-12 //3-1/2 active tith vegetated), numan activities. 3 3 3	vegation le width), little h	rian zone < 6 r ess than 1/3 ac e riparian vege numan activitie	etive channel station due to es.	8 8 8
Zone Width (from stream edge to field) Grade (left) Grade (Right) 6b. Riparian Zone Vegetation Protection/	channel wid grasses), 10 10	arian zone >18 ths with trees, s human activitie impacted zone	shrubs, or tall as have not be a share not be a sha	Width of ripa 1 active char grasses), hur 7 7 7 CON 75-90% streyoung specie trees behit	Suboptima rian zone 12- nnel width w/tr nan activities impacted zon 6 6 NDITION C. Suboptima ambank vege	8 meters (1/2- 8 meters (1/2- 8 meters (1/2- 9 ese, shrubs, or have minimally a. 5 5 ATEGORY (Ill station, mixed hel and mature evident with	Ma Width of rips meters (1 channel wic impacted by h 4 4 4 GRADE or S Ma 50-75% vegetation of and sparse shrub spe frequent wit	rginal arian zone 6-12 /3-1/2 active tht vegetated), numan activities.	vegation le width), little le width), little le le vidth), little le le vidth), little le vidth le le vidth little le vidth le vi	rian zone < 6 i ss than 1/3 ac e riparian vege numan activitie 1 1 Poor 60% streambai onsisting mos w trees & shr.	tive channel tation due to es. O Avg.Score nk vegetation thy of pasture bis; low plant ed with gullies	8 8 8 8 8
Zone Width (from stream edge to field) Grade (left) Grade (Right) 6b. Riparian Zone Vegetation Protection/ Completeness	channel widi grasses), 10 10 10	erian zone >18 ths with trees, s this with trees, s one of the property of the	shrubs, or tall se have not be a second seco	Width of ripa 1 active char grasses), hur 7 7 7 CON 75-90% strr young specie trees behi breaks oc	Suboptima rian zone 12-rian zone 12-rian zone 12-rian zone 12-rian activities impacted zon 6 6 6 NDITION C Suboptima ambank vege sambank vege sa along channed; disruption curring at intermeters.	8 meters (1/2- 8 meters (1/2- 8 meters (1/2- 9 ese, shrubs, or have minimally 9. 5 ATEGORY (Il tation, mixed hel and mature evident with rvals of >50	Ma Width of rips meters (1) channel wic impacted by the service of	rginal arian zone 6-12 /3-1/2 active tht vegetated), numan activities. 3 3 3 CCORE rginal streambank ir mixed grasses young tree or cicles; breaks h some gullies very 50 meters.	Less than 5 coverage c grasses, fe density; banl al	rian zone < 6 i siss than 1/3 ac i riparian vege numan activitie 1 1 1 Poor i riow streambar streambar streambar streambar switches with the streambar streambar should be streambar stre	tive channel tation due to ses. O O Avg.Score Avg.Score nk vegetation thy of pasture thes; low plant ed with gullies gth.	8 8 8 8 8 8 8 8 8 8 8 8 8
Zone Width (from stream edge to field) Grade (left) Grade (Right) 6b. Riparian Zone Vegetation	channel wid grasses), 10 10 10 >90% plan shrubs, prain riparian zor graz	erian zone >18 ths with trees, s thuman activitie impacted zone 9 9 Optimal t density of ma rie grasses, or ne intact or dis- ing/mowing mir	shrubs, or tall se have not 8 8 8 ture trees or marsh plants, ruption from nimal.	Width of ripa 1 active char grasses), hur 7 7 7 CON CON 5treyoung species behis breaks oc	Suboptima rian zone 12- rian zone 12- rian zone 12- rian nel width wtr nan activities impacted zon 6 6 6 NDITION C Suboptima earnbank vege se along chan nd; disruption curring at inte meters.	8 meters (1/2- 8 meters (1/2- 8 meters (1/2- 9 ese, shrubs, or nave minimally 9. 5 ATEGORY (II station, mixed hel and mature evident with rvals of >50	Ma Width of rips meters (1 channel wic impacted by h 4 4 4 GRADE or S Ma 50-75% vegetation of and sparse shrub spe frequent wit and scars en	rginal arian zone 6-12 3-1/2 active tht vegetated), numan activities. 3 3 3 CORE rginal streambank mixed grasses young tree or cicles; breaks h some gullies very 50 meters.	Less than 5 coverage c grasses, fe density; banl	rian zone < 6 i sss than 1/3 ac i riparian vege numan activitie 1 1 Poor 60% streambai onsisting mos w trees & shruk k deeply scarr II along its leng	tive channel tation due to be seen and the total content of the total co	8 8 8 8 7 8 8 8 8 8 8

M VARIABLES											SCORE	Refero Source		
1	1 FLOW REGI TYPE		Perennial		Intermitte	ent w/ Perenr	iol Poole	Intern	nittent		Ephemera	al		KDWI
	Grade	10	9	8	7	6	5	4	3	2	1	0	0	
		•					-		•	1				
2	2 EPIFAUNAL	SUBSTRATE/AV		COVER	,					_				
		Within stream	Optimal	r than E00/	Mithin otroo	Suboptimal im bed, 30-50	/ aauaraaa	Mar Within stream	ginal	L oon thou	Poor 10% bobit	at features	4	
		coverage by s				abitat features		coverage by				at is obvious;		USAC Norfo
		favorable for str	ream faunal	colonization	for stream t	faunal coloniza	ation and/or	features favora	able for stream	substrat	e unstable o	or lacking;		2004
		and/or fish/amph				bian cover. Ma		faunal coloni	zation and/or cover; habitat			els. Habitat ed or lacking,		SAAN
		features non tr include snags, si				t transient. (Se ory for habitat t		availability ma			bottom ma		,	Form
		banks, roots, cob				components.)		desirable, sub	strate may be			.,		(page
		packs, pools ar						frequently dis						Barbo al. 19
		habitat at a sta	ge to allow	colonization				feature cor	gory for habitat					EPA I
														Parso
														al., 20
														AUSF
	Grade	10	9	8	7	6	5	4	3	2	1	0	2	2
3	3 STREAM BC	TTOM SUBSTRA	ATF: Pool 9	Substrate Ch	aracterizatio	nn .								
-	3 TILLY IN DO		Optimal			Suboptimal		Mar			Poor			
		Mixture of substr				soft sand, mu		All mud or clay				rock; no root		Barbo
		and firm sand p submerged				be dominant; I submerged v		little or no r submerged		mat or s	ubmerged v	regetation.		al. 19
						present.		. 5==					1	RBA page
													1	Parso
		<u> </u>			<u> </u>								<u> </u>	al., 20
	Grade	10	9	8	7	6	5	4	3	2	1	0	0	AUSF
4	4 POOL VARIA	ABILITY												
			Optimal			Suboptimal			ginal		Poor			
		Even mix of lar small-shallow, s			Majority o	f pools large-o	leep; very	Shallow pool prevalent tha				II-shallow or		Barbo
		smail-snailow, s	maii-deep p	oois present		few shallow.		prevalent tha	n deep pools		pools abser	nt		al. 19
														RBA page
														Parso
														al., 20
_														
5	Grade	10	9	8	7	6	5	4	3	2	1	0	0)
		DEPOSITION/SC		8	7		5			2	1 Poor	0	0)
		DEPOSITION/SC	Optimal		7 5-30% affe	6 Suboptimal cted by scour or		4 Mar 30-50% affect	ginal		Poor % of the botte	0 om in a state of		
		DEPOSITION/SC <5% of channel b	Optimal		Scour at cor	Suboptimal cted by scour or strictions and w	deposition; ehre grades	Mary 30-50% affect deposition. Depo	ginal ed by scour or osits and scour at	More than 50 flux or char	% of the botte ge nearly yea	om in a state of arlong. Pools	f	Barbo
		DEPOSITION/SC <5% of channel b	Optimal oottom affecte		Scour at cor	Suboptimal cted by scour or	deposition; ehre grades	Mary 30-50% affect deposition. Depo	ginal ed by scour or osits and scour at onstrictions and	More than 50 flux or char minimal or ab	% of the botte ge nearly yea	om in a state of arlong. Pools eavy deposition	f	Barbo al. 19 RBA
		DEPOSITION/SC <5% of channel b	Optimal oottom affecte		Scour at cor	Suboptimal cted by scour or strictions and w	deposition; ehre grades	30-50% affect deposition. Depo obstructions, co	ginal ed by scour or osits and scour at onstrictions and	More than 50 flux or char minimal or ab	% of the botto ge nearly yea sent due to h	om in a state of arlong. Pools eavy deposition	f	Barbo al. 19 RBA page
		DEPOSITION/SC <5% of channel b	Optimal oottom affecte		Scour at cor	Suboptimal cted by scour or strictions and w	deposition; ehre grades	30-50% affect deposition. Depo obstructions, co	ginal ed by scour or osits and scour at onstrictions and	More than 50 flux or char minimal or ab	% of the botto ge nearly yea sent due to h	om in a state of arlong. Pools eavy deposition	f	Barbo al. 19 RBA page Parso
		DEPOSITION/SC <5% of channel b	Optimal oottom affecte		Scour at cor	Suboptimal cted by scour or strictions and w	deposition; ehre grades	30-50% affect deposition. Depo obstructions, co	ginal ed by scour or osits and scour at onstrictions and	More than 50 flux or char minimal or ab	% of the botto ge nearly yea sent due to h	om in a state of arlong. Pools eavy deposition	f	Barbo al. 19 RBA page Parso al., 20
6	5 SEDIMENT I	<5% of channel b	Optimal pottom affecte deposition.	d by scour or	Scour at cor steepen.	Suboptimal cted by scour or strictions and w Some depositio	deposition; ehre grades n in pools	Mari 30-50% affect deposition. Depc obstructions, or bends. Some	ginal ed by scour or sits and scour at onstrictions and filling of pools.	More than 50 flux or char minimal or ab or e	% of the botto ge nearly yea sent due to h	om in a state of arlong. Pools eavy deposition uring.	f	Barbo al. 19 RBA page Parso al., 20
6	5 SEDIMENT [DEPOSITION/SC <5% of channel b 10 LOW STATUS	Optimal pottom affecte deposition.	d by scour or	Scour at cor steepen.	Suboptimal cted by scour or strictions and w Some depositio	deposition; ehre grades n in pools	Mari 30-50% affect deposition. Depc obstructions, or bends. Some	ginal ed by scour or sits and scour at anstrictions and filling of pools.	More than 50 flux or char minimal or ab or e	% of the botto ge nearly yea sent due to h	om in a state of arlong. Pools eavy deposition uring.	f	Barbo al. 19 RBA page Parso al., 20
6	5 SEDIMENT I	SEPOSITION/SC <5% of channel by the control of the contr	Optimal cottom affected deposition.	d by scour or	Scour at cor steepen.	Suboptimal cted by scour or strictions and strictions and strictions and some deposition of the control of the	deposition; ehre grades n in pools 5	Marr 30-50% affect deposition. Depc obstructions, cr bends. Some	ginal ed by scour or sists and scour at onstrictions and filling of pools. 3 ginal 5-75% of the	More than 50 flux or char minimal or ab or e	% of the botting nearly year sent due to have scored in th	om in a state of arlong. Pools eavy deposition uring.	f o	Barbo al. 19 RBA page Parso al., 20
6	5 SEDIMENT I	DEPOSITION/SC <5% of channel to 10 LOW STATUS	Optimal cottom affected deposition.	d by scour or	Scour at cor steepen.	Suboptimal cted by scour or strictions and w Some depositio 6 Suboptimal >75% of the c of channel sub-	deposition; ehre grades n in pools 5	Marr 30-50% affect deposition. Depo obstructions, or bends. Some	ginal ed by scour or sists and scour at anstrictions and filling of pools. 3 ginal 5-75% of the net and/or riffle	More than 50 flux or char minimal or ab or e	% of the bottinge nearly year sent due to have soon and the total and th	om in a state of arlong. Pools eavy deposition uring.	f o	Barbo al. 19 RBA page Parso al., 20) TCE0 1999 Wrks Barbo
6	5 SEDIMENT I	SEPOSITION/SC <5% of channel by the control of the contr	Optimal cottom affected deposition.	d by scour or	Scour at cor steepen.	Suboptimal cted by scour or strictions and strictions and strictions and some deposition of the control of the	deposition; ehre grades n in pools 5	Marr 30-50% affect deposition. Depc obstructions, cr bends. Some	ginal ed by scour or sists and scour at anstrictions and filling of pools. 3 ginal 5-75% of the net and/or riffle	More than 50 flux or char minimal or ab or e	% of the botting nearly year sent due to have scored in th	om in a state of arlong. Pools eavy deposition uring.	f o	Barbo al. 19 RBA page Parso al., 20) TCE0 1999 Wrks Barbo al. 19
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6	5 SEDIMENT I	SEPOSITION/SC <5% of channel by the control of the contr	Optimal cottom affected deposition.	d by scour or	Scour at cor steepen.	Suboptimal cted by scour or strictions and w Some depositio 6 Suboptimal >75% of the c of channel sub-	deposition; ehre grades n in pools 5	Marr 30-50% affect deposition. Depo obstructions, or bends. Some	ginal ed by scour or sists and scour at anstrictions and filling of pools. 3 ginal 5-75% of the net and/or riffle	More than 50 flux or char minimal or ab or e	% of the bottinge nearly year sent due to have soon and the total and th	om in a state of arlong. Pools eavy deposition uring.	f o	Barbo al. 19 RBA page Parso al., 20) TCEO 1999 Wrks Barbo al. 19 RBA page
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6	Grade 6 CHANNEL F	CEPOSITION/SC -5% of channel to the control of the	Optimal affects deposition. 9 Optimal the base of annel substructure and	8 both lower	7 Water fills <25% c	Suboptimal cted by scour or strictions and w Some depositio 6 Suboptimal >75% of the of forhamel sub: exposed 6	deposition; ehre grades in in pools 5 channel; or strate is	Mar. 30-50% affect deposition. Depodestructions, cubends. Some 4 Mar. Water fills 2! available chan substrates are i	ginal ed by scour or solts and scour at nonstrictions and filling of pools. 3 ginal 5-75% of the nel and/or riffle mostly exposed	More than 50 flux or char minimal or ab or e	% of the botting enearly years sent due to his control of the bottom of	orn in a state of arlong. Pools easy deposition uring. 0 channel and ding pools; or ry	0	Barbo al. 19 RBA: page Parso al., 20 TCEC 1999 Wrks Barbo al. 19 RBA: page Parso
	Grade 6 CHANNEL F	c5% of channel to the control of the	Optimal affecte deposition. 9 Optimal the base of annel substr	d by scour or 8 both lower ate is exposed 8 or dredging	Scour at cor steepen. 7 Water fills <25% c	Suboptimal Eded by scour or strictions and w Some depositio 6 Suboptimal >75% of the c of channel sub- exposed 6 Suboptimal	deposition; ehre grades ni n pools 5 channel; or strate is 5	Mar. 30-50% affect deposition. Deposition: Deposition Deposition Deposition Compensation of the Mar. 4 Mar. Water fills 2: available chan substrates are to the Mar. 4 Mar. Alteration or cha	ginal ed by scour or seits and scour at nonstrictions and filling of pools. 3 ginal 5-75% of the nel and/or riffle mostly exposed 3 ginal nnelization may	More than 50 flux or char minimal or ab a minimal or ab a control or e	% of the botting ge nearly year sent due to hoxcessive sco	om in a state of airlong. Pools early deposition uring. 0 channel and fing pools; or ry	0	Barbo al. 19 RBA page Parso al., 20 1999 Wrks Barbo al. 19 RBA page Parso
	Grade 6 CHANNEL F	Channelization absent or mini	Optimal affecte deposition. 9 Optimal the base of annel substructural	8 both lower ate is exposed 8 or dredging and stable	Scour at cor steepen. 7 Water fills <25% c	Suboptimal ted by scour or strictions and w Some depositio 6 Suboptimal >75% of the c foannel sub: exposed Suboptimal aration or char t, usually adja	deposition; chire grades nin pools 5 channel; or strate is 5 nelization cent to	Mar. 30-50% affect deposition. Deposition. Deposition. Deposition. Composition. Deposition. Composition. Some 4 Mar. Water filis 2: available chan substrates are in the subst	ginal ed by scour or sists and scour at nostrictions and filling of pools. 3 ginal 5-75% of the nel and/or riffle mostly exposed 3 ginal nnelization may embankments	More than 50 flux or char minimal or above or e	% of the bottogge nearly yearsent due to hoxcessive sco	om in a state of arlong. Pools easy deposition uring. O channel and ding pools; or ry O ion, riprap, or r riprap lined	0	Barbton al. 198 RBA page Parso al., 20 TCE(1999 Wrks Barbton al. 198 RBA page Parso 0)
	Grade 6 CHANNEL F	25% of channel to 45% of chann	Optimal option affected position. 9 Optimal the base of annel substructure optional, alteration, mal; normal are pattern. ##	both lower ate is exposed 8	Scour at cor steepen. 7 Water fills <25% c	Suboptimal ted by scour or strictions and w Some depositio 6 Suboptimal >75% of the c of channel sub- exposed Suboptimal eration or char t, usually adja	deposition; ehre grades nin pools 5 channel; or strate is 6 nelization cent to oridge	Mar. 30-50% affect deposition. Deposition. Deposition. Deposition. Deposition. Deposition. Deposition. Some 4 Mar. Water fills 2! available chan substrates are to the deposition. Alternation or che be extensive; (including spoil including spoil.)	ginal ed by scour or seits and scour ar nonstrictions and filling of pools. 3 ginal 5-75% of the net and/or riffle mostly exposed 3 ginal innelization may embankments piles) or shoring	More than 50 flux or char minimal or ab or e 2 2 Very little v mostly pres	% of the bottoge ge nearly yes sent due to h xcessive sco 1 Poor vater in the tent in the tent in standstream is di 1 Poor ad with gab Concrete oils. Instream is not sent in stands.	om in a state of arlong. Pools easy deposition uring. O channel and ding pools; or ry O ion, riprap, or riprap lined in habitat	0	Barbia al. 193 RBA page Parsta 1, 21 TCEC 1999 Wrks Barbta al. 19 RBA page Parst Norfc Distri
	Grade 6 CHANNEL F	Channelization absent or mini	Optimal option affected position. 9 Optimal the base of annel substructure optional, alteration, mal; normal are pattern. ##	both lower ate is exposed 8	Scour at cor steepen. 7 Water fills <25% c 7 Some altr presen struct abutments past altera past al	Suboptimal ted by scour or strictions and w Some depositio Suboptimal >75% of the to from the control of the control exposed Suboptimal aration or char ft, usually adja- gres, (such as or culverts); etion, (i.e., char	deposition; chire grades in in pools 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	Mar. 30-50% affect deposition. Deposition. Deposition. Deposition. Deposition. Deposition. Deposition. Some 4 Mar. Water filis 2: available chan substrates are substrates are substrates are substrates are substrates. Alteration or che be extensive; (including spoil structures pre banks; normal	ginal ed by scour or sists and scour or sists and scour or sists and scour or sists and scour or sists and scour or and filling of pools. 3 ginal string of pools 3 ginal annelization may pheson or shoring seson or shoring seson or shoring seson or shoring seson or shoring seson or shoring seson or shoring seson or shoring seson or shoring seson or shoring seson or shoring	More than 50 flux or char minimal or ab or e 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	% of the bottoge ge nearly yes sent due to h xcessive sco 1 Poor vater in the tent in the tent in standstream is do 1 Poor duting the tent in the control of the tent in standstream is do 1 Poor ad with gab Concrete or ols. Instrear altered by suts. Over 8 to standstream the tent in standstream the tent in standstream is do the tent in standstream to the tent in standstream to the tent in standstream to the tent in standstream to the tent in standstream to the tent in the tent	om in a state of arlong. Pools easy deposition uning. O channel and diing pools; or ry O ion, riprap, or r riprap lined on habitat stormwater oi softwork of the stormwater of softwork of the stormwater or softwork or softwor	0	Barbta al. 19 al. 19 al. 19 al. 19 al. 19 al. 19 al. 19 al. 20 al
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	Grade 6 CHANNEL F	25% of channel to 45% of chann	Optimal option affected position. 9 Optimal the base of annel substructure optional, alteration, mal; normal are pattern. ##	both lower ate is exposed 8	Scour at cor steepen. 7 Water fills <25% c 7 Some alte presen struct. abutments past alterat may be pread affective and stabilit alteration.	Suboptimal ted by scour or strictions and w Some depositio Suboptimal >75% of the c of channel sub- exposed Suboptimal ration or char t, usually adja res, (such as or culverts); e tion, (i.e., chan esent, but stree, y have recove n is not present	deposition; ehre grades nin pools 5 channel; or strate is 5 nelization cent to oridge vidence of inmelization) am pattern red; recent t. Minor	Mar. 30-50% affect deposition. Depo obstructions, co bends. Some 4 Mar. Water fills 2! available chan substrates are to be extensive; (including spoil) structures prebanks; normal meander pa recovered. A stormwater in	ginal ed by scour or sists and scour at mostrictions and filling of pools. 3 ginal 3-75% of the nel and/or riffle mostly exposed mostly exposed ginal innelization may embankments piles) or shoring sent on both stable stream ttern has not literation from puts may be 80% of stream	More than 50 flux or char minimal or ab or e 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	% of the bottoge ge nearly yes sent due to h xcessive sco 1 Poor vater in the tent in the tent in standstream is do 1 Poor duting the tent in the control of the tent in standstream is do 1 Poor ad with gab Concrete or ols. Instrear altered by suts. Over 8 to standstream the tent in standstream the tent in standstream is do the tent in standstream to the tent in standstream to the tent in standstream to the tent in standstream to the tent in standstream to the tent in the tent	om in a state of arlong. Pools easy deposition uning. O channel and diing pools; or ry O ion, riprap, or r riprap lined on habitat stormwater oi softwork of the stormwater of softwork of the stormwater or softwork or softwor	0	Barbda al. 198 RBA page Parsca al., 21 TCEE 1999 Wrks Barbda al. 1999 Wrks Barbda al. 2004 WSAKN Form (Field page Barbd Barbda al. 2004
	Grade 6 CHANNEL F	25% of channel to 45% of chann	Optimal option affected position. 9 Optimal the base of annel substructure optional, alteration, mal; normal are pattern. ##	both lower ate is exposed 8	Scour at cor steepen. 7 Water fills <25% c 7 Some alte presen struct. abutments past alterat may be pread affective and stabilit alteration.	Suboptimal cted by scour or strictions and w Some deposition Some deposition of the strict of the st	deposition; ehre grades nin pools 5 channel; or strate is 5 nelization cent to oridge vidence of inmelization) am pattern red; recent t. Minor	Mar. 30-50% affect deposition. Deposition. Deposition. Deposition. Commendation of the Mar. Water fills 2: available value available value available to the extensive; (including spoil structures probanks; normal meander parecovered. A stormwater in extensive in extensive. In extensive in extensive in extensive.	ginal ed by scour or sists and scour at mostrictions and filling of pools. 3 ginal 3-75% of the nel and/or riffle mostly exposed mostly exposed ginal innelization may embankments piles) or shoring sent on both stable stream ttern has not literation from puts may be 80% of stream	More than 50 flux or char minimal or ab or e 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	% of the bottoge ge nearly yes sent due to h xcessive sco 1 Poor vater in the tent in the tent in standstream is do 1 Poor duting the tent in the control of the tent in standstream is do 1 Poor ad with gab Concrete or ols. Instrear altered by suts. Over 8 to standstream the tent in standstream the tent in standstream is do the tent in standstream to the tent in standstream to the tent in standstream to the tent in standstream to the tent in standstream to the tent in the tent	om in a state of arlong. Pools easy deposition uning. O channel and diing pools; or ry O ion, riprap, or r riprap lined on habitat stormwater oi softwork of the stormwater of softwork of the stormwater or softwork or softwor	0	Barbcda. 19 RBA: al. 19 RBA: al. 20 TCEC 1999 Wrks Barbca. 19 Apage Parsc. USA(Norfot 2004 SAAM (Field page Barbcda. 19 Apart 2004 SAAM (Field page Barbcda. 19 Apart 2004 Apage Barbcda. 19 Apa
	Grade 6 CHANNEL F	25% of channel to 45% of chann	Optimal option affected position. 9 Optimal the base of annel substructure optional, alteration, mal; normal are pattern. ##	both lower ate is exposed 8	Scour at cor steepen. 7 Water fills <25% c 7 Some alte presen struct. abutments past alterat may be pread affective and stabilit alteration.	Suboptimal cted by scour or strictions and w Some deposition Some deposition of the strict of the st	deposition; ehre grades nin pools 5 channel; or strate is 5 nelization cent to oridge vidence of inmelization) am pattern red; recent t. Minor	Mar. 30-50% affect deposition. Deposition. Deposition. Deposition. Commendation of the Mar. Water fills 2: available value available value available to the extensive; (including spoil structures probanks; normal meander parecovered. A stormwater in extensive in extensive. In extensive in extensive in extensive.	ginal ed by scour or sists and scour at mostrictions and filling of pools. 3 ginal 3-75% of the nel and/or riffle mostly exposed mostly exposed ginal innelization may embankments piles) or shoring sent on both stable stream ttern has not literation from puts may be 80% of stream	More than 50 flux or char minimal or ab or e 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	% of the bottoge ge nearly yes sent due to h xcessive sco 1 Poor vater in the tent in the tent in standstream is do 1 Poor duting the tent in the control of the tent in standstream is do 1 Poor ad with gab Concrete or ols. Instrear altered by suts. Over 8 to standstream states over the tent in standstream is do the tent in standstream is do the tent in standstream is do the tent in standstream is do the tent in standstream is do the tent in standstream is do the tent in the t	om in a state of arlong. Pools easy deposition uning. O channel and diing pools; or ry O ion, riprap, or r riprap lined on habitat stormwater oi softwork of the stormwater of softwork of the stormwater or softwork or softwor	0	Barbhal. 15 RBA page Pars: al., 2 1999 TCE-11999 Wrks Barbhal. 15 RBA page Pars: al. 15 RBA page Barbhal. 16 RF page Barbhal. 15 RBA RBA RBA
	Grade 6 CHANNEL F	25% of channel to 45% of chann	Optimal option affected position. 9 Optimal the base of annel substructure optional, alteration, mal; normal are pattern. ##	both lower ate is exposed 8	Scour at cor steepen. 7 Water fills <25% c 7 Some alte presen struct. abutments past alterat may be pread affective and stabilit alteration.	Suboptimal cted by scour or strictions and w Some deposition Some deposition of the strict of the st	deposition; ehre grades nin pools 5 channel; or strate is 5 nelization cent to oridge vidence of inmelization) am pattern red; recent t. Minor	Mar. 30-50% affect deposition. Deposition. Deposition. Deposition. Commendation of the Mar. Water fills 2: available available value available available to the extensive; (including spoil structures probanks; normal meander parecovered. A stormwater in extensive in extensive. In extensive in extensive in extensive.	ginal ed by scour or sists and scour at mostrictions and filling of pools. 3 ginal 3-75% of the nel and/or riffle mostly exposed mostly exposed ginal innelization may embankments piles) or shoring sent on both stable stream ttern has not literation from puts may be 80% of stream	More than 50 flux or char minimal or ab or e 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	% of the bottoge ge nearly yes sent due to h xcessive sco 1 Poor vater in the tent in the tent in standstream is do 1 Poor duting the tent in the control of the tent in standstream is do 1 Poor ad with gab Concrete or ols. Instrear altered by suts. Over 8 to standstream states over the tent in standstream is do the tent in standstream is do the tent in standstream is do the tent in standstream is do the tent in standstream is do the tent in standstream is do the tent in the t	om in a state of arlong. Pools easy deposition uning. O channel and diing pools; or ry O ion, riprap, or r riprap lined on habitat stormwater oi softwork of the stormwater of softwork of the stormwater or softwork or softwor	0	Barbbaal. 15 RBA page Pars: al., 2 1999 TCE's 1999 Wrks Barbbaal. 15 RBA page Pars: class al. 15 al. 15 RBA Pars: class al. 15 RBA Pars:

		SINUOSITY	Optimal			Suboptima	al	Mar	rginal		Poor		1	
			the stream	increase the		n the stream	increase the	The bends i	in the stream		ight; waterw	ay has been		Barbour, e
				longer than if it ote - channel		ngth 2 to 3 to was in a str			stream 1 to 2 nan if it was in a	cnanneliz	ed for a long	gastance		al. 1999 RBA #7b;
		braiding is cor	nsidered nor	mal in coastal					ght line					Parsons, e
				g areas. This ated in these										al., 2001
			areas).											AUSRIVAS
	Grade	10	9	8	7	6	5	4	3	2	1	0	3	
	9 BANK STAB	BILITY (SCORE I	EACH BAN Optimal	IK)		Suboptima	al	Mar	rginal		Poor			
			evidence of	erosion or bank		stable; infre	equent, small	Moderately uns	stable; perennial		perennial v	egetation at		Barbour, e
		failure absent affected), perer					healed over. has areas of		waterline sparse ed or stripped by		severe erosi ently expose			al. 1999 RBA #8;
		no raw or under	cut banks (s	some erosion or ds O.K.); no		erosion and		lateral erosion	n), bank held by s (trees, rock		ee falls and			Parsons, e
		recently expose					vegetation to es; recently	outcrops) and	d eroded back		trees comm as; "raw" are			al., 2001
							but present.	elsewhere; 30-	-60% of bank in		ght sections	and bends; 60-100% of		AUSRIVAS USACE
								bank underco	as of erosion and utting; recently		as erosional			Norfolk
									oots and fine root n; high erosion					District,
									luring floods					2004 SAM #3; Scholz
														and Booth
														from
														Henshaw, 1999)
	Grade Grade	10 10	9	8	7	6	5 5	4	3	2	1	0	0	
	0.000	, 10	. ,	. 0		, 0	, ,	, -	, ,	, -	Avg.Score		0	1
	10 VECETATIV	E DROTECTION	U (CCORE	EACH DANK	1									
1	VEGETATIV	'E PROTECTION	Optimal	EACH BANK		Suboptima	al	Mar	rginal		Poor		1	1
		More than 90%	of the strea	mbank surfaces		the streamb	ank surfaces ation, but one	50-70% of th	ne streambank ed by vegetation;		50% of the s		1	Barbour, e
			e ripariari zor etation, inclu			of plants is r			ious; patches of		covered by v f streambanl			al. 1999 RBA #9:
		understory macrophytes; v	shrubs, or	nonwoody	represente		evident but		losely cropped		h; vegetation			Parsons, e
		grazing or mov	ving minimal	or not evident;		cting full pla any great	extent; more		mmon; less than e potential plant		5 centimete ge stubble h			al., 2001
		almost all plant	s allowed to	grow naturally.		nalf of the po le height ren	otential plant	stubble heig	tht remaining.					AUSRIVAS KDWP
					Stubb	ic ricignit fon	naning.							2000;
														Petersen, et al., 1992
		<u> </u>			1			1		1			Ī	
	Grade				_								.	RCE
		10	9	8	7	6	5	4	3	2	1	0	4	RCE
	Grade	10	9	8	7	6	5 5	4 4	3	2 2	1 1 Avg.Score	0	4 4	RCE
	Grade	10	9	8	7 7						1 1 Avg.Score			RCE
1	Grade	10 ZONE (SCORE E	9 EACH BAN Optimal	8 IK)	7 7	6 Suboptima	5 al	4 Mar	3 rginal	2	Poor	0		RCE
1	Grade	20NE (SCORE E	9 EACH BAN Optimal in zone >18	8 K) meters; human		Suboptima	5 al 12-18 meters;	4 Mar Width of ripa	rginal rian zone 6-12	2 Width of ri	Poor parian zone	0 <6 meters;		Barbour, ea
1	Grade	10 ZONE (SCORE E	9 EACH BAN Optimal In zone >18 arking lots, r	8 IK) meters; human roadbeds, clear-	human activ	Suboptima	5 al 12-18 meters; npacted zone	4 Mar Width of ripa meters; humai	3 rginal	2 Width of ri	Poor	0 <6 meters; ation due to		Barbour, et al., 1999 RBA #10;
1	Grade	ONE (SCORE E Width of riparia activities (I.e., p	9 EACH BAN Optimal In zone >18 arking lots, r	8 IK) meters; human roadbeds, clear-	human activ	Suboptima arian zone 1	5 al 12-18 meters; npacted zone	4 Mar Width of ripa meters; humai	rginal rian zone 6-12 n activities have	2 Width of ri	Poor parian zone parian veget	0 <6 meters; ation due to		Barbour, et al., 1999 RBA #10; Parsons, e
1	Grade	ONE (SCORE E Width of riparia activities (I.e., p	9 EACH BAN Optimal In zone >18 arking lots, r	8 IK) meters; human roadbeds, clear-	human activ	Suboptima arian zone 1	5 al 12-18 meters; npacted zone	4 Mar Width of ripa meters; humai	rginal rian zone 6-12 n activities have	2 Width of ri	Poor parian zone parian veget	0 <6 meters; ation due to		Barbour, et al., 1999 RBA #10;
1	Grade RIPARIAN Z Grade	20NE (SCORE E Width of riparia activities (I.e., p cuts, lawns, or	9 EACH BAN Optimal In zone >18 arking lots, r	8 IK) meters; human roadbeds, clear-	human activ	Suboptima arian zone 1	5 al	4 Mar Width of ripa meters; humai	rginal rian zone 6-12 n activities have ne a great deal.	Width of ri	Poor parian zone parian veget	<6 meters; ation due to es.	4	Barbour, et al., 1999 RBA #10; Parsons, e al., 2001 AUSRIVAS
1	Grade	Width of riparia activities (I.e., p cuts, lawns, or	9 EACH BAN Optimal In zone >18 arking lots, r crops) have zone.	Meters; human roadbeds, clear- e not impacted	human activ	Suboptima arian zone 1 vities have in only minimal	al 12-18 meters; npacted zone	Mar Width of ripa meters; humar impacted zon	rginal rian zone 6-12 n activities have ne a great deal.	Width of ri	Poor parian zone parian veget man activitie	<6 meters; ation due to es.	8 8	Barbour, et al., 1999 RBA #10; Parsons, e al., 2001 AUSRIVAS
1	Grade RIPARIAN Z Grade	20NE (SCORE E Width of riparia activities (I.e., p cuts, lawns, or	9 EACH BAN Optimal In zone >18 arking lots, r crops) have zone.	MK) meters; human roadbeds, clear- e not impacted	human activ	Suboptima varian zone 1 vities have in only minimal	5 al	Mar Width of ripa meters; human impacted zon	rginal rian zone 6-12 n activities have ne a great deal.	Width of ri	Poor parian zone parian veget	<6 meters; ation due to es.	4	Barbour, et al., 1999 RBA #10; Parsons, e al., 2001 AUSRIVAS
	Grade Grade Grade Grade Grade	20NE (SCORE E Width of riparia activities (I.e., p cuts, lawns, or	9 EACH BAN Optimal in zone >18 arking lots, r crops) have zone.	Meters; human roadbeds, cleare not impacted	human activ	Suboptim: arian zone 1 itites have in only minimal	2-18 meters; npacted zone by).	Mar Width of ripa meters; human impacted zon	rginal rian zone 6-12 n activities have ne a great deal.	Width of ri	Poor parian zone parian veget iman activitie 1 1 Avg.Score	<6 meters; ation due to es.	8 8	Barbour, et al., 1999 RBA #10; Parsons, e al., 2001 AUSRIVAS
	Grade Grade Grade Grade Grade	Width of riparia activities (I.e., p cuts, lawns, or 10 10	9 9 EACH BAN Optimal In zone > 18 arking lots, I crops) have zone. 9 9 9 ITION (SCC Optimal	Meters; human roadbeds, cleare not impacted	human activ	Suboptimarian zone furities have in only minimal 6 6 6 Suboptimarin (dbh>3 inch	al l2-18 meters; ppacted zone y).	Mar Width of ripa meters; humar impacted zon	rginal rian zone 6-12 n activities have ne a great deal.	Width of ri little or no ri hu	Poor parian zone parian veget man activitie	of meters; attion due to es. 0	8 8	Barbour, et al., 1999 RBA #10; Parsons, e al., 2001 AUSRIVAS
	Grade Grade Grade Grade Grade	Width of riparia activities (Le., p cuts, lawns, or 10 10 10 Tree stratum (r. 560% tree canc.)	9 EACH BAN Optimal In zone >18 arking lots, r crops) have zone. 9 9 9 ITION (SCC Optimal dbb-3 inche popy cover. (MK) meters; human roadbeds, cleare not impacted 8 8 8 ORE EACH Ba	human active of the street of	Suboptimarian zone 1 vittes have in only minimal 6 6 6 Suboptimarin (dbh-3 inc 660% tree c	al 12-18 meters; pacted zone y).	Mar Width of ripa meters; humai impacted zon 4 4 4 4 Mar Tree stratum present, with <	rginal rian zone 6-12 n activities have le a great deal. 3 3 3 rginal (dbh>3 inches) 30% tree canopy	Width of ri	Poor parian zone parian veget man activitie 1 1 1 Avg.Score	of meters; ation due to as. O O mpervious e spoil lands,	8 8	Barbour, e. al., 1999 RBA #10; Parsons, e. al., 2001 AUSRIVAS
	Grade Grade Grade Grade Grade	Vidth of riparia activities (I.e., p cuts, lawns, or 10 10 10 10 Tree stratum (< >60% tree cance layers may herbaceous	9 EACH BAN Optimal In zone >18 arking lots, r crops) have zone. 9 9 9 ITION (SCC Optimal Jbh>3 inche popy cover. (include: sag, and leaf lite.)	meters; human roadbeds, clear e not impacted 8 8 8 ORE EACH B. s) present, with Additional fores oling, shrub, ter including	7 7 ANK) Tree stratur with 30% to (See E examples of	Suboptim: arian zone 1 trites have in only minimal 6 6 6 Suboptim: m (dbh-3 into 60% tree c excellent Cat if additional)	al 12-18 meters; ppacted zone by).	Mar Width of ripa meters; humai impacted zon 4 4 4 Tree stratum present, with <- cover. (See Ex- for examples of	rginal rian zone 6-12 n activities have ne a great deal. 3 3 3 (dbh>3 inches) 30% tree canopy ccellent Category ccellent Category	Width of ri little or no r hu	Poor parian zone parian veget iman activitie 1 1 1 Avg.Score Poor um absent; i polands, min streams, med herbaceo	o meters; ation due to ass. O 0 o 0 <td>8 8</td> <td>Barbour, et al., 1999 RBA #10; Parsons, e al., 2001 AUSRIVAS Norfolk SAAM Form 1</td>	8 8	Barbour, et al., 1999 RBA #10; Parsons, e al., 2001 AUSRIVAS Norfolk SAAM Form 1
	Grade Grade Grade Grade Grade	Width of riparia activities (i.e., p cuts, lawns, or 10 10 10 Tree stratum (r >60% tree cance layers may herbaceous mosses/lichens	9 EACH BAN Optimal In zone >18 arking lots, I crops) have zone. 9 9 9 ITION (SCC Optimal Jobhs's inche popy cover. (include: sag, and leaf lit and woody	8 MK) meters; human roadbeds, cleare e not impacted 8 8 8 ORE EACH B. s) present, with Additional fores long, shrub, bling, shrub, ter including debris.) Score a	ANK) Tree straturt with 30% to (See E examples of t Score at the	Suboptim: arian zone 1 vities have in nly minimal 6 6 Suboptim: n (dbh-3 in o 60% tree cixcellent Cat f additional	al 2-18 meters; ppacted zone by). 5 5 5 5 5 5 5 6 6 6 6 6 6 6 6 6 6 6 6	Mar Width of ripa meters; humar impacted zon 4 4 4 Tree stratum present, with < cover. (See Ex for examples of layers.) Score a	rginal rian zone 6-12 n activities have le a great deal. 3 3 3 rginal (dbh>3 inches) 30% tree canopy xcellent Category a additional forest at the high end of	Width of ri little or no n ht	Poor parian zone parian veget iman activities 1	of meters; ation due to ss. O O o o o o o o o d i o o o d i o	8 8	Barbour, et al., 1999 RBA #10; Parsons, e al., 2001 AUSRIVAS Norfolk SAAM Form 1
	Grade Grade Grade Grade Grade	Width of riparia activities (I.e., p cuts, lawns, or 10 10 10 10 Tree stratum (I.e.) ABITAT CONDITION To the Condition of the	9 EACH BAN Optimal In zone >18 arking lots, r crops) have zone. 9 9 9 ITION (SCC Optimal dbh-3 inche popy cover. (include: sag, and leaf lit and woody of of Excellen's are presented to the same population of the same population of the same population of the same population of the same population of the same presented the same population of the same presented the same population of th	B Meters; human roadbeds, cleare e not impacted B B B ORE EACH B. s) present, with Additional fores bling, shrub, ter including debris.) Score at trange if ≥2 nt. Score at low.	Tree straturt with 30% to (See E examples ot Score at the fig2 and present.	Suboptim: arian zone stitles have in only minimall 6 6 6 Suboptim: n (dbh-3 in o 60% tree cixcellent Cat f additional e high end o ilitional forest Score at lo	al 2-18 meters; ppacted zone by). 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	Mar Width of ripa meters; humar impacted zon 4 4 4 Free stratum present, with < cover. (See Ex for examples of layers.) Score a Fair range if ≥2 are present.	rginal rian zone 6-12 n activities have le a great deal. 3 3 3 rginal (dbh-3 inches) 30% tree canopy coellent Category a dditional forest at the high end of a dditional layers core at low end if	Width of ri little or no n hu	Poor parian zone parian veget iman activitie 1 1 1 Avg.Score Poor um absent; i polands, min streams, med herbaceo	of meters; ation due to ss. O O o o o o o o o d i o o o d i o	8 8	Barbour, et al., 1999 RBA #10; Parsons, e al., 2001 AUSRIVAS Norfolk SAAM Form 1
	Grade Grade Grade Grade Grade	Width of riparia activities (I.e., p cuts, lawns, or 10 10 10 10 Tree stratum (I.e.) ABITAT CONDITION To the Condition of the	9 EACH BAN Optimal In zone >18 arking lots, r crops) have zone. 9 9 9 ITION (SCC Optimal dbh-3 inche popy cover. (include: sag, and leaf lit and woody of of Excellen's are presented to the same population of the same population of the same population of the same population of the same population of the same presented the same population of the same presented the same population of th	B Meters; human roadbeds, clear e not impacted B B ORE EACH B S) present, with Additional fores olining, shrub, ter including a debris.) Score a trange if ≥2	Tree straturt with 30% to (See E examples of t ≥ 2 add present. additional to additional to additional to additional to additional to additional to additional to additional to additional to additional to additional to a	Suboptima: arian zone 1 rities have in only minimall 6 6 6 Suboptima: n (dbh>3 ind 6 60% tree c f additional forest Score at lof forest layers	al 22-18 meters; ppacted zone by). 5 5 5 5 5 5 5 6 7 6 7 6 7 6 7 6 7 6 7 6	Mar Width of ripa meters; human impacted zon 4 4 4 Tree stratum present, with e- cover. (See E- for examples of layers.) Score s Fair range if _2 are present. S; _1 additional la	rginal rian zone 6-12 n activities have le a great deal. 3 3 3 rginal (dbh>3 inches) 30% tree canopy cellent Category additional forest at the high end of additional layers	Width of ri little or no n hu	Poor parian zone parian veget iman activities 1	of meters; ation due to ss. O O o o o o o o o d i o o o d i o	8 8	Barbour, et al., 1999 RBA #10; Parsons, e al., 2001 AUSRIVAS Norfolk SAAM Form 1
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	Grade Grade Grade Grade Grade 12 RIPARIAN F 12 RIPARIAN F 13 Enter the Right Bank	Unit (SCORE E Width of riparia activities (I.e., p cuts, lawns, or 10 10 Tree stratum (6 >60% tree canc layers may herbaceous mosses/lichens the high enc additional layers end if ≤1 add 11 10 riparian areas a e square footage %Riparian Area %Riparian Area %Riparian Area %Riparian Area %Riparian Area %Riparian Area %Riparian Area %Riparian Area %Riparian Area %Riparian Area %Riparian Area	9 EACH BAN Optimal in zone -18 garking lots, r crops) have zone. 9 9 9 ITION (SCC Optimal include: said include	B MIK) meters; human roadbeds, cleare e not impacted B B B ORE EACH B. S) present, with Additional fores oling, shrub, ter including debris.) Score at trange if ≥2 and trange if ≥2 are present. B Stream bank is by measuring d purposes, erections.	Tree straturt with 30% to (See E examples of Score at the if ≥2 add present. additional OR cutoff or estimating or estimating or estimating the condition or estimating the condition or estimating the condition or estimating the condition or estimating the condition or estimating the condition or estimating the condition or estimating the condition or estimating the condition of estimating the estimating the condition of estimating the condition of estimating the condition of estimating the condition of estimating the condition of estimating the condition of estimating the condition	Suboptimarian zone sittes have in not good to some some some some some some some som	al 12-18 meters, ppacied zone by). 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	Mar Width of ripa meters; human impacted zon 4 4 4 4 Tree stratum present, with e- for examples of layers.) Score s Fair range if _2 are present. S 1 additional la odense herba woody v 4 ittion Scores us d Use GIS mag r each riparian Mar	rginal rian zone 6-12 n activities have le a great deal. 3 3 3 rginal (dbh3 inches) 30% tree canopy coellent Category a additional layers at the high end of a additional layers core at low end if yers are present, mists of non- mists of non- egetation. 3 ing the above o so may be used category in the rginal	Tree strat surfaces of the surface o	Poor parian zone parian voget man activitie 1	one of meters; ation due to see. One of one	a 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	Barbour, et al., 1999 RBA #10; Parsons, et al., 2001 AUSRIVAS Norfolk SAAM Form 1 Field

	Stream Function	nal Capacity C	alculation		
	N1-Trib2 (0.5	-2)			
Date:	5/17/2006				
Project:	Lake Ralph H	all			
Assessment Area:	WP 1				
Assessors:	Holmes Voigh	nt Capps			
Project Status:	XPrepro	ject	Postproject		
		Stream	Stream	Multiplication	
Major Function Categories	FCI	Length (LF)*	Characterization	Factor**	FC
Hydrologic	0.07	793	E	0.00125	0.07
Water Quality Improvement	0.20	793	E	0.00125	0.20
Habitat	0.23	793	E	0.00125	0.22
Total	0.50	793			0.49
*Stream Length is the length of the Si **Multiplication Factors Ephemeral = 0.00125 Intermittent = 0.0025 Perennial = 0.0038	tream Assessme	nt Reach (SAF	₹)		





SWAMPIM DATASHEETS – NORTH EPHEMERAL 2.5 TO 5.0' PRE-PROJECT

• N10

N10 (2.5-5)

PARAMET	ER													
		CONDITION CATEGORY GRADE or SCORE												
				CONI						Poor				
		Optimal			Suboptima	l	Mar	ginal						
0	40													
Grade	10	9	8	/	6	5	4	3	2	1 1	0	<u> </u>		

Park area, surrounded by pasture and roads. Reach crosses under road. Riparian zone is 15 to 100m depending on proximity to road.

East 2990 P61, 60

FLOW REGIME	<u>:</u>		LOGIC FUN			N10 (2.	- J					SCORE	Source
TYPE		Perennial		Intermitte	ent w/ Perer	nial Poole	Inter	mittent		Ephemera	ı		KDWP . Kansas
Grade	10	9	8	7	6	5	4	3	2	1	0	2	Subjecti
CHANNEL CO	NDITION:	Measureme	nt or Observ	ation of St	ream Chanr	nel Condition	IS	•		•			
				CON	IDITION C	ATEGORY (PADE or 9	SCOPE					Barbour
		Optimal			Suboptima			rginal		Poor			EPA RB
	Natural cl	hannel; no st	ructures or	Some ch	annelization		Altered c	hannel; 40-		l is actively dov			5-21; <i>N</i>
		elization mini			areas) or pas			the reach		>80% of the re lized. Degrada			1998 U
2a.Channel		nce of downcu e lateral cuttir			on, but with s f channel bed			elized or d. Excess		s prevent acce			NRCS S
Condition/Alter ation (natural,	frequency of	of hydrologica	al connection	Acceptabl	e frequency	of overbank		on; braided		floodplain.			page 7
altered, or	between	channel and	floodplain.	flow	vs onto flood	olain.		th excessive of overbank					
downcutting)								onto the					
								n. Historical					
								es or levees loodplain.					
Grade	10	9	8	7	6	5	4	3	2	1	0	2	
				CON	NDITION CA	ATEGORY (SRADE or S	SCORE					w/ assis
2b.Channel		Optimal			Suboptima	l	Ma	rginal		Poor]	and inpu
Capacity to		apacity to Flo	. ,			w Frequency overflow from		Capacity to ency Ratio is		Capacity to Flouch that bank of the control of the			Dr. Mike
Flow		ch that bank onts occur at a				requent than		ency Ratio is ank overflow		ucn that bank o ents are more f			Harvey a Travant
Frequency Ratio (for 2-		ear frequenc		every 1.2	5 years or le	ss frequent	from storn	n events are		f year or less f	requent than		, ravailt
year peak		0.75-1.25			n every 2.5 y <0.75 or >1.2			quent than ear or less		every 10 year <0.24 or >2			
flow)					5 0. 7 1.2	-	frequent t	han every 5		.5.2.01/2			
								ears. or >1.5					
Grade	10	9	8	7	6	5	4	3	2	1 1	0	7	
Grade	10	J 9	0	,	0	5	4	<u> </u>			U	,	
		Optimal		CON	NDITION CA Suboptima	ATEGORY (SCORE rginal	1	Poor			Newton, USDA/ I
	Banks stab	le; evidence	of erosion or	Moderately	stable; infre			ly unstable;	Unstable	; no perennial	vegetation at		SVAP p
0- 0		absent or m						vegetation to		ie; severe eros		10; <i>Bart</i>	
2c.Channel Bank Stability		k affected), p n to waterline			ank in reach erosion and/			parse (mainly r stripped by		ecently expose n; tree falls and			al., 1999
(score each	undercut l	banks (some	erosion on	undercuttin	g; perennial	vegetation to	lateral ero	sion), bank	undercut t	rees common;	many eroded		RBA pa
bank, left or		meander ben exposed roots			in most place ee roots rare			nard points ck outcrops)		raw" areas fred ections and be			Norfolk
right facing	recently e	tree falls;	s, no recent	exposed in	ee 100ts rare	but present.		ded back		ghing; 60-100%			2004
downstream)								e; 30-60% of		erosional sca	rs.		
								ch has areas n and bank					
								ing; recently					
								ee roots and					
Grade (Left)	10	9	8	7	6	5	tine root na 4	airs common:	2	1	0	7	
Grade (Right)	10	9	8	7	6	5	4	3	2	1	0	7	
											Avg.Score	/	
CHANNEL RO	JGHNESS	FACTORS		_			-						
				CON		ATEGORY (Barbour
3a.Channel	The hend	Optimal s in the strea	m incresse	The hend	Suboptima s in the strea			rginal in the stream	Channel	Poor straight; waterv	vav has heen		EPA RB Chapter
Sinuosity		m length 2.5			n length 1.5			the stream		elized for a long	,		5-25; <i>KL</i>
(bends in low gradient		than if it was			ın if it was a s			to 1.5 times	Channe	l length/valley	ength <_1.0		1996
stream)	Channel lei	ngth/valley le >1.5.	ngth at least	Channel le	ength/valley I 1.5	ength 1.2 to		an if it was a ie. Channel					
,		7 1.01			1.0		length/valle	ey length 1.0					
							to	1.2.					
Grade	10	9	8	7	6	5	4	3	2	1	0	3	
				CON		ATEGORY (_]	KDWP,
	l ittle or n	Optimal no channel en	largement	Some grou	Suboptima el bars of co			rginal pars of rocks,	Channel	Poor divided into bra	ids or stream		Kansas Subjecti
3b. Bottom	resul	Iting from sec	diment	and well-wa	ashed debris	present, little	sands, and	silt common;	is chann	elized; substra	te is uniform		Evaluati
Substrate	accumul	ation; channe	el is stable		moderately s			ely unstable	sand, silt	, clay, or bedro	ck; unstable		Aquatic
Composition													Habitats
				1			i						
Grade	10	9	8	7	6	5	4	3	2	1	0	2	

Continue Continue	USACE, Norfolk Dis. 2004 SAAN Form 1 #1 VT Stream Geomorphi Assessmer Phase 2
Diverse bottom topography including Solution Topography Solut	USACE, Norfolk Dis 2004 SAAN Form 1 #1 a VT Stream Geomorphic Assessmer
Category Category	USACE, Norfolk Dis 2004 SAAN Form 1 #1 a VT Stream Geomorphii Assessmer
CONDITION CATEGORY GRADE or SCORE	USACE, Norfolk Dis 2004 SAAN Form 1 #1 a VT Stream Geomorphi Assessmer
Of Optimal Suboptimal Marginal Poor 3c. Manning's n 0.05 to 0.099 0.035 to 0.05 0.021 to 0.03 or >0.10 to 0.03 or >0.10 to 0.02 due to excessive obstruction to flow or 0.01 to 0.02 due to channelization and clean, smooth channel. Grade 10 9 8 7 6 5 4 3 2 1 0 3d. Channel Incision (TLB/BFD=BH Factor = CI) Optimal Suboptimal Suboptimal Marginal Marginal Marginal Poor Incision ratio ≥1.0 <1.2 and Where channel slope >2%, Entrenchment ratio >1.4; and Where channel slope >2%, Entrenchment ratio >1.4; where channel slope >2%, Entrenchment ratio >1.4; where channel slope <2%, Entrenchment ratio >2.0 Incision ratio ≥1.4 < 2.0 and Where channel slope >2%, Entrenchment ratio >1.4; where channel slope <2%, Entrenchment ratio >2.0 Incision ratio ≥2.0 and Where channel slope >2%, Entrenchment ratio >1.4; where channel slope <2%, Entrenchment ratio >2.0 Entrenchment ratio >2.0 Entrenchment ratio >2.0 Entrenchment ratio >2.0 TLB = 10 BHR = 1 BHR = 1	Norfolk Dis 2004 SAAN Form 1 #1 a VT Stream Geomorphic Assessmen
Of Optimal Suboptimal Marginal Poor 3c. Manning's n 0.05 to 0.099 0.035 to 0.05 0.021 to 0.03 or >0.10 to 0.03 or >0.10 to 0.02 due to excessive obstruction to flow or 0.01 to 0.02 due to channelization and clean, smooth channel. Grade 10 9 8 7 6 5 4 3 2 1 0 3d. Channel Incision (TLB/BFD=BH Factor = CI) Optimal Suboptimal Suboptimal Marginal Marginal Marginal Poor Incision ratio ≥1.0 <1.2 and Where channel slope >2%, Entrenchment ratio >1.4; and Where channel slope >2%, Entrenchment ratio >1.4; where channel slope >2%, Entrenchment ratio >1.4; where channel slope <2%, Entrenchment ratio >2.0 Incision ratio ≥1.4 < 2.0 and Where channel slope >2%, Entrenchment ratio >1.4; where channel slope <2%, Entrenchment ratio >2.0 Incision ratio ≥2.0 and Where channel slope >2%, Entrenchment ratio >1.4; where channel slope <2%, Entrenchment ratio >2.0 Entrenchment ratio >2.0 Entrenchment ratio >2.0 Entrenchment ratio >2.0 TLB = 10 BHR = 1 BHR = 1	Norfolk Dis 2004 SAAN Form 1 #1 a VT Stream Geomorphic Assessmen
3c. Manning's n 0.05 to 0.099	Norfolk Dis 2004 SAAN Form 1 #1 a VT Stream Geomorphic Assessmen
Sc. Mannings 10 9 8 7 6 5 4 3 2 1 0	Norfolk Dis 2004 SAAN Form 1 #1 a VT Stream Geomorphic Assessmen
CONDITION CATEGORY GRADE or SCORE Optimal 3d. Channel Incision ratio ≥1.0 <1.2 and Where channel slope >2%; Entrenchment ratio >1.4; Where channel slope >2%, Entrenchment ratio >1.4; Where channel slope ≤2%, Entrenchment ratio >1.4; Where channel slope ≤2%, Entrenchment ratio >2.0 TLB = 10 BHR = 1	Norfolk Dis 2004 SAAN Form 1 #1 a VT Stream Geomorphic Assessmen
Optimal Suboptimal Marginal Poor Incision ratio ≥ 1.0 <1.2 and Where channel slope >2%; Entrenchment ratio >1.4; Where channel slope >2%; Entrenchment ratio >1.4; Where channel slope >2%, Entrenchment ratio >2.0 Incision ratio ≥ 1.4 < 2.0 and Where channel slope >2%, Entrenchment ratio ≥1.4; Where channel slope >2%, Entrenchment ratio >2.0 Incision ratio ≥ 1.4 < 2.0 and Where channel slope >2%, Entrenchment ratio ≥ 1.4; Where channel slope >2%, Entrenchment ratio >2.0 Factor =CI) ≤2%; Entrenchment ratio >2.0 ≤2%, Entrenchment ratio >2.0 Entrenchment ratio >2.0 Entrenchment ratio >2.0 TLB = 10 BHR = 1	Norfolk Dis 2004 SAAN Form 1 #1 a VT Stream Geomorphic Assessmen
3d. Channel Incision ratio ≥ 1.0 <1.2 and Where channel slope >2%; Entrenchment Tatio >1.4; Where channel slope >2%, Entrenchment ratio >1.4; Where channel slope >2%, Entrenchment ratio >1.4; Where channel slope ≥2%, Entrenchment ratio >1.4; Where channel slope ≥2%, Entrenchment ratio >1.4; Where channel slope ≥2%, Entrenchment ratio >1.4; Where channel slope ≥2%, Entrenchment ratio >1.4; Where channel slope ≥2%, Entrenchment ratio >1.4; Where channel slope ≤2%, Entrenchment ratio >2.0 TLB = 10 BHR = 1	2004 SAAN Form 1 #1 a VT Stream Geomorphic Assessmen
Incision (TLB/BFD=BH ratio >1.4; Where channel slope >2%, Entrenchment ratio >1.4; Where channel slope ≥2%, Entrenchment ratio >2.0 ≤2%, Entrenchment ratio >2.0 ≤2%, Entrenchment ratio >2.0 Entrenchment ratio >2.0 ≤2%, Entrenchment ratio >2.0 En	Form 1 #1 a VT Stream Geomorphic Assessmen
(TLB/BFD=BH ratio >1.4; Where channel slope R; 1/BHR*Adj Factor =CI) TLB = 10 BHR = 1 Tatio >1.4; Where channel slope ≤2%, Entrenchment ratio >2.0 Slope > 2%, Entrenchment ratio >2.0 Entrenchment ratio >2.0 Entrenchment ratio >2.0 Entrenchment ratio >2.0 Entrenchment ratio >2.0 Entrenchment ratio >2.0 Entrenchment ratio >2.0 Entrenchment ratio >2.0 Entrenchment ratio >2.0 Entrenchment ratio >2.0 Entrenchment ratio >2.0	VT Stream Geomorphic Assessmen
R; 1/BHR*Adj ≤2%; Entrenchment ratio >2.0 ≤2%, Entrenchment ratio >2.0 Entrenchment ratio >1.4; Where channel slope ≤2%, Entrenchment ratio >2.0 Entrenchment ratio >1.4; Where channel slope ≤2%, Entrenchment ratio >2.0	Geomorphic Assessmen
Factor =CI)	Assessmen
125	
PED - 10	
5.5	
Grade 10 9 8 7 6 5 4 3 2 1 0	4
DYNAMIC SURFACE WATER STORAGE	
CONDITION CATEGORY GRADE or SCORE	Newton, et
Optimal Suboptimal Marginal Poor	1998 USDA
4a.Pools Deep and shallow pools abundant; Pools present, but not abundant; Pools present, but Pools absent, or the entire bottom is	NRCS SVA
(abundant, greater than 30% of the pool bottom from 10-30% of the pool bottom is shallow; from 5-10% of discernible. No water = zero.	page 14;
present or is obscure due to depth, or pools are obscure due to depth, or the pools the pool bottom is obscure due to depth, or the pool bottom is obscure due to depth,	Barbour, et
absent) at least 5 feet deep. are at least 3 feet deep. ooscure due to depth, or the pools are less than 3 feet deep.	1999
Grade 10 9 8 7 6 5 4 3 2 1 0	1
4b. Channel CONDITION CATEGORY GRADE or SCORE	
Flow Status Optimal Suboptimal Marginal Poor	Barbour, et
(degree to Water reaches base of both lower Water fills >75% of the available Water fills 25-75% of Very little water in channel and mostly	1999 EPA
which channel banks and minimal amount of channel; or <25% of channel the available channel, present as standing pools. No water =	page 5-19 /
is filled) channel substrate is exposed. substrate is exposed. and /or riffle substrates are mostly exposed.	9#5; TCEQ 1999: VANI
Grade 10 9 8 7 6 5 4 3 2 1 0	1999 VAINI
	1 2005
Calculation of Function Capacity Index = Total Score/Total Possible Score	

I. HYDROLOGIC FUNCTIONS

N10 (2.5-5)

CONDITION CATEGORY GRADE or SCORE Suboptimal Marginal Moderately stable; infrequent, small Moderately unstable; 30-60% of bank in reach has areas of erosion mostly healed over, areas of erosion, high erosion. 8 7 6 5 4 3 2 1 0 Avg. Score CONDITION CATEGORY GRADE or SCORE Suboptimal Marginal Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods. 8 7 6 5 4 3 2 1 0 Avg. Score CONDITION CATEGORY GRADE or SCORE Suboptimal Marginal Marginal Poor Avg. Score CONDITION CATEGORY GRADE or SCORE Suboptimal Soltom 1/3 of bank is generally periodic material; plant/soil matrix or material. Sepenally highly erodible material; plant/soil matrix compromised. 8 7 6 5 4 3 2 1 0 Avg. Score CONDITION CATEGORY GRADE or SCORE Suboptimal Marginal Poor Suboptimal Marginal Poor Substrate; dominant substrate type is mix of gravel with some finer sediments; moderately stable gravel, but may still be a Poor Substrate; dominant substrate type is mix of gravel, but may still be a Poor Substrate; dominant substrate type is mix of gravel, but may still be a Poor Substrate; dominant substrate type is mix of gravel, but may still be a Poor Substrate; dominant substrate type is mix of gravel, but may still be a Poor Substrate; dominant substrate type is mix of gravel, but may still be a Poor Substrate till be a Poor Substrate; dominant substrate type is mix of gravel by the poor Substrate till be a Poor Substrate; dominant substrate type is mix of gravel by the poor Substrate till be a Poor Substrate; dominant substrate type is mix of gravel by the poor Substrate till be a Poor Substrate; dominant substrate	g straight vious bank												/DE 1
CONDITION CATEGORY GRADE or SCORE Suboptimal Marginal Poor areas of erosion mostly healed work of erosion or measy hereafted mostly healed with the most of erosion. Suboptimal Marginal Poor areas frequently along straight sareas of erosion, high erosion potential during floods. In the most of erosion Suboptimal Marginal Poor Avg.Score Suboptimal Marginal Poor Avg.Score Suboptimal Marginal Poor Avg.Score Suboptimal Marginal Poor Poo	g straight vious bank												PE OTES
CONDITION CATEGORY GRADE or SCORE Suboptimal Marginal Poor areas of erosion mostly healed work of erosion or measy hereafted mostly healed with the most of erosion. Suboptimal Marginal Poor areas frequently along straight sareas of erosion, high erosion potential during floods. In the most of erosion Suboptimal Marginal Poor Avg.Score Suboptimal Marginal Poor Avg.Score Suboptimal Marginal Poor Avg.Score Suboptimal Marginal Poor Poo	g straight vious bank									ON	EPOSITI	ANSPORT/	DIMENT TR
Suboptimal Marginal Poor Institute Institute In	g straight vious bank									<u></u>			
of erosion or iniminal; little areas of erosion mostly healed over. (a) for some starting areas of erosion mostly healed over. (b) for orosion. (b) for orosion. (c) for orosion mostly healed over. (c) for orosion. (c) for orosion. (c) for orosion potential during floods. (c) for orosion potential during floods. (c) for orosion potential during floods. (c) for orosion potential during floods. (c) for orosion potential during floods. (c) for orosional scars. (c) for or or orosional scars. (c) for or or or orosional scars. (c) for or or orosional scars. (c) for or or orosional scars. (c) for or or orosional scars. (c) for or or or orosional scars. (c) for or or orosional scars. (c) for or or orosional scars. (c) for orosional scars. (c) for or or orosional scars. (c) for or or orosional scars. (c) for or orosional scars. (c) for orosional scars. (c) for orosional scars. (c) for orosional scars. (c) for orosional scars. (c) for orosional scars. (c) for orosional scars. (c) for orosional scars. (c) for orosional scars. (c) for orosional scars. (c) for orosional scars. (c) for orosional scars. (c) for orosional scars. (c) for orosional scars. (c) for orosiona	g straight vious bank												
inimimal; little areas of erosion mostly healed over. essens. <5% of solid erosion. Beat of erosion mostly healed over. essens. <5% of erosion. Beat of erosion potential during floods. 8 7 6 5 4 3 2 1 0 Avg.Score CONDITION CATEGORY GRADE or SCORE Suboptimal Bottom 1/3 of bank is generally seistant plant/soil matrix or material. Bottom 1/3 of bank is generally seistant plant/soil matrix or material. Bottom 1/3 of bank is generally seistant plant/soil matrix or material. Bottom 1/3 of bank is generally seistant plant/soil matrix or material. Bottom 1/3 of bank is generally seistant plant/soil matrix or material. Bottom 1/3 of bank is generally seistant plant/soil matrix or material. Bottom 1/3 of bank is generally seistant plant/soil matrix or material. Bottom 1/3 of bank is generally seistant plant/soil matrix or material. Bottom 1/3 of bank is generally seistant plant/soil matrix or material. Bottom 1/3 of bank is generally seistant plant/soil matrix or material. Bottom 1/3 of bank is generally sight perodible material; plant/soil matrix severely compromised. Avg.Score	g straight vious bank			4.							Optimal	Danie stabi	1a. Bank
### areas of erosion; high erosion potential during floods. ### areas of erosion; between sloods. ### areas of erosion; bounds. ### areas of erosion; 60-100% of bank is generally and poor is generally between gravel between generally floods poor dollar and is generally between gravel between gravel between gravel between gravel between gravel between gravel and gravel between gravel or larger substrate; dominant substrate; poor larger substrate; dominant substrate; poor larger substrate; dominant substrate; poor larger substrate; dominant substrate type is finer than gravel or larger substrate; dominant substrate type is finer than gravel or larger substrate; dominant substrate type is finer than gravel or larger substrate; dominant substrate type is f	vious bank												Stability score each
Suboptimal Marginal Poor Bottom 1/3 of bank is generally Poor Score Suboptimal Substrate; Suboptimal Substrate; Suboptimal Substrate; Suboptimal Substrate; Suboptimal Substrate; Suboptimal Substrate; Suboptimal Substrate; Suboptimal Substrate; Suboptimal Substrate; Suboptimal Substrate; Suboptimal Substrate; Suboptimal Substrate; Suboptimal Substrate; Suboptimal Substrate; Suboptimal Substrate; Suboptimal Substrate; Suboptimal Substrate; Suboptimal Substrate; Substrate; Suboptimal Substrate; Substrate; Substrate; Substrate; Substrate; Suboptimal Substrate; S		nd bends; obv ; 60-100% of l	ections an sloughing;	5	erosion; high etential during	areas of e erosion pot		nk in reach l		ems. <5% of		potential for	pank, left or right facing ownstream)
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material; plant/soil matrix compromised. 8		/3 of bank is o		\top	/3 of bank is	Bottom 1/3	generally	3 of bank is			of bank is		ottom Bank
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sidominant dominant substrate type is mix of gravel with some finer sediments; moderately stable substrate type is finer than gravel, but may still be a substrate type is finer than gravel, but may still be a g	d. silt. clav.		ubstrate is	r S	J				30-50% gr	substrate:		>50% gra	ediments or
moderately stable gravel, but may still be a 8										s; dominant			Substrate
CONDITION CATEGORY GRADE or SCORE Suboptimal Marginal Poor										el or larger;		substrate t	composition
CONDITION CATEGORY GRADE or SCORE Suboptimal tea-colored; 3-6 feet (less objects visible at depth 1.5-3 ft; may have slightly green color; no oil sheen on water surface. 8 7 6 5 4 3 2 1 0				4	a						stable	40	- 1-
CONDITION CATEGORY GRADE or SCORE Suboptimal tea-colored; Occasionally cloudy, especially after storm event, but clears rapidly; objects visible at depth 1.5-3 ft; may have slightly green color; no oil sheen on water surface. 8 7 6 5 4 3 2 1 0	- 0	1	2	Ш.	3	4	5	ь	/	_	9	10	ade ATER APPE
Suboptimal Suboptimal Marginal Poor Considerable cloudiness most of the time; objects visible to depth 0.5 ft; slow moving water may be bright-green; objects visible at depth 1.5-3 ft; may have slightly green color; no oil sheen on water surface. Solvent in the time; objects visible to depth 0.5 ft; slow moving water may be bright-green; obtom rocks or sumerged objected covered with film. Marginal Poor Very turbid or muddy appearance most the time; objects visible to depth 0.5 ft; slow moving water may be bright-green; obtom rocks or sumerged objected covered with film.				—						isibility	arity or v	ARANCE. (ATER APPEA
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objects visible at depth 1.5-3 ft; may have slightly green color; no oil sheen on water surface. Slow moving water may be bright-green; obtom rocks or sumerged objected covered with film. Slow sections may appear pea-green; bottom rocks or sumerged objected covered with film. Slow sections may appear pea-green; bottom rocks or sumerged objected covered with film. Slow moving water may be bright-green; obtom volvious water pollutants; floating algal mats, surface scum, sheen or heavy coat of foam on surface. No water = zero.										tea-colored;			
e film on bave slightly green color; no oil sheen on water surface. Slow sections may appear pea-green; bottom rocks or sumerged objected covered with film. Slow sections may appear pea-green; bottom rocks or sumerged objected covered with film. Slow sections may appear pea-green; bottom rocks or sumerged objected covered with film. Slow sections may appear pea-green; bottom rocks or sumerged objected covered with film. Slow sections may appear pea-green; bottom rocks or sumerged objected covered with film. Slow sections may appear pea-green; bottom rocks or sumerged objected covered with film. Slow sections may appear pea-green; bottom rocks or sumerged objected covered with film. Slow sections may appear pea-green; bottom rocks or sumerged objected covered with film. Slow sections may appear pea-green; bottom rocks or sumerged objected covered with film. Slow sections may appear pea-green; bottom rocks or sumerged objected covered with film. Slow sections may appear pea-green; bottom rocks or sumerged objected covered with film. Slow sections may appear pea-green; bottom rocks or sumerged objected covered with film. Slow sections may appear pea-green; bottom rocks or sumerged objected covered with film. Slow sections may appear pea-green; bottom rocks or sumarce sum or surface. No water = Slow sections may appear pea-green; bottom rocks or sumarce sum or													
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		T	2 1	+		, 1	l -	6	7	I 0		10 1	ada
ION: Presence and Percent Coverage		1	2	上	3	4	5	б	/	8	9	10	ade
	0			_			rage	cent Cove	ence and Pe	ION: Prese	/EGETAT	AQUATIC	RESENCE OF
CONDITION CATEGORY GRADE or SCORE	0			F									
Suboptimal Marginal Poor ire reach; Fairly clear or slightly greenish water Greenish water along entire Pea green, gray, or brown water along	0		ea green	+						iro roach:	Optimal	Clear	
											r along ent atic plant o		Ba. Nutrient
ss of many growth on stream substrates. green macrophytes; abundant macrophytes clog stream; severe algal	water along		acrophytes	nt n	ohytes; abundant	green macroph					w quantatie		Enrichment
	water along ands of severe algal											species of	
substrate. No water = zero.	water along ands of severe algal ats in stream	e thick algal ma								II.	wth preser	gı	
	water along ands of severe algal ats in stream to unstable	e thick algal ma e present due to											
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OONDITION OF TEODON OF THE COORT	water along ands of severe algal ats in stream to unstable = zero.	e thick algal ma e present due to ate. No water =	substra	\pm	3	4	5		'	8	<u> </u>		
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	water along ands of severe algal ats in stream to unstable = zero.	e thick algal ma e present due to ate. No water =	substra	<u>+</u>	SCORE	GRADE or S	ATEGORY (DITION CA	CON	8			or
	water along ands of severe algal ats in stream to unstable = zero.	e thick algal ma e present due to ate. No water =	substra	<u>+</u>	SCORE arginal	GRADE or S Mar	ATEGORY (DITION CA Suboptima	CON		Optimal	When pros	Or Oh Agustia
algae present due to unstable	water along ands of severe algal ats in stream to unstable = zero.	e thick algal ma e present due to ate. No water = 1 Poor s cover bottor	2 Algal mats		SCORE Irginal present, some	GRADE or S Mar Algal mats p	ATEGORY (I ols, larger	DITION CA Suboptimal	CON Algae do	vegetation patches of	Optimal ent, aquatic		Bb. Aquatic
substrate. No water = zero.	water along ands of severe algal ats in stream to unstable = zero. 0 om, larger nnel or NO unstable	e thick algal ma e present due te ate. No water = 1 Poor s cover bottor inate the char esent due to u	substra 2 Algal mats dominalgae pre		SCORE Irginal present, some	GRADE or S Mar Algal mats p	ATEGORY (I ols, larger	DITION CA Suboptimal	CON Algae do	vegetation	Optimal ent, aquatic		

				100	NDITION CA	ATEGORY (GRADE or S	CORE				F
		Optimal			Suboptima			rginal		Poor		е
		onsisting of le without sed			and wood so lebris without		debris; co organic	es or woody arse and fine matter with liment.	color and fo	anic sedimer oul odor (ana present due t scouring	erobic) or no	1 R
Grade	10	9	8	7	6	5	4	3	2	1	0	0
AND USE PA	TTERN: Bey	yond Imme	diate Ripari	an Zone								
				COI	NDITION CA	ATEGORY (GRADE or S	CORE				F
		Optimal			Suboptima			rginal		Poor		e
		ed, consisting ve prairie, ar wetlands.			ent pasture n and swamp crops		pasture; s	w crops and ome wooded be present but	N	lainly row cro	ops	1 R
					, .		as isolat	ed patches				N
Grade (Left)	10	9	8	7	6	5	4	3	2	1	0	7
Grade (Right)	10	9	8	7	6	5	4	3	2	1	0	7
RIPARIAN ZON	JE WIDTH :	AND CONT	INILIITV:								Avg.Score	
VIENKININ ZOL	NE WIDTH /	AIND CONT	INUIT.									
				COI	NDITION CA	ATEGORY (GRADE or S	SCORE				В
6a. Riparian		Optimal]	Suboptima		Ma	rginal		Poor		а
Zone Width		arian zone >18			rian zone 12-1			arian zone 6-12			meters (natural	1
(from stream edge to field)	grasses), h	hs with trees, a numan activitie impacted zone	s have not	grasses), hur	nnel width w/tre man activities I impacted zone	nave minimally	channel wid	/3-1/2 active dth vegetated), numan activities.	width), little	ess than 1/3 ac e riparian vege human activitie	etation due to	P e R
cage to licia)					impaoted zone		impacted by i	idilidii delivilles.		ilailiali activiti		I.
cage to licia)		impacted zone										U
Grade (left)	10	9	8	7	6	5	4	3	2	1	0	7
Grade (left)				7	6	5 5	4 4	3	2 2	1 1	0	7 7
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Grade (left)	10	9	8	7	6 NDITION C	5 ATEGORY (4 GRADE or S	3 SCORE		1	0	7 7 7
Grade (left) Grade (Right)	10	9	8 8	7 CON	6	5 ATEGORY (4 GRADE or S	3	2		0 Avg.Score	7 7 7 7 E
Grade (left) Grade (Right) 6b. Riparian Zone	10 10 >90% plant shrubs, prairi	9 9 Optimal density of ma	8 8 ture trees or marsh plants,	7 COI 75-90% stre	6 NDITION CA Suboptima eambank vege es along chann	5 ATEGORY (I tation, mixed nel and mature	GRADE or S Ma 50-75% vegetation o	3 SCORE Irginal streambank f mixed grasses	Less than 8 coverage of	Poor 50% streambar consisting mos	0 Avg.Score nk vegetation titly of pasture	7 7 7
Grade (left) Grade (Right) 6b. Riparian Zone Vegetation	10 10 >90% plant shrubs, prairi riparian zon	9 9 Optimal density of ma ie grasses, or ne intact or dis	8 8 ture trees or marsh plants, ruption from	7 COI 75-90% stre young specie trees behi	6 NDITION C/ Suboptima eambank vege es along chann nd; disruption	5 ATEGORY (I Itation, mixed nel and mature evident with	4 GRADE or S Ma 50-75% vegetation o and sparse	3 SCORE urginal streambank f mixed grasses young tree or	Less than 5 coverage of grasses, fee	Poor 50% streambar consisting mosew trees & shru	0 Avg.Score nk vegetation titly of pasture ubs; low plant	7 7 7 7 E
Grade (left) Grade (Right) 6b. Riparian Zone Vegetation Protection/	10 10 >90% plant shrubs, prairi riparian zon	9 9 Optimal density of ma	8 8 ture trees or marsh plants, ruption from	7 COI 75-90% stre young specie trees behi	6 NDITION CA Suboptima eambank vege es along chann	5 ATEGORY (I tation, mixed nel and mature evident with	A GRADE or S Ma 50-75% vegetation or and sparse shrub spe frequent with	3 SCORE Irginal streambank f mixed grasses y oung tree or cies; breaks th some gullies	Less than 5 coverage of grasses, fedensity; ban	Poor 50% streambar consisting mosew trees & shru	0 Avg.Score nk vegetation titly of pasture ubs; low plant ted with gullies	7 7 7 7 E e 1 R F
Grade (left) Grade (Right) 6b. Riparian Zone Vegetation Protection/	10 10 >90% plant shrubs, prairi riparian zon	9 9 Optimal density of ma ie grasses, or ne intact or dis	8 8 ture trees or marsh plants, ruption from	7 COI 75-90% stre young specie trees behi	6 NDITION C/ Suboptima eambank vege es along chann nd; disruption curring at inter	5 ATEGORY (I tation, mixed nel and mature evident with	A GRADE or S Ma 50-75% vegetation or and sparse shrub spe frequent with	3 SCORE rginal streambank f mixed grasses young tree or cies; breaks	Less than 5 coverage of grasses, fedensity; ban	Poor 50% streambar consisting mos w trees & shruk deeply scarr	0 Avg.Score nk vegetation titly of pasture ubs; low plant ted with gullies	77 77 77 8 e 1 1 R F e 1
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6b. Riparian Zone Vegetation Protection/ Completeness	10 10 10 >90% plant shrubs, prairi riparian zon grazir	9 9 Optimal density of ma ie grasses, or he intact or dis ng/mowing min	8 8 ture trees or marsh plants, ruption from nimal.	7 COI 75-90% strr young specie trees behi breaks oc	6 NDITION C/ Suboptima aambank vege es along chanr nd; disruption curring at inter meters.	5 ATEGORY (I I tation, mixed nel and mature evident with vals of >50	4 SRADE or S Ma 50-75% vegetation o and sparse shrub spe frequent wit and scars er	3 SCORE grginal streambank f mixed grasses young tree or scies; breaks h some gullies very 50 meters.	Less than 8 coverage c grasses, fe density; ban a	Poor 50% streambal consisting mos we trees & shru k deeply scarr II along its len	0 Avg.Score nk vegetation tly of pasture ubs; low plant ed with gullies gth.	7 7 7 7 8 6 1 1 R F e 1 1 R
Grade (left) Grade (Right) George Vegetation Protection/ Completeness	>90% plant shrubs, prairi riparian zon grazir	9 9 9 Optimal density of ma e grasses, or le intact or dis ng/mowing min	8 8 8 ture trees or marsh plants, ruption from nimal.	7 COI 75-90% strr young specie trees behi breaks oc	6 NDITION C/ Suboptima eambank vege eas along chanr nd; disruption curring at inter meters.	5 ATEGORY (I tation, mixed tel and mature evident with vals of >50	4 GRADE or S Ma 50-75% vegetation o and sparse shrub spe frequent wit and scars er	3 GCORE rginal spinal shak f mixed grasses young tree or cices; breaks h some gullies very 50 meters.	Less than 8 coverage c grasses, fe density; ban a	Poor 50% streambar sonsisting mos w trees & shruk deeply scarr II along its leng	0 Avg.Score nk vegetation tity of pasture ubs; low plant red with gullies gth.	7 7 7 7 8 6 1 1 8 6 1 1 1 8 8
Grade (left) Grade (Right) 6b. Riparian Zone Vegetation Protection/ Completeness	10 10 10 >90% plant shrubs, prairi riparian zon grazir	9 9 Optimal density of ma ie grasses, or he intact or dis ng/mowing min	8 8 ture trees or marsh plants, ruption from nimal.	7 COI 75-90% strr young specie trees behi breaks oc	6 NDITION C/ Suboptima aambank vege es along chanr nd; disruption curring at inter meters.	5 ATEGORY (I I tation, mixed nel and mature evident with vals of >50	4 SRADE or S Ma 50-75% vegetation o and sparse shrub spe frequent wit and scars er	3 SCORE grginal streambank f mixed grasses young tree or scies; breaks h some gullies very 50 meters.	Less than 8 coverage c grasses, fe density; ban a	Poor 50% streambal consisting mos we trees & shru k deeply scarr II along its len	0 Avg.Score nk vegetation tity of pasture bus; low plant ed with guilles gth. 0 0	7 7 7 7 8 9 1 1 R F e e 1 1 R F
Grade (left) Grade (Right) 6b. Riparian Zone Vegetation	>90% plant shrubs, prairi riparian zon grazir	9 9 9 Optimal density of ma e grasses, or le intact or dis ng/mowing min	8 8 8 ture trees or marsh plants, ruption from nimal.	7 COI 75-90% strr young specie trees behi breaks oc	6 NDITION C/ Suboptima eambank vege eas along chanr nd; disruption curring at inter meters.	5 ATEGORY (I tation, mixed tel and mature evident with vals of >50	4 GRADE or S Ma 50-75% vegetation o and sparse shrub spe frequent wit and scars er	3 GCORE rginal spinal shak f mixed grasses young tree or cices; breaks h some gullies very 50 meters.	Less than 8 coverage c grasses, fe density; ban a	Poor 50% streambar sonsisting mos w trees & shruk deeply scarr II along its leng	0 Avg.Score nk vegetation tity of pasture ubs; low plant red with gullies gth.	7 7 7 7 8 6 1 1 8 6 1 1 1 8 8

II. WATER QUALITY/BIOGEOCHEMICAL FUNCTIONS

N10 (2.5-5)

1 FLOW REGI	ME		III. HABITA	AT FUNCTION	JNS	N10 (2.	J-5)					SCORE
TYPE		Perennial		Intermitte	nt w/ Pereni	nial Pools	Interm	nittent		Ephemera	al	Ī
Grade	10	9	8	7	6	5	4	3	2	1	0	2
o EDIEALINIAL	OUDOTDATE/A	11/4U ADI E /	201/50									
2 EPIFAUNAL	SUBSTRATE/A	Optimal	COVER		Suboptimal		Marg	rinal	1	Poor		4
	Within stream	m bed, greater	than 50%	Within strea	m bed, 30-50	% coverage	Within stream		Less tha	n 10% habit	at features	1
	coverage by	y stable habitat	features,		abitat features		coverage by s	stable habitat			t is obvious;	
	favorable for s and/or fish/amp	stream faunal o			aunal coloniza pian cover. Ma		features favora faunal colonia			e unstable o	or lacking; els. Habitat	
		transient. Fea			transient. (Se		fish/amphibian				ed or lacking,	
	include snags,				ry for habitat t	feature	availability may		channe	l bottom ma	ay be flat.	
	banks, roots, co	obble, rocks, po and glides, or c		'	components.)		desirable, sub- frequently dis-					
		stage to allow o					Excellent Categ	gory for habitat				
							feature con	nponents.)				
Grade	10	9	8	7	6	5	4	3	2	1	0	4
3 STDEAM BC	OTTOM SUBSTR	PATE: Pool !	Substrate Ch	paracterizati	ion							
O INEAW DO		Optimal			Suboptimal		Marg	ginal		Poor		
	Mixture of subs	strate materials			soft sand, mu		All mud or clay of	or sand bottom;		y or bedroo	k; no root ma	.t
		d prevalent; roo ed vegetation co			be dominant; submerged v		little or no ro submerged		or sub	merged veg	getation.	
		9			present.	-9		9				
Grade	10	9	8	7	6	5	4	3	2	1	0	2
4 POOL VARIA	ABILITY											
		Optimal			Suboptimal		Març	ginal		Poor		1
	Even mix of large			Majority of p	ools large-dee	ep; very few	Shallow pools		Majority o		Il-shallow or	
	snallow, sm	nall-deep pools	s present		shallow.		prevalent that	n deep pools		pools abser	nt	
Grade	10	9	8	7	6	5	4	3	2	1	0	1
5 SEDIMENT I	DEPOSITION/S	Optimal			Suboptimal		Marg	lenir	1	Poor		4
	<5% of channel	bottom affected	d by scour or	5-30% affect	ted by scour or	deposition;	30-50% affects		More than 50		om in a state of	ıf
		deposition.			strictions and w Some deposition		deposition. Depo obstructions, co		flux or char	ge nearly yea	arlong. Pools eavy deposition	
				Steepen.	Some deposition	iii iii poois	bends. Some			xcessive sco		1
												2
Grade	10	9	8	7	6	5	4	3	2	1	0	
Grade 6 CHANNEL F		9	8	7	6	5	4	3	2	1	0	
	LOW STATUS	Optimal			Suboptimal		Marg	ginal	_	1 Poor		
	LOW STATUS Water reache	Optimal es the base of	both lower	Water fills	Suboptimal >75% of the o	channel; or	Marc Water fills 25	ginal 5-75% of the	Very little	vater in the	channel and	
	LOW STATUS	Optimal es the base of	both lower	Water fills	Suboptimal	channel; or	Marg	ginal 5-75% of the nel and/or riffle	Very little mostly pre:	vater in the	channel and	
	LOW STATUS Water reache	Optimal es the base of	both lower	Water fills	Suboptimal >75% of the o	channel; or	Marg Water fills 25 available chann	ginal 5-75% of the nel and/or riffle	Very little mostly pre:	vater in the sent in stand	channel and	
	LOW STATUS Water reache	Optimal es the base of	both lower	Water fills	Suboptimal >75% of the o	channel; or	Marg Water fills 25 available chann	ginal 5-75% of the nel and/or riffle	Very little mostly pre:	vater in the sent in stand	channel and	
6 CHANNEL F	Water reache banks; <5% of cl	Optimal es the base of channel substra	both lower ate is exposed	Water fills <25% of cha	Suboptimal >75% of the cannel substrate	channel; or e is exposed	Març Water fills 25 available chanr substrates are r	ginal 5-75% of the nel and/or riffle nostly exposed	Very little mostly pre	vater in the sent in stand	channel and ding pools; or ry	
6 CHANNEL F	Water reache banks; <5% of cl	Optimal es the base of	both lower	Water fills	Suboptimal >75% of the o	channel; or	Marg Water fills 25 available chann	ginal 5-75% of the nel and/or riffle	Very little mostly pre:	vater in the sent in stand	channel and	
6 CHANNEL F	Water reache banks; <5% of cl	Optimal es the base of channel substra	both lower ate is exposed	Water fills <25% of cha	Suboptimal >75% of the cannel substrate	channel; or e is exposed	Març Water fills 25 available chanr substrates are r	ginal 7-75% of the nel and/or riffle mostly exposed	Very little mostly pre	vater in the sent in stand	channel and ding pools; or ry	
6 CHANNEL F	Water reache banks; <5% of cl	Optimal es the base of channel substra 9 Optimal on, alteration, o	both lower tate is exposed	Water fills <25% of cha	Suboptimal >75% of the c annel substrate 6 Suboptimal eration or chan	channel; or e is exposed 5	Marg Water fills 25 available chanr substrates are r	ginal 5-75% of the net and/or riffle nostly exposed 3 ginal nnetization may	Very little mostly pres	vater in the sent in stand stream is di	channel and ding pools; or ry 0	2
6 CHANNEL F	Water reache banks; <5% of cl	Optimal es the base of channel substra 9 Optimal on, alteration, c al; normal and	both lower ate is exposed 8	Water fills <25% of cha	Suboptimal >75% of the cannel substrate 6 Suboptimal eration or chart, usually adja	channel; or e is exposed 5	Marr Water fills 25 available chanr substrates are r 4 Marr Alteration or cha be extensive; is	ginal 5-75% of the nel and/or riffle mostly exposed 3 ginal nnelization may	Very little mostly pre:	vater in the sent in stand stream is discontinuous discont	channel and ding pools; or ry 0 ion, riprap, or r riprap lined	2
6 CHANNEL F	Water reache banks; <5% of cl	Optimal es the base of channel substra 9 Optimal on, alteration, c al; normal and	both lower tate is exposed 8 or dredging stable stream y stormwater	Water fills <25% of cha 7 Some alter presen structures, (or culve	Suboptimal >75% of the cannel substrate 6 Suboptimal reation or chart, usually adja such as bridge rts); evidence	channel; or e is exposed 5 inelization cent to eabutments of past	Marg Water fills 25 available chann substrates are r 4 Marg Alteration or cha be extensive; 6 (including spoil; r	ginal -75% of the nel and/or riffle mostly exposed 3 ginal nnelization may embankments of short or shoring seen to no both	Very little mostly pres	Poor ed with gab Concrete outs. Instread altered by s	channel and ding pools; or ry 0 ion, riprap, or riprap lined n habitat stormwater or	2
6 CHANNEL F	Water reache banks; <5% of cl	Optimal es the base of channel substra 9 Optimal on, alteration, o als; normal and m. Alteration b	both lower tate is exposed 8 or dredging stable stream y stormwater	Water fills <25% of che 7 Some alte presen structures, (or culve alteration, 1	Suboptimal >75% of the c annel substrate 6 Suboptimal reation or chan t, usually adja such as bridge yirts); evidence	channel; or e is exposed 5 Inelization cent to a abutments of past atton) may	Marr fills 25 available chamr substrates are r Marr Alteration or chabe extensive; (including spoil r structures pre banks; normal	ginal 775% of the nel and/or riffle mostly exposed 3 ginal nnelization may embankments tolles) or shoring essent on both stable stream	Very little mostly pre:	Poor ed with gab Concrete or else. Instrear altered by s	channel and ding pools; or ry 0 ion, riprap, or r riprap lined n habitat stormwater or of the stream	2
6 CHANNEL F	Water reache banks; <5% of cl	Optimal es the base of channel substra 9 Optimal on, alteration, o als; normal and m. Alteration b	both lower tate is exposed 8 or dredging stable stream y stormwater	Water fills <25% of cha 7 Some alte pressen structures, (or culve alteration, 1 be pressen)	Suboptimal >75% of the cannel substrate 6 Suboptimal reation or chart, usually adja such as bridge rts); evidence	channel; or e is exposed 5 Inelization cent to e abutments of past aution) may attern and	Marr filis 25 available chanr substrates are r 4 Marr Alteration or chabe extensive; (including spoil ir structures pre	ginal 5-75% of the nel and/or riffle mostly exposed 3 ginal nnelization may embankments oiles) or shoring esent on both stable stream tern has not	Very little mostly pre:	Poor ed with gab Concrete outs. Instread altered by s	channel and ding pools; or ry 0 ion, riprap, or r riprap lined n habitat stormwater or of the stream	2
6 CHANNEL F	Water reache banks; <5% of cl	Optimal es the base of channel substra 9 Optimal on, alteration, o als; normal and m. Alteration b	both lower tate is exposed 8 or dredging stable stream y stormwater	Water fills <25% of cha 7 Some allte presen structures, (or culve alteration, be present stability It alteration	Suboptimal >75% of the cannel substrate 6 Suboptimal rration or chan, u, usually adja such as bridge rris); evidence [1.e, channeliz], but stream p lave recovere is not present	channel; or a is exposed 5 see is exposed 5 see is exposed 5 see is exposed 1 se	Marr fills 25 available chanr substrates are r 4 Marg Alteration or cha be extensive; ci (including spoil structures pre banks; normal meander pat recovered. Al stormwater in stormwa	ginal 5-75% of the net and/or riffle mostly exposed 3 ginal nnelization may embankments inlies) or shoring esent on both stable stream tern has not literation from puts may be	Very little mostly pre:	Poor ed with gab Concrete or else. Instrear altered by s	channel and ding pools; or ry 0 ion, riprap, or r riprap lined n habitat stormwater or of the stream	2
6 CHANNEL F	Water reache banks; <5% of cl	Optimal es the base of channel substra 9 Optimal on, alteration, o als; normal and m. Alteration b	both lower tate is exposed 8 or dredging stable stream y stormwater	Water fills <25% of cha 7 Some allte presen structures, (or culve alteration, be present stability It alteration	Suboptimal >75% of the connel substrate 6 Suboptimal ration or chart, usually adjassuch as bridge fits); evidence [l.e., channeliz], but stream p have recoveren in s not present orm stormwath.	channel; or a is exposed 5 see is exposed 5 see is exposed 5 see is exposed 1 se	Marr fills 25 available chann substrates are r 4 Marr Alteration or chabe extensive; e (including spoil protour) estructures pre banks; normal meander pat recovered. Al stormwater in extensive. 40-8	ginal 5-75% of the nel and/or riffle mostly exposed 3 ginal nnelization may embankments pilesent on both stable stream tern has not lteration from puts may be gow of stream	Very little mostly pre:	Poor ed with gab Concrete or else. Instrear altered by s	channel and ding pools; or ry 0 ion, riprap, or r riprap lined n habitat stormwater or of the stream	2
6 CHANNEL F	Water reache banks; <5% of cl	Optimal es the base of channel substra 9 Optimal on, alteration, o als; normal and m. Alteration b	both lower tate is exposed 8 or dredging stable stream y stormwater	Water fills <25% of cha 7 Some allte presen structures, (or culve alteration, be present stability It alteration	Suboptimal >75% of the cannel substrate 6 Suboptimal rration or chan, u, usually adja such as bridge rris); evidence [1.e, channeliz], but stream p lave recovere is not present	channel; or a is exposed 5 see is exposed 5 see is exposed 5 see is exposed 1 se	Marr fills 25 available chanr substrates are r 4 Marg Alteration or cha be extensive; ci (including spoil structures pre banks; normal meander pat recovered. Al stormwater in stormwa	ginal 5-75% of the nel and/or riffle mostly exposed 3 ginal nnelization may embankments pilesent on both stable stream tern has not lteration from puts may be gow of stream	Very little mostly pre:	Poor ed with gab Concrete or else. Instrear altered by s	channel and ding pools; or ry 0 ion, riprap, or r riprap lined n habitat stormwater or of the stream	2
6 CHANNEL F	Water reache banks; <5% of cl	Optimal es the base of channel substra 9 Optimal on, alteration, o als; normal and m. Alteration b	both lower tate is exposed 8 or dredging stable stream y stormwater	Water fills <25% of cha 7 Some allte presen structures, (or culve alteration, be present stability It alteration	Suboptimal >75% of the connel substrate 6 Suboptimal ration or chart, usually adjassuch as bridge fits); evidence [l.e., channeliz], but stream p have recoveren in s not present orm stormwath.	channel; or a is exposed 5 see is exposed 5 see is exposed 5 see is exposed 1 se	Marr fills 25 available chann substrates are r 4 Marr Alteration or chabe extensive; e (including spoil protour) estructures pre banks; normal meander pat recovered. Al stormwater in extensive. 40-8	ginal 5-75% of the nel and/or riffle mostly exposed 3 ginal nnelization may embankments pilesent on both stable stream tern has not lteration from puts may be gow of stream	Very little mostly pre:	Poor ed with gab Concrete or else. Instrear altered by s	channel and ding pools; or ry 0 ion, riprap, or r riprap lined n habitat stormwater or of the stream	2
6 CHANNEL F	Water reache banks; <5% of cl	Optimal es the base of channel substra 9 Optimal on, alteration, o als; normal and m. Alteration b	both lower tate is exposed 8 or dredging stable stream y stormwater	Water fills <25% of cha 7 Some allte presen structures, (or culve alteration, be present stability It alteration	Suboptimal >75% of the connel substrate 6 Suboptimal ration or chart, usually adjassuch as bridge fits); evidence [l.e., channeliz], but stream p have recoveren in s not present orm stormwath.	channel; or a is exposed 5 see is exposed 5 see is exposed 5 see is exposed 1 se	Marr fills 25 available chann substrates are r 4 Marr Alteration or chabe extensive; e (including spoil protour) estructures pre banks; normal meander pat recovered. Al stormwater in extensive. 40-8	ginal 5-75% of the nel and/or riffle mostly exposed 3 ginal nnelization may embankments pilesent on both stable stream tern has not lteration from puts may be gow of stream	Very little mostly pre:	Poor ed with gab Concrete or else. Instrear altered by s	channel and ding pools; or ry 0 ion, riprap, or r riprap lined n habitat stormwater or of the stream	2

8	8	CHANNEL S	INUOSITY]	I
				Optimal			Suboptim			ginal		Poor			
			The bends in the s length 3 to 4 time					n increase the es longer than		in the stream eam 1 to 2 times		raight; waterv ized for a lone			Barbour, et al. 1999
			straight line. (N	lote - channe	I braiding is		vas in a strai		longer than if it	was in a straight			9		RBA #7b;
			considered nor other low-lying are						li	ne					Parsons,
				ed in these a											et al., 2001 AUSRIVAS
															AUSKIVAS
		Grade	10	9	8	7	6	5	4	3	2	1	0	3	
9	9	BANK STAB	ILITY (SCORE E	ACH BANK	()										
				Optimal			Suboptim			ginal		Poor			
			Banks stable; ev failure absent o					equent, small healed over.		stable; perennial vaterline sparse		no perennial v e; severe eros			Barbour, et al. 1999
			affected), perenn	ial vegetation	to waterline;	5-30% of b	oank in reach	has areas of	(mainly scoure	d or stripped by	banks; re	cently expose	d tree roots		RBA #8;
			no raw or underco outside of meande				r erosion and	or bank vegetation to		i), bank held by trees, rock		tree falls and at trees comm			Parsons,
			exposed root			waterline	in most place	es; recently	outcrops) and	d eroded back	eroded ar	eas; "raw" are	eas frequent		et al., 2001 AUSRIVAS
						exposed to	ree roots rare	but present.		-60% of bank in s of erosion and		aight sections ank sloughing;			; USACE
									bank undercu	utting; recently	bank	has erosiona			Norfolk
										oots and fine root n; high erosion					District, 2004 SAM
									potential d	uring floods					#3; Scholz
															and Booth
															from Henshaw,
		Grade	10	9	8	7	6	5	4	3	2	1	0	7	
		Grade	10	9	8	7	6	5	4	3	2	Ava Score	0	7	
												Avg.Score	7	· '	
10	10	VEGETATIV	E PROTECTION		ACH BANK)			•		1				
			More than 90% o	Optimal f the streamh	ank curfaces	70-90% of	Suboptim the streamh	al ank surfaces		ginal e streambank	I ass than	Poor 1 50% of the s	etroamhank		Barbour, et
			and immediate r	iparian zones	s covered by	covered by	native vege	tation, but one	surfaces covere	ed by vegetation;	surfaces	covered by v	egetation;		al. 1999
			native vegetation, shrubs, or no					II-represented; ot affecting full		ous; patches of losely cropped		of streambank h; vegetation	vegetation is		RBA #9;
			vegetative disru	uption through	n grazing or	plant grov	wth potential	to any great	vegetation con	nmon; less than	removed	to 5 centimete	ers or less in		Parsons, et al., 2001
			mowing minimal	or not evider ed to grow n			nore than one ial plant stub			potential plant ht remaining.	ave	rage stubble h	neight.		AUSRIVAS
			piants allow	ca to grow ii	aturany.	potoni	remaining		Stubble fleig	in remaining.					; KDWP
															2000; Petersen,
		Grade	10	9	8	7	6	5	4	3	2	1 1	0	7	i eterseri,
		Grade	10	9	8	7	6	5	4	3	2	1	0	7	
												Avg.Score	9	7	
11	11	RIPARIAN ZO	ONE (SCORE EA	ACH BANK)										
				Optimal			Suboptim			ginal		Poor			
			Width of riparian activities (I.e., par					12-18 meters; npacted zone		rian zone 6-12 n activities have		arian zone <6 parian vegetat	6 meters; little tion due to		Barbour, et al., 1999
			cuts, lawns, or o	crops) have n			only minimal			e a great deal.		numan activiti			RBA #10;
				zone.											Parsons,
															et al., 2001 AUSRIVAS
		Grade	10	9	8	7	6	5	4	3	2	1	0	7	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
		Grade	10	9	8	7	6	5	4	3	2	1	0	7	
												Avg.Score		7	
12	12	RIPARIAN H.	ABITAT CONDIT	TON (SCO	RE EACH BA	ANK)									Norfolk
				Optimal			Suboptim			ginal		Poor			SAAM
			Tree stratum (db >60% tree canop					ches) present, canopy cover.		(dbh>3 inches) 30% tree canopy		atum absent; roplands, min			Form 1 Field
			layers may ir	nclude: saplin	g, shrub,	(See Excel	lent Categor	y for examples	cover. (See Ex	cellent Category	culverte	d streams, m	owed and		ricia
			herbaceous, mosses/lichens ar				al forest layer end of Good	ers.) Score at I range if >2		additional forest the high end of		ned herbaced surfaces, acti	ouo arouo,		
			the high end o	of Excellent ra	ange if <u>></u> 2	additional	forest layers	are present.	Fair range if >2	additional layers		pasture, and e			
			additional layers end if <1 additi					dditional forest cutover areas		core at low end if yers are present.					
			ond ii <u>s</u> r addiii	ionanayoro a	ro procent.		stumps rem		OR area co	nsists of non-					
										nd naturalized ous and/or woody	,				
										tation.	Ί				
		Grade	10	9	8	7	6	5	4	3	2	1	0		
			riparian areas al e square footage									rs		e sums of an Blocks	
			%Riparian Area									elow.		1 100	
				Optimal			Suboptim	al	Mar	ginal	P	oor			
		Right Bank	%Riparian Area Score	·	100 8								100	-	1
		right DdHK	SubCl		8		0			0			1		1
		Left Bank	%Riparian Area Score		100								100		1
		Left Bank	SubCl		8		0			0		0			†
												RA*Scores]
				1	1		1	1	1	1	Rt Bank C LT Bank (7	CI 7	ł
			·					Calculation	of Function C	apacity Index =		re/Total Pos		0.41	1
													FCI = #/120		1

III. HABITAT FUNCTIONS N10 (2.5-5)

	Stream Function	nal Capacity C	alculation		
	N10 (2.5-	5)			
Date:	5/19/2006	,			
Project:	Lake Ralph H	all			
Assessment Area:	East 2990				
Assessors:	Holmes Voigh	nt Capps			
Project Status:	XPrepro	ect	Postproject		
		Stream	Stream	Multiplication	
Major Function Categories	FCI	Length (LF)*	Characterization	Factor**	FC
Hydrologic	0.31	5,632	E	0.00125	2.18
Water Quality Improvement	0.45	5,632	E	0.00125	3.17
Habitat	0.41	5,632	E	0.00125	2.87
Total	1.17	5,632			8.23
*Stream Length is the length of the S' **Multiplication Factors Ephemeral = 0.00125 Intermittent = 0.0025 Perennial = 0.0038	tream Assessme	nt Reach (SAF	R)		

Pasture outside of riparian zone. Rip zone 20m or less.





SWAMPIM DATASHEETS – NORTH EPHEMERAL 2.5 TO 5.0' PRE-PROJECT

• N5

N5 (2.5-5)

PARAMET	ER													
		CONDITION CATEGORY GRADE or SCORE												
				CONI										
		Optimal			Suboptima		Mar	ginal		Poor				
Grade	10	9	8	7	6	5	4	3	2	1	0			

Park area, surrounded by pasture. Trees present, riparian zone 10-30m, mostly trees in zone, several bends.

WP3 P97,96

1

Triggrand 10 9 8 7 6 5 4 3 2 1 0 0 0 0 0 0 0 0 0	/ARIABLES FLOW REGIME	E:	I. HYDRO	LOGIC FUN	ICTIONS		N5 (2.5	-5)		1			SCORE	Source
CANDITION Measurement or Observation of Siream Crannel Conditions Condition (Antural advanced present from the condition (Antural advanced present) Condition (Antural	TYPE		Perennial		Intermitte	ent w/ Pere	nnial Pools	Inter	mittent		Ephemera	l		KDWP 2 Kansas
Comparison Co						_			3	2	1	0	0	Subjectiv
Poor Charmel (action mismal. Ne ovidence or charmelization mismal.	JIANNEL COI	NDITION.	Weasurern	ent or Obse										
Section of the manufaction (instant) for excessive internal control control of the reach right of the reac			Ontimal		CON					1	Poor			Barbour, EPA RB
26. Chamine and floodplain. 37. Chamine and floodplain. 38. Chamine and floodplain. 38. Chamine and floodplain. 39. Chamine and	ŀ		hannel; no st			nannelization	(usually in	Altered c	hannel; 40-		is actively dov		1	5-21;
Controller of Capacity of Capa														Newton, USDA/ N
affacted, or downcutting) Grade 1D 9 8 7 6 5 4 3 2 1 0 0 8 CONDITION CATEGORY GRADE or SCORE Capacity to Ratio is such that bank overflow from Prequency flow Prequenc		cutting.	. Normal freq	uency of	recovery o	f channel be	d and banks.	disrupte	d. Excess		s prevent acce			SVAP p
Strade								channel wi	th excessive		пооцріант.			
Condition Subscription Condition C														
Companies Comp	σ,							floodplair	n. Historical					
Comparing Comp		İ												
Comparing Comp		İ												
26. Channel Capacity to Robert Sequency (Channel Capacity to Flow Frequency Ratio is such that bank overflow from formation expension of the Sequency (Channel Capacity to Flow Frequency Ratio is such that bank overflow from formation events out at 1.25 to 2.5 symmetry (Channel Capacity to Flow Frequency Ratio is such that bank overflow from storm events are more frequent than every 2.5 years of less frequent from storm events are more frequent than every 2.5 years of less frequent from storm events are more frequent than every 2.5 years of less frequent from storm events are more frequent than every 1.5 years of less frequent from storm events are more frequent than every 1.5 years of less frequent from storm events are more frequent than every 1.5 years of less frequent from storm events are more frequent than every 1.5 years of less frequent from storm events are more frequent than every 1.5 years of less frequent from storm events are more frequent than every 1.5 years of less frequent from storm events are more frequent than every 1.5 years of less frequent from storm events are more frequent than every 1.5 years of less frequent from storm events are more frequent than every 1.5 years of less frequent from storm events are more frequent than every 1.5 years of less frequent from every 1.5 years of less frequent from events are more frequent than every 1.5 years of less frequent from events are more frequent than every 1.5 years of less frequent from events are more frequent than every 1.5 years of less frequent from events are more frequent than every 1.5 years of less frequent from from events are more frequent than every 1.5 years of less frequent from events are more frequent than every 1.5 years of less frequent from events are more frequent than every 1.5 years of less frequent from events are more frequent than every 1.5 years of less frequent from events are more frequent than every 1.5 years of less frequent from events are more frequent than every 1.5 years of less frequent from events are more f	Grade	10	9	8	7	6	5	4	3	2	1	0	8	
26. Channel Capacity to Robert Sequency (Channel Capacity to Flow Frequency Ratio is such that bank overflow from formation expension of the Sequency (Channel Capacity to Flow Frequency Ratio is such that bank overflow from formation events out at 1.25 to 2.5 symmetry (Channel Capacity to Flow Frequency Ratio is such that bank overflow from storm events are more frequent than every 2.5 years of less frequent from storm events are more frequent than every 2.5 years of less frequent from storm events are more frequent than every 2.5 years of less frequent from storm events are more frequent than every 1.5 years of less frequent from storm events are more frequent than every 1.5 years of less frequent from storm events are more frequent than every 1.5 years of less frequent from storm events are more frequent than every 1.5 years of less frequent from storm events are more frequent than every 1.5 years of less frequent from storm events are more frequent than every 1.5 years of less frequent from storm events are more frequent than every 1.5 years of less frequent from storm events are more frequent than every 1.5 years of less frequent from storm events are more frequent than every 1.5 years of less frequent from storm events are more frequent than every 1.5 years of less frequent from every 1.5 years of less frequent from events are more frequent than every 1.5 years of less frequent from events are more frequent than every 1.5 years of less frequent from events are more frequent than every 1.5 years of less frequent from events are more frequent than every 1.5 years of less frequent from from events are more frequent than every 1.5 years of less frequent from events are more frequent than every 1.5 years of less frequent from events are more frequent than every 1.5 years of less frequent from events are more frequent than every 1.5 years of less frequent from events are more frequent than every 1.5 years of less frequent from events are more frequent than every 1.5 years of less frequent from events are more f		<u> </u>			CON	JOITION C	ATEGORY (SRADE or	SCORE					w/ assist
Capacity to Flow Frequency Plow Frequency Plow Frequency Ratio is such that bank overflow from storm events are more frequent than storm events are more frequent than storm events are more frequent than eventy 2.5 years. d.7.5 of >1.25 Grade 10 9 8 7 6 5 4 3 2 1 0 0 0 CONDITION CATEGORY GRADE or SCORE Suboptimal areas of erosion mostly healed oxer frequent water events are more frequent than eventy 1.25 years. d.0.75 of >1.25 Grade 10 9 8 7 6 5 4 3 2 1 0 0 0 CONDITION CATEGORY GRADE or SCORE Suboptimal areas of erosion mostly healed oxer frequent or standard areas of erosion mostly healed oxer frequent or standard trees content on the first own events are more frequent than eventy 1.09 years. d.0.24 or >2 CONDITION CATEGORY GRADE or SCORE Suboptimal wegetation to waterline, no read or undercut bank (some exotion or or event) are more frequent than eventy 1.09 years. d.0.24 or >2 CONDITION CATEGORY GRADE or SCORE Suboptimal wegetation to waterline, no read or undercut bank (some exotion or or event) are more remaind vegetation to waterline, so read or event or event or strong than the first produced bank (some exotion or event) are more remainded bank, left or or event waterline, so read or event or strong than the waterline, so read or event or stripped by lateral evosion, bank suboptimal wegetation to waterline, so read or event or strong than it was straight. Channel stream) CHANNEL ROUGHNESS FACTORS CHANNEL ROUGHNESS FACTORS CHANNEL ROUGHNESS FACTORS CONDITION CATEGORY GRADE or SCORE Suboptimal Marginal Poor CONDITION CATEGORY GRADE or SCORE Suboptimal Marginal Poor Avg.Score 5 CONDITION CATEGORY GRADE or SCORE Suboptimal Marginal Poor CONDITION CATEGORY GRADE or SCORE Frequent than every 1.00 to the stream increase the stream length 1.0 to 1.2 to 1.00 t	2b.Channel					Suboptima	al	Ma	rginal				1	and inpu
Frequency Ratio (for 2- year feequency). Sirade 10 9 8 7 6 5 4 3 2 1 0 0 Condition Category and peak (flow) Submitted in the stream increase the Stream increase the Stream) Subpolimal Submitted in the stream increase the Stream increase the Stream) Subpolimal Subpo	Capacity to													Dr. Mike Harvey a
Strade		storm ever	nts occur at a	a 1.25 to 2.5	storm ever	nts are more t	frequent than	such that b	ank overflow	storm eve	ents are more f	requent than		Travant
Strade	Ratio (for 2-	, y		cy.	tha	n every 2.5 y	ears.			every hal				
Section Sec		İ				<0.75 or >1.2	25				<0.24 or >2			
CONDITION CATEGORY GRADE or SCORE District Converted Suboptimal Suboptim	,							ye	ars.					
CONDITION CATEGORY GRADE or SCORE Suboptimal Marginal Marginal Marginal Marginal Marginal Marginal Marginal Moderately unstable; evidence of erosion or bank failure absent or minimal; (45% of bank failure absent or minimal; (4	Prodo	10	Ι ο	Т о	7	T 6	1 5			2	1 1	Ι ο	0	
Optimal Suboptimal Suboptimal Marginal Poor	Jiaue	10	9	0	1	0	5	4	3		1	1 0	0	
Banks stable; evidence of erosion or bank failure absent or milmaris (-5% and failure absent or milma			Ontimal		CON						Poor			Newton, USDA/ N
2c.Channel Bank Stability (score each bank leftcoted), perennial vegetation to waterline; no rea or undercut banks (some erosion on outside of meander bends O.K.); no recently exposed roters, no recent free falls; Secore each bank, left or right facing downstream 10 9 8 7 6 5 4 3 2 1 0 0 5 5			le; evidence			y stable; infre	quent, small	Moderate	ly unstable;		no perennial v		1	SVAP p
Bank Stability (score each common to waterline; no raw or undercut banks (some erosion on outside of meander bends O.K.); no right facing downstream) Bank Stability (exclusing perennial vegetation to undercut banks (some erosion on outside of meander bends O.K.); no recently exposed roots; no recent tree falls; Bank Stability (exclusing perennial vegetation) to undercut banks (some erosion on outside of meander bends O.K.); no recently exposed tree roots are but present. Bank Stability (exclusing perennial vegetation) to undercut banks (some erosion on dustrict) the perennial vegetation to undercut trees common; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars. Bank Stability (common; many eroded areas; "raw" areas frequent along straight sections and bends; obvious banks loughing; 60-100% of bank has erosional scars. Bank Stability (tree, rock outcrops) and eroded back elsewhere; 30-60% of bank has erosional scars. Bank I reach has areas of erosion and bank undercutting; recently exposed tree roots and bends; obvious banks loughing; 60-100% of bank has erosional scars. Bank I reach has areas of erosion and bank undercutting; recently exposed tree roots and bank loughting; 60-100% of bank has erosional scars. Bark Stability (tree falls and/or severely banks bends on the stream increase the stream increase the stream increase the stream increase the stream increase the stream increase the stream increase the stream length 1.5 to 2.5 times longer than if it was a straight line. Channel length/valley length 1.0 to 1.2. Bark Channel straight; waterway has been channel length/valley length 1.0 to 1.2. Condition in waterial stream increase the stream increase the stream increase the stream increase the stream increase the stream increase the stream increase the stream increase the stream increase the stream increase the stream increase the stream increase the stream increase the stream increase the stream increase the stre	2c.Channel													10; Barb al., 1999
bank, left or right facing downstream) about the falls; bank left or right facing downstream bank, left or right facing downstream bank sloughing, 60-100% of bank has erosional scars. bank sloughing,														RBA pag
right facing downstream) Security exposed total process to the folial street falls; Security exposed total process to the falls; Security exposed total process to the falls; Security exposed total process to the falls; Security exposed total process to the fall process of the falls; Security exposed total process of the falls; Security exposed total process of the falls; Security exposed total process of the falls; Security exposed total process of the fall proc	bank, left or	outside of r	meander ben	ids O.K.); no	waterline	in most place	es; recently	held by h	nard points	areas; "	raw" areas freq	uent along		26; USA Norfolk
Sinusity (bends in low gradient stream) Sinusity (bends in low gradient) Sinusity (bends in low gradient) Sinusity (bends in low gradient) Sinusity (bends in low gradient) Sinusity (bends in low gradient) Sinusity (bends in low gradient) Sinusity (bends in low gradient) Sinusity (bends in low gradient) Sinusity (bends in low gradient) Sinusity (bends in low gradient) Sinusity (bends in low gradient) Sinusity (bends in low gradient) Sinusity (bends in low stream)		recently e		s, no recent	exposed II	ee 100ts rare	but present.	and ero	ded back		ghing; 60-100%	of bank has		District,
Condition Category Grade (Left) 10 9 8 7 6 5 4 3 2 1 0 5	downourcamy										erosional scar	S.		
Serade (Left) 10 9 8 7 6 5 4 3 2 1 0 5								of erosio	n and bank					
Grade (Left) 10 9 8 7 6 5 4 3 2 1 0 5 5														
Sinusity (bends in low gradient stream) Sinusity (bends in low gradient stream) Sinusity (bends in low gradient stream) Sinusity (bends in low gradient stream) Sinusity (bends in low gradient stream) Sinusity (bends in low gradient stream) Sinusity (bends in low gradient stream) Sinusity (bends in low gradient stream) Sinusity (bends in low gradient stream) Sinusity (bends in low gradient stream) Sinusity (bends in low gradient stream) Sinusity (bends in low gradient stream) Sinusity (bends in low gradient stream) Sinusity (bends in low gradient stream) Sinusity (bends in low gradient stream) Sinusity (bends in low gradient stream) Sinusity (bends in low gradient stream) Sinusity (bends in low gradient stream) Sinusity (bends in low gradient stream length 1.5 to 2.5 times longer than if it was a straight line. Channel length 1.2 to 1.5 Sinusity (bends in low gradient stream) Sinusity (bends in low gradient stream length 1.5 to 2.5 times longer than if it was a straight line. Channel length/valley length 1.0 to 1.2. Sinusity (bends in low gradient stream length 1.5 to 2.5 times longer than if it was a straight line. Channel length/valley length 1.0 to 1.2. Sinusity (bends in low gradient stream length 1.5 to 2.5 times longer than if it was a straight line. Channel length/valley length 1.0 to 1.2. Sinusity (bends in the stream increase the stream length 1.5 times longer than if it was a straight line. Channel length/valley length 1.0 to 1.2. Sinusity (bends in the stream increase the stream length 1.5 to 2.5 times longer than if it was a straight line. Channel length/valley length 1.0 to 1.2. Sinusity (bends in the stream increase the stream length 1.5 to 2.5 times longer than if it was a straight line. Channel length/valley length 1.0 to 1.0 to 1.2. Sinusity (bends in the stream length 1.5 to 2.5 times longer than if it was a straight line. Channel length/valley length 1.0 to 1.0 to 1.2. Sinusity (bends in the stream length 1.5 to 2.5 times longer than if	Grade (Left)	10	9	8	7	6	5			2	1	0	5	
CHANNEL ROUGHNESS FACTORS 3a. Channel Sinuosity (bends in low gradient stream) The bends in the stream increase the stream length 2.5 to 4 times longer than if it was straight. Channel length/valley length at least >1.5. Grade 10 9 8 CONDITION CATEGORY GRADE or SCORE The bends in the stream increase the stream length 1.5 to 2.5 times longer than if it was straight. Channel length/valley length in the stream increase the stream length 1 to 1.5 times longer than if it was a straight line. Channel length/valley length 1.0 to 1.5 important length/valley length 1.0 to 1.5 important length/valley length 1.0 to 1.2. Grade 10 9 8 7 6 5 6 CONDITION CATEGORY GRADE or SCORE In the stream increase the stream length 1 to 1.5 times longer than if it was a straight line. Channel length/valley length 1.0 to 1.5 important length 1.0 to 1.5 important length/valley length 1.0 to 1.2. Grade 10 9 8 7 6 CONDITION CATEGORY GRADE or SCORE Optimal Little or no channel enlargement resulting from sediment accumulation; channel is stable 3b. Bottom Substrate 3b. Bottom Substrate 3counulation; channel is stable	3rade (Right)	10	9	8	7	6	5	4	3	2	1			
3a.Channel Sinuosity (bends in low gradient stream) The bends in the stream increase the stream length 2.5 to 4 times longer than if it was straight. Channel length/valley length at least >1.5. Grade The bends in the stream increase the stream length 2.5 to 4 times longer than if it was a straight line. Channel length/valley length 1.2 to 1.5 Grade The bends in the stream increase the stream length 1.5 to 2.5 times longer than if it was a straight line. Channel length 1 to 1.5 times longer than if it was a straight line. Channel length/valley length 1.0 to 1.2. Grade The bends in the stream increase the stream length 1 to 1.5 times longer than if it was a straight line. Channel length 1 to 1.5 times longer than if it was a straight line. Channel length/valley length 1.0 to 1.2. Grade The bends in the stream increase the stream length 1 to 1.5 times longer than if it was a straight line. Channel length 1 to 1.5 times longer than if it was a straight line. Channel length/valley length 1.0 to 1.2. Grade The bends in the stream increase the stream length 1 to 1.5 times longer than if it was a straight line. Channel length 1 to 1.5 times longer than if it was a straight line. Channel length/valley length 1.0 to 1.2. Condition Category Grade of the stream length 1 to 1.5 times longer than if it was a straight line. Channel length/valley length 1.0 to 1.5 times longer than if it was a straight line. Channel length/valley length 1.0 to 1.5 times longer than if it was a straight line. Channel length/valley length 1.0 to 1.5 times longer than if it was a straight line. Channel length/valley length 1.0 to 1.5 times longer than if it was a straight line. Channel length/valley length 1.0 to 1.5 times length/valley length 2.0 to 1.0 to 1.2. Straight line. Channel length/valley length 2.0 to 1.0 to 1.2 to 1.0 to 1.2 to 1.0 to 1.2 to 1.0 to 1.2 to 1.0 to 1.2 to 1.0 to 1.2 to 1.0 to 1.2 to 1.0 to 1.0 to 1.2 to 1.0 to 1.0 to 1.0 to 1.0 to 1.0 to 1.0 to 1.0 to 1.0 to 1.0 to 1.0 to 1.0 to 1.0 to 1.0 to 1.0 to 1.0 to		<u> </u>										Avg.Score	5	1
Sa. Channel Sinuosity (bends in low gradient stream) Suboptimal Suboptimal Marginal Poor	CHANNEL ROI	UGHNESS	FACTORS	3									-	
3a. Channel Sinuosity (bends in Iow gradient stream length 2.5 to 4 times longer than if it was straight. Channel length/valley length at least >1.5. Grade 10 9 8 7 6 5 4 3 2 1 0 7 CONDITION CATEGORY GRADE or SCORE Optimal 3b. Bottom Substrate 3b. Bottom Substrate 3b. Bottom Substrate					CON									Barbour,
stream length 2.5 to 4 times longer than if it was a straight. Channel length/valley length at least >1.5. Stream length 2.5 to 4 times longer than if it was a straight. Channel length/valley length 1.2 to 1.5		The hende		increase the	The bende				3	Channel		av has heen	-	EPA RB. Chapter
gradient stream) length/valley length at least >1.5. length/valley length 1.2 to 1.5 length/valley length 1.2 to 1.5 length/valley length 1.2 to 1.5 length/valley length 1.2 to 1.5 length/valley length 1.2 to 1.5 length/valley length 1.2 to 1.5 length/valley length 1.2 to 1.5 longer than if it was a straight line. Channel length/valley length 1.2 to 1.5 to 1.2. CONDITION CATEGORY GRADE or SCORE Optimal Little or no channel enlargement resulting from sediment accumulation; channel is stable 3b. Bottom Substrate Substrat		stream len	ngth 2.5 to 4 t	times longer	stream len	gth 1.5 to 2.5	times longer	increase	the stream	channe	lized for a long	distance.		5-25; <i>KE</i>
CONDITION CATEGORY GRADE or SCORE CONDITION CATEGORY GRADE OR SCORE CONDITION CATEGORY GRADE OR SCORE CONDITION CATEGORY GRADE OR SCORE CONDITION CATEGORY GRADE OR SCORE CONDITION CATEGORY GRADE OR SCORE CONDITION CATEGORY GRADE OR										Channel	length/valley le	ength <_1.0		1996
Grade 10 9 8 7 6 5 4 3 2 1 0 7 CONDITION CATEGORY GRADE or SCORE Optimal Suboptimal Marginal Poor Substrate Substr	stream)													
CONDITION CATEGORY GRADE or SCORE Optimal Suboptimal Marginal Poor Little or no channel enlargement resulting from sediment accumulation; channel is stable silt; moderately stable Substrate CONDITION CATEGORY GRADE or SCORE Marginal Poor Sediment bars of rocks, Channel divided into braids or stream and well-washed debris present, little sands, and silt common; is channelized; substrate is uniform moderately unstable sand, silt, clay, or bedrock; unstable Aqu														
Optimal Suboptimal Marginal Poor Little or no channel enlargement resulting from sediment accumulation; channel is stable Substrate Substrate Optimal Suboptimal Marginal Poor Sediment bars of rocks, Channel divided into braids or stream and well-washed debris present, little sands, and silt common; is channelized; substrate is uniform moderately unstable sand, silt, clay, or bedrock; unstable Aqu	3rade	10	9	8	7	6	5	4	3	2	1	0	7	
Little or no channel enlargement resulting from sediment accumulation; channel is stable and well-washed debris present, little silt; moderately stable sediment bars of rocks, channel divided into braids or stream and well-washed debris present, little sands, and silt common; is channelized; substrate is uniform moderately unstable sand, silt, clay, or bedrock; unstable Aqu	ŀ				CON								1	KDWP,
3b. Bottom resulting from sediment accumulation; channel is stable and well-washed debris present, little sands, and silt common; is channelized; substrate is uniform moderately unstable and well-washed debris present, little sands, and silt common; is channelized; substrate is uniform and well-washed debris present, little sands, and silt common; and silt; moderately unstable and well-washed debris present, little sands, and silt common; and silt; clay, or bedrock; unstable and well-washed debris present, little sands, and silt common; and silt; clay, or bedrock; unstable and well-washed debris present, little sands, and silt common; and silt; clay, or bedrock; unstable and well-washed debris present, little sands, and silt common; and silt; clay, or bedrock; unstable and well-washed debris present, little sands, and silt common; and silt; clay, or bedrock; unstable and well-washed debris present, little sands, and silt common; and silt; clay, or bedrock; unstable and well-washed debris present, little sands, and silt common; and silt; clay, or bedrock; unstable and well-washed debris present, little sands, and silt common; and silt; clay, or bedrock; unstable and well-washed debris present, little sands, and silt common; and		Little or r		nlargement	Some ara					Channel o		ds or stream	-	Kansas Subjectiv
Inqui		resul	Iting from sec	diment	and well-wa	ashed debris	present, little	sands, and	silt common;	is channe	elized; substrat	e is uniform		Evaluation
		accumul	ation; channe	ei is stable	silt;	moderately	stable	moderate	ery unstable	sand, silt	, cıay, or bedro	ск; unstable		Aquatic Habitats
														Lasiais
Grade 10 9 8 7 6 5 4 3 2 1 0 2			1 -	1 -	<u> </u>	1 2	-		1 -			1 -	<u> </u>	

3c. Instream				CON	IDITION C	ATEGORY (GRADE or	SCORE						KDWP, 1996
3c. Instream		Optimal			Suboptima			rginal		Po	or			Newton et a
3c. Instream Bottom Topography	>7 of the boulders/g debris, overhan		iphy including leep pools, large woody /oxbows, tion, riffles,			es 5-7 of the	Channe includes < : listed in	el bottom 5 of the items n Optimal egory		l bottom i	nclude	es <3 of the I Category		1998 USDA/NRC SVAP page
5	undercut	t banks, or sid pools	ide channel											
Grade	10	9	8	7	6	5	4	3	2	1		0	2]
Graue				CON	NDITION C	ATEGORY	GRADE or	SCORE						
or		Optimal			Suboptima			rginal		Po				
3c. Manning's n		0.05 to 0.09	9		0.035 to 0.0	95		.03 or >0.10 0.15	obstructio	n to flow	or 0.0 and cle	txcessive 1 to 0.02 due ean, smooth		
Grade	10	9	8	7	6	5	4	3	2	1	1	0		
				CON	IDITION C	ATEGORY (GRADE or	SCORE						USACE,
		Optimal			Suboptima	al		rginal		Po	or			Norfolk
3d. Channel Incision (TLB/BFD=BH R; 1/BHR*Adj Factor =CI)	Optimal Incision ratio ≥1.0 <1.2 and Where channel slope >2%; Entrenchment ratio >1.4; Where channel slope ≤2%; Entrenchment ratio >2.0		ntrenchment annel slope	channel s ratio >1.4			and Whe slope Entrench >1.4; Who slope	io $\geq 1.4 < 2.0$ ere channel $\epsilon > 2\%$, ere channel ere channel ere channel $\epsilon \leq 2\%$, ent ratio ≤ 2.0	slope >2% Whe Ent		chme el slop			District, 200 SAAM For #1 and VT Stream Geomorphi Assessmer Phase 2
TLB =		10		BHR =	1									
BFD =		10												
Grade	10	9	8	7	6	5	4	3	2	1		0	1	
4 DYNAMIC SUF	RFACE WA	TER STOF	RAGE											
				10.0	IDITION C	ATEGORY	GRADE or	SCORE						Newton, et
		Optimal		00.	Suboptima			rginal		Po	or			1998 USD/
4a.Pools (abundant, present or absent)	greater that		e pool bottom , or pools are	from 10-3 obscure d	esent, but no 0% of the po ue to depth, at least 3 fee	ool bottom is or the pools	shallow; from the pool obscure du the pools a	resent, but om 5-10% of I bottom is e to depth, or are less than	discer	sent, or th		ire bottom is er = zero.		NRCS SV/ page 14; Barbour, et 1999
							3 fee	t deep.						
Grade	10	9	8	7	6	5	4	3	2	1		0	0	1
4b. Channel				CON	IDITION C	ATEGORY	GRADE or	SCORE						
		Optimal			Suboptima			rginal		Po	or			Barbour, et
Flow Status	banks a	aches base of and minimal a I substrate is	amount of	channe	s >75% of the el; or <25% of estrate is exp	e available f channel	Water fills the availa and /or riff	s 25-75% of ble channel, le substrates			pools	el and mostly s. No water =		1999 EPA RBA page 5 /A-9#5; TC
Flow Status (degree to which channel is filled)	channel	i substrate is	скросса.				are most	lv exposed				1		
(degree to which channel	channel 10	9	8	7	6	5	are most	ly exposed.	2	1	1	0	0	
(degree to which channel is filled)			·	7	1	•	4	3				0 ssible Score	0.25	1999; VAN

I. HYDROLOGIC FUNCTIONS

N5 (2.5-5)

	TVDE													
	TYPE NOTES													1
	SEDIMENT TR	ANSPOR	T/DEPOS	ITION	J									T I
Ì	CEDIMENT III	101 011	.,		•									†
						CO	NDITION C	ATEGORY (GRADE or S	CORE				
	1a. Bank		Optim				Suboptima	al	Ma	rginal		Poor		
	Stability		ble; eviden					equent, small		unstable; 30-			areas; "raw"	
	(score each		re absent o					healed over. has areas of		k in reach has erosion; high		equently alor nd bends; ol		
	bank, left or right facing	poteritial II	bank affe		∪. \ ∪ /0 UI	3-30 /6 UI D	erosion.	nas artas Ul		tential during		; 60-100% c		
	downstream)									ods.		rosional sca		
	downoucarriy													
(Grade (Left)	10	9		8	7	6	5	4	3	2	1	0	5
(Grade (Right)	10	9		8	7	6	5	4	3	2	1	0	5
													Avg.Score	5
														1
			<u> </u>			COI		ATEGORY (1			
	1b. Channel	Botto	Optim		norally.	Bottom	Suboptima			rginal	Bottom (Poor	gonorelly	
	Bottom Bank		1/3 of ban sistant plan				1/3 of bank is ant/soil matri	s generally ix or material.		/3 of bank is ighly erodible		/3 of bank is dible materia		
	Stability	inginy io	materia		au A OI	. colotant pi	a. woon math	or material.		ant/soil matrix		everely com		
										romised.		, ,		
										,		,		
	Grade (Left)	10	9	_	8	7	6	5	4	3	2	1	0	2
	Grade (Right)	10	9		8	7	6	5	4	3	2	1	0 Ava Scoro	2
													Avg.Score	2
	or					CO	NDITION C	ATEGORY (SRADE or S	SCORE				
	1c. Channel		Optim	al			Suboptima			rginal		Poor		
	Sediments or		ravel or lar	ger su			ravel or large	er substrate;	10-29.9% g	ravel or larger		s uniform sa	nd, silt, clay,	
	Substrate		obble bould				substrate ty			e; dominant	or b	edrock; uns	table	
	Composition	substrat	e type is gr stable		r larger;		h some finer			pe is finer than				
							oderately sta			may still be a				
	Grade	10	9		8	7	6	5	4	3	2	1	0	
١	WATER APPE	ARANCE:	Clarity o	r Visil	ollity									
						CO	NDITION C	ATEGORY (DANE or C	COPE				
			Optim	al		I	Suboptima			rginal		Poor		
		Very clea	r, or clear b		-colored:	Occasiona		pecially after		ole cloudiness	Very turbid		earance most	-
		objects vis	sible at dep	th 3-6	feet (less	storm ev	ent, but clea	ars rapidly;	most of the	time; objects	the time; obj	ects visible to	depth <0.5 ft;	
	Water Clarity		colored); n					1.5-3 ft; may		epth 0.5-1.5 ft;		water may be us water pollut	bright-green;	
			e;no notice erged objec				ghtly green c n on water s			ns may appear bottom rocks			sheen or heavy	,
		Subine	nged objec	15 01	UCKS.	31166	II OII Water S	unace.		ged objected	coat of foa	m on surface.	No water =	
										d with film.		zero.		
						<u> </u>								<u> </u>
	Grade	10	9		8	7	6	5	4	3	2	1	0	0
	DE0E::05 0	- 40:::4=	0.1/5055	A T. C	N. F									↓
	PRESENCE OF	- AQUATI	U VEGET	ATIC	N: Prese	ence and P	ercent Cove	erage						<u> </u>
						001	UDITION C	ATECODY (2DADE 0	COPE				
			Optim	al		I	Suboptima	ATEGORY (rginal		Poor		
		Clear w	ater along		reach.	Fairly clear		eenish water		iter along entire	Pea green	gray, or brown	n water along	
			aquatic pla	nt cor	nmunity	along enti	re reach; mo	derate algal	reach; overab	oundance of lush	entire i	each; dense s	stands of	
	3a. Nutrient	diverse	iow quant	aties (of many		on stream su			hytes; abundant		s clog stream		
	3a. Nutrient Enrichment	includes			ittle algal					th, especially rmer months.		te thick algal r ie present due	nats in stream to unstable	
		includes	of macroph	sent.								ate. No water		
		includes	of macroph growth pre											
		includes					_ ^	5	4	3	2	1	0	
	Enrichment	includes			8	7	6							
	Enrichment	includes species o	growth pre		8		•							<u> </u>
	Enrichment Grade	includes species o	growth pre	I	8		NDITION C	ATEGORY (T			
	Enrichment Grade Or	includes species of	growth pre			COI	NDITION C.	al	Ma	rginal	A1*	Poor	I	
	Grade Or 3b. Aquatic	includes species of 10	growth pre	atic ve	egetation	COI Algae do	NDITION C. Suboptima ominant in po	al ools, larger	Ma Algal mats	rginal present, some		ts cover bott		
	Enrichment Grade Or	includes species of 10	9 Optimesent, aqua	atic ve	egetation	COI Algae do	NDITION C.	al ools, larger	Ma Algal mats	rginal	plants don		annel or NO	
	Grade Or 3b. Aquatic	includes species of 10	growth pre	atic ve	egetation	COI Algae do	NDITION C. Suboptima ominant in po	al ools, larger	Ma Algal mats	rginal present, some	plants dom algae pr	ts cover bott inate the ch	annel or NO unstable	

				COI	NDITION C	ATEGORY (GRADE or S	SCORE				F
		Optimal			Suboptima			ırginal		Poor		ϵ
		onsisting of le I without sed			and wood so lebris withou		debris; coa organic	es or woody arse and fine matter with liment.	color and fo	anic sedimen oul odor (ana present due t scouring	erobic) or no	1 F
Grade	10	9	8	7	6	5	4	3	2	1	0	2
AND USE PA	TTERN: Be	yond Imme	diate Ripari		UDITION O	ATE 0.00 N/	20405					
		Ontinon		COI		ATEGORY (D		F
	Undieturhe	Optimal ed, consistin	a of forcet	Perman	Suboptima ent pasture r			rginal w crops and		Poor Mainly row cro	one	C
		ve prairie, ar wetlands.			and swamp crops		pasture; sareas may l	ome wooded be present but ed patches		nainy row cre	pps	F
Grade (Left)	10	9	8	7	6	5	4	3	2	1	0	4
Grade (Right)	10	9	8	7	6	5	4	3	2	1	0 Avg.Score	4
6a. Riparian Zone Width		arian zone >18				18 meters (1/2-		arian zone 6-12			meters (natural	1 1
Zone Width (from stream	channel widtl grasses), h	arian zone >18 hs with trees, numan activition impacted zone	shrubs, or tall es have not	1 active chargrasses), hur	nnel width w/tre	ees, shrubs, or have minimally	meters (1 channel wid	arian zone 6-12 /3-1/2 active dth vegetated), human activities.	vegation le width), little	irian zone < 6 i ess than 1/3 ad e riparian vege human activitie	tive channel tation due to	
Zone Width (from stream edge to field)	channel widtl grasses), h	hs with trees, numan activitie	shrubs, or tall es have not	1 active chargrasses), hur	nnel width w/tro man activities	ees, shrubs, or have minimally	meters (1 channel wid	/3-1/2 active dth vegetated),	vegation le width), little	ess than 1/3 ac e riparian vege	tive channel tation due to	1 F 6 R U N
Zone Width (from stream edge to field)	channel widtl grasses), h i	hs with trees, numan activition impacted zone	shrubs, or tall es have not e.	1 active chai grasses), hui	nnel width w/troman activities impacted zon	ees, shrubs, or have minimally e.	meters (1 channel wid impacted by h	/3-1/2 active dth vegetated), human activities.	vegation le width), little	ess than 1/3 ac e riparian vege human activitie	tive channel tation due to es.	1 F G R L N
Zone Width (from stream edge to field)	channel widt grasses), r i	hs with trees, numan activitie impacted zone	shrubs, or tall es have not e.	1 active chargrasses), hur	nnel width w/tr/ nan activities impacted zon-	ees, shrubs, or have minimally e.	meters (1 channel wid impacted by h	/3-1/2 active dth vegetated), human activities.	vegation le width), little	ess than 1/3 ac e riparian vege human activitie	tive channel tation due to es.	1 F 6 F L N 2 2 2 2 2
Zone Width (from stream edge to field)	channel widt grasses), r i	hs with trees, numan activitie impacted zone	shrubs, or tall es have not e.	1 active chargrasses), hur	nnel width w/tm man activities impacted zone 6 6	ees, shrubs, or have minimally e.	meters (1 channel wid impacted by h	/3-1/2 active dth vegetated), human activities.	vegation le width), little	ess than 1/3 ace riparian vege human activitie	tive channel tation due to es.	1 F 6 F 1 N N N N N N N N N N N N N N N N N N
Zone Width (from stream edge to field) Grade (left) Grade (Right) 6b. Riparian Zone Vegetation Protection/	channel widti grasses), h 10 10 10	hs with trees, numan activitie impacted zone	8 8 8 ture trees or marsh plants, ruption from	1 active chargrasses), hur range from 7 7 7 COI 75-90% strr young specie trees behir trees behir range from 7 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1	nnel width w/tr man activities impacted zon 6 6 NDITION C. Suboptima eambank vege	ees, shrubs, or have minimally e	meters (1 channel wich impacted by has been seen as the seen as th	/3-1/2 active dth vegetated), human activities.	vegation le width), little 2 2 Less than 5 coverage c grasses, fe density; ban	ess than 1/3 ac e riparian vege human activitie	titive channel tation due to iss. 0 0 Avg.Score nk vegetation ty of pasture bs; low plant ed with gullies	1 F 6 F L N 2 2 2 2 2
Zone Width (from stream edge to field) Grade (left) Grade (Right) 6b. Riparian Zone Vegetation Protection/ Completeness	channel widti grasses), h 10 10 10 >90% plant shrubs, prairi riparian zor grazi	hs with trees, numan activition impacted zone 9 9 9 9 Optimal density of ma ie grasses, or ne intact or dis ng/mowing mi	shrubs, or tall se have not be.	1 active char grasses), hur 7 7 COI 75-90% stri young specific trees behi breaks oc	nnel width with man activities impacted zon 6 6 6 NDITION C. Suboptima ambank vege sa along chann d; disruption curring at intermeters.	ees, shrubs, or have minimally e	meters (1 channel wich impacted by has been seen as the channel wich impacted by has been seen as the channel with a seen as the	/3-1/2 active the vegetated), human activities. 3 3 3 SCORE triginal streambank from the control of the contro	vegation le width), little 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	ess than 1/3 ac e riparian vege human activities 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	0 0 Avg.Score Avg.Score of pasture dwith gullies gith.	2 2 E E E E E E E E E E E E E E E E E E
Zone Width (from stream edge to field) Grade (left) Grade (Right) 6b. Riparian Zone Vegetation Protection/ Completeness	channel widti grasses), h 10 10 >90% plant shrubs, prairi riparian zor grazii	hs with trees, numan activitic impacted zone 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	shrubs, or tall se have not be.	1 active chair grasses), hui 7 7 7 COI 75-90% str young specitrees behi breaks oc	nnel width with man activities impacted zon 6 6 6 NDITION C. Suboptima earnbank vege sa along channot; disruption curring at inte meters.	ees, shrubs, or have minimally e. 5 ATEGORY (a) Il to tation, mixed the land mature evident with rivals of >50	meters (1 channel wich impacted by has been seen as the seen as the seen as the seen as the seen as the seen as the seen as the seen and scars en an	/3-1/2 active this vegetated), human activities. 3 3 3 SCORE triginal streambank fraixed grasses a young tree or eacies; breaks th some guillies very 50 meters.	vegation le width), little 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	es than 1/3 ace e riparian vege human activities 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	titive channel tation due to iss. 0 0 0 Avg.Score nk vegetation tly of pasture bis; low plant ed with gullies th.	2 2 2 2 1 1 1 6 6 1 7 6 1 7
Zone Width (from stream edge to field) Grade (left) Grade (Right) 6b. Riparian Zone Vegetation	channel widti grasses), h 10 10 10 >90% plant shrubs, prairi riparian zor grazi	hs with trees, numan activition impacted zone 9 9 9 9 Optimal density of ma ie grasses, or ne intact or dis ng/mowing mi	shrubs, or tall se have not be.	1 active char grasses), hur 7 7 COI 75-90% stri young specific trees behi breaks oc	nnel width with nan activities impacted zon from the first simpacted zon f	ees, shrubs, or have minimally e. 5 5 ATEGORY (a) 1 station, mixed rel and mature evident with rivals of >50	meters (1 channel wic impacted by h	/3-1/2 active the vegetated), human activities. 3 3 3 SCORE triginal streambank from the control of the contro	vegation le width), little 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	Poor Poor Food Streambar Poor Food Streambar Some Streamb	O O Avg.Score O O O O O O O O O O O O O O O O O O O	2 2 E E E E E E E E E E E E E E E E E E

	1 FLOW REG	МГ		.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	ONS		N5 (2.5						SCORE
	TYPE	ME	Perennial		Intermitte	nt w/ Peren	nial Pools	Interm	nittent		Ephemera	al	
	Grade	10	9	8	7	6	5	4	3	2	1	0	(
: 2	2 EPIFAUNAL	SUBSTRATE/A	AVAILABLE Optimal	COVER		Suboptimal		Marc	rin al	1	Poor		
		Within strea	am bed, greater	r than 50%	Within strea	m bed, 30-50		Within stream		Less tha	n 10% habit	at features	
		coverage by	y stable habita	t features,	by stable h	abitat feature	s favorable	coverage by		present; la	ack of habita	at is obvious;	
		favorable for and/or fish/am	stream faunal			aunal coloniz		features favora faunal colonia			te unstable		
			n transient. Fe			pian cover. M transient. (Se		fish/amphibian				els. Habitat ed or lacking,	
		include snags,	s, submerged lo	gs, undercut	Catego	ry for habitat	feature	availability ma	y be less than		l bottom ma		
		banks, roots, c	cobble, rocks, p	ersistent leaf		components.))	desirable, sub					
			and glides, or stage to allow of					frequently dist					
		nabiai ai a c	stage to allow t	JOIOT II LAUGIT				feature con					
	Grade	10	9	8	7	6	5	4	3	2	1	0	2
;	STREAM BO	TTOM SUBST		Substrate Ch	aracterizati								
		Mixture of sub-	Optimal ostrate materials	s with aravel	Mixture of	Suboptimal soft sand, mu		All mud or clay		Hard pan of	Poor av or bedroo	ck; no root mat	d
			id prevalent; ro			be dominant;		little or no ro			merged ve		1
		submerge	ed vegetation o	ommon.	mats and	submerged v	egatation	submerged	vegetation.		-	-	
						present.							
	Grade	10	9	8	7	6	5	4	3	2	1	0	1
						Ŭ		·					
4	POOL VARI	ABILITY	Optimal		l	Suboptimal		Marg	ninal		Poor		
		Even mix of larg	ge-shallow, lar		Majority of p	ools large-de		Shallow pools	s much more	Majority o	f pools sma	II-shallow or	1
		shallow, sr	mall-deep pool	s present		shallow.		prevalent that	n deep pools		pools abse	nt	
	Grade	10	9	8	7	6	5	4	3	2	1	0	(
	SEDIMENT	DEPOSITION/S			_								
		<5% of channe	Optimal el bottom affecte	id by scour or	5-30% affec	Suboptimal ted by scour o		Marg 30-50% affecte		More than 50	Poor	om in a state of	
		4070 OF GRAINIO	deposition.	a by 000ai 0i	Scour at con	strictions and v	vehre grades	deposition. Depo	sits and scour at	flux or char	nge nearly ye	arlong. Pools	
					steepen.	Some deposition	on in pools	obstructions, co bends. Some			sent due to h excessive sco	neavy deposition	n
									g p			9-	
	Grade	10	9	8	7	6	5	4	3	2	1	0	2
	CHANNEL E	LOW STATUS											
•	O I W II I I I I		Optimal			Suboptimal		Marg	ginal		Poor		
			nes the base of			>75% of the		Water fills 25				channel and	
		banks; <5% of of	channel substra	ate is exposed	<25% of cna	annel substrat	e is exposea	available chann substrates are r			sent in stand stream is d	ding pools; or	
								oubotratoo aro r	noony expected		otrouii io u	.,	
						,							
	Grade 7 CHANNEL A	10	9	8	7	6	5	4	3	2	1	0	(
;			9 Optimal	8		Suboptimal		Marg	ginal		1 Poor	0	(
;		10 LTERATION Channelization	Optimal ion, alteration,	or dredging	Some alte	Suboptimal eration or char	nnelization	Marg Alteration or cha	ginal nnelization may	Banks shor	ed with gab	ion, riprap, or	(
;		10 ILTERATION Channelizatiabsent or minim	Optimal ion, alteration, nal; normal and	or dredging I stable stream	Some alte	Suboptimal eration or chai t, usually adja	nnelization	Març Alteration or cha be extensive; e	ginal nnelization may embankments	Banks shor concrete.	ed with gab Concrete o	ion, riprap, or r riprap lined	(
;		10 LTERATION Channelizati absent or minim meander patter	Optimal ion, alteration, nal; normal and	or dredging I stable stream by stormwater	Some alter present structures, (:	Suboptimal eration or char	nnelization acent to e abutments	Marg Alteration or cha	ginal nnelization may embankments biles) or shoring	Banks shor concrete.	ed with gab Concrete o els. Instrear	ion, riprap, or r riprap lined	-
		10 LTERATION Channelizati absent or minim meander patter	Optimal ion, alteration, nal; normal and ern. Alteration b	or dredging I stable stream by stormwater	Some alter present structures, (control or culver alteration, (control or culver alteration, (control or culver)	Suboptimal eration or char t, usually adja such as bridg erts); evidence (I.e., channeliz	nnelization acent to e abutments e of past zation) may	Marg Alteration or cha be extensive; e (including spoil p structures pre banks; normal	ginal Innelization may	Banks shor concrete. channe significantly other inputs	red with gab Concrete o els. Instrear altered by s . Over 80%	ion, riprap, or r riprap lined m habitat stormwater or of the stream	-
		10 LTERATION Channelizati absent or minim meander patter	Optimal ion, alteration, nal; normal and ern. Alteration b	or dredging I stable stream by stormwater	Some alter present structures, (control or culver alteration, (control or culver alteration),	Suboptimal eration or char t, usually adja such as bridg erts); evidence (I.e., channelia t, but stream p	nnelization acent to e abutments e of past zation) may pattern and	Març Alteration or cha be extensive; e (including spoil p structures pre banks; normal meander pat	ginal nnelization may embankments biles) or shoring esent on both stable stream etern has not	Banks shor concrete. channe significantly other inputs	red with gab Concrete o els. Instrear altered by	ion, riprap, or r riprap lined m habitat stormwater or of the stream	-
7		10 LTERATION Channelizati absent or minim meander patter	Optimal ion, alteration, nal; normal and ern. Alteration b	or dredging I stable stream by stormwater	Some alter present structures, (concluder alteration, leading the present stability has been stability from the present stability	Suboptimal eration or char t, usually adja such as bridg erts); evidence (I.e., channeliz	nnelization acent to e abutments e of past zation) may pattern and ed; recent	Marg Alteration or cha be extensive; e (including spoil p structures pre banks; normal meander pat recovered. Al stormwater in	ginal nnelization may embankments piles) or shoring esent on both stable stream tern has not diteration from eputs may be	Banks shor concrete. channe significantly other inputs	red with gab Concrete o els. Instrear altered by s . Over 80%	ion, riprap, or r riprap lined m habitat stormwater or of the stream	-
:		10 LTERATION Channelizati absent or minim meander patter	Optimal ion, alteration, nal; normal and ern. Alteration b	or dredging I stable stream by stormwater	Some alter present structures, (control of culver alteration, depresent stability halteration	Suboptimal eration or chart, usually adjasuch as bridg rts); evidence (I.e., channelii, but stream pave recoveren is not preserrom stormwa	nnelization acent to e abutments e of past zation) may battern and ad; recent nt. Minor	Març Alteration or cha be extensive; e (including spoil p structures pre banks; normal meander pat recovered. Al stormwater in extensive. 40-8	ginal nnelization may embankments biles) or shoring esent on both stable stream ttem has not literation from uputs may be 80% of stream	Banks shor concrete. channe significantly other inputs	red with gab Concrete o els. Instrear altered by s . Over 80%	ion, riprap, or r riprap lined m habitat stormwater or of the stream	-
7		10 LTERATION Channelizati absent or minim meander patter	Optimal ion, alteration, nal; normal and ern. Alteration b	or dredging I stable stream by stormwater	Some alter present structures, (control of culver alteration, depresent stability halteration	Suboptimal pration or chai t, usually adja such as bridg prts); evidence (I.e., channelia t, but stream p mave recovere n is not preser	nnelization acent to e abutments e of past zation) may battern and ad; recent nt. Minor	Marg Alteration or cha be extensive; e (including spoil p structures pre banks; normal meander pat recovered. Al stormwater in	ginal nnelization may embankments biles) or shoring esent on both stable stream ttem has not literation from uputs may be 80% of stream	Banks shor concrete. channe significantly other inputs	red with gab Concrete o els. Instrear altered by s . Over 80%	ion, riprap, or r riprap lined m habitat stormwater or of the stream	-
;		10 LTERATION Channelizati absent or minim meander patter	Optimal ion, alteration, nal; normal and ern. Alteration b	or dredging I stable stream by stormwater	Some alter present structures, (control of culver alteration, depresent stability halteration	Suboptimal eration or chart, usually adjasuch as bridg rts); evidence (I.e., channelii, but stream pave recoveren is not preserrom stormwa	nnelization acent to e abutments e of past zation) may battern and ad; recent nt. Minor	Març Alteration or cha be extensive; e (including spoil p structures pre banks; normal meander pat recovered. Al stormwater in extensive. 40-8	ginal nnelization may embankments biles) or shoring esent on both stable stream ttem has not literation from uputs may be 80% of stream	Banks shor concrete. channe significantly other inputs	red with gab Concrete o els. Instrear altered by s . Over 80%	ion, riprap, or r riprap lined m habitat stormwater or of the stream	-
;		10 LTERATION Channelizati absent or minim meander patter	Optimal ion, alteration, nal; normal and ern. Alteration b	or dredging I stable stream by stormwater	Some alter present structures, (control of culver alteration, depresent stability halteration	Suboptimal eration or chart, usually adjasuch as bridg rts); evidence (I.e., channelii, but stream pave recoveren is not preserrom stormwa	nnelization acent to e abutments e of past zation) may battern and ad; recent nt. Minor	Març Alteration or cha be extensive; e (including spoil p structures pre banks; normal meander pat recovered. Al stormwater in extensive. 40-8	ginal nnelization may embankments biles) or shoring esent on both stable stream ttem has not literation from uputs may be 80% of stream	Banks shor concrete. channe significantly other inputs	red with gab Concrete o els. Instrear altered by s . Over 80%	ion, riprap, or r riprap lined m habitat stormwater or of the stream	-

8	8	CHANNEL S	INUOSITY												1
				Optimal			Suboptima			ginal		Poor			
			The bends in the s length 3 to 4 time					n increase the es longer than		n the stream eam 1 to 2 times		raight; waterw ized for a long			Barbour, et al. 1999
			straight line. (N	lote - channe	I braiding is		vas in a straiç		longer than if it	was in a straight	or armo	1200 101 0 1011	g diotarioo		RBA #7b;
			considered non other low-lying are						lin	ne					Parsons,
				ed in these ar											et al., 2001
															AUSRIVAS
		Grade	10	9	8	7	6	5	4	3	2	1	0	7	
9	9	BANK STAB	ILITY (SCORE E	ACH BANK	.)										
				Optimal			Suboptima			ginal		Poor			
			Banks stable; ev failure absent o					equent, small healed over.		stable; perennial vaterline sparse		no perennial v e; severe eros			Barbour, et al. 1999
			affected), perenn	ial vegetation	to waterline;	5-30% of b	ank in reach	has areas of	(mainly scoure	d or stripped by	banks; re	cently expose	d tree roots		RBA #8;
			no raw or underco outside of meande				erosion and	or bank vegetation to), bank held by (trees, rock		tree falls and at trees comm			Parsons,
			exposed root	s; no recent	ree falls;		in most plac			d eroded back		eas; "raw" are			et al., 2001 AUSRIVAS
						exposed ii	ee 100ts rare	but present.		60% of bank in s of erosion and		aight sections ank sloughing;			; USACE
										utting; recently ots and fine root	bank	has erosional	l scars.		Norfolk District,
									hairs commo	n; high erosion					2004 SAM
									potential d	uring floods					#3; Scholz
															and Booth from
															Henshaw,
		Grade	10	9	8	7	6	5	4	3	2	1	0	5	
		Grade	10	9	8	/	6	5	4	3	2	Avg.Score	0	5 5	
												g			
10	10	VEGETATIV	E PROTECTION	(SCORE E	ACH BANK		Suboptima	al .	Mor	ginal	ı	Poor			
			More than 90% o		ank surfaces	70-90% of		ank surfaces		e streambank	Less than	1 50% of the s	streambank		Barbour, et
			and immediate r native vegetation,					ation, but one Il-represented;		ed by vegetation; ous; patches of		covered by v			al. 1999
			shrubs, or no	nwoody mac	rophytes;	disruption e	vident but no	ot affecting full		osely cropped		h; vegetation			RBA #9; Parsons,
			vegetative disru mowing minimal				wth potential nore than one			nmon; less than potential plant		to 5 centimete rage stubble h			et al., 2001
				ed to grow n			ial plant stubl			ht remaining.	ave	rage stubble r	icigiit.		AUSRIVAS
							remaining.								; KDWP 2000;
															Petersen,
		Grade	10	9	8	7	6	5	4	3	2	1	0	2	
		Grade	10	9	8	7	6	5	4	3	2	1	0	2	
												Avg.Score	!		
11	11	RIPARIAN Z	ONE (SCORE EA						,		,				
			Width of riparian	Optimal zone >18 me	eters: human	Width of rit	Suboptima parian zone 1	al 12-18 meters;		ginal rian zone 6-12	Width of rin	Poor parian zone <6	meters: little		Barbour, et
			activities (I.e., par	rking lots, roa	dbeds, clear-	human acti	ivities have in	npacted zone	meters; human	activities have	or no rip	oarian vegetat	ion due to		al., 1999
			cuts, lawns, or o	zone.	ot impacted		only minimal	iy).	impacted zon	e a great deal.		numan activitie	es.		RBA #10; Parsons,
															et al., 2001
															AUSRIVAS
		Grade	10	9	8	7	6	5	4	3	2	1	0	2	
		Grade	10	9	8	/	6	5	4	3	2	Avg.Score	0	2	
												<u> </u>	1		
12	12	RIPARIAN H	ABITAT CONDIT	Optimal	RE EACH BA	ANK)	Suboptima	al	Mar	ginal	ı	Poor			Norfolk SAAM
			Tree stratum (db	h>3 inches)			ım (dbh>3 ind	ches) present,		(dbh>3 inches)		atum absent; i			Form 1
			>60% tree canop layers may ir					canopy cover.	present, with <3 cover. (See Ex	30% tree canopy		roplands, min ed streams, m			Field
			herbaceous,	and leaf litter	including	of addition	al forest laye	ers.) Score at	for examples of	additional forest	maintai	ned herbaced	ous areas,		
			mosses/lichens ar the high end of				end of Good	range if <a>2 are present.		at the high end of additional layers		surfaces, acti pasture, and e			
			additional layers	are present.	Score at low	Score at lov	w end if <1 a	dditional forest	are present. So	core at low end if	1	basiaro, ana c			
			end if ≤1 additi	ional layers a	re present.		present. OR stumps rem	cutover areas	1 additional lag OR area co.	yers are present.					
						With	i sturrips remi	all ling.	maintained a	nd naturalized					
										ous and/or woody tation.	′				
									rogo	totion.					
		Grade	10	9	8	7	6	5	4	3	2	1	0		
			riparian areas al									rs	Ensure th		
			e square footage %Riparian Area									elow	%Riparia	in Blocks I 100	
		or Enter the		Optimal	parpooco; o	incor iorigin	Suboptima			ginal		oor	oqua	. 100	
		District Co.	%Riparian Area	-						00			100		
		Right Bank	Score SubCl		0		0			<u>4</u> 4			ł		
							L								
		1-4 D	%Riparian Area	1						00			100		
		Left Bank	Score SubCl		0		0			<u>4</u> 4		0			
												RA*Scores			
				1	1	1	1	ı	1		Rt Bank C		4	CI 4	
			·	1	1		1	Calculation	of Function Ca	apacity Index =				0.28	
										-			FCI = #/120		

	Stream Function	nal Capacity Ca	alculation		
	N5 (2.5-5))			
Date:	5/17/2006	,			
Project:	Lake Ralph H				
Assessment Area:	WP3				
Assessors:	Holmes Voigh	nt Capps			
Project Status:	XPrepro	ect	Postproject		
		Stream	Stream	Multiplication	
Major Function Categories	FCI	Length (LF)*	Characterization	Factor**	FC
Hydrologic	0.25	2,840	E	0.00125	0.89
Water Quality Improvement	0.21	2,840	E	0.00125	0.75
Habitat	0.28	2,840	E	0.00125	0.98
Total	0.74	2,840			2.62
*Stream Length is the length of the **Multiplication Factors Ephemeral = 0.00125 Intermittent = 0.0025 Perennial = 0.0038	Stream Assessme	nt Reach (SAR)		

Pasture outside of riparian zone. Rip zone 20m or less.





SWAMPIM DATASHEETS – NORTH EPHEMERAL 6 TO 15	,,
PRE-PROJECT	

• N6-TRIB1

N6-TRIB1

PARAMET	ER										
		Optimal			OITION CAT			CORE	l	Poor	
		Optimal			Опрорини		IVICI	giriai		1 001	
Grade	10	9	8	7	6	5	4	3	2	1	0

Surrounded by pasture, 10-20 meters of riparian. Few trees.

WP 13 P72, 71

1

TYPE	VARIABLES FLOW REGIME:	:		I. HYDROL	_OGIC FUN	ICTIONS	N6-TRIB1						SCORE	Source
Chicago 10 9 8 7 6 5 4 3 2 0 1 1 1 1 1 1 2 2 1 0 1 1 1 1 2 2 2 1 0 1 1 2 2 2 2 3 3 3 3 3 3			Perennial		Intermitte	ent w/ Pere	nnial Pools	Interi	mittent		Enheme	ral		
Continue Continue		10		8	7		5			2			•	
Subspiration Subs	CHANNEL CON	DITION:	Measureme	ent or Obser	rvation of St	tream Char	nel Conditio	ns						
Charmel Condition/Marked charmer is an internal from the first post of the condition of t	_				001	DITION	TE005\(\)							
Animal character is not incurred to decident to the control (stately in a proper of the control (stately in a proper of the control (stately in a proper of the control (stately in a proper) of demonstrating or excession intend Condition (natural and the control (stately in a proper) of demonstrating or excession intend Condition (natural and the control (stately in a proper) of control (stat	_		Ontimal		CON					ı	Poor			
commontation or minimal. No evidence and construction of the const	-	Natural ch	•	ructures or	Some ch					Channe		owncutting o	. 	
Continue Continue	c	hannelizati	ion minimal.	No evidence	bridge a	reas) or pas	t channel	80% of	the reach	widening.	>80% of the	reach riprap	or	
Condition Continue Condition Continue Condition Condit	za.Charinei												or <u>S</u>	
Grade 10 9 8 7 6 5 4 3 2 1 0 1 1 2t. Channel Capacity to Flow Prequency Rabio (or 2-year regions) 2 10 2.5 years regions (flow) 2 10 2 1 2 2 1 0 0 1 1 2c. Channel Capacity to Flow Prequency Rabio (or 2-year regions) 2 10 2.5 years regions (flow) 2 1 2 2 1 0 0 1 1 2c. Channel Bank Stability and Capacity to Flow Prequency Rabio (or 2-year regions) 2 10 2.5 years regions (flow) 2 1 2 2 1 0 0 1 1 2c. Channel Bank Stability and Capacity to Flow Prequency Rabio (or 2-year regions) 2 10 2.5 years regions (flow) 2 1 2 2 1 0 0 0 0										.0100			e o	SVAP pa
Condition Continue Condition Continue Condition Condit		chan	nel and flood	dplain.	flow	s onto flood	olain.						alte	
Control Capacity to Flow Control Capacity to Flow Frequency Capacity to Flow Frequency Ratio (tor 2-typera peak flow)													rati	
Control Capacity to Flow Control Capacity to Flow Frequency Capacity to Flow Frequency Ratio (tor 2-typera peak flow)	3,												on.	
Grade 10 9 8 7 6 5 4 3 2 1 0 1 CONDITION CATEGORY GRADE or SCORE Subpointed Capacity to Flow Frequency Ratio (pr 2- year Feeders) Ratio (pr 2- year Feeder													o h	
Continued 10 9 8 7 6 5 4 3 2 1 0 1 1 1 2 2 2 2 2 2 2								restrict f	loodplain.				l me	
Continued Cont													5	
2b. Channel Capacity to Flow Frequency Channel Capacity to Flow Frequency Channel Capacity to Flow Frequency Channel Capacity to Flow Frequency Channel Capacity to Flow Frequency Channel Capacity to Flow Frequency Ratio is such that bank overflow from Blow Frequency Ratio Blow F	Grade	10	9	8	7	6	5	4	3	2	1	0		1
Continued Capacity to Flow Frequency Roll Capacity To Flow F	E				CON									w/ assista
Ratio is such that bank overflow from Piow Prequency Ratio is such that bank overflow from Prought Than Piow Prequency Ratio is such that bank overflow from Prought Than Piow Prequency Ratio is such that bank overflow from Prought Than Piow Prequency Ratio is such that bank overflow from Som events are more frequent than some year frequency. A comparison of the Piow Prequency Ratio is such that bank overflow from Som events are more frequent than some year frequent than every 125 years or less frequent than every 125 years or less frequent from some events are more frequent than every 125 years or less frequent from some events are more frequent than every 125 years or less frequent from some events are more frequent than every 125 years or less frequent from some events are more frequent than every 125 years or less frequent from some events are more frequent than every 125 years or less frequent from some events are more frequent than every 125 years or less frequent from some events are more frequent than every 125 years or less frequent from some events are more frequent than every 125 years or less frequent from some events are more frequent than every 125 years or less frequent from some events are more frequent than every 125 years or less frequent from some events are more frequent than every 125 years or less frequent from some events are more frequent than every 125 years or less frequent from some events are more frequent than every 125 years or less frequent from some events are more frequent than every 125 years or less frequent from some events are more frequent than every 125 years or less frequent from some events are more frequent than every 125 years or less frequent from some events are more frequent than every 125 years or less frequent from some events are more frequent than every 125 years 125 year		Channal Ca		low Frequency Channel Capacity to Flow Frequence				3					21/	
Frequency Ratio (for 2 year feature) from everets occur at a 1.25 to 2.5 year feature (every 1.25 years of see frequent than every 2.5 years (every 1.25 years of see frequent than every 2.5 years) every 1.25 years of see frequent than every 1.25 years of yea	Capacity to													
Ratio (for 2- year peak (flow) Control C												e frequent than		
Series Continue		у		cy.						every ha			n	
Company Com	year peak		0.70 1.20											
Grade	flow)													
Dotimal Subop														
Ditimal Suboptimal Suboptimal Marginal Marginal Moderately unstable; personal vegetation to bank failure absent or minimal (-5% for each stability develocity), perminal vegetation to waterline, no raw or undercut banks (stability deformation to waterline, no raw or undercut banks (store), perminal vegetation to waterline, no raw or undercut banks (some erosion on outside of meander bends O.K.); no recently exposed free roots are but present) and ownstream) undercut banks (some erosion on outside of meander bends O.K.); no recently exposed free roots are but present) tree falls; exposed free roots rare but present tree falls; exposed free roots rare but present from the face of the	Grade	10	9	8	7	6	5	4	3	2	1	0	(0
Banks stable; evidence of erosion or bank failure absent or minima; class dama failure absent or minima; class dama failure absent or minima; class dama failure absent or minima; class dama failure absent or minima; class dama failure absent or minima; class dama failure absent or minima; class dama failure absent or minima; class dama failure absent or minima; class dama failure absent or minima; class dama for severely exposed tree roots and the more places; recently exposed tree roots and for severely undercuttes common; refe falls and/or severely undercuttes common; refe falls and/or severely undercuttes common; refer glate sociently exposed free roots and for severely undercuttes common; many eroded areas; resonant and erosion and brank undercutting; recently exposed free roots and fine most places; under the places of the place of the place of the place of the place of the place of the place of the place of the place of the p					CON	IDITION CA	ATEGORY (GRADE or	SCORE					Newton,
2c.Channel Bank Stability (corrected) perennial vegetation to of bank affected), perennial vegetation to of bank affected), perennial vegetation to of bank affected), perennial vegetation to waterline, no raw or undercut banks (some erosion of bank, left or right facing downstream) downstream) Grade (Left) 10 9 8 7 6 5 4 3 2 1 0 3 2 1 0 3 3 2 1 0 3 3 2 1 0 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3			•											
2c.Channel Bank Stability (score each bank affected), perennial vegetation to waterline; no raw or undercut thinks (some erosion and root bank left or right facing downstream) and the properties of the proper														
Bank Stability (score each bank, left or content bank, left or light facing downstream) Fight facing downstream Grade (Left) 10 9 8 7 6 5 4 3 2 1 0 1 3 3 2 1 0 1 3 3 2 1 0 3 3 2 1 0 0 3 3 4 3 2 1 0 0 3 3 4 3 3 2 1 0 0 3 3 4 3 3 2 1 0 0 3 3 4 3 3 2 1 0 0 3 3 4 3 3 3 3 3 3 4 3 3 3 3 3 3 3 4 3	2c.Channel	of bank	k affected), p	erennial	5-30% of ba	ank in reach	has areas of	waterline sp	parse (mainly	banks; r	ecently expo	sed tree roots	3	
bank, left or right facing downstream) Dearwight facing downstream of recently exposed rotes; no recent tree falls; waterline in most places; recently exposed tree rots rare but present. waterline in most places; recently exposed rotes; no recent tree falls; waterline in most places; recently exposed rotes; no recent tree falls; waterline in most places; recently exposed rotes; no recent tree falls; waterline in most places; recently exposed rotes; no recent trees, not outcome and bank undercuting; recently exposed tree rots and fine root hairs common: Grade (Left) 10 9 8 7 6 5 4 3 2 1 1 0 3 3 Avg.Score 2 CHANNEL ROUGHNESS FACTORS CONDITION CATEGORY GRADE or SCORE Stream length 2.5 to 4 times longer than if it was straight. Channel length/valley length at least >1.5. Barbour, EPA RBB Chapter (channel length/valley length at least >1.5. Grade 10 9 8 7 6 5 4 3 2 1 0 2 CONDITION CATEGORY GRADE or SCORE stream length 1.5 to 2.5 times longer than if it was straight. Channel length/valley length 1.0 to 1.2 Grade 10 9 8 7 6 5 4 3 2 1 0 2 CONDITION CATEGORY GRADE or SCORE stream length 1.5 to 2.5 times longer than length/valley length 1.0 to 1.2 Grade 10 9 8 7 6 5 4 3 2 1 0 2 CONDITION CATEGORY GRADE or SCORE stream length 1.5 to 2.5 times longer than if it was a straight time. Channel length/valley length 1.0 to 1.2 Grade 10 9 8 7 6 5 4 3 2 1 0 2 CONDITION CATEGORY GRADE or SCORE stream length 1.5 to 2.5 times longer than if it was a straight time. Channel length/valley length 1.0 to 1.2 CONDITION CATEGORY GRADE or SCORE stream length 1.5 to 1.5 to 1.2 times longer than if it was a straight time. Channel length/valley length 1.0 to 1.2 CONDITION CATEGORY GRADE or SCORE stream length 1.5 to 1.5 to 1.2 times longer than if it was a straight time. Channel length/valley length 1.0 to 1.2 CONDITION CATEGORY GRADE or SCORE stream length 1.5 to 1.5														
right facing downstream) recently exposed roots; no recent tree falls; continu	(
elsewhere; 30-60% of bank in reach has areas of erosional dank undercutting; recently exposed tree roots and fine root hairs common: Grade (Reight) 10 9 8 7 6 5 4 3 2 1 0 3 Avg.Score 2 CHANNEL ROUGHNESS FACTORS CONDITION CATEGORY GRADE or SCORE Sinuosity (bends in low gradient stream) Grade in low gradient stream) Grade 10 9 8 7 6 5 4 3 2 1 0 3 Avg.Score 2 CONDITION CATEGORY GRADE or SCORE The bends in the stream increase the stream		recently e		; no recent	exposed tre	ee roots rare	but present.							
Barbour, Condition Category GRADE or SCORE Condition Catego	downstream)		tree falls;							bank slou			as	District, 2
Undercutting; recently exposed tree roots and fine monthairs common: Grade (Left) 10 9 8 7 6 5 4 3 2 1 0 3 Grade (Right) 10 9 8 7 6 5 4 3 2 1 0 3 Avg.Score 22											0.00.0.10.	Ja. 0.		
Crade (Left) 10 9 8 7 6 5 4 3 2 1 0 3														
Condition Carage (Left) 10 9 8 7 6 5 4 3 2 1 0 3														
CANDITION CATEGORY GRADE or SCORE Suboptimal The bends in the stream increase the stream length 2.5 to 4 times longer than if it was straight. Channel length/valley length at least > 1.5. Suboptimal length/valley length 1.2 to 1.5 Suboptimal length/valley length 1.0 to 1.2.	Grade (Left)	10	9	8	7	6	5			2	1 1	0	- .	1
CHANNEL ROUGHNESS FACTORS 3a.Channel Sinuosity (bends in low gradient stream) Grade 10 9 8 7 6 5 4 3 2 1 0 2 CONDITION CATEGORY GRADE or SCORE Suboptimal Marginal Poor Channel striaght; waterway has been channelized for a long distance. Channel length/valley length at least >1.5. Grade 10 9 8 7 6 5 4 3 2 1 0 2 CONDITION CATEGORY GRADE or SCORE Suboptimal The bends in the stream increase the stream length 1.0 to 1.5 times longer than if it was a straight. Channel length/valley length 1.0 to 1.5 times longer than if it was a straight line. Channel length/valley length 1.0 to 1.2. Grade 10 9 8 7 6 5 4 3 2 1 0 2 CONDITION CATEGORY GRADE or SCORE Optimal Suboptimal Marginal Poor CONDITION CATEGORY GRADE or SCORE Optimal Suboptimal Marginal Poor CONDITION CATEGORY GRADE or SCORE Optimal Suboptimal Marginal Poor CONDITION CATEGORY GRADE or SCORE Suboptimal Marginal Poor CONDITION CATEGORY GRADE or SCORE Optimal Suboptimal Marginal Poor Condition of coarse stones and well-washed debris present, little silt; moderately stable sands, and silt common; moderately unstable sand, silt, clay, or bedrock; unstable sand, silt	Grade (Right)	10	9		7	6		4	3		1			
3a.Channel Sinuosity (bends in low gradient stream) The bends in the stream increase the stream length 2.5 to 4 times longer than if it was straight. Channel length/valley length at least >1.5. Grade 10 9 8 7 6 5 4 3 2 1 10 2 CONDITION CATEGORY GRADE or SCORE The bends in the stream increase the stream increase the stream length 2.5 to 4 times longer than if it was a straight line. Channel length 1 to 1.5 times longer than if it was a straight line. Channel length 1 to 1.5 times longer than if it was a straight line. Channel length 1 to 1.5 times longer than if it was a straight line. Channel length 1 to 1.2. Grade 10 9 8 7 6 5 4 3 2 1 0 2 CONDITION CATEGORY GRADE or SCORE Optimal Little or no channel enlargement resulting from sediment accumulation; channel is stable Some gravel bars of coarse stones and well-washed debris present, little silt; moderately stable COMPOSITION CATEGORY GRADE or SCORE Some gravel bars of coarse stones and well-washed debris present, little silt; moderately unstable CONDITION CATEGORY GRADE or SCORE Some gravel bars of coarse stones and well-washed debris present, little silt; moderately stable Channel straight; waterway has been channel straight; waterway has been channel straight; waterway has been channel straight; waterway has been channel straight; waterway has been channel straight; waterway has been channel straight; waterway has been channel straight; waterway has been channel straight; waterway has been channel straight; waterway has been channel straight; waterway has been channel straight; waterway has been channel straight; waterway has been channel straight; waterway has been channel straight; waterway has been channel straight; waterway has been channel straight; waterway has been channel straight; waterway has been channel straight; waterway has been channel straight line. Channel length 1 to 1.5 times longth; waterway has been channel straight line. Channel length 1 to 1.5 times longth; waterway has been channel straight line. Channel length 1 to 1.												Avg.Sco	ore 2	2
3a.Channel Sinuosity (bends in low gradient stream) The bends in the stream increase the stream length 2.5 to 4 times longer than if it was straight. Channel length/valley length at least >1.5. The bends in the stream increase the stream increase the stream length 2.5 to 4 times longer than if it was straight. Channel length/valley length 1.5 to 2.5 times longer than if it was a straight line. Channel length 1.0 to 1.2. Grade 10 9 8 7 6 5 4 3 2 1 0 22 CONDITION CATEGORY GRADE or SCORE Optimal Little or no channel enlargement resulting from sediment accumulation; channel is stable 3b. Bottom Substrate Composition 3c. Hong in the stream increase the	CHANNEL ROU	GHNESS	FACTORS											
Sinussity (bends in low gradient stream) The bends in the stream increase the stream length 2.5 to 4 times longer than if it was a straight. Channel length/valley length at least >1.5. Grade 10 9 8 7 6 5 4 3 2 1 0 CONDITION CATEGORY GRADE or SCORE Optimal Little or no channel enlargement substrate Composition 3b. Bottom Substrate Composition The bends in the stream increase the stream increase the stream length 1.5 to 2.5 times longer than if it was a straight line. Channel length 1 to 1.5 times longer than if it was a straight line. Channel length 1 to 1.5 times longer than if it was a straight line. Channel length 1 to 1.5 times longer than if it was a straight line. Channel length 1 to 1.5 times longer than if it was a straight line. Channel length 1 to 1.5 times longer than if it was a straight line. Channel length 1 to 1.5 times longer than if it was a straight line. Channel length/valley length 2 to 1.0 CONDITION CATEGORY GRADE or SCORE Optimal Little or no channel enlargement resulting from sediment accumulation; channel is stable Some gravel bars of coarse stones and well-washed debris present, little silt; moderately stable Some gravel bars of coarse stones and well-washed debris present, little silt; moderately stable Some gravel bars of coarse stones and well-washed debris present, little sand, and silt common; moderately unstable					CON						_			
Sinuosity (bends in low gradient stream length 2.5 to 4 times longer than if it was a straight. Channel length/valley length at least >1.5. Grade 10 9 8 7 6 5 4 3 2 1 0 22 The bends in the stream increase the stream gradient stream length 1.2 to 1.5 times length 1 to 1.5 times len	3a.Channel	The bear's '		ingran 4	Thobard				J -	Cherry		muov k = = L		EPA RBA
(bends in low gradient stream) than if it was a straight. Channel length/valley length at least >1.5. than if it was a straight line. Channel length 1.2 to 1.5 longer than if it was a straight line. Channel length 1.2 to 1.5 longer than if it was a straight line. Channel length 1.0 to 1.2. Grade 10 9 8 7 6 5 4 3 2 1 0 2 CONDITION CATEGORY GRADE or SCORE Optimal Little or no channel enlargement resulting from sediment accumulation; channel is stable Some gravel bars of coarse stones and well-washed debris present, little silt; moderately stable Composition Channel length/valley length ≤1.0 Channel length/valley length ≤1.0 Channel length/valley length ≤1.0 Some gravel bars of coarse stones and well-washed debris present, little sands, and silt common; moderately unstable Channel length/valley length ≤1.0 Channel length/valley length ≤1.0 Channel length/valley length ≤1.0 Some gravel bars of coarse stones and well-washed debris present, little sands, and silt common; moderately unstable	Sinuosity												211	
length/valley length at least >1.5. length/valley length 1.2 to 1.5 longer than if it was a straight line. Channel length/valley length 1.0 to 1.2.	(bends in low	than if it	was straight.	Channel	than if it wa	s a straight li	ne. Channel	length 1 t	o 1.5 times)	
Ingth/valley length 1.0 to 1.2. Ingth/valley length 1.0 to 1.2.		length/val	lley length at	least >1.5.	length/v	alley length	1.2 to 1.5							
Grade 10 9 8 7 6 5 4 3 2 1 0 2 CONDITION CATEGORY GRADE or SCORE Optimal Suboptimal Marginal Poor Subjective resulting from sediment accumulation; channel is stable Suboptimal accumulation; channel is stable Suboptimal silt; moderately stable Suboptimal Suboptimal Suboptimal Suboptimal Suboptimal Suboptimal Suboptimal Suboptimal Some gravel bars of coarse stones and well-washed debris present, little silt; moderately stable silt; moderately unstable sands, and silt common; moderately unstable sand, silt, clay, or bedrock; unstable Suboptimal S	000111)							length/valle	ey length 1.0					
CONDITION CATEGORY GRADE or SCORE Optimal Suboptimal Little or no channel enlargement resulting from sediment accumulation; channel is stable Some gravel bars of coarse stones and well-washed debris present, little silt; moderately stable Some gravel bars of coarse stones sand, silt common; is channelized; substrate is uniform sand, silt, clay, or bedrock; unstable KDWP, 1. Kansas Subjective Evaluation Aquatic Habitats	Grade	10	Ια	Ω	7	I 6	- F			2	1 1	0	ļ.,	2
Optimal Suboptimal Marginal Poor Little or no channel enlargement resulting from sediment accumulation; channel is stable Composition Optimal Suboptimal Marginal Poor Sediment darget of coarse stones and well-washed debris present, little salty stable Sediment bars of rocks, sands, and silt common; moderately unstable sand, and silt common; moderately unstable sand, silt, clay, or bedrock; unstable Habitats Kansas Subjective Evaluation Aquatic Habitats	Jiaue	10	J 3		I	ı.	I.				<u> </u>	ı u		
Substrate Composition Little or no channel enlargement resulting from sediment accumulation; channel is stable Some gravel bars of coarse stones and well-washed debris present, little sands, and silt common; moderately unstable Sediment bars of rocks, sands, and silt common; moderately unstable Subjective Evaluation sand, silt, clay, or bedrock; unstable Subjective Evaluation sand, silt, clay, or bedrock; unstable	-		Ontimal		CON					1	Poor			
3b. Bottom Substrate Composition resulting from sediment accumulation; channel is stable and well-washed debris present, little silt; moderately stable sands, and silt common; moderately unstable sand, silt, clay, or bedrock; unstable sand, silt, clay, or bedrock; unstable habitats			o channel en			el bars of co	arse stones	Sediment b	ars of rocks,		divided into b			
Composition Habitats														Evaluation
		accumula	auon; cnanne	ııs stadle	sılt;	moderately s	siable	moderate	ny uristable	sand, silt	, clay, or bed	поск; unstab	e	
	Composition													Habitats

				CON	IDITION CA	ATEGORY (GRADE or	SCORE					KDWP, 199
		Optimal			Suboptima	ıl	Mai	rginal		Poor			Newton et a
3c. Instream Bottom	>7 of the	tom topograp following: de gravel, logs/la	eep pools,		ottom include ed in Optima	es 5-7 of the I Category	includes < 5	el bottom 5 of the items n Optimal			ides <3 of the nal Category		1998 USDA/NRC SVAP page
Topography	debris, overhang vegetate	backwaters/oging vegetations of shallows, residuants, or siduants	oxbows, on, riffles, rootwads,					egory					SVAF page
Grade	10	9	8	7	6	5	4	3	2	1	0	2	2
				CON		ATEGORY (
or		Optimal 0.05 to 0.099	2		Suboptima 0.035 to 0.0			rginal	0.40.4	Poor		_	
3c. Manning's n	'	10 9 8				5	0.021 to 0.03 or >0.10 to 0.15		0.16 to 0.20 due to excessive obstruction to flow or 0.01 to 0.02 du to channelization and clean, smooth channel.				
Grade	10 9 8		8	7 6 5			4	3	2 1 0				
				CON	IDITION C	ATEGORY (CCORE					110405
	Optimal			CON	Suboptima			rginal		Poor	_	USACE, Norfolk	
3d. Channel	Incision ratio ≥1.0 <1.2 and Where channel slope >2%; Entrenchment			Incision ra	tio >1.2 <1.4			io <u>></u> 1.4 < 2.0	Incision rat		Where chan	nel	District, 20
Incision					ope >2%, Er			ere channel			nent ratio <1.	4;	SAAM For
(TLB/BFD=BH R; 1/BHR*Adi		i; Where chai ntrenchment r			; Where cha ntrenchment			e > 2%, nment ratio		re channel s renchment r			#1 and VT
Factor =CI)	<u>-</u> 270, 211		14.10 - 2.10	<u></u>				ere channel			<u> </u>		Stream Geomorph
,								e <u><</u> 2%, ent ratio >2.0					Assessment Phase 2
TLB =		10		BHR =	1								
BFD =	10	10	8		6	5	4	3	2	T 1	0		
Grade	10	9	0		0	5	4	3		<u> </u>	0		1
DYNAMIC SUI	RFACE WA	TER STOR	AGE										Ī
												_	Newton, et
				CON	IDITION CA	ATEGORY (GRADE or	SCORE					
		Optimal			Suboptima	ıl	Mai	rginal		Poor		<u> </u>	1998 USD
4a.Pools		shallow pools		Pools pre	Suboptima sent, but not	l abundant;	Mai Pools pr	rginal esent, but		ent, or the e	entire bottom	s	NRCS SV
(abundant,	greater than		pool bottom	Pools pre from 10-3	Suboptima	ll abundant; ol bottom is	Pools pr shallow; fro	rginal				S	NRCS SV. page 14;
	greater than	shallow pools n 30% of the	pool bottom or pools are	Pools pre from 10-3 obscure d	Suboptima sent, but not 0% of the po	abundant; ol bottom is or the pools	Pools pr shallow; fro the pool obscure du	rginal resent, but om 5-10% of bottom is e to depth, or		ent, or the e		s	NRCS SV. page 14;
(abundant, present or	greater than	shallow pools n 30% of the due to depth,	pool bottom or pools are	Pools pre from 10-3 obscure d	Suboptima sent, but not 0% of the po ue to depth,	abundant; ol bottom is or the pools	Pools pr shallow; fro the pool obscure du the pools a	rginal resent, but om 5-10% of bottom is		ent, or the e		S	NRCS SV page 14; Barbour, e
(abundant, present or	greater than	shallow pools n 30% of the due to depth,	pool bottom or pools are	Pools pre from 10-3 obscure d	Suboptima sent, but not 0% of the po ue to depth,	abundant; ol bottom is or the pools	Pools pr shallow; fro the pool obscure du the pools a	rginal resent, but om 5-10% of bottom is e to depth, or are less than		ent, or the e		is 0	Barbour, ei 1999
(abundant, present or absent)	greater than is obscure d at le	shallow pools n 30% of the due to depth, east 5 feet de	pool bottom or pools are eep.	Pools pre from 10-3 obscure d are a	Suboptima sent, but not 0% of the po ue to depth, t least 3 feet	abundant; ol bottom is or the pools deep.	Mai Pools pr shallow; from the pool obscure du the pools a 3 fee	rginal esent, but om 5-10% of bottom is e to depth, or are less than t deep.	discer	sent, or the e nible. No wa	ater = zero.		NRCS SV. page 14; Barbour, et 1999
(abundant, present or absent) Grade 4b. Channel Flow Status	greater than is obscure d at le	shallow pools n 30% of the due to depth, east 5 feet de	pool bottom or pools are eep.	Pools pre from 10-3 obscure d are a	Suboptima sent, but not 0% of the po ue to depth, it least 3 feet	abundant; ol bottom is or the pools deep.	Mai Pools pr shallow; from the pool obscure du the pools a 3 fee	rginal esent, but om 5-10% of bottom is e to depth, or are less than t deep. 3 SCORE rginal	discer	sent, or the en nible. No was	ater = zero.	0	NRCS SV. page 14; Barbour, et 1999
(abundant, present or absent) Grade 4b. Channel Flow Status (degree to	greater than is obscure do at le	shallow pools n 30% of the due to depth, east 5 feet de	pool bottom or pools are eep.	Pools pre from 10-3 obscure d are a	Suboptima sent, but not 0% of the po ue to depth, it least 3 feet 6 DITION C/ Suboptima s >75% of th	abundant; ol bottom is or the pools deep.	Mai Pools pr shallow; fir the pool obscure du the pools a 3 fee	rginal resent, but om 5-10% of 1 bottom is to to depth, or are less than t deep. 3 SCORE rginal s 25-75% of	discer	ent, or the enible. No was	onnel and mos	O	NRCS SV. page 14; Barbour, et 1999 Barbour, et
(abundant, present or absent) Grade 4b. Channel Flow Status	greater than is obscure defined at le	shallow pools n 30% of the due to depth, east 5 feet de	pool bottom or pools are eep.	Pools pre from 10-3 obscure d are a	Suboptima sent, but not 0% of the po ue to depth, it least 3 feet	abundant; of bottom is or the pools deep.	Pools pr shallow; frr the pool obscure du the pools a 3 fee 4 GRADE or : Mai Water fills the availal and /or riffl	rginal esent, but om 5-10% of bottom is e to depth, or are less than t deep. 3 SCORE rginal	discer	ent, or the enible. No was	ater = zero.	O	NRCS SV. page 14; Barbour, e: 1999 Barbour, e: 1999 Ee: 1999 Ee: 1999 Ee: 1999 Ee: 1999 E7: 1990 E7:
(abundant, present or absent) Grade 4b. Channel Flow Status (degree to which channel	greater than is obscure defined at le	shallow pools n 30% of the due to depth, east 5 feet de 9 Optimal ches base of nd minimal ai	pool bottom or pools are eep.	Pools pre from 10-3 obscure d are a	Suboptima sent, but not 0% of the po ue to depth, it least 3 feet 6 DITION C/ Suboptima s >75% of th	abundant; of bottom is or the pools deep.	Pools pr shallow; frr the pool obscure du the pools a 3 fee 4 GRADE or : Mai Water fills the availal and /or riffl	rginal resent, but own 5-10% of bottom is e to depth, or are less than t deep. 3 SCORE rginal 2 25-75% of ble channel, e substrates	discer	ent, or the enible. No was a sent, or the enible. No was a sent of the enible of the e	onnel and mos	O tity	NRCS SV. page 14; Barbour, ei 1999 Barbour, ei 1999 EPA RBA page /A-9#5; TC 1999; VAN
(abundant, present or absent) Grade 4b. Channel Flow Status (degree to which channel is filled)	greater than is obscure d at le	shallow pools n 30% of the due to depth, east 5 feet do 9 Optimal ches base of ind minimal a substrate is 6	pool bottom or pools are eep. 8 both lower impount of exposed.	Pools prefrom 10-3 obscure d are a 7 CON Water fill: channe sub	Suboptima sent, but noto yow of the pour to depth, tt least 3 feet 6	abundant; ol bottom is or the pools deep. 5 ATEGORY (il e available is channel osed.	Mai Pools pr shallow; frr shallow; frr the pool s a 3 fee 4 4 GRADE or Mai Water fills the availal and for riff are most!	rginal esent, but own 5-10% of bottom is e to depth, or are less than t deep. 3 SCORE rginal a 25-75% of ble channel, e substrates y exposed.	discer 2 Very little very present as	Poor water in char standing poor zero.	0 nnel and mosols. No water	O tity	NRCS SV, page 14; Barbour, et 1999
(abundant, present or absent) Grade 4b. Channel Flow Status (degree to which channel is filled)	greater than is obscure d at le	shallow pools n 30% of the due to depth, east 5 feet do 9 Optimal ches base of ind minimal a substrate is 6	pool bottom or pools are eep. 8 both lower impount of exposed.	Pools prefrom 10-3 obscure d are a 7 CON Water fill: channe sub	Suboptima sent, but not yow of the po ue to depth, tt least 3 feet 6 IDITION C/ Suboptima > 75% of th ; or <25% of strate is expe	abundant; abundant; abundant; oli bottom is or the pools deep. 5 ATEGORY (II e available ichannel osed. 5	Mai Pools pr Shallow; fri the pool obscure du the pools a 3 fee 4 GRADE or Mai Water fills the availal and for riffl are mostl	rginal esent, but own 5-10% of bottom is e to depth, or are less than t deep. 3 SCORE rginal a 25-75% of ble channel, e substrates y exposed.	discer 2 Very little v present as	Poor water in chan standing po zero.	0 nnel and mosols. No wate	tty r =	NRCS SV, page 14; Barbour, et 1999 Barbour, et 1999 EPA RBA page /A-9#5; TC 1999; VAN 2005

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	TER QUALITY/E VARIABLES	BIOGEOCH	HEMICAL F	UNCTIONS		_		N6-TRIB1					SCORE	Referer
	TYPE													Source
	NOTES												1	
1.	SEDIMENT TR	ANSPORT	/DEPOSIT	ION									Ī	
													Ĭ	
					CO	NDITION C	ATEGORY (SRADE or S	CORE					Newtor
	1a. Bank		Optimal			Suboptima			rginal		Poor			et al.,
	Stability			of erosion or			equent, small		unstable; 30-			l areas; "raw"		1998
	(score each			minimal; little			healed over.		k in reach has		equently alor			USDA/I
	bank, left or		hank affecte	lems. <5% of	5-30% 01 0	erosion.	has areas of		erosion; high tential during		and bends; o g; 60-100% o			CS SV
	right facing		Darik allecte	u.		erosion.			ods.		erosional sca			page 10
	downstream)								000.	`	51 001011a1 000			Barbou
														et al.,
	O	40		Т о	7		-	4	2	0	1	1 0	4	1999 E
	Grade (Left)	10	9	8	7	6	5	4	3	2	1	0	1	-
	Grade (Right)	10	9	8	7	6	5	4	3	2	1	0	3	
												Avg.Score	2	
					001	UDITION O	ATEOODY (204050	20005					o ""
			0		001		ATEGORY (1	D			Galli,
-	1b. Channel	Dettern	Optimal 1/3 of bank is		Detter	Suboptima 1/3 of bank is			rginal 3 of bank is	Dettern	Poor 1/3 of bank is		_	1996
ğ	Bottom Bank		istant plant/s				ix or material.		ighly erodible		odible materia			Wash-
ă.	Stability	I lightly 165	material.	SOII IIIAIIIX OI	resistant pi	anivson main	ix oi illatellat.		ant/soil matrix		severely com			COG
>									romised.			,		RSAT
)ne								'						No. 1
Enter Score for Only One Variable	Grade (Left)	10	9	8	7	6	5	4	3	2	1	0	0	ī
2	Grade (Right)	10	9	8	7	6	5	4	3	2	1	0		
'n	()			,		-1						Avg.Score	0)
efc												<u> </u>		1
ğ	or				CO	NDITION C	ATEGORY (GRADE or S	CORE					Barbou
Ñ	1c. Channel		Optimal			Suboptima	al	Ma	rginal		Poor			et al.,
ţe	Sediments or	>50% gr	avel or large	r substrate;	30-50% g	ravel or large	er substrate;	10-29.9% g	ravel or larger	Substrate	is uniform sa	and, silt, clay,		1999;
ш	Substrate		bble boulder			substrate ty			e; dominant	or	bedrock; uns	stable		Peters
	Composition	substrate	type is grav	el or larger;	5	h some finer			oe is finer than					et al.,
			stable		m	oderately sta	able	gravel, but	may still be a					1992
	Grade	10	9	8	7	6	5	4	3	2	1	0	0	1
2	WATER APPE	ARANCE:	Clarity or V	/isibility										
					CO	NDITION C	ATEGORY (GRADE or S	CORE					Newton
			Optimal			Suboptima			rginal		Poor			et al.,
				tea-colored;			specially after		le cloudiness		or muddy app			1998
				3-6 feet (less		ent, but clea			time; objects			depth <0.5 ft; bright-green;		USDA
	Water Clarity		colorea); no (e;no noticeab	oil sheen on		ible at depth ghtly green c	1.5-3 ft; may		epth 0.5-1.5 ft; ns may appear		us water pollu			NRCS
	•		rged objects			n on water s			bottom rocks	algal mats, s	urface scum,	sheen or heavy	,	SVAP
		Cubino	.god objecte	01 1001101	000		arrace.		ed objected	coat of foa	am on surface	. No water =		page 1
									d with film.		zero.			
					1									
	Grade	10	9	8	7	6	5	4	3	2	1	0	0	đ
					· · ·			, ,			· · ·			1
3	PRESENCE OF	F AQUATION	C VEGETA	TION: Prese	ence and P	ercent Cove	erage						†	
J				2 1.000									1	
					CO	NDITION C	ATEGORY (SRADE or S	CORE				İ	Newto
			Optimal			Suboptima			rginal		Poor			et al.,
Ď		Clear wa	ater along en	tire reach:	Fairly clear		reenish water		ter along entire	Pea green.	, gray, or brow	n water along	1	1998
2	3a. Nutrient		aquatic plant			re reach; mo		reach; overab	undance of lush	entire	reach; dense :	stands of		USDA
g	Enrichment	includes	low quantati	es of many		on stream su			hytes; abundant		es clog stream			NRCS
טַ				es; little algal					th, especially		ate thick algal i ae present due	mats in stream		SVAP
5		9	growth prese	ent.				uuring war	mer months.		ae present due rate. No wate			page 1
		1								0.0001				Page
È					1		-	1	3	2	1			1
Î	Grada	40	Ι ο		7					. /				
	Grade	10	9	8	7	6	5	4	3		1	0		
	Grade	10	9	8	l.	1					'	1 0		D. 1:
Score for Oilly		10	1	8	l.	NDITION C	ATEGORY (GRADE or S	CORE	_		0		
er score for Only o	or		Optimal		CO	NDITION C	ATEGORY (GRADE or S Ma	CORE rginal		Poor			et al.,
Enter Score for Only One Variable	Or 3b. Aquatic	When pre	Optimal esent, aquation	c vegetation	COI Algae do	NDITION Constitution Suboptima communication por suboptima	ATEGORY (GRADE or S Ma Algal mats p	CORE rginal present, some	Algal ma	Poor ats cover bott	tom, larger		et al., 1992
	or	When pre	Optimal sent, aquation of moss and	c vegetation	COI Algae do	NDITION C	ATEGORY (GRADE or S Ma Algal mats p	CORE rginal	Algal ma	Poor ats cover bott	tom, larger annel or NO	-	et al., 1992 RCE f
	Or 3b. Aquatic	When pre	Optimal esent, aquation	c vegetation	COI Algae do	NDITION Constitution Suboptima communication por suboptima	ATEGORY (GRADE or S Ma Algal mats p	CORE rginal present, some	Algal ma plants don algae p	Poor ats cover both ninate the ch	tom, larger lannel or NO o unstable		
	Or 3b. Aquatic	When pre	Optimal sent, aquation of moss and	c vegetation	COI Algae do	NDITION Constitution Suboptima communication por suboptima	ATEGORY (GRADE or S Ma Algal mats p	CORE rginal present, some	Algal ma plants don algae p	Poor ats cover bott ninate the ch resent due to	tom, larger lannel or NO o unstable	0	et al., 1992 RCE fo No. 13

		0		CON			GRADE or S		1			F
	Maiakraa	Optimal onsisting of le		Laguage	Suboptima and wood sc			rginal s or woody	Fine area	Poor anic sedimen	t blook in	е
		l without sed			ebris without		debris; coa organic	arse and fine matter with iment.	color and fo	oul odor (ana	erobic) or no	1 R
Grade	10	9	8	7	6	5	4	3	2	1	0	0
LAND USE PA	TTERN: Be	yond Imme	diate Ripari	an Zone								
				CON			GRADE or S					F
		Optimal		_	Suboptima			rginal .		Poor		е
		ed, consisting ive prairie, ar wetlands.			ent pasture n and swamp crops		pasture; se areas may b	v crops and ome wooded be present but ed patches	IV	lainly row cro	ops	1 R N
Grade (Left)	10	9	8	7	6	5	4	3	2	1	0	3
Grade (Right)	10	9	8	7	6	5	4	3	2	1	0	3
											Avg.Score	3
RIPARIAN ZOI	VIE WIEITI	AND CONT	11401111	CON	NDITION CA	ATEGORY (GRADE or S	CORE				В
6a. Riparian		Optimal			Suboptima	ıl	Ma	rginal		Poor		а
Zone Width (from stream edge to field)	channel widtl grasses), h	arian zone >18 hs with trees, s human activitie impacted zone	shrubs, or tall es have not	1 active char grasses), hur	nel width w/tre	8 meters (1/2- ees, shrubs, or have minimally e.	meters (1, channel wid	arian zone 6-12 /3-1/2 active lth vegetated), numan activities.	vegation le width), little	rian zone < 6 r ss than 1/3 ac riparian vege numan activitie	tation due to	1. P e R
(from stream edge to field)	channel widtl grasses), h i	hs with trees, shuman activities impacted zone	shrubs, or tall es have not e.	1 active char grasses), hur	nnel width w/tre nan activities l impacted zone	ees, shrubs, or have minimally e.	meters (1, channel wid impacted by h	/3-1/2 active Ith vegetated), numan activities.	vegation le width), little h	ss than 1/3 ac riparian vege	etation due to ess.	P e R U
(from stream edge to field) Grade (left)	channel widtl grasses), h	hs with trees, : human activitie	shrubs, or tall es have not	1 active char grasses), hur	nnel width w/tre	ees, shrubs, or have minimally	meters (1, channel wid	/3-1/2 active Ith vegetated),	vegation le width), little	ss than 1/3 ac riparian vege numan activitie	ctive channel etation due to	F e R U
(from stream edge to field) Grade (left)	channel widt grasses), h i	hs with trees, shuman activities impacted zone	shrubs, or tall es have not e.	1 active char grasses), hur	nnel width w/tre nan activities l impacted zone	ees, shrubs, or have minimally e.	meters (1, channel wid impacted by h	/3-1/2 active lth vegetated), numan activities.	vegation le width), little h	ss than 1/3 ac riparian vege numan activitie	etive channel station due to es.	P e R U
(from stream edge to field) Grade (left)	channel widt grasses), h i	hs with trees, shuman activities impacted zone	shrubs, or tall es have not e.	1 active char grasses), hur	nnel width w/tre nan activities I impacted zone 6 6	ees, shrubs, or have minimally e. 5	meters (1, channel wid impacted by h	/3-1/2 active (th vegetated), numan activities.	vegation le width), little h	ss than 1/3 ac riparian vege numan activitie	etive channel etation due to es.	4 4
(from stream edge to field) Grade (left) Grade (Right)	channel width grasses), r i	hs with trees, shuman activities impacted zone 9 9	shrubs, or tall es have not s	1 active char grasses), hur	nnel width w/tre nan activities I impacted zone 6 6 NDITION C/ Suboptima	ees, shrubs, or have minimally e. 5 5 ATEGORY (meters (1. channel wid impacted by h	/3-1/2 active (th vegetated), numan activities. 3 3 3 SCORE rginal	vegation le width), little h	ss than 1/3 ac riparian vege numan activitie	tive channel station due to es. 0 0 Avg.Score	4 4 4
(from stream edge to field) Grade (left) Grade (Right) 6b. Riparian Zone Vegetation Protection/	channel widti grasses), i 10 10 10 >90% plant shrubs, prairi riparian zon	hs with trees, shuman activities impacted zone	shrubs, or tall as have not	1 active char grasses), hur 7 7 CON 75-90% streyoung specie trees behir	nnel width w/tre nan activities I impacted zone 6 6 NDITION C/ Suboptima	ees, shrubs, or have minimally a	meters (1. channel wichannel wichannel wichannel wichannel wichannel with a series of the series of	/3-1/2 active lth vegetated), numan activities.	vegation le width), little le width), little le le vidth), little le le vidth), litt	ss than 1/3 ac riparian vege uman activitie 1 1 Poor % streambar onsisting mos! w trees & shru	tive channel tation due to ass. 0 0 Avg.Score nk vegetation tity of pasture ubs; low plant ed with guillies	4 4 4 6
(from stream edge to field) Grade (left) Grade (Right) 6b. Riparian Zone Vegetation Protection/ Completeness	channel widti grasses), i 10 10 10 >90% plant shrubs, prairi riparian zon	hs with trees, shuman activities impacted zone 9 9 Optimal density of mail degrasses, or ne intact or dis	shrubs, or tall as have not	1 active char grasses), hur 7 7 CON 75-90% streyoung specie trees behir	nel width w/tre nan activities I impacted zone 6 6 NDITION C/ Suboptima eambank vege ss along chann d; disruption curring at inter	ees, shrubs, or have minimally a	meters (1. channel wichannel wichannel wichannel wichannel wichannel with a series of the series of	/3-1/2 active th vegetated), numan activities. 3 3 3 GCORE rginal streambank mixed grasses young tree or cies; breaks h some guillies	vegation le width), little le width), little le le vidth), little le le vidth), litt	ss than 1/3 ac riparian vege numan activitie 1 1 Poor 0% streambar onsisting most w trees & shru k deeply scarn	tive channel tation due to ass. 0 0 Avg.Score nk vegetation tity of pasture ubs; low plant ed with guillies	4 4 4 4 E e 1 R F
(from stream edge to field) Grade (left) Grade (Right) 6b. Riparian Zone Vegetation	channel widti grasses), f 10 10 10 >90% plant shrubs, prairi riparian zor grazii	hs with trees, numan activitie impacted zone 9 9 9 Optimal density of ma lee grasses, or ne intact or dis ng/mowing min	shrubs, or tall se have not 8 8 8 uture trees or marsh plants, ruption from nimal.	1 active char grasses), hur 7 7 7 CON 75-90% strr young specie trees behit breaks oc	nel width w/tre nan activities I impacted zone 6 6 6 NDITION C/ Suboptima sambank vege salong chann nd; disruption curring at inter meters.	ees, shrubs, or have minimally be. 5 5 4TEGORY (Ill tattion, mixed the land mature evident with rvals of >50	meters (1 channel wid impacted by have a channel wid impacted by have a channel wid impacted by have a channel with a channel with a channel meters and sparse shrub spe frequent with and scars event and scars event with a channel	/3-1/2 active tith vegetated), numan activities. 3 3 3 GCORE rginal streambank mixed grasses young tree or cies; breaks h some gullies very 50 meters.	Less than 5 coverage c grasses, fe density; banl	ss than 1/3 ac riparian vege numan activitie 1 1 1 Poor 0% streambar onsisting mosi w trees & shru k deeply scarr I along its leng	tive channel tation due to be seen a consistency of the consistency of	4 4 4 4 5 6 6 1 1 R F 6 1 1 R 8

II. WATER QUALITY/BIOGEOCHEMICAL FUNCTIONS

N6-TRIB1

1 FLOW REGII	III. HABITAT FI										
TYPE		Perennial		Intermitte	ent w/ Perer	nial Pools	Interm	nittent		Ephemera	al
Grade	10	9	8	7	6	5	4	3	2	1	0
2 EPIFAUNAL	CLIDOTD ATE /A	VAILABLE CO	OVED.								
2 EPIFAUNAL	SUBSTRATE/A	Optimal Optimal	JVER		Suboptima	ı	Marg	ninal	1	Poor	
		n bed, greater t		Within strea)% coverage	Within stream		Less than	n 10% habita	at features
		stable habitat			abitat feature		coverage by				it is obvious;
	favorable for s and/or fish/amp				faunal coloniz pian cover. N		features favora faunal colonia			e unstable o	or lacking; els. Habitat
		transient. Feat			t transient. (S		fish/amphibian				ed or lacking,
	include snags,				ory for habitat		availability ma		channel	l bottom ma	y be flat.
	banks, roots, co packs, pools a				components)	desirable, sub- frequently dis-				
		tage to allow co					Excellent Cated				
							feature con	nponents.)			
Grade	10	9	8	7	6	5	4	3	2	1	0
	TTOM SUBSTR	•									
3 STREAM BO		Optimal			Suboptima		Marg			Poor	
	Mixture of subsi	strate materials, I prevalent; root			soft sand, m be dominant		All mud or clay of little or no ro			clay or bedr ubmerged v	ock; no root
		d vegetation co			submerged		submerged		mat or or	abilioigoa v	ogotation.
					present.						
Grade	10	a	8	7	6	5	4	3	2	1	0
	•		. 0	, ,	. 0	, ,	-	, ,	. 4		, 0
4 POOL VARIA	BILITY	Optimal			Suboptima	I	Marg	ginal		Poor	
		arge-shallow, la		Majority o	f pools large	deep; very	Shallow pools	s much more		f pools smal	Il-shallow or
	small-shallow,	small-deep po	ols present		few shallow		prevalent that	n deep pools		pools abser	nt
Grade	10	9	8	7	6	5	4	3	2	1	0
5 SEDIMENT D	DEPOSITION/SO	Optimal Optimal		1	Suboptima		Marg	nin al	ı	Poor	
	<5% of channel	bottom affected	by scour or	5-30% affe	cted by scour of		30-50% affecte		More than 50		om in a state of
		deposition.		Scour at cor	strictions and	wehre grades	deposition. Depo				arlong. Pools
				steepen.	Some depositi	on in pools	obstructions, co bends. Some			sent due to he xcessive sco	eavy deposition uring.
								3 - 1			
Grade	10	9	8	7	6	5	4	3	2	1	0
6 CHANNEL FI	OW STATUS								ı		
	Water reache	Optimal es the base of b	oth lower	Water fills	>75% of the		Marg Water fills 25		Very little v	Poor vater in the	channel and
	banks; <5% of cl				of channel sul		available chann				ding pools; or
					exposed		substrates are r	mostly exposed	:	stream is dr	ry
Grade	10	9	8	7	6	5	4	3	2	1	0
Grade 7 CHANNEL A		9	8	7		•		· · · ·	2	1	0
	LTERATION	9 Optimal		, 	6 Suboptima	ı	4 Marg Alteration or cha	ginal		1 Poor ed with gabi	0 ion, riprap, or
	Channelizatio absent or mir	on, alteration, or nimal; normal a	dredging nd stable	Some alte	Suboptima eration or cha t, usually adj	I nnelization acent to	Març Alteration or cha be extensive; e	ginal innelization may embankments	Banks shore concrete.	ed with gabi Concrete or	ion, riprap, or r riprap lined
	Channelizatio absent or mir stream means	on, alteration, or nimal; normal a der pattern. Alt	dredging nd stable eration by	Some alte	Suboptima eration or cha it, usually adjures, (such as	I nnelization acent to bridge	Marg Alteration or cha be extensive; e (including spoil p	ginal innelization may embankments piles) or shoring	Banks shore concrete.	ed with gabi Concrete or els. Instrean	ion, riprap, or r riprap lined n habitat
	Channelizatio absent or mir stream means	on, alteration, or nimal; normal a	dredging nd stable eration by	Some alter present structurabutments	Suboptima eration or cha t, usually adj	I nnelization acent to bridge evidence of	Març Alteration or cha be extensive; e	ginal unnelization may embankments piles) or shoring esent on both	Banks short concrete. channe significantly	ed with gabi Concrete or els. Instrean	ion, riprap, or r riprap lined n habitat stormwater or
	Channelizatio absent or mir stream means	on, alteration, or nimal; normal a der pattern. Alt	dredging nd stable eration by	Some alter present structurabutments past alterarmay be pre	Suboptima eration or cha it, usually adjures, (such as or culverts); tion, (I.e., cha esent, but stre	I nnelization acent to s bridge evidence of annelization) eam pattern	Marg Alteration or cha be extensive; e (including spoil p structures pre banks; normal meander pat	ginal Innelization may	Banks shore concrete. channe significantly other inp	ed with gabi Concrete or els. Instrean altered by s	ion, riprap, or r riprap lined n habitat stormwater or 80% of the
	Channelizatio absent or mir stream means	on, alteration, or nimal; normal a der pattern. Alt	dredging nd stable eration by	Some alteration of the structure of the	Suboptima eration or cha tt, usually adjures, (such as or culverts); tion, (I.e., cha esent, but struy have recov	I nnelization acent to bridge evidence of annelization) eam pattern ered; recent	Marg Alteration or cha be extensive; & (including spoil p structures push banks; normal meander pat recovered. A	ginal gi	Banks shore concrete. channe significantly other inp	ed with gabi Concrete or els. Instrean altered by s outs. Over 8	ion, riprap, or r riprap lined n habitat stormwater or 80% of the
	Channelizatio absent or mir stream means	on, alteration, or nimal; normal a der pattern. Alt	dredging nd stable eration by	Some alter presen structure abutments past altera may be pre and stabilit alteration	Suboptima eration or cha it, usually adjures, (such as or culverts); tion, (I.e., cha esent, but stre	I nnelization acent to shridge evidence of annelization) eam pattern ered; recent nt. Minor	Marg Alteration or cha be extensive; ((including spoil) structures pre banks; normal meander pat recovered. A stormwater ir extensive. 40-0	ginal Innelization may embankments oiles) or shoring esent on both stable stream ttern has not literation from nputs may be 80% of stream	Banks shore concrete. channe significantly other inp	ed with gabi Concrete or els. Instrean altered by s outs. Over 8	ion, riprap, or r riprap lined n habitat stormwater or 80% of the
	Channelizatio absent or mir stream means	on, alteration, or nimal; normal a der pattern. Alt	dredging nd stable eration by	Some alter presen structure abutments past altera may be pre and stabilit alteration	Suboptima eration or cha it, usually adj ures, (such as or culverts); tion, (I.e., cha esent, but strr y have recov n is not prese	I nnelization acent to shridge evidence of annelization) eam pattern ered; recent nt. Minor	Marg Alteration or cha be extensive; & (including spoil structures pre banks; normal meander par recovered. A stormwater in	ginal Innelization may embankments oiles) or shoring esent on both stable stream ttern has not literation from nputs may be 80% of stream	Banks shore concrete. channe significantly other inp	ed with gabi Concrete or els. Instrean altered by s outs. Over 8	ion, riprap, or r riprap lined n habitat stormwater or 80% of the
	Channelizatio absent or mir stream means	on, alteration, or nimal; normal a der pattern. Alt	dredging nd stable eration by	Some alter presen structure abutments past altera may be pre and stabilit alteration	Suboptima eration or cha it, usually adj ures, (such as or culverts); ion, (l.e., cha esent, but strn y have recov n is not prese rom stormwa	I nnelization acent to shridge evidence of annelization) eam pattern ered; recent nt. Minor	Marg Alteration or cha be extensive; ((including spoil) structures pre banks; normal meander pat recovered. A stormwater ir extensive. 40-0	ginal Innelization may embankments oiles) or shoring esent on both stable stream ttern has not literation from nputs may be 80% of stream	Banks shore concrete. channe significantly other inp	ed with gabi Concrete or els. Instrean altered by s outs. Over 8	ion, riprap, or r riprap lined n habitat stormwater or 80% of the
	Channelizatio absent or mir stream means	on, alteration, or nimal; normal a der pattern. Alt	dredging nd stable eration by	Some alter presen structure abutments past altera may be pre and stabilit alteration	Suboptima eration or cha it, usually adj ures, (such as or culverts); ion, (l.e., cha esent, but strn y have recov n is not prese rom stormwa	I nnelization acent to shridge evidence of annelization) eam pattern ered; recent nt. Minor	Marg Alteration or cha be extensive; ((including spoil) structures pre banks; normal meander pat recovered. A stormwater ir extensive. 40-0	ginal Innelization may embankments oiles) or shoring esent on both stable stream ttern has not literation from nputs may be 80% of stream	Banks shore concrete. channe significantly other inp	ed with gabi Concrete or els. Instrean altered by s outs. Over 8	ion, riprap, or r riprap lined n habitat stormwater or 80% of the
	Channelizatio absent or mir stream means	on, alteration, or nimal; normal a der pattern. Alt	dredging nd stable eration by	Some alter presen structure abutments past altera may be pre and stabilit alteration	Suboptima eration or cha it, usually adj ures, (such as or culverts); ion, (l.e., cha esent, but strn y have recov n is not prese rom stormwa	I nnelization acent to shridge evidence of annelization) eam pattern ered; recent nt. Minor	Marg Alteration or cha be extensive; ((including spoil) structures pre banks; normal meander pat recovered. A stormwater ir extensive. 40-0	ginal Innelization may embankments oiles) or shoring esent on both stable stream ttern has not literation from nputs may be 80% of stream	Banks shore concrete. channe significantly other inp	ed with gabi Concrete or els. Instrean altered by s outs. Over 8	ion, riprap, or r riprap lined n habitat stormwater or 80% of the

	8 CHANNEL S												_	1
			Optimal			Suboptima			rginal		Poor			
		The bends in the stream length 3 to			in the stream	increase the mes longer		in the stream stream 1 to 2		aight; waterv zed for a long		1	Barbour, et al. 1999	
		was in a straigl	ht line. (Note	e - channel		it was in a str		times longer th	nan if it was in a			,		RBA #7b;
		braiding is cons plains and other						straig	ght line					Parsons, et
		parameter is n	ot easily rate	ed in these										al., 2001 AUSRIVAS
			areas).											, LOUINIVAS
	Grade	10	9	8	7	6	5	4	3	2	1	0	2	1
		ILITY (SCORE EA	ACH DANK	\										
	9 DAINK STADI		Optimal			Suboptima			rginal		Poor			
		Banks stable; evi failure absent o				ly stable; infre			stable; perennial vaterline sparse		no perennial v severe eros			Barbour, et al. 1999
		affected), perenni	ial vegetation	n to waterline;	5-30% of I	oank in reach	has areas of	(mainly scoure	d or stripped by	banks; red	ently expose	d tree roots		RBA #8;
		no raw or undercu outside of me				r erosion and ng; perennial	or bank vegetation to		n), bank held by s (trees, rock		tree falls and t trees comm			Parsons, et
		recently exposed	roots; no rec	ent tree falls;		in most plac			d eroded back -60% of bank in		eas; "raw" are ight sections			al., 2001 AUSRIVAS;
					exposed to	ree roots rare	but present.	reach has area	s of erosion and	obvious ba	nk sloughing;	60-100% of		USACE
									utting; recently oots and fine root		has erosiona	I scars.		Norfolk District,
								hairs commo	n; high erosion					2004 SAM
								potential d	uring floods					#3; Scholz
														and Booth from
	Crosts	40	1 ^		-		1 -			_		_	 	Henshaw,
	Grade Grade	10 10	9	8	7	6	5 5	4	3	2	1	0	3	†
											Avg.Score		2	
,	10 VEGETATIVI	E PROTECTION	(SCORE FA	ACH BANK)									1	
			Optimal			Suboptima			rginal		Poor		1	
		More than 90% of and immediate ri				f the streamb native veget			ne streambank ed by vegetation;		50% of the s			Barbour, et al. 1999
		native vegeta	ation, includir	ng trees,	class	of plants is r	ot well-	disruption obvi	ious; patches of	disruption	of streamban	k vegetation		RBA #9;
		understory s macrophytes; veg				ed; disruptior ecting full pla			losely cropped nmon; less than		gh; vegetation 5 centimeter			Parsons, et
		grazing or mowing almost all plants	ng minimal or	not evident;	potential	to any great or half of the po	extent; more	one-half of the	potential plant th remaining.		age stubble l			al., 2001 AUSRIVAS;
		airiost aii piarits	allowed to gr	ow naturally.		ble height ren		Stubble field	in remaining.					KDWP
														2000; Petersen,
	1	1			1			ī		1			1	
	-													et al., 1992
	Grade	10	9	8	7	6	5	4	3	2	1 1	0	4	et al., 1992
	Grade Grade	10 10	9	8	7	6	5 5	4 4	3	2 2	1 1 Avg.Score	0	4 4	et al., 1992
1	Grade	10	9	8	7 7						1 1 Avg.Score	0	4 4	et al., 1992
1	Grade	10 ONE (SCORE EA	9 ACH BANK) Optimal	8		6 Suboptima	5 al	4 Mar	3 rginal	2	Poor	0	4 4	
1	Grade	10 ONE (SCORE EA	9 ACH BANK) Optimal zone >18 me	8 eters; human	Width of ri	6	5 al 2-18 meters;	4 Mar Width of ripar	3	2 Width of		0 <6 meters;	4 4	Barbour, et
1	Grade	ONE (SCORE EA	9 ACH BANK) Optimal zone >18 me king lots, roa rops) have n	8 eters; human idbeds, clear-	Width of ri	6 Suboptima parian zone 1	5 al 2-18 meters; npacted zone	4 Mar Width of ripar meters; humar	rginal rian zone 6-12	2 Width of little or no	Poor iparian zone	<6 meters;	4 4	Barbour, et al., 1999 RBA #10;
1	Grade	ONE (SCORE EA	9 ACH BANK) Optimal zone >18 me king lots, roa	8 eters; human idbeds, clear-	Width of ri	Suboptima parian zone 1 ivities have in	5 al 2-18 meters; npacted zone	4 Mar Width of ripar meters; humar	rginal rian zone 6-12 n activities have	2 Width of little or no	Poor iparian zone iparian vege	<6 meters;	4 4	Barbour, et al., 1999 RBA #10; Parsons, et
1	Grade	ONE (SCORE EA	9 ACH BANK) Optimal zone >18 me king lots, roa rops) have n	8 eters; human idbeds, clear-	Width of ri	Suboptima parian zone 1 ivities have in	5 al 2-18 meters; npacted zone	4 Mar Width of ripar meters; humar	rginal rian zone 6-12 n activities have	2 Width of little or no	Poor iparian zone iparian vege	<6 meters;	4 4 4	Barbour, et al., 1999 RBA #10;
1	Grade RIPARIAN Z	ONE (SCORE EA Width of riparian activities (I.e., par cuts, lawns, or c	9 ACH BANK) Optimal zone >18 me king lots, roa rops) have n zone.	8 eters; human dbeds, clear-ot impacted	Width of ri	Suboptima parian zone 1 ivities have in only minimal	5 2-18 meters; npacted zone y).	Mar Width of ripar meters; humar impacted zon	rginal rian zone 6-12 n activities have ue a great deal.	Width of little or no	Poor iparian zone iparian vege	<6 meters; tation due to es.	4 4 4	Barbour, et al., 1999 RBA #10; Parsons, et al., 2001
1	Grade	ONE (SCORE EA Width of riparian activities (i.e., par cuts, lawns, or c	9 ACH BANK) Optimal zone >18 me king lots, roa rops) have n zone.	8 eters; human idbeds, clear- oot impacted	Width of ri	Suboptima parian zone 1 ivities have in only minimal	al 2-18 meters; npacted zone y).	Mar Width of ripar meters; humar impacted zon	rginal rian zone 6-12 n activities have le a great deal.	Width of little or no	Poor iparian zone iparian vege uman activiti	<6 meters; tation due to es.	4 4 4	Barbour, et al., 1999 RBA #10; Parsons, et al., 2001
	Grade Grade Grade Grade Grade	ONE (SCORE EA Width of riparian activities (i.e., par cuts, lawns, or c	9 ACH BANK) Optimal zone >18 me king lots, roa rops) have n zone.	eters; human ddbeds, clear- ot impacted	Width of ri human act	Suboptima parian zone 1 ivities have in only minimal	5 2-18 meters; npacted zone y).	Mar Width of ripar meters; humar impacted zon	rginal rian zone 6-12 n activities have ue a great deal.	Width of little or no	Poor iparian zone iparian vege	<6 meters; tation due to es.	4 4 4 4	Barbour, et al., 1999 RBA #10; Parsons, et al., 2001 AUSRIVAS
	Grade Grade Grade Grade Grade	ONE (SCORE EA Width of riparian activities (I.e., par cuts, lawns, or c	9 ACH BANK) Optimal zone >18 me king lots, roa rops) have n zone.	eters; human ddbeds, clear- ot impacted	Width of ri human act	Suboptima parian zone 1 ivities have in only minimal	al 2-18 meters; pacted zone y).	Mar Width of ripar meters; humar impacted zon	rginal rian zone 6-12 n activities have le a great deal.	Width of little or no	Poor iparian zone riparian vege uman activiti 1 1 Avg.Score	<6 meters; tation due to es.	4 4 4 4	Barbour, et al., 1999 RBA #10; Parsons, et al., 2001
	Grade Grade Grade Grade Grade	ONE (SCORE EA Width of riparian activities (i.e., par cuts, lawns, or c	9 ACH BANK) Optimal zone >18 ms (king lots, roa rops) have n zone. 9 9 9 ION (SCOF Optimal h>3 inches) i	eters; human dibeds, clear-ot impacted 8 8 8 RE EACH BA	Width of ri human act	Suboptimparian zone tivities have in only minimal	al 2-18 meters; ppacted zone y).	Mar Width of ripal meters; human impacted zon 4 4 Tree stratum	rginal rian zone 6-12 n activities have ue a great deal. 3 3 3 ginal (dbh>3 inches)	Width of little or no	Poor iparian zone riparian vege uman activiti 1 1 1 Avg.Score	<6 meters; tation due to es.	4 4 4 4	Barbour, et al., 1999 RBA #10; Parsons, et al., 2001 AUSRIVAS Norfolk SAAM Form 1
	Grade Grade Grade Grade Grade	ONE (SCORE EA Width of riparian activities (I.e., par cuts, lawns, or c 10 10 Tree stratum (db >60% tree canop layers may in	9 ACH BANK) Optimal Zone > 18 me king lots, roa zone > 18 me zone, In March Solution 9 9 ION (SCOF Optimal h>3 inches) y coure. (Ad cloude: saplin	eters; human dbeds, clear-ot impacted 8 8 8 RE EACH BA present, with ditional forest g, shrub,	Width of ri human act 7 7 7	Suboptima parian zone : vivities have in only minimal 6 6 6 Suboptima (dbh-3) into 60 60% tree c Excellent Cat	al 2-18 meters; ppacted zone y).	4 Width of ripar meters; humar impacted zon 4 4 4 Tree stratum present, with < cover. (See Ex-	ginal rian zone 6-12 n activities have te a great deal. 3 3 3 ginal (dbh>3 inches) 30% tree canopy	Width of little or no h	Poor iparian zone iparian vege uman activiti 1 1 Avg.Score Poor tum absent; oplands, mir d streams, m	<6 meters; tation due to es. 0 0 impervious e spoil lands owed and	4 4 4 4	Barbour, et al., 1999 RBA #10; Parsons, et al., 2001 AUSRIVAS Norfolk SAAM
	Grade Grade Grade Grade Grade	10 ONE (SCORE EA Width of riparian activities (I.e., par cuts, lawns, or c 10 10 ABITAT CONDIT Tree stratum (db >60% tree canop layers may in herbaceous, i	9 ACH BANK) Optimal Zone -18 m king lots, roa zone, have n Zone. 9 9 ION (SCOF Optimal h-3 inches) y y cover. (Ad clude: saplin and leaf littler	eters; human dbeds, clear-ot impacted 8 8 8 RE EACH BA present, with diditional forest g, shrub, including	Width of ri human act 7 7 7 ANK) Tree stratt. with 30% (See examples	Suboptims parian zone fivities have in only minimall 6 6 6 Suboptims (dbh-3 into 60% tree c Excellent Cat of additional)	al 2-18 meters; ppacted zone y). 5 5 5 5 5 6 6 7 6 7 6 7 6 7 6 7 6 7 6 7	Mar Width of ripan meters; human impacted zon 4 4 4 Tree stratum present, with < cover. (See Ex for examples of	rginal rian zone 6-12 n activities have ue a great deal. 3 3 3 (dbh>3 inches) 30% tree canopy cellent Category cellent Category additional forest	Width of little or no little or no little or no little or no little or no little or no curve surfaces, c culverte maintail	Poor iparian zone iparian vege uman activiti 1 1 Avg.Score Poor turn absent; oplands, mir de therbasen med herbasen	<6 meters; tation due to es. 0 0 0 0 0 0 0 impervious ue spoil lands owed and us areas, us area	4 4 4 4	Barbour, et al., 1999 RBA #10; Parsons, et al., 2001 AUSRIVAS Norfolk SAAM Form 1
	Grade Grade Grade Grade Grade	10 ONE (SCORE EA Width of riparian activities (i.e., par cuts, lawns, or c 10 10 10 ABITAT CONDIT Tree stratum (db >60% tree canop layers may in herbaceous, in mosses/lichens ar the high entry	9 ICH BANK) Optimal Zone -18 mix king lots, roa zones, law zone -10 mix zone -10 mix zone -10 mix glots, roa glots, roa glots, roa glots	eters; human adbeds, clear-ot impacted 8 8 8 RE EACH BA present, with ditional forest gi, shrub, including bris.) Score al angel fi ≥ 2	Width of ri human act 7 7 7 Tree stratt. with 30% (See examples t Score at tf f≥2 ad	Suboptims parian zone 1 ivities have in only minimall 6 6 6 6 Suboptims Im (dbh-3 into 60% tree c Excellent Cat of additional 1 en high end of ditional fores in the first parial forest	al 2-18 meters; ppacted zone y). 5 5 5 5 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6	Mar Width of ripal meters; humar impacted zon 4 4 4 Tree stratum present, with < cover. (See Ex for examples of layers.) Score a layers.) Score a Fair range if ≥2	rginal rian zone 6-12 n activities have le a great deal. 3 3 3 (dbh>3 inches) 30% tree canopy cellent Category additional forest at the high end of additional layers	Width of little or no h	Poor iparian zone iparian vege uman activiti 1 1 Avg.Score Poor tum absent; oplands, mir d streams, m	<6 meters; tation due to es. 0 0 0 impervious se spoil lands owed and owed and owed and owed and owed and owed and owed and owed specific series, well y grazed to the control of the con	4 4 4 4	Barbour, et al., 1999 RBA #10; Parsons, et al., 2001 AUSRIVAS Norfolk SAAM Form 1
	Grade Grade Grade Grade Grade	Udith of riparian activities (I.e., par cuts, lawns, or cuts, lawns,	9 ACH BANK) Optimal Zone >18 mking lots, roa rops) have n Zone. 9 9 10N (SCOF Optimal h>3 inches) y cover. (Ad clude: saplin and leaf litter di woody def of Excellent ra are present.	eters; human dbeds, clear-ot impacted 8 8 RE EACH BA Present, with diditional forest including a hirs, Score at lange if ≥2 Score at low	Width of ri human act 7 7 Tree stratu. with 30% (See examples to Score at tif £2 ad present	Suboptim: parian zone ivities have in only minimall 6 6 6 Suboptim: m (dbh-3 in to 60% tree cexcellent Cato of additional of dditional fores: Score at lo 5. Score at lo 5. Score at lo 5. Score at lo 5. Score at lo 5. Score at lo 5. Score at lo 5. Score at lo 5. Score at lo 5. Score at lo 5. Score at lo 5. Score at lo 5. Score at lo 5. Score at lo 5. Score at lo 6.	al 2-18 meters; ppacted zone y). 5 5 5 6 6 7 6 7 7 7 8 7 8 7 8 7 8 8 8 8 8 8 8	Mar Width of ripar meters; humar impacted zon 4 4 4 Free stratum present, with < cover. (See Ex for examples of layers.) Score a Fair range if ≥ Fair range if ≥ Fair range if ≥ Fair range if ≥	rginal rian zone 6-12 n activities have le a great deal. 3 3 3 rginal (dbh>3 inches) 30% tree canopy cellent Category additional forest at the high end of additional layers core at low end if	Width of little or no r little or no	Poor iparian zone iparian vege uman activiti 1 1 1 Avg.Score Poor turm absent; oplands, mit d streams, m led bracec surfaces, act	<6 meters; tation due to es. 0 0 0 impervious se spoil lands owed and owed and owed and owed and owed and owed and owed and owed specific series, well y grazed to the control of the con	4 4 4 4	Barbour, et al., 1999 RBA #10; Parsons, et al., 2001 AUSRIVAS Norfolk SAAM Form 1
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	Grade Grade Grade Grade Grade	Udith of riparian activities (I.e., par cuts, lawns, or cuts, lawns,	9 ACH BANK) Optimal Zone >18 mking lots, roa rops) have n Zone. 9 9 10N (SCOF Optimal h>3 inches) y cover. (Ad clude: saplin and leaf litter di woody def of Excellent ra are present.	eters; human dbeds, clear-ot impacted 8 8 RE EACH BA Present, with diditional forest including a hirs, Score at lange if ≥2 Score at low	Width of ri human act 7 7 7 7 NKK) Tree stratt with 30% (See examples t Score at tf 152 ad present additional additional additional metals.	Suboptim: parian zone fivities have in only minimall 6 6 6 Suboptim: Im (dbh-3 into 60% tree cecolent cafe additional forest alyers . Score at lof forest layers .	al 2-18 meters; ppacted zone y). 5 5 5 5 5 5 6 7 7 7 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8	Mar Width of ripal meters; humar impacted zon 4 4 4 Tree stratum present, with <2 cover. (See Ex for examples of layers.) Score Fair range if ≥2 are present. Sc ≤1 additional lay OR area co maintained a	ginal rian zone 6-12 n activities have te a great deal. 3 3 3 ginal (dbh>3 inches) 30% tree canopy cellent Category a dditional forest of additional layers core at low end if yers are present. nsists of non- non naturalized	Width of little or no r little or no	Poor iparian zone iparian vege uman activiti 1 1 1 Avg.Score Poor turm absent; oplands, mit d streams, m led bracec surfaces, act	<6 meters; tation due to es. 0 0 0 impervious se spoil lands owed and owed and owed and owed and owed and owed and owed and owed specific series, well y grazed to the control of the con	4 4 4 4 4	Barbour, et al., 1999 RBA #10; Parsons, et al., 2001 AUSRIVAS Norfolk SAAM Form 1
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St	ream Functior	nal Capacity C	alculation		
	N 6-TRIB1				
Date:	5/19/2006				
Project:	Lake Ralph H	all			
Assessment Area:	WP 14				
Assessors:	Holmes Voigh	nt Capps			
Project Status:	XPreproj	ect	Postproject		
		Stream	Stream	Multiplication	
Major Function Categories	FCI	Length (LF)*	Characterization	Factor**	FC
Hydrologic	0.10	1,356	E	0.00125	0.17
Water Quality Improvement	0.16	1,356	E	0.00125	0.28
Habitat	0.15	1,356	E	0.00125	0.25
Total	0.41	1,356			0.70
*Stream Length is the length of the Stre **Multiplication Factors Ephemeral = 0.00125 Intermittent = 0.0025 Perennial = 0.0038	am Assessme	nt Reach (SAF	R)		





SWAMPIM DATASHEETS – NORTH EPHEMERAL 6 T	O 15	,
PRE-PROJECT		

• N22-TRIB2

N22 Trib2 (6-15')

PARAMET	ER]	
	CONDITION CATEGORY GRADE or SCORE												
		Optimal			Suboptima	<u> </u>	Mar	ginal		Poor		1	
Grade	10	9	8	7	6	5	4	3	2	1	0		

Right bank- 20-25 meters before pasture, Left bank 50 meters to pasture. Riparian zone 10 m, few trees.

WP7 P 89,88

FLOW REGIME:			Source KDWP
TYPE Perennial Intermittent w/ Perennial Pools Intermittent Ephemeral			Kansas
Grade 10 9 8 7 6 5 4 3 2 1	0	2	Subjecti
CHANNEL CONDITION: Measurement or Observation of Stream Channel Conditions			
CONDITION CATEGORY GRADE or SCORE			Barbour
Optimal Suboptimal Marginal Poor			EPA RB
Natural channel; no structures or Some channelization (usually in Altered channel; 40- Channel is actively downcutti			5-21;
channelization minimal. No evidence bridge areas) or past channel 80% of the reach widening. >80% of the reach right of downcutting or excessive lateral alteration, but with significant channelized or channelized. Degradation, dil			Newton, USDA/ N
Za. Channel cutting. Normal frequency of recovery of channel bed and banks. disrupted. Excess levees prevent access to t			SVAP p
otion (notice) hydrological conflection between Acceptable frequency of overbank aggradation, braided floodplain.			0 1/11
altered, or channel and floodplain. flows onto floodplain. channel with excessive frequency of overbank			
downcutting) flows onto the			
floodplain. Historical incision,dikes or levees			
restrict floodplain.			
Grade 10 9 8 7 6 5 4 3 2 1	0	1	
	0		
CONDITION CATEGORY GRADE or SCORE Optimal Suboptimal Marginal Poor			w/ assis and inpu
2b. Channel Capacity to Channel Capacity to Flow Frequency Channel Capacity to Flow Frequency Channel Capacity to Channel Capacity to Flow Frequency Channel Capacity Channel Capacity Channel Capacity Channel Capacity Channel Capacity Channel Capacity Channel Ca	quency		Dr. Mike
Ratio is such that bank overflow from Ratio is such that bank overflow from Flow Frequency Ratio is Ratio is such that bank overflow	ow from		Harvey a
Frequency storm events occur at a 1.25 to 2.5 storm events are more frequent man such that bank overnow storm events are more frequent to storm events are event half year or less frequent events are event half year or less frequent frequent to storm events are event half year or less frequent events are event half year or less frequent events are event half year.			Travant
Ratio (for 2- 0.75-1.25 than every 2.5 years. more frequent than every 10 years.			
year peak flow) <0.75 or >1.25 every year or less frequent than every 5 <0.24 or >2			
years.			
< 0.5 or >1.5			
Grade 10 9 8 7 6 5 4 3 2 1	0	0	
CONDITION CATEGORY GRADE or SCORE			Newton
Optimal Suboptimal Marginal Poor			USDA/ I
Banks stable; evidence of erosion or bank failure absent or minimal; (<5% areas of erosion mostly healed over. perennial vegetation to waterline; severe erosion of			SVAP p 10; Bark
2c.Channel of bank affected), perennial 5-30% of bank in reach has areas of waterline sparse (mainly banks; recently exposed tree	roots		al., 1999
Bank Stability vegetation to waterline; no raw or score each undercut banks (some erosion on undercutting; perennial vegetation to lateral erosion), bank undercut trees common; many			RBA pa
(score each bank, left or outside of meander bends O.K.); no bank, left or bank, left or bank (some erosion on bank, left or bank); left or bank, left or bank (some erosion on bank); no bank			26; USA
right facing recently exposed roots; no recent exposed tree roots rare but present. (trees, rock outcrops) straight sections and bends; of			Norfolk District,
downstream) tree falls; and eroded back elsewhere; 30-60% of erosional scars.	ank nas		2.01.701,
bank in reach has areas			
of erosion and bank undercutting; recently			
exposed tree roots and			
	0	0	
Grade (Right) 10 9 8 7 6 5 4 3 2 1	0	0	
Avg	g.Score	0	
CHANNEL ROUGHNESS FACTORS			
CONDITION CATEGORY GRADE or SCORE			Barbour
Ontimal Subontimal Marginal Poor			EPA RB
3a. Channel The bends in the stream increase the The bends in the stream increase the The bends in the stream Channel straight; waterway has			Chapter
Silludsity (bends in low than if it was straight. Channel than if it was a straight in the stream to the stream than if it was straight. Channel than if it was a straight line. Channel than if it was a straight line. Channel than if it was a straight line. Channel than if it was a straight line. Channel than if it was a straight line. Channel than if it was a straight line. Channel than if it was a straight line. Channel than if it was a straight line. Channel than if it was a straight line. Channel than if it was a straight line. Channel than if it was a straight line. Channel than if it was a straight line than if it was a straight line. Channel than if it was a straight line than it was a straight line than it was a straight line than it was a straight line than it was a straight line than it was a straight line than it was a straight line than it was a straight line than it was a straight line than it was a straight line than it was a straight line than it was a straight line than it was a straight line			5-25; KI
gradient length/valley length at least >1.5. length/valley length 1.2 to 1.5 longer than if it was a			1996
stream) straight line. Channel length/valley length 1.0			
to 1.2.			
Grade 10 9 8 7 6 5 4 3 2 1	0	3	
CONDITION CATEGORY GRADE or SCORE			KDWP,
Optimal Suboptimal Marginal Poor			Kansas
Little or no channel enlargement Some gravel bars of coarse stones Sediment bars of rocks, Channel divided into braids or and well-washed debris present, little sands, and silt common; is channelized; substrate is ur			Subjecti
3b. Bottom resulting from sediment and well-washed debris present, little sands, and silt common; is channelized; substrate is ur substrate accumulation; channel is stable silt; moderately stable moderately unstable sand, silt, clay, or bedrock; un			Evaluation Aquatic
Composition			Habitats
		ļ	I
		ì	
Grade 10 9 8 7 6 5 4 3 2 1	0	0	

	j					CON	IDITION C	ATEGORY	GRADE or	SCORE						KDWP, 1996,
			Optir	mal			Suboptima	al	Ma	rginal		Po	oor			Newton et al.
3c. Inst Botto Topogr	om	>7 of the boulders/ debris overhar vegetat	e followin /gravel, k , backwa nging veg ed shallo	ng: de ogs/la aters/c getatio ows, re or sid	phy including pep pools, arge woody oxbows, on, riffles, ootwads, de channel		ottom include ed in Optima	es 5-7 of the al Category	includes <	el bottom 5 of the items n Optimal egory				es <3 of the I Category		1998 USDA/NRCS SVAP page 1
Grade		10	9		8	7	6	5	4	3	2		1	0	0	
Grade			•						•		1					
5 O			Optir	mal		CON	NDITION CA Suboptima	ATEGORY		SCORE rginal	1	D/	oor			
·	- 1		0.05 to)		0.035 to 0.0			.03 or >0.10	0.16 to			xcessive		
3c Mannir										0.15	obstruction	n to flow elization	or 0.0	1 to 0.02 due ean, smooth		
Grade		10	9		8	7	6	5	4	3	2		1	0		
	-					CON	IDITION C	ATEGORY	GRADE or	SCORF						USACE,
	ľ		Optir	mal			Suboptima			rginal		Po	oor			Norfolk
3d. Ch		Incision ra			and Where	Incision ra	tio <u>></u> 1.2 <1.4		Incision rat	io <u>></u> 1.4 < 2.0	Incision ra	tio <u>></u> 2.0	and W	here channel		District, 2004
Incis (TLB/BF R; 1/BH Factor	D=BH IR*Adj	channel slope >2%; Entrenchment ratio >1.4; Where channel slope ≤2%; Entrenchment ratio >2.0				channel slope >2%, Entrenchment ratio >1.4; Where channel slope <2%, Entrenchment ratio >2.0			and Where channel slope > 2%, Entrenchment ratio >1.4; Where channel slope ≤2%, Entrenchment ratio >2.0		Where channel slope ≤2%, Entrenchment ratio ≤2.0					SAAM Form #1 and VT Stream Geomorphic Assessment Phase 2
TLB	3 =		10)		BHR =	1									
BFD) =		10)												
Grade		10	9	1	8	7	6	5	4	3	2		1	0	0	
4 DYNAM	IC SUR	FACE WA	ATER S	TOR	AGE											
						000	IDITION C	ATEGORY	GPADE or	SCORE						Newton, et a
	-		Optir	mal		COI	Suboptima			rginal		Po	oor			1998 USDA
4a.Po (abund prese abse	dant, nt or	greater that is obscure	shallow an 30% o	pools of the epth,	s abundant; pool bottom or pools are eep.	Pools present, but not abundant; from 10-30% of the pool bottom is obscure due to depth, or the pools			Pools postallow; from the pool obscure due the pools a	resent, but om 5-10% of I bottom is e to depth, or are less than at deep.	discer	sent, or t	he ent	ire bottom is er = zero.		NRCS SVAI page 14; Barbour, et a 1999
Grade		10	9		8	7	6	5	4	3	2		1	0	0	
4b. Ch	annel					001	IDITION	ATEGORY	CDADE at	SCORE						1
Flow S			Optir	mal		CON	Suboptima			rginal		Pr	oor			Barbour, et a
(degree which cl is fille	ee to hannel	banks	aches ba and minir	ise of mal ar	both lower mount of exposed.	channe	s >75% of the el; or <25% of strate is exp	e available f channel	Water fills the availa and /or riff	s 25-75% of ble channel, le substrates ly exposed.		water in standing	chann	el and mostly s. No water =		1999 EPA RBA page 5- /A-9#5; <i>TCE</i>
Grade		10	9		8	7	6	5	4	3	2		1	0	0	1999; VANR 2005
	L						Cal	culation of F	Function Ca	nacity Index	- Total Sc	ore/Tot	al Po	ssible Score	0.06	-
							Cal	odiation of t	andulum Ca	paoily index	_ rotar 0t	JUIU/ 1 UI	uii Ui	COIDIC CCOIC		
														FCI = #/100	0.00	

I. HYDROLOGIC FUNCTIONS N22 Trib2 (6-15')

	(DE												4
	/PE OTES												
	EDIMENT TRA	ANSPORT	T/DEPOSIT	ON									7
													1
					COI		ATEGORY (
	1a. Bank		Optimal			Suboptima			rginal		Poor		
(:	Stability score each		ble; evidence re absent or i			/ stable; infre osion mostly	equent, small healed over.		unstable; 30- k in reach has		many eroded equently alor		
r	pank, left or right facing ownstream)	potential fo	or future prob bank affecte		5-30% of b	ank in reach erosion.	has areas of	erosion po	erosion; high tential during ods.	sloughing	and bends; ol g; 60-100% o erosional sca	of bank has	
Gr	rade (Left)	10	9	8	7	6	5	4	3	2	1	0	
Gr	rade (Right)	10	9	8	7	6	5	4	3	2	1	0	(
												Avg.Score) (
	-				COI	NDITION C	ATEGORY (SRADE or S	CORE				
1	b. Channel		Optimal			Suboptima			rginal		Poor		
	ottom Bank		1/3 of bank is			1/3 of bank is			3 of bank is		1/3 of bank is		
B Gr Gr	Stability	highly res	sistant plant/s material.	oil matrix or	resistant pl	ant/soil matri	x or material.	material; pla	ighly erodible ant/soil matrix romised.		odible materia severely comp		
Gr	rade (Left)	10	9	8	7	6	5	4	3	2	1	0	
Gr	rade (Right)	10	9	8	7	6	5	4	3	2	1	0	1
L												Avg.Score	•
	or				COI	NDITION C	ATEGORY (SRADE or S	CORF				
1	c. Channel		Optimal		001	Suboptima			rginal		Poor		
	ediments or	>50% gr	ravel or larger	substrate;	30-50% g	ravel or large			ravel or larger	Substrate	is uniform sa	nd, silt, clay,	
	Substrate		obble boulder			substrate typ			e; dominant	or	bedrock; uns	table	
С	Composition	substrate	e type is grav stable	ei or larger;		h some finer oderately sta			be is finer than may still be a				
Gr	rade	10	9	8	7	6	5	4	3	2	1	0	(
-	ATER APPE			_	, ,	U	3	4	3	2	'	U	
	ATERATIE	TOTAL	Clarity or v	ioibility									†
					COI	NDITION C	ATEGORY (SRADE or S	CORE				
			Optimal			Suboptima			rginal		Poor		
			r, or clear but sible at depth			lly cloudy, es rent, but clea	pecially after		le cloudiness time; objects		or muddy appoper		
١,,			colored); no				1.5-3 ft; may		epth 0.5-1.5 ft;	slow moving	g water may be	bright-green;	
VV	later Clarity		e;no noticeab			ghtly green co			ns may appear		ous water pollut surface scum, s		,
		subme	erged objects	or rocks.	shee	n on water s	urface.	or sumero	bottom rocks ged objected d with film.		am on surface. zero.		
Gr	rade	10	9	8	7	6	5	4	3	2	1	0	(
PF	RESENCE OF	AQUATI	C VEGETA	TION: Prese	ence and Po	ercent Cove	erage				-	-	
									CORE				
1			Optimal		I	Suboptima	ATEGORY (rginal		Poor		-
1		Clear w	ater along en	tire reach;	Fairly clear		eenish water		ter along entire	Pea green	, gray, or brown	n water along	1
	Ba. Nutrient	diverse a	aquatic plant	community	along enti	re reach; mo	derate algal	reach; overab	undance of lush	entire	reach; dense s	stands of	
	Enrichment		low quantation for the state of		growth	on stream su	ubstrates.		hytes; abundant th, especially		es clog stream ate thick algal r		
1 '			growth prese						mer months.	or NO alg	ae present due trate. No water	to unstable	
	rade	10	9	8	7	6	5	4	3	2	1	0	
						•	•		l .				
	L				COI	NDITION C	ATEGORY (GRADE or S	CORE				
					1								
Gr	or	When are	Optimal	vegetation	Algan de	Suboptima			rginal	Algal ma	Poor	om largor	1
Gr 3	Or 3b. Aquatic Vegetation		esent, aquation of moss and				ols, larger	Algal mats	rginal present, some s, few mosses.	plants don	Poor ats cover bott minate the charesent due to	annel or NO	
Gr 3	3b. Aquatic		esent, aquation			Suboptima ominant in po	ols, larger	Algal mats	present, some	plants dor algae p	ats cover bott minate the ch	annel or NO unstable	

				COI	NDITION CA	ATEGORY (GRADE or S	CORE				F
		Optimal			Suboptima	l	Ma	rginal		Poor		e
		onsisting of le d without sedi			and wood so lebris without		debris; coa organic i	es or woody arse and fine matter with iment.	color and fo	anic sedimen oul odor (ana present due t scouring	erobic) or no	1 F
Grade	10	9	8	7	6	5	4	3	2	1	0	0
AND USE PA	<u>I</u> TTERN: Be	yond Imme	diate Ripari	an Zone								
				COI	NDITION CA	ATEGORY (GRADE or S	CORE				F
		Optimal			Suboptima			rginal		Poor		e
		ed, consisting tive prairie, ar wetlands.			ent pasture n s and swamp crops		pasture; so areas may b	w crops and ome wooded be present but ed patches	N	lainly row cro	pps	1 F N
Grade (Left)	10	9	8	7	6	5	4	3	2	1	0	3
Grade (Right)	10	9	8	7	6	5	4	3	2	1	0	3
							•				Avg.Score	3
RIPARIAN ZOI	NE WIDTH	AND CONT	INUITY:	001	NDITION C	ATECORY (GRADE or S	CORE				E
6a. Riparian		Optimal		I	Suboptima			rginal		Poor		a
Zone Width	Width of rip	parian zone >18	meters (1-2	Width of ripa	rian zone 12-1			arian zone 6-12	Width of ripa		neters (natural	1
(from stream edge to field)	grasses), I	ths with trees, s human activitie impacted zone	es have not	1 active channel width w/trees, shrubs, or grasses), human activities have minimally			meters (1/3-1/2 active channel width vegetated), impacted by human activities.		vegation less than 1/3 active channel width), little riparian vegetation due to human activities.			F e R U
2 (1-ft)	10	9	8	7	6	5	4	3	2	1	0	3
Grade (left)	10	9	8	7	6	5	4	3	2	1	0	3
Grade (Right)											Avg.Score	3
				001	NDITION CA	ATECODY (ODADE or C	CORF				E
				COI								le
Grade (Right)	. 000/ =last	Optimal			Suboptima	l	Ma	rginal	Lass than 5	Poor	laastatiaa	
	shrubs, prair riparian zor	Optimal t density of mar rie grasses, or ne intact or dis ing/mowing min	marsh plants, ruption from	75-90% stro young specie trees behi		tation, mixed nel and mature evident with	Ma 50-75% s vegetation of and sparse shrub spe frequent wit		coverage c grasses, fe density; ban	Poor 60% streambar onsisting most w trees & shru k deeply scarre Il along its leng	ly of pasture bs; low plant ed with gullies	1 F F 6 1
Grade (Right) 6b. Riparian Zone Vegetation Protection/ Completeness	shrubs, prair riparian zor grazi	t density of marie grasses, or ne intact or disting/mowing min	marsh plants, ruption from nimal.	75-90% str young speci trees behi breaks oc	Suboptima eambank vege es along chanr nd; disruption ccurring at inter meters.	I tation, mixed nel and mature evident with vals of >50	Ma 50-75% s vegetation of and sparse shrub spe frequent wit and scars ev	rginal streambank f mixed grasses young tree or ocies; breaks h some gullies very 50 meters.	coverage c grasses, fe density; ban al	50% streambar onsisting most w trees & shru k deeply scarro Il along its leng	ly of pasture bs; low plant ed with gullies th.	F F 6
6b. Riparian Zone Vegetation Protection/Completeness	shrubs, prair riparian zor grazi	t density of ma- rie grasses, or ne intact or dis- ing/mowing mir	marsh plants, ruption from nimal.	75-90% str young speci trees behi breaks oc	Suboptima eambank vege es along chanr nd; disruption occurring at inter meters.	tation, mixed tation, mixed and mature evident with vals of >50	Ma 50-75% s vegetation of and sparse shrub spe frequent wit and scars ev	rginal streambank f mixed grasses young tree or icies; breaks h some gullies very 50 meters.	coverage c grasses, fe density; ban al	50% streambar onsisting most w trees & shru k deeply scarre Il along its leng	lly of pasture bs; low plant ad with gullies pth.	F 6 1 F #
Grade (Right) 6b. Riparian Zone Vegetation Protection/ Completeness	shrubs, prair riparian zor grazi	t density of marie grasses, or ne intact or disting/mowing min	marsh plants, ruption from nimal.	75-90% str young speci trees behi breaks oc	Suboptima eambank vege es along chanr nd; disruption ccurring at inter meters.	I tation, mixed nel and mature evident with vals of >50	Ma 50-75% s vegetation of and sparse shrub spe frequent wit and scars ev	rginal streambank f mixed grasses young tree or ocies; breaks h some gullies very 50 meters.	coverage c grasses, fe density; ban al	50% streambar onsisting most w trees & shru k deeply scarro Il along its leng	ly of pasture bs; low plant ed with gullies th.	F F 6 1 1 F F

			FUNCTIONS				N22 Tril	02 (6-15')					SCORE
1	FLOW REGI	ME	Perennial		Intermitte	nt w/ Perenr	nial Pools	Intern	nittent		Ephemeral		4
	Grade	10	9	8	7	6	5	4	3	2	1	0	2
2	EPIFAUNAL	SUBSTRATE		COVER		0 1 " 1							4
		Within stre	Optimal am bed, greater	than 50%		Suboptimal m bed, 30-50°	% coverage		ginal bed, 10-30%	Less than	Poor 10% habitat t	features	4
		coverage b	by stable habita	t features,	by stable ha	abitat features	s favorable	coverage by	stable habitat	present; lac	ck of habitat is	s obvious;	
			r stream faunal			aunal coloniza			able for stream		unstable or I		
			nphibian cover. n transient. Fe			oian cover. Ma transient. (Se			ization and/or n cover; habitat		ned channels pools buried		
		include snags	s, submerged lo	gs, undercut	Catego	ry for habitat f	feature		y be less than	channel	bottom may l	be flat.	
			cobble, rocks, p		(components.)			strate may be sturbed. (See				
			stage to allow of					Excellent Cate	gory for habitat				
								feature co	mponents.)				
	Grade	10	9	8	7	6	5	4	3	2	1	0	0
3	STREAM BC	OTTOM SUBS	TRATE: Pool	Substrate Cl	naracterizati	ion							
	011127111130		Optimal			Suboptimal			ginal		Poor		
			ostrate material: nd prevalent; ro			soft sand, mu be dominant;		All mud or clay	or sand bottom; oot mat; no		lay or bedrock bmerged veg		
			ed vegetation c			submerged v			vegetation.	mat or su	billelged veg	otation.	
						present.				1			1
	Grade	10	9	8	7	6	5	4	3	2	1	0	0
4	POOL VARIA	ABILITY											
			Optimal			Suboptimal			ginal		Poor		1
			large-shallow, w, small-deep p			f pools large-of few shallow.	deep; very		s much more in deep pools		pools small-s oools absent	hallow or	
		Siliali Silaliov	v, sman deep p	oois present		icw silaliow.		provatoriture	in deep pools	,	oois abscrit		
	0	10	9	1 0	7		-			0			
5	Grade SEDIMENT I	10 DEPOSITION/3		8		6	5	4	3	2	1 1	00	0
			Optimal			Suboptimal			ginal		Poor]
		<5% of chann	nel bottom affecte deposition.	d by scour or		ted by scour or strictions and w			ed by scour or osits and scour at		6 of the bottom ge nearly yearlo		f
			асрозноп.			Some depositio		obstructions, o	onstrictions and	minimal o	or absent due to	o heavy	
								bends. Some	filling of pools.	deposition	or excessive s	couring.	
	0 1	40		1 0	_		_						
	Grade	10	9	8	7	6	5	4	3	2		0	0
6	CHANNEL F	LOW STATUS	S Optimal		l	Suboptimal		Mar	ginal	<u> </u>	Poor		4
			hes the base of		Water fills:	>75% of the c		Water fills 2	5-75% of the		ater in the cha		
		banks; <5°	% of channel su exposed	ubstrate is	<25% of	f channel subsexposed	strate is		nel and/or riffle mostly exposed		ent in standing stream is dry	g pools; or	
			exposed			exposed		substrates are	mostry exposed		stream is dry		
	Grade	10	9	8	7	6	5	4	3	2	1 1	0	0
7	Grade CHANNEL A		•	8			5		•	2	1	0	0
7		ALTERATION	9 Optimal tion, alteration,			6 Suboptimal ration or chan		Mar	ginal		1 Poor		
7		Channelizat absent or m	Optimal tion, alteration, ninimal; normal	or dredging and stable	Some alte	Suboptimal ration or chan t, usually adja	nelization cent to	Mar Alteration or o	ginal channelization extensive;	Banks shore concrete. (d with gabion Concrete or rip	n, riprap, or prap lined	
7		Channelizat absent or m stream mea	Optimal tion, alteration,	or dredging and stable alteration by	Some alte present structu	Suboptimal ration or chan	inelization cent to bridge	Mar Alteration or o may be e embankments	ginal channelization extensive; (including spoil	Banks shore concrete. C	ed with gabion Concrete or rip ls. Instream h	n, riprap, or prap lined habitat	
7		Channelizat absent or m stream mea	Optimal tion, alteration, ninimal; normal under pattern. A	or dredging and stable alteration by	Some alte present structu abutments past alterati	Suboptimal ration or chan t, usually adja res, (such as or culverts); e ion, (I.e., char	nelization cent to bridge evidence of nnelization)	Mar Alteration or o may be e embankments piles) or shor present on both	ginal channelization extensive; (including spoil ing structures n banks; normal	Banks shore concrete. C channel significantly a other inpu	ed with gabion Concrete or rights. Instream haltered by storuts. Over 80%	n, riprap, or prap lined habitat rrmwater or % of the	
7		Channelizat absent or m stream mea	Optimal tion, alteration, ninimal; normal under pattern. A	or dredging and stable alteration by	Some alte present structu abutments past alterati may be pre	Suboptimal ration or chan t, usually adja res, (such as or culverts); e ion, (I.e., char esent, but strea	nnelization cent to bridge evidence of nnelization) am pattern	Mar Alteration or o may be e embankments piles) or shor present on both stable stream n	ginal channelization extensive; (including spoil ing structures a banks; normal neander pattern	Banks shore concrete. C channel significantly a other inpu	ed with gabion Concrete or rip ls. Instream haltered by stor	n, riprap, or prap lined habitat rrmwater or % of the	
7		Channelizat absent or m stream mea	Optimal tion, alteration, ninimal; normal under pattern. A	or dredging and stable alteration by	Some alte present structu abutments past alterati may be pre and stability alteration	Suboptimal ration or chan t, usually adja res, (such as or culverts); e ion, (I.e., char, but stready have recovern is not present	inelization cent to bridge evidence of inelization) am pattern red; recent it. Minor	Mar Alteration or o may be e embankments piles) or shor present on bot stable stream n has not recove from stormwate	ginal channelization extensive; (including spoil ing structures n banks; normal neander pattern ered. Alteration er inputs may be	Banks shore concrete. C channel significantly a other inpu	ed with gabion Concrete or rights. Instream haltered by storuts. Over 80%	n, riprap, or prap lined habitat rrmwater or % of the	
7		Channelizat absent or m stream mea	Optimal tion, alteration, ninimal; normal under pattern. A	or dredging and stable alteration by	Some alte present structu abutments past alterati may be pre and stability alteration	Suboptimal ration or chan t, usually adja res, (such as or culverts); e ion, (l.e., char syent, but streaty have recover is not preser rom stormwat	inelization cent to bridge evidence of inelization) am pattern red; recent it. Minor	Mar Alteration or of may be e embankments piles) or shor present on both stable stream in has not recove from stormwate extensive. 40-	ginal channelization extensive; (including spoil ing structures a banks; normal neander pattern ered. Alteration er inputs may be 80% of stream	Banks shore concrete. C channel significantly a other inpu	ed with gabion Concrete or rights. Instream haltered by storuts. Over 80%	n, riprap, or prap lined habitat rrmwater or % of the	
7		Channelizat absent or m stream mea	Optimal tion, alteration, ninimal; normal under pattern. A	or dredging and stable alteration by	Some alte present structu abutments past alterati may be pre and stability alteration	Suboptimal ration or chan t, usually adja res, (such as or culverts); e ion, (I.e., char, but stready have recovern is not present	inelization cent to bridge evidence of inelization) am pattern red; recent it. Minor	Mar Alteration or o may be e embankments piles) or shor present on bot stable stream n has not recove from stormwate	ginal channelization extensive; (including spoil ing structures a banks; normal neander pattern ered. Alteration er inputs may be 80% of stream	Banks shore concrete. C channel significantly a other inpu	ed with gabion Concrete or rights. Instream haltered by storuts. Over 80%	n, riprap, or prap lined habitat rrmwater or % of the	
7		Channelizat absent or m stream mea	Optimal tion, alteration, ninimal; normal under pattern. A	or dredging and stable alteration by	Some alte present structu abutments past alterati may be pre and stability alteration	Suboptimal ration or chan t, usually adja res, (such as or culverts); e ion, (l.e., char syent, but streaty have recover is not preser rom stormwat	inelization cent to bridge evidence of inelization) am pattern red; recent it. Minor	Mar Alteration or of may be e embankments piles) or shor present on both stable stream in has not recove from stormwate extensive. 40-	ginal channelization extensive; (including spoil ing structures a banks; normal neander pattern ered. Alteration er inputs may be 80% of stream	Banks shore concrete. C channel significantly a other inpu	ed with gabion Concrete or rights. Instream haltered by storuts. Over 80%	n, riprap, or prap lined habitat rrmwater or % of the	
7		Channelizat absent or m stream mea	Optimal tion, alteration, ninimal; normal under pattern. A	or dredging and stable alteration by	Some alte present structu abutments past alterati may be pre and stability alteration	Suboptimal ration or chan t, usually adja res, (such as or culverts); e ion, (l.e., char syent, but streaty have recover is not preser rom stormwat	inelization cent to bridge evidence of inelization) am pattern red; recent it. Minor	Mar Alteration or of may be e embankments piles) or shor present on both stable stream in has not recove from stormwate extensive. 40-	ginal channelization extensive; (including spoil ing structures a banks; normal meander pattern ered. Alteration er inputs may be 80% of stream	Banks shore concrete. C channel significantly a other inpu	ed with gabion Concrete or rights. Instream haltered by storuts. Over 80%	n, riprap, or prap lined habitat rrmwater or % of the	
7		Channelizat absent or m stream mea	Optimal tion, alteration, ninimal; normal under pattern. A	or dredging and stable alteration by	Some alte present structu abutments past alterati may be pre and stability alteration	Suboptimal ration or chan t, usually adja res, (such as or culverts); e ion, (l.e., char syent, but streaty have recover is not preser rom stormwat	inelization cent to bridge evidence of inelization) am pattern red; recent it. Minor	Mar Alteration or of may be e embankments piles) or shor present on both stable stream in has not recove from stormwate extensive. 40-	ginal channelization extensive; (including spoil ing structures a banks; normal meander pattern ered. Alteration er inputs may be 80% of stream	Banks shore concrete. C channel significantly a other inpu	ed with gabion Concrete or rights. Instream haltered by storuts. Over 80%	n, riprap, or prap lined habitat rrmwater or % of the	
	CHANNEL A	Channelizat absent or m stream mea stormwater	Optimal tion, alteration, inimal; normal ander pattern. A r inputs absent	or dredging and stable alteration by or minimal	Some alter present structure abutments past alteratimay be preand stability alteration alteration from the stability alteration from the stability alteration from the stability alteration from the stability alteration from the stability alteration from the stability alteration from the stability alteration from the stability alteration from the stability alteration from the stability alteration from the stability alteration from the stability alteration from the stability alteration from the stability alteration from the stability alteration from the stability alteration alteration from the stability alteration alteration from the stability alteration alteration from the stability alteration alteration from the stability alteration altera	Suboptimal ration or chan t, usually adja res, (such as or culverts); e ion, (I.e., char ssent, but stree y have recove i nis not preser rom stormwat inputs.	nnelization cent to bridge evidence of nnelization) am pattern red; recent tt. Minor er or other	Mar Alteration or of may be e embankments piles) or shor present on both stable stream in has not recove from stormwate extensive. 40- reach i	ginal channelization extensive; (including spoil ing structures i banks; normal neander pattern red. Alteration er inputs may be 80% of stream altered.	Banks shore concrete. C channel significantly a other inpu strea	ed with gabion Concrete or rights. Instream haltered by storuts. Over 80%	n, riprap, or prap lined habitat rmwater or % of the red.	
	Grade	Channelizat absent or m stream mea stormwater	Optimal tion, alteration, ninimal; normal nder pattern. A r inputs absent	or dredging and stable literation by or minimal	Some alter present structure abutments past alteration may be prere and stability alteration fit of the present stability alteration from the pres	Suboptimal ration or chant, usually adjainers, tosually adjainers, tosuch as or culverls); enes, (such as or culverls); essent, but stream, where recovers is not preservorm stormwatters inputs.	inelization cent to bridge svidence of inelization) am pattern red; recent it. Minor er or other	Mar Alteration or of may be of may be of piles) or short present on both stable stream in has not recove from stormwate extensive. 40-	ginal shannelization sxtensive; (including spoil ing structures banks; normal neander pattern ored. Alteration or inputs may be 80% of stream altered.	Banks shore concrete. C channel significantly softer inputs trea	d with gabion Concrete or rijs. In Italian and the state of the state	n, riprap, or prap lined nabitat rmwater or % of the red.	1
	Grade	Channelizat absent or m stream mea stormwater 10 SINUOSITY The bends	Optimal tion, alteration, inimal; normal under pattern. A rinputs absent	or dredging and stable literation by or minimal	Some alter present structure abutments past alteration and stability alteration for alteration for the bends in the bends in the bends in the bends in the present alteration for the bends in the bends	Suboptimal ration or chant, usually adja res, (such as or culverts); einon, (I.e., charsent, but stret, have recove is not preser rom stormwat inputs.	inelization cent to bridge widence of neelization) and pattern red; recent it. Minor er or other	Mar Alteration or or may be a embankments piles) or shor present on both stable stream in has not recove from stormwate extensive. 40-	ginal shannelization sxtensive; (including spoil ing structures banks; normal neander pattern ored. Alteration or inputs may be 80% of stream altered.	Banks shore concrete. C channel stra	d with gabion Concrete or rig is. Instream haltered by storuts. Over 80% m reach alter	n, riprap, or prap lined habitat rrmwater or % of the ed.	1
	Grade	Channelizat absent or m stream mea stormwater 10 SINUOSITY The bends stream length was in a str	Optimal tion, alteration, ninimal; normal nder pattern. A r inputs absent of 9 Optimal in the stream in a d times lo aight line. (Not	or dredging and stable literation by or minimal 8	Some alte present structu abutments past alterati past alterati may be pre and stability alteration alteration fr	Suboptimal ration or chant, usually adja res, (such as or culverts); exion or culverts); chu street, chance recover is not preservom stormwat inputs.	inelization cent to bridge svidence of inelization) am pattern red; recent it. Minor er or other	Mar Alteration or of may be elembankments piles) or shor present on both stable stream in has not recove from stormwate extensive. 40- The bends in increase the times longer the times longer the may be expensed.	ginal shannelization extensive; (including spoil ing structures n banks; normal neander pattern red. Alteration or inputs may be 80% of stream altered. 3 ginal n the stream 1 to 2 an if it was in a	Banks shore concrete. C channel stra	d with gabion Concrete or rijs. Instream in altered by stotal state of the state of	n, riprap, or prap lined habitat rrmwater or % of the ed.	1
	Grade	Channelizat absent or m stream mea stormwater 10 SINUOSITY The bends stream length was in a strt braiding is cc	Optimal tion, alteration, ninimal; normal under pattern. A r inputs absent of Optimal in the stream in 3 to 4 times lo aight line. (Not	or dredging and stable lateration by or minimal 8	Some alte present structu abutments past alterati past alterati may be pre and stability alteration alteration fr	Suboptimal ration or chan t, usually adja ration or chan t, usually adja ration to content of the content of th	inelization cent to bridge svidence of inelization) am pattern red; recent it. Minor er or other	Mar Alteration or of may be elembankments piles) or shor present on both stable stream in has not recove from stormwate extensive. 40- The bends in increase the times longer the times longer the may be expensed.	ginal shannelization sxtensive; (including spoil ing structures i banks; normal neander pattern red. Alteration or inputs may be 80% of stream altered.	Banks shore concrete. C channel stra	d with gabion Concrete or rijs. Instream in altered by stotal state of the state of	n, riprap, or prap lined habitat rrmwater or % of the ed.	1
	Grade	Channelizat absent or m stream mea stormwater 10 SINUOSITY The bends stream length was in a streading is occ plains and coplains and	Optimal tion, alteration, ninimal; normal nder pattern. A r inputs absent of Optimal in the stream in 3 to 4 times lo aight line. (Noto nosidered norm other low-lying a is not easily rate	or dredging and stable literation by or minimal 8	Some alte present structu abutments past alterati past alterati may be pre and stability alteration alteration fr	Suboptimal ration or chan t, usually adja ration or chan t, usually adja ration to content of the content of th	inelization cent to bridge svidence of inelization) am pattern red; recent it. Minor er or other	Mar Alteration or of may be elembankments piles) or shor present on both stable stream in has not recove from stormwate extensive. 40- The bends in increase the times longer the times longer the may be expensed.	ginal shannelization extensive; (including spoil ing structures n banks; normal neander pattern red. Alteration or inputs may be 80% of stream altered. 3 ginal n the stream 1 to 2 an if it was in a	Banks shore concrete. C channel stra	d with gabion Concrete or rijs. Instream in altered by stotal state of the state of	n, riprap, or prap lined habitat rrmwater or % of the ed.	1
	Grade	Channelizat absent or m stream mea stormwater 10 SINUOSITY The bends stream length was in a streading is occ plains and coplains and	Optimal tion, alteration, ninimal; normal nder pattern. A rinputs absent 9 Optimal in the stream in a 3 to 4 times lo aight line. (Not onother low-lying a	or dredging and stable literation by or minimal 8	Some alte present structu abutments past alterati past alterati may be pre and stability alteration alteration fr	Suboptimal ration or chan t, usually adja ration or chan t, usually adja ration to content of the content of th	inelization cent to bridge svidence of inelization) am pattern red; recent it. Minor er or other	Mar Alteration or of may be elembankments piles) or shor present on both stable stream in has not recove from stormwate extensive. 40- The bends in increase the times longer the times longer the may be expensed.	ginal shannelization extensive; (including spoil ing structures n banks; normal neander pattern red. Alteration or inputs may be 80% of stream altered. 3 ginal n the stream 1 to 2 an if it was in a	Banks shore concrete. C channel stra	d with gabion Concrete or rijs. Instream in altered by stotal state of the state of	n, riprap, or prap lined habitat rrmwater or % of the ed.	1
	Grade	Channelizat absent or m stream mea stormwater 10 SINUOSITY The bends stream length was in a streading is occ plains and coplains and	Optimal tion, alteration, ninimal; normal nder pattern. A r inputs absent of Optimal in the stream in 3 to 4 times lo aight line. (Noto nosidered norm other low-lying a is not easily rate	or dredging and stable literation by or minimal 8	Some alte present structu abutments past alterati past alterati may be pre and stability alteration alteration fr	Suboptimal ration or chan t, usually adja ration or chan t, usually adja ration to content of the content of th	inelization cent to bridge svidence of inelization) am pattern red; recent it. Minor er or other	Mar Alteration or of may be elembankments piles) or shor present on both stable stream in has not recove from stormwate extensive. 40- The bends in increase the times longer the times longer the may be expensed.	ginal shannelization extensive; (including spoil ing structures n banks; normal neander pattern red. Alteration or inputs may be 80% of stream altered. 3 ginal n the stream 1 to 2 an if it was in a	Banks shore concrete. C channel stra	d with gabion Concrete or rijs. Instream in altered by stotal state of the state of	n, riprap, or prap lined habitat rrmwater or % of the ed.	1

9 BANK STAE	BILITY (SCORE EA)	1	Cube-4:	.1		rin al		D		
	Banks stable; evid	Optimal	sion or bank	Moderately	Suboptima stable: infre	al quent, small	Marg Moderately uns		Hnetable: 5	Poor	vegetation at	
	failure absent or					quent, small healed over.	vegetation to w			io perennial ; severe eros		
	affected), perennia	al vegetation	to waterline;	5-30% of ba	ank in reach	has areas of	(mainly scoured	d or stripped by	banks; red	ently expose	d tree roots	
	no raw or undercu				erosion and		lateral erosion)			tree falls and		
	outside of mea recently exposed r				g; perennial in most plac	vegetation to	hard points outcrops) and			t trees comm as; "raw" are		
	recently exposed i	oots, no rec	ent tree rans,			but present.	elsewhere; 30-			ight sections		
							reach has areas				; 60-100% of	
							bank undercu		bank	has erosiona		
							exposed tree roo	ots and fine root				
							hairs common potential du					
							poteritial de	illing noods				
Grade	10	9	8	7	6	5	4	3	2	1	0	
Grade	10	9	8	7	6	5	4	3	2	1	0	
										Avg.Score		
		(000000										
10 VEGETATIV	/E PROTECTION		ACH BANK)	0 1 "				1			
	More than 90% of	Optimal		70.000/ -4/	Suboptima	al ank surfaces	50-70% of the		1 4	Poor 50% of the s		
	and immediate ri					ation, but one				covered by		
	native vegeta				of plants is r		disruption obvio				k vegetation	
	understory s					evident but	bare soil or clo			gh; vegetation		
	macrophytes; veg				cting full pla		vegetation com			5 centimete		
	grazing or mowing almost all plants a				any great	extent; more tential plant	one-half of the stubble heigh		avera	age stubble l	neight.	
	aimost aii piams a	allowed to gr	ow naturally.		le height ren		Stubble fleigi	it remaining.				
1				3.000		.5.	1		1			
						_						
Grade	10	9	8	7	6	5	4	3	2	1	0	
Grade	10	9	8	7	6	5	4	3	2	1	0	
-										Avg.Score		
11 ΡΙΡΑΡΙΑΝΙ 7	ZONE (SCORE EA	CH BANK	1									
TI KII AKIAN 2		Optimal			Suboptima	al	Marc	ninal		Poor		
	Width of riparian 2		ters: human	Width of rip		2-18 meters;	Width of ripari		Width of r	iparian zone	<6 meters:	
	activities (I.e., park					pacted zone	meters; human				tation due to	
	cuts, lawns, or cr	rops) have n			nly minimal		impacted zone			uman activiti		
		zone.										
												l
Grade	10	9	8	7	6	5	4	3	2	1	0	
Grade Grade		9	8 8	7 7	6	5 5	4 4	3	2 2	1 1	0	
	10									1 1 Avg.Score	0	
Grade	10 10	9	8	7						1 1 Avg.Score	0	
Grade	10 10 HABITAT CONDIT	9 ION (SCOF	8	7	6	5	4	3			0	
Grade	10 10 HABITAT CONDIT	9 ION (SCOF	8 RE EACH B	7 ANK)	6 Suboptima	5 al	4 Marg	3 ginal	2	Poor	0	
Grade	10 10 HABITAT CONDITI	9 ION (SCOR	8 RE EACH B	7 ANK) Tree stratum	Suboptiman (dbh>3 ind	5 al	4 Març Tree stratum (ginal dbh>3 inches)	2 Tree stra	Poor tum absent;	0 impervious	
Grade	10 10 10 Tree stratum (dbi >60% tree canop layers may inc	9 ION (SCOF Optimal h>3 inches) / cover. (Add clude: saplin	8 RE EACH B. present, with ditional forest g, shrub,	7 ANK) Tree stratum with 30% to (See E	Suboptima n (dbh>3 ind o 60% tree o	al thes) present anopy cover. egory for	Mary Tree stratum (present, with <3 cover. (See Exc	ginal dbh>3 inches) 0% tree canopy cellent Category	Tree stra surfaces lands, culve	Poor tum absent; , croplands,	impervious mine spoil s, mowed and	
Grade	10 10 10 HABITAT CONDIT Tree stratum (dbl >60% tree canopy layers may line herbaceous, a	9 ION (SCOF Optimal h>3 inches) r cover. (Add clude: saplin and leaf litter	8 RE EACH By present, with ditional forest g, shrub, including	ANK) Tree stratun with 30% to (See E examples o	Suboptima n (dbh>3 ind o 60% tree of xcellent Cat f additional	thes) present anopy cover. egory for forest layers.)	Març Tree stratum (present, with <3 cover. (See Ext	ginal dbh>3 inches) 0% tree canopy sellent Category additional foresl	Tree stra surfaces lands, culve maintair	Poor tum absent; c, croplands, erted streams	impervious mine spoil s, mowed and ous areas,	
Grade	10 10 10 To HABITAT CONDIT (Tree stratum (dbl) >60% tree canopy layers may incherbaceous, a mosses/lichens an mosses/lichens an	9 ION (SCOP Deptimal h>3 inches) v cover. (Add clude: saplin and leaf litter id woody det	8 RE EACH By present, with ditional forest g, shrub, including pris.) Score at	7 ANK) Tree stratun with 30% to (See E examples o	Suboptima n (dbh>3 ind o 60% tree o xcellent Cat f additional e high end o	al hhes) present anopy cover. egory for orest layers.) f Good range	Tree stratum (present, with <3 cover. (See Exc for examples of layers.) Score a	ginal dbh>3 inches) 0% tree canopy ealditional forest t the high end of	Tree stra surfaces lands, culve maintair denuded s	Poor tum absent; , croplands, inted streams ned herbaced surfaces, act	impervious mine spoil s, mowed and ous areas, ively grazed	
Grade	10 10 10 Tree stratum (dbi >60% tree canopy layers may incherbaceous, a mosses/lichens and the high end o	9 ION (SCOP Optimal h>3 inches) r cover. (Add clovers aplin ind leaf litter id woody det f Excellent ra	RE EACH B. Dresent, with ditional forest g, shrub, including oris.) Score at ange if ≥2	7 ANK) Tree stratun with 30% tc (See E examples o	Suboptima n (dbh>3 ind o 60% tree o xcellent Cat f additional e high end o itional forest	al whes) present anopy cover. egory for orest layers.) f Good range layers are	Març Tree stratum (present, with <3 cover. (See Exc for examples of layers.) Score a Fair range if ≥2:	ginal dbh>3 inches) 0% tree canopy sellent Category additional forest the high end of additional layers	Tree stra surfaces lands, culve maintair denuded s	Poor tum absent; c, croplands, erted streams	impervious mine spoil s, mowed and ous areas, ively grazed	
Grade	HABITAT CONDIT Tree stratum (dbi 560% tree canopy layers may ini herbaceous, a mosses/lichens an the high end o additional layers a	9 ION (SCOP Deptimal h>3 inches) v cover. (Add clude: saplin dl leaf litter id woody det f Excellent ra are present.	8 RE EACH B. Dresent, with ditional forest g, shrub, including oris.) Score at ange if ≥2 Score at low	7 ANK) Tree stratun with 30% to (See E examples o Score at the if ≥2 add present.	Suboptima n (dbh>3 ind o 60% tree c xcellent Cat f additional e high end o itional forest Score at lo	al thes) present anopy cover. egory for orest layers.) if layers are wend if ≤1	Marg Tree stratum (present, with <3 cover. (See Ext for examples of layers.) Score a Fair range if ≥2 are present. Sc	ginal dbh>3 inches) 0% tree canopy pellent Category additional foresi the ingh and additional layers ore at low end if	Tree stra surfaces lands, culve maintair denuded s	Poor tum absent; , croplands, inted streams ned herbaced surfaces, act	impervious mine spoil s, mowed and ous areas, ively grazed	
Grade	10 10 10 Tree stratum (dbi >60% tree canopy layers may incherbaceous, a mosses/lichens and the high end o	9 ION (SCOP Deptimal h>3 inches) v cover. (Add clude: saplin dl leaf litter id woody det f Excellent ra are present.	8 RE EACH B. Dresent, with ditional forest g, shrub, including oris.) Score at ange if ≥2 Score at low	7 ANK) Tree stratun with 30% to (See E examples o Score at the if ≥2 add present. additional f	Suboptima n (dbh>3 ind o 60% tree c xcellent Cat f additional e high end o itional forest Score at lo	al thes) present anopy cover. egory for orest layers.) Good range layers are w end if ≤1 are present.	Març Tree stratum (present, with <3 cover. (See Exc for examples of layers.) Score a Fair range if ≥2:	ginal dbh>3 inches) 0% tree canopy eadditional foresi t the high end of additional layers ore at low end if ers are present.	Tree stra surfaces lands, culve maintair denuded s	Poor tum absent; , croplands, inted streams ned herbaced surfaces, act	impervious mine spoil s, mowed and ous areas, ively grazed	
Grade	HABITAT CONDIT Tree stratum (dbi 560% tree canopy layers may ini herbaceous, a mosses/lichens an the high end o additional layers a	9 ION (SCOP Deptimal h>3 inches) v cover. (Add clude: saplin dl leaf litter id woody det f Excellent ra are present.	8 RE EACH B. Dresent, with ditional forest g, shrub, including oris.) Score at ange if ≥2 Score at low	7 ANK) Tree stratun with 30% to (See E examples o Score at the if ≥2 add present. additional f	Suboptima in (dbh>3 ind o 60% tree of xcellent Cat if additional e high end o itional forest Score at lot forest layers	al thes) present anopy cover. egory for orest layers.) Good range layers are w end if ≤1 are present.	Tree stratum (present, with -3 cover. (See Ext for examples of layers.) Score a Fair range if ≥2 ≤1 additional lay OR area cor maintained ar	ginal dbh-3 inches) 0% tree canopy sellent Category additional foresi the high end of additional layers ore at low end if ers are present issists of non- id naturalized	Tree stra surfaces lands, culve maintair denuded s	Poor tum absent; , croplands, inted streams ned herbaced surfaces, act	impervious mine spoil s, mowed and ous areas, ively grazed	
Grade	HABITAT CONDIT Tree stratum (dbi 560% tree canopy layers may ini herbaceous, a mosses/lichens an the high end o additional layers a	9 ION (SCOP Deptimal h>3 inches) v cover. (Add clude: saplin dl leaf litter id woody det f Excellent ra are present.	8 RE EACH B. Dresent, with ditional forest g, shrub, including oris.) Score at ange if ≥2 Score at low	7 ANK) Tree stratun with 30% to (See E examples o Score at the if ≥2 add present. additional f	Suboptima n (dbh>3 ind o 60% tree c xcellent Cat f additional e high end o itional forest Score at lo forest layers	al thes) present anopy cover. egory for orest layers.) Good range layers are w end if ≤1 are present.	Tree stratum (present, with <a>3 cover. (See Extore examples of layers.) Score a Fair range if ≥2 are present. Score and training of a rea commaintained and dense herbar	ginal dbh-3 inches) 0% tree canopy sellent Category additional foresi the high end of additional layers ore at low end if ers are present sists of non- did naturalized	Tree stra surfaces lands, culve maintair denuded s	Poor tum absent; , croplands, inted streams ned herbaced surfaces, act	impervious mine spoil s, mowed and ous areas, ively grazed	
Grade	HABITAT CONDIT Tree stratum (dbi 560% tree canopy layers may ini herbaceous, a mosses/lichens an the high end o additional layers a	9 ION (SCOP Deptimal h>3 inches) v cover. (Add clude: saplin dl leaf litter id woody det f Excellent ra are present.	8 RE EACH B. Dresent, with ditional forest g, shrub, including oris.) Score at ange if ≥2 Score at low	7 ANK) Tree stratun with 30% to (See E examples o Score at the if ≥2 add present. additional f	Suboptima n (dbh>3 ind o 60% tree c xcellent Cat f additional e high end o itional forest Score at lo forest layers	al thes) present anopy cover. egory for orest layers.) Good range layers are w end if ≤1 are present.	Tree stratum (present, with -3 cover. (See Ext for examples of layers.) Score a Fair range if ≥2 ≤1 additional lay OR area cor maintained ar	ginal dbh-3 inches) 0% tree canopy sellent Category additional foresi the high end of additional layers ore at low end if ers are present sists of non- did naturalized	Tree stra surfaces lands, culve maintair denuded s	Poor tum absent; , croplands, inted streams ned herbaced surfaces, act	impervious mine spoil s, mowed and ous areas, ively grazed	
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Grade 12 RIPARIAN I Grade 1. Delineate 2. Determin 3. Enter the	10 10 10 10 10 10 10 10 10 10 Tree stratum (dh) >60% tree canopy layers may incherbaceous, a mosses/lichens and the high end of additional layers end if ≤1 additional layers end if ≤2 additional layers end if ≤3 additional layers end if ≤4 additional la	9 JON (SCOF Dptimal Nos3 linches) in your (Add clude: saplin Ind leaf little I to work (Add clude: saplin I would be applied I woody det I to wood y det I to wood y det I to wood y det I to wood y det I to wood y det I to wood y det I to wood y det I to wood y det I to wood y det I to wood y det I to wood y det I to wood y det I to wood y de I to w	8 RE EACH B, present, with ditional forest g, shrub, including pris.) Score at low re present. 8 tream bank g measuring purposes, 6	7 ANK) Tree stratun with 30% to (See E examples o Score at the if ≥2 add present. additional f OR cuto	Suboptimin (dbh>3 ind 60% tree concentrate of 60% tree concentrate of 60% tree concentrate of 60% tree concentrate of 60% tree concentrate of 60% tree concentrate of 60% concentrate of	al hes) present anopy cover. agony for orest layers.) Good range layers are present. th stumps	Tree stratum (present, with <a>3 cover. (See Ext for examples of layers.) Score a fair range if ≥2 are present. So ≤1 additional young OR area cor maintained ar dense herbar woody ve 4 dition Scores t indi Use GIS ma for each ripariar Marg	ginal dbh>3 inches) 0% tree canopy sellent Category additional forest the high end of additional layers ore at low end if eres are pressor d naturalized coous and/or getation. 3 using the abov an category in t	Tree stra surfaces lands, culve maintain denuded of p	Poor turn absent; , croplands, rtred streams used herbaceced herbaceced herbaceced streams assurfaces, act assure, and of the streams of the stream of the streams of the s	impervious mine spoil s, mowed and sus areas, veely grazed atc. 0 Ensure th %Riparia equa	e sums
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Grade Grade Grade Delineat Determin Enter the	10 10 10 10 Tree stratum (dbl >60% tree canopy layers may in herbaceous, a mosses/lichens an the high end o additional layers a end if ≤1 additional layers	9 JON (SCOF Dptimal Dptimal Dptimal Dptimal Dptimal Dptimal Dptimal Dptimal Dptimal Dptimal Dptimal Dptimal Dptimal Dptimal Dptimal Dptimal Dptimal	8 RE EACH B, present, with ditional forest g, shrub, including oris), Score al now e present. 8 tream bank r measuring purposes, 6	7 ANK) Tree stratun with 30% to (See E examples o Score at the if ≥2 add present. additional f OR cuto	Suboptim: n (dbh>3 ind 60% tree c xcellent Cat f additional e high end o titional forest Score at lo forest layers ver areas w remaining 6 on Catego glength a and width) Suboptim: 0	al hes) present anopy cover. ggory for corest layers, if Good range layers are wend if ≤1 are present. this tumps	A Marg Tree stratum (present, with <3 cover. (See Exc for examples of layers.) Score a r Fair range if ≥2 are present. Sc ≤1 additional lay OR area cor maintained ar dense herba woody ve	ginal dbh-3 inches) 0% tree canopy ellent Category of the category carditional forest the high end of additional lagaditional lagaditional lagaditional lagaditional lagaditional lagaditional sissists of non-ind naturalized ceous and/or getation.	Tree stra surfaces lands, culve maintain denuded sidenuded of this. he blocks but a subcle of the su	Poor turn absent; , croplands, croplands, rited streams red herbacet surfaces, act asture, and of the streams red herbacet asture, and of the streams red herbacet surfaces, act asture, and of the streams red herbacet surfaces act as the streams red herbacet surfaces red herbacet surfac	impervious mine spoil mus areas, rively grazed atc. 0 Ensure th %Riparia equa 100 100	e sums in Blocks I 100

N22 Trib2 (6-15')

Perennial = 0.0038

St	ream Function	nal Capacity C	alculation		
	N22 Trib2				
Date:	5/17/2005	` ,			
Project:	Lake Ralph H				
Assessment Area:	WP7				
Assessors:	Holmes Voigh	nt Capps			
Project Status:	XPreproj	ect	Postproject		
		Stream	Stream	Multiplication	
Major Function Categories	FCI	Length (LF)*	Characterization	Factor**	FC
Hydrologic	0.06	1,676	E	0.00125	0.13
Water Quality Improvement	0.09	1,676	E	0.00125	0.18
Habitat	0.10	1,676	E	0.00125	0.21
Total	0.25	1,676			0.52
*Stream Length is the length of the Stre **Multiplication Factors Ephemeral = 0.00125 Intermittent = 0.0025	eam Assessme	nt Reach (SAR	R)		





SWAMPIM DATASHEETS – NORTH EPHEMERAL	6 TO 15'
PRE-PROJECT	

N20 (6-15')

PARAMET	ER]
				CONI		TEGORY G						1
		Optimal			Suboptima	l	Mar	ginal	ļ	Poor		Į.
												<u> </u>
Grade	10	9	8	7	6	5	4	3	2	1	0	

Right bank-50 meters of trees before pasture, Left bank 50-20 meters of trees to row crops. Park area, left bank row crops beyond trees, right bank pasture beyond trees.

WP 5 P 92, 93

TYPE		E:		i. HYDRO	_OGIC FUN	ICTIONS	N20 (6-	10)					SCORE	Source KDWP 2
CHANNEL CONDITION. Measurement or Observation of Stream Channel Condition/Number of Continued and Recipitary of Continued Condition/Number of Continued Condition/Number of Condition/Numb	TYPE		Perennial		Intermitte	ent w/ Perei	nnial Pools	Interr	mittent		Ephemeral			
Control Cont	Grade								3	2	1	0	2	Subjectiv
Subcoptions Subcoptions	CHANNEL CO	NDITION:	ivieasureme	ent or Obse	vation of S	ream Char	inei Conditio	ons						
Natural channels (no structures or consistent of the controlling or excessive interest conditions) and structures of controlling or excessive interest controlling or excessive					CON	IDITION CA	ATEGORY (GRADE or S	SCORE					Barbour,
22. Channel Condition Advantage of excessive based condition Advantage of excessive based condition Advantage of excessive based condition (natural altered, or charmel and floodplain. 10 9 8 7 6 6 5 4 3 3 2 1 0 0 0 Condition (natural altered, or charmel and floodplain. 25. Channel Capacity to Floor Flo														
Section Company Comp														
Control (natural, downcutting) The properties of the properties o	2a.Channel													
district of downcutring) Grade 10 9 8 7 6 5 4 3 2 1 0 0 0 Condition Category GRADE or SCORE Capacity to Froquency Street seath that have control from some than the street control from some than the street control from some than the street control from some than the street control from some than the street control from some than the street control from some than the street control from some than the street control from some than the street control from some than the street control from some than the street control from some than the street control from some than the street control from some than the street control from some than the street control from some than the street control from some street is sean than than some control from some some than the street control from some some than the street control from some from some some street are more frequent than every 10 years. 40 24 or 2 Condition Category GRADE or SCORE Suboptimal Bank stable, rendered of enrollers or work of the street from some events are more frequent than every 10 years. 40 24 or 2 Condition Category GRADE or SCORE Suboptimal Bank stable, rendered of enrollers or award of the street from some events are more frequent than every 10 years. 40 24 or 2 Condition Category GRADE or SCORE Suboptimal Bank stable, rendered of enrollers or award of the street from some events are more frequent than every 10 years. 40 24 or 2 Condition Category GRADE or SCORE Suboptimal Bank stable, rendered of enrollers or award of the street from some events are more frequent than every 10 years. 40 25 or 3 + 15 Condition Category GRADE or SCORE Suboptimal Bank stable, rendered bank, led to a street frequency and the street frequency and the street frequency and the street frequency and the street frequency and the street frequency and the street frequency and the street frequency and the street frequency and the street frequency and the street frequency and the street frequency and the street frequency and the street frequency and the street fre	Condition/Alter									levees		ss to the		SVAP pa
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Condition Cond	0,							floodplain	. Historical					
Grade 10 9 8 7 6 5 4 3 2 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0														
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Condition Capacity to Pow Frequency Ratio (pr. 2-power frequency Ratio	Crada	10	T 0		7	I 6		4		2	1 4			
26. Channel Capacity to Flow Frequency Chapacity to Flow Frequency Ratio (for 2-types) Property Ratio (for 2-types) Ratio	Grade	10	1 9	0	I	L.	L	I	1		'	0		
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Friequency Frequ			apacity to Flo			pacity to Flo	w Frequency	Channel (Capacity to		apacity to Flow		1	
Frequency year frequency. 9														
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Strade 10 9 8 7 6 5 4 3 2 1 0 0			0.75-1.25									3.		
Serade 10 9 8 7 6 5 4 3 3 2 1 0 0 0						CO.7 O OI > 1.2	.0	frequent th	nan every 5		10.24 OI 22			
CONDITION CATEGORY GRADE or SCORE Suboptimal Marginal Poor Institute absent or minimal; (<5%) of bank affected, perennial vegetation to waterline; or raw or undercut banks (some erosion or bank lative absent or minimal; (<5%) of bank affected, perennial vegetation to waterline; or raw or undercut banks (some erosion or both bank, left or right facing downstream) Newton, undercut banks (some erosion or both bank, left or right facing downstream) Newton, undercut banks (some erosion or both bank, left or right facing downstream) Newton, undercut banks (some erosion or both bank undercut banks (some erosion or both bank undercut banks (some erosion or both bank), left or recently exposed tree roots (some erosion or both bank undercutting); expensive development or recently exposed tree roots and for bank undercutting; exceently exposed tree roots common; tree falls and/or severely lateral erosion, bank lateral erosions, bank lateral erosions, bank lateral erosions, bank lateral erosions and bends, solvious bank slouphing; 60-100% of bank has erosional scars. Norfolk District, 2 Norfolk District,														
Suboptimal Suboptimal Suboptimal Marginal Poor	Grade	10	9	8	7	6	5			2	1	0	C)
Suboptimal Suboptimal Marginal Poor					CON	IDITION CA	ATEGORY (GRADE or S	SCORE					Newton
2c. Channel Bank Stability (score each bank falture absent or minimal; (<5% of bank affected), perennial vegetation to waterline; no raw or or load bank stability (score each bank, left or night facing downstream) 2c. Channel Bank Stability (score each bank, left or night facing downstream) 2c. Stability (score each bank, left or night facing downstream) 2c. Stability (score each bank), left or recently exposed rots; no recent tree falls; no recent tree falls; 2c. Stability (score) 2c. Stability						Suboptima	i	Mar	rginal					
2.C.Channel Bank Stability (score each bank affected), perennial egatation to waterine; no raw or undercut banks (some erosion on obtaine), and or each pank affected), perennial vegetation to waterine; no raw or undercut banks (some erosion on obtaine), and or undercut banks (some erosion on obtaine), and or undercut banks (some erosion on obtaine), and or undercut banks (some erosion on obtaine), and or undercut banks (some erosion on obtained of the pand points) and obtained or bank left or inglift facing downstream) or ecently exposed rore rots; no recent tree falls; Grade (Left) 10 9 8 7 6 5 4 3 3 2 1 0 2 2 1 0 2 2 1 0 0 2 2 1 1 0 0 2 1 1 1 0 1 1 1 1														
Bank Stability (score each correct control of the stream increase the first earling and the stream increase the first earling radient stream) 3a. Channel Sinuosity (bends in low gradient stream) 3b. Bottom Substrate Composition Bank Stability (vegetation to waterline; no raw of undercut thank (some erosion and droit waterline) and provided the stream increase the length/valley length 1.0 to 1.2. CONDITION CATEGORY GRADE or SCORE Optimal The bends in the stream increase the length/valley length 1.0 to 1.2. Suboptimal CONDITION CATEGORY GRADE or SCORE Substrate CONDITION CATEGORY GRADE or SCORE Interior that was a straight line. Channel length/valley length 1.0 to 1.2. Grade 10 9 8 7 6 5 4 3 3 2 1 0 1 2 1 2 1 0 1 3 1 2 1 0 1 3 2 1 1 0 1 3 3 2 1 1 0 1 4 2 3 3 2 1 1 0 1 5 3 4 4 3 3 2 1 1 0 1 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5		of ban	k affected), p	erennial	5-30% of ba	ank in reach	has areas of	waterline sp	parse (mainly	banks; re	cently exposed	tree roots		
bank, left or right facing outside of meander bends C.K.); no recently exposed tree roots rare but present, recently exposed tree roots rare but present, recently exposed tree roots rare but present, recently exposed tree roots rare but present, recently exposed tree roots rare but present, recently exposed tree roots rare but present, recently exposed tree roots and bank undercutting; recently exposed tree roots and bank undercutting; recently exposed tree roots and for recision and bank undercutting; recently exposed tree roots and for recision and bank undercutting; recently exposed tree roots and for recision and bank undercutting; recently exposed tree roots and for recision and bank undercutting; recently exposed tree roots and for recision and bank undercutting; recently exposed tree roots and for recision and bank undercutting; recently exposed tree roots and for recision and bank undercutting; recently exposed tree roots and for recision and bank undercutting; recently exposed tree roots and for recision and bank undercutting; recently exposed tree roots and for recision and bank undercutting; recently exposed tree roots and for recision and bank undercutting; recently exposed tree roots and for recision and bank undercutting; recently exposed tree roots and for recision and bank undercutting; recently exposed tree roots and for recision and bank undercutting; recently exposed tree roots and for recision and bank undercutting; recently exposed tree roots and for recision and bank undercutting; recently exposed tree roots and for recision and bank undercutting; recently exposed tree roots and for recision and bank undercutting; recently exposed tree roots and for recision and bank undercutting; recently exposed tree roots and for recision and bank undercutting; recently exposed tree roots and for recision and bank undercutting; recently exposed tree roots and for recision and bank undercutting; recently exposed tree roots and for recision and bank undercutting; recently exposed tree roots and for recis														
right facing downstream) Tree falls; Treents seemly subsuphing; Tree falls; Tree falls; Tree falls; Tr		outside of I	meander ben	ds O.K.); no	waterline	in most place	es; recently	held by h	ard points	areas; "i	aw" areas frequ	uent along		
Seriable Seriable		recently e		; no recent	exposed tre	ee roots rare	but present.							
Grade (Left) 10 9 8 7 6 5 4 3 2 1 0 2 Grade (Right) 10 9 8 7 6 5 4 3 2 1 0 2 Avg.Score 1.5 CHANNEL ROUGHNESS FACTORS CONDITION CATEGORY GRADE or SCORE Stream length 2.5 to 4 times longer than if it was a straight line. Channel length/valley length at least >1.5. Grade 10 9 8 7 6 5 4 3 2 1 0 2 2 Avg.Score 1.5	downstream)		troo iano,					elsewhere	; 30-60% of	·				
undercuting; recently exposed tree roots and fine more hairs common: Grade (Right) 10 9 8 7 6 5 4 3 2 1 0 2 Avg.Score 1.5 CHANNEL ROUGHNESS FACTORS CONDITION CATEGORY GRADE or SCORE Stream increase the Stream length 2.5 to 4 times longer than if it was straight. Channel length/valley length at least >1.5. Channel stream in the was straight. Channel length/valley length at least >1.5. Condition CATEGORY GRADE or SCORE Suboptimal Marginal Poor Channel stream increase the stream length 1.5 to 2.5 times longer in crease the stream length 1.5 to 2.5 times longer in an if it was straight. Channel length/valley length 1.0 to 1.2. Condition CATEGORY GRADE or SCORE Suboptimal Channel length 1 to 1.5 times Suboptimal Suboptim														
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Avg.Score 1.5 CHANNEL ROUGHNESS FACTORS 3a. Channel Sinuosity (bends in low gradient stream) The bends in the stream increase the stream length 2.5 to 4 times longer than if it was a straight line. Channel length/valley length at least >1.5. Grade 10 9 8 7 6 5 4 3 2 1 0 3 CONDITION CATEGORY GRADE or SCORE Subportmal If it was a straight line. Channel length/valley length 1.0 to 1.2. Grade 10 9 8 7 6 5 4 3 2 1 0 3 CONDITION CATEGORY GRADE or SCORE Stream length 1.0 to 1.2. CONDITION CATEGORY GRADE or SCORE Subportmal Subportmal If it was a straight line. Channel length/valley length 1.0 to 1.2. CONDITION CATEGORY GRADE or SCORE Subportmal Subportmal Itile or no channel enlargement resulting from sediment accumulation; channel is stable COMPOSITION CATEGORY GRADE or SCORE Subportmal Subportmal Subportmal Subportmal Substrate Composition Substrate Substrat	Grade (Left)							4	3				-1	
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Optimal Suboptimal Marginal Poor The bends in the stream increase the stream length 2.5 to 4 times longer than if it was straight. Channel length/valley length at least >1.5. In the stream length 1.2 to 1.5 In the stream length 1.2 to 1.5 In the stream length 1.2 to 1.5 In the stream length 1.0 to 2.5 times longer than if it was straight. Channel length/valley length 1.0 to 1.2. In the bends in the stream increase the stream length 1.0 to 2.5 times longer than if it was a straight line. Channel length 1.0 to 1.2. In the bends in the stream increase the stream length 1.0 to 1.5 times longer than if it was a straight line. Channel length 1.0 to 1.2. In the bends in the stream increase the stream length 1.0 to 2.5 times longer than if it was a straight line. Channel length 1.0 to 1.2. In the bends in the stream increase the stream length 1.0 to 2.5 times longer than if it was a straight line. Channel length 1.0 to 1.2. In the bends in the stream increase the stream length 1.0 to 1.5 times longer than if it was a straight line. Channel length 1.0 to 1.2. In the bends in the stream increase the stream length 1.0 to 1.5 times longer than if it was a straight line. Channel length 1.0 to 1.2. In the bends in the stream increase the stream length 1.0 to 1.5 times longer than if it was a straight line. Channel length 1.0 to 1.5 times longer than if it was a straight line. Channel length 1.0 to 1.2. In the bends in the stream increase the stream length 1.0 to 1.5 times longer than if it was a straight line. Channel length 1.0 to 1.5 times longer than if it was a straight line. Channel length 1.0 to 1.5 times longer than if it was a straight line. Channel length 1.0 to 1.5 times longer than if it was a straight line. Channel length 1.0 to 1.2. In the bends in the stream length 1.0 to 1.5 times longer than if it was a straight line. Channel length 1.0 to 1.5 times longer than if it was a straight line. Channel length 1.0 to 1.5 times longer than if it was a straight line. Channel length	CHANNEL RO	UGHNESS	FACTORS											
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gradient stream) length/valley length at least >1.5. length/valley length 1.2 to 1.5 length/valley length 1.2 to 1.5 length/valley length 1.2 to 1.5 length/valley length 1.2 to 1.5 length/valley length 1.2 to 1.5 length/valley length 1.2 to 1.5 length/valley length 1.2 to 1.5 length/valley length 1.2 to 1.5 longer than if it was a straight line. Channel length/valley length 1.0 to 1.2. CONDITION CATEGORY GRADE or SCORE Optimal Little or no channel enlargement resulting from sediment accumulation; channel is stable Some gravel bars of coarse stones and well-washed debris present, little sands, and silt common; moderately unstable Some gravel bars of coarse stones and well-washed debris present, little sands, and silt common; moderately unstable Some gravel bars of rocks, sands, and silt common; moderately unstable Some gravel bars of rocks, sands, and silt common; moderately unstable Some gravel bars of rocks, sands, and silt common; moderately unstable Some gravel bars of rocks, sands, and silt common; moderately unstable														
Ingth/valley length 1.0 Into 1.2. In										Chaine	lerigiti/valley le	nigui <u><</u> 1.0		1996
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3b. Bottom Substrate Composition resulting from sediment accumulation; channel is stable and well-washed debris present, little silt; moderately stable silt; moderately unstable moderately unstable is channelized; substrate is uniform sand, silt, clay, or bedrock; unstable sand, silt, clay, or bedrock; unstable washed debris present, little sands, and silt common; moderately unstable is channelized; substrate is uniform sand, silt, clay, or bedrock; unstable Habitats	stream)	10	9	8	l	IDITION CA	ATEGORY (GRADE or S	SCORE					KDWP, 1
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	stream) Grade	Little or n	Optimal no channel en	largement	CON Some grav	Suboptima rel bars of co	arse stones	Mar Sediment b	rginal ars of rocks,		ivided into braid			Kansas Subjective
Grade 10 9 8 7 6 5 4 3 2 1 0 1	Stream) Grade 3b. Bottom Substrate	Little or n	Optimal no channel en ulting from sec	nlargement	CON Some grav	Suboptima rel bars of co shed debris	ll arse stones present, little	Mar Sediment b sands, and	rginal ears of rocks, silt common;	is channe	ivided into braid elized; substrate	e is uniform		Kansas Subjective Evaluation Aquatic
Grade 10 9 8 7 6 5 4 3 2 1 0 1	Stream) Grade 3b. Bottom Substrate	Little or n	Optimal no channel en ulting from sec	nlargement	CON Some grav	Suboptima rel bars of co shed debris	ll arse stones present, little	Mar Sediment b sands, and	rginal ears of rocks, silt common;	is channe	ivided into braid elized; substrate	e is uniform		Kansas Subjective Evaluation Aquatic
Grade 10 9 8 7 6 5 4 3 2 1 0 1	Stream) Grade 3b. Bottom Substrate	Little or n	Optimal no channel en ulting from sec	nlargement	CON Some grav	Suboptima rel bars of co shed debris	ll arse stones present, little	Mar Sediment b sands, and	rginal ears of rocks, silt common;	is channe	ivided into braid elized; substrate	e is uniform		Kansas Subjective Evaluation Aquatic
	Stream) Grade 3b. Bottom Substrate	Little or n	Optimal no channel en ulting from sec	nlargement	CON Some grav	Suboptima rel bars of co shed debris	ll arse stones present, little	Mar Sediment b sands, and	rginal ears of rocks, silt common;	is channe	ivided into braid elized; substrate	e is uniform		Subjective Evaluation Aquatic

I					CO	NDITION C	ATEGORY	GRADE or	SCORE						KDWP, 1996
ı			Optima	ı		Suboptim			rginal		Poo	or			Newton et a
010000000000000000000000000000000000000	3c. Instream Bottom Topography	>7 of the boulders/ debris overhar vegetat	ottom topograme following: gravel, logs backwaters ging vegeta ded shallows t banks, or s	aphy includi deep pools, /large wood s/oxbows, ation, riffles, , rootwads,	items lis		les 5-7 of the	Chann includes < : listed in	el bottom 5 of the items n Optimal regory			clude	es <3 of the Category		1998 USDA/NRC SVAP page
9			pools												
ב ט	Grade	10	9	8	7	6	5	4	3	2	1 1		0	2	
2000					CO	NDITION C	ATEGORY	GRADE or	SCORE						
5	or		Optima	ı		Suboptim			rginal		Pod	or			
בוופוי	3c. Manning's n		0.05 to 0.0	99		0.035 to 0.0	05		.03 or >0.10 0.15	obstructio		r 0.01 nd cle	xcessive 1 to 0.02 due ean, smooth		
Ī	Grade	10	9	8	7	6	5	4	3	2	1		0		
					CO	NDITION C	ATEGORY	GRADE or	SCORE						USACE,
	3d. Channel		Optima			Suboptim			rginal		Poo				Norfolk
	Incision (TLB/BFD=BH R; 1/BHR*Adj Factor =CI)	channel s ratio >1.	atio ≥1.0 <1. slope >2%; E 4; Where ch antrenchmen	Entrenchmer nannel slope	nt channel s ratio >1.			and Whe slope Entrench >1.4; Wh slope	io $\geq 1.4 < 2.0$ ere channel $\epsilon > 2\%$, nment ratio ere channel $\epsilon \leq 2\%$, ent ratio ≥ 2.0	slope >29 Whe En		hmer I slop			District, 200 SAAM Form #1 and VT Stream Geomorphic Assessmen Phase 2
ŀ	TLB =		10		BHR =	1									
Ī	BFD =		10												
1	Grade	10	9	8	7	6	5	4	3	2	1		0	3	
4	DYNAMIC SUR	RFACE WA	ATER STO	RAGE											
					CO	NDITION C	ATEGORY	GRADE or	SCORE						Newton, et
			Optima	l		Suboptim			rginal		Poo	or			1998 USDA
	4a.Pools (abundant, present or absent)	greater that is obscure	I shallow poo an 30% of the due to dept least 5 feet	ne pool botto h, or pools a	m from 10-3 re obscure	esent, but no 30% of the po due to depth, at least 3 fee	ool bottom is or the pools	shallow; from the pool obscure dute the pools a	resent, but om 5-10% of I bottom is e to depth, or are less than it deep.	disce	sent, or the rnible. No		re bottom is r = zero.		NRCS SVA page 14; Barbour, et 1999
1	Grade	10	9	8	7	6	5	4	3	2	1		0	0	
	4b. Channel				CO	NDITION O	ATEGORY	CDADE or	SCORE						
	Flow Status		Optima		30	Suboptim			rginal		Poo	or			Barbour. et
	(degree to which channel	banks	aches base and minimal Il substrate i	of both lower	chann	lls >75% of the el; or <25% of the batrate is exp	ne available of channel	Water fills the availa and /or riff	s 25-75% of ble channel, le substrates ly exposed.		water in ch	nanne pools	el and mostly s. No water =		1999 EPA RBA page 5 /A-9#5; TCI 1999; VANI
	is filled)														
	is filled) Grade	10	9	8	7	6	5	4	3	2	1		0	0	2005
	,	10	9	8	7		•	4			1			0.13	
	,	10	9	8	7		•	4	3		1	l Pos			

I. HYDROLOGIC FUNCTIONS N20 (6-15')

- 1	/ARIABLES												SCORE
	TYPE NOTES												1
	SEDIMENT TR	ANSPORT	T/DEPOSIT	ION									7
						IDITION	1TE00D\(20.405	2005]
	1a. Bank		Optimal		I	Suboptima	ATEGORY (rginal	l	Poor		4
	Stability	Banks stab		of erosion or		/ stable; infre	quent, small	Moderately	unstable; 30-		many eroded		1
	(score each bank, left or right facing	potential fo		minimal; little lems. <5% of ed.		osion mostly ank in reach erosion.	healed over. has areas of	areas of e	k in reach has erosion; high tential during ods.	sections a	equently alon and bends; ob g; 60-100% o erosional scal	ovious bank f bank has	
	downstream)												
	Grade (Left)	10	9	8	7	6	5	4	3	2	1	0	1
(Grade (Right)	10	9	8	/	6	5	4	3	2	1	0 Avg.Score	1.5
			Optimal		COI	NDITION CA Suboptima	ATEGORY (rginal	I	Poor		-
	1b. Channel Bottom Bank	Bottom	1/3 of bank is	s generally	Bottom ²	1/3 of bank is			/3 of bank is	Bottom	1/3 of bank is	generally	-
	Stability	highly res	sistant plant/s material.	soil matrix or	resistant pla	ant/soil matri	x or material.	material; pl	ighly erodible ant/soil matrix romised.		odible materia severely comp		
	Grade (Left)	10	9	8	7	6	5	4	3	2	1	0	0
۴	Grade (Right)	10	9	8	7	6	5	4	3	2	1	0 Avg.Score	9 0
												711g.00010	
	or		Ontina		COI		ATEGORY (CORE rginal	ı	Daar		
	1c. Channel Sediments or	>50% ar	Optimal avel or large	r substrate:	30-50% a	Suboptima ravel or large			rginai ravel or larger	Substrate	Poor is uniform sai	nd. silt. clav.	-
	Substrate Composition	gravel, co substrate	obble boulder type is grav stable	rs; dominant el or larger;	dominant gravel wit m	substrate typh h some finer oderately sta	pe is mix of sediments; able	substrate substrate ty gravel, but	e; dominant pe is finer than may still be a	or	bedrock; unsi	table	
	Grade	10	9	8	7	6	5	4	3	2	1	0	1
٧	WATER APPE	ARANCE.	Clarity of V	risibility									†
					COI		ATEGORY (1			
		Very clear	Optimal or clear but	tea-colored;	Occasional	Suboptima Ilv cloudy, es	pecially after		rginal ole cloudiness	Verv turbid	Poor or muddy appe	earance most	4
,	Water Clarity	objects visi if slightly surface		3-6 feet (less oil sheen on ole film on	storm ev objects visi have slig	ent, but clea	irs rapidly; 1.5-3 ft; may olor; no oil	most of the visible to de slow section pea-green; or sumerg	e time; objects epth 0.5-1.5 ft; ns may appear bottom rocks ged objected d with film.	the time; ob slow moving other obvio algal mats, s	jects visible to g water may be us water pollut urface scum, s am on surface. zero.	depth <0.5 ft; bright-green; ants; floating sheen or heavy	
(Grade	10	9	8	7	6	5	4	3	2	1	0	0
Ę	PRESENCE OF	= AOLIAT!	C VECETA	TION: Dre-	anno cad D	arcont Co:	rago	-		· · · · · ·			↓
۲	NESENCE U	AQUATI	O VEGETA	IION. PIESE	ence and Pe	FICEIII COVE	aye						1
					COI		ATEGORY (ī			
		Cloar	Optimal ater along er	tire reach:	Fairly closs	Suboptima or slightly gr	eenish water		rginal ter along entire	Pea green	Poor gray, or brown	water along	4
1	3a. Nutrient	diverse a	aquatic plant	community	along enti	re reach; mo	derate algal	reach; overab	undance of lush	entire	reach; dense s	tands of	
	Enrichment	species o	low quantati if macrophyte growth prese	es; little algal	growth	on stream su	ubstrates.	algal grow	ohytes; abundant th, especially rmer months.	blooms crea or NO alga	es clog stream; te thick algal n ae present due rate. No water	nats in stream to unstable	
		40		0	7	6	5	4	3	2	1	0	
C	Grade	10	9	8	· · · · · ·								
_	Grade	10	<u> </u>	8	l	NDITION C	ATEGORY (SRADE or S	CORE				
0	Grade Or	10	Optimal	8	l	NDITION CA	ATEGORY (CORE rginal		Poor		
Œ		When pre	•	c vegetation	COI		ols, larger	Ma Algal mats		plants don algae p	Poor ats cover botten inate the charesent due to ate. No wate	annel or NO unstable	- - -

				CO	NDITION C	ATEGORY (ODADE or C	CORE				
		Optimal		COI	Suboptima			rginal	1	Poor		1
	Mainly co	nsisting of le	aves and	Leaves	and wood so			s or woody	Fine orga	anic sedimen	t - black in	
		without sedi			debris without		debris; coa organic	arse and fine matter with iment.	color and fo		erobic) or no	F 1
Grade	10	9	8	7	6	5	4	3	2	1	0	8
AND USE PA	TTERN: Be	yond Imme	diate Ripari	an Zone								
		0 11 1		CO		ATEGORY (1			ı
	Ula d'atrodos	Optimal		D	Suboptima			rginal		Poor		6
		ed, consisting ve prairie, ar			ent pasture r and swamp			w crops and ome wooded	I N	lainly row cro	pps	
	Photilio Hati	wetlands.	io, or matural	WOOdiots	crops	, 16W 10W	areas may l	pe present but ed patches				1
Grade (Left)	10	9	8	7	6	5	4	3	2	1	0	3
Grade (Right)	10	9	8	7	6	5	4	3	2	1	0	3
RIPARIAN ZON											Avg.Score	3
Ca Dinarian				COI		ATEGORY (GRADE or S	CORE				,
										1		
6a. Riparian	Midth of sing	Optimal	1 (1 O	Midth of sing	Suboptima			rginal	Midth of sings	Poor		é
Zone Width		arian zone >18			arian zone 12-1	18 meters (1/2-	Width of ripa	arian zone 6-12		rian zone < 6 i	meters (natural	
Zone Width (from stream	channel width grasses), h		shrubs, or tall es have not	1 active cha	arian zone 12-1 nnel width w/tre	18 meters (1/2- ees, shrubs, or have minimally	Width of ripa meters (1 channel wid		vegation le width), little		tive channel tation due to	6 1 <i>1</i> 6 F
	channel width grasses), h	arian zone >18 hs with trees, s numan activitie	shrubs, or tall es have not	1 active cha	arian zone 12-1 nnel width w/tre man activities	18 meters (1/2- ees, shrubs, or have minimally	Width of ripa meters (1 channel wid	arian zone 6-12 /3-1/2 active dth vegetated),	vegation le width), little	rian zone < 6 i ess than 1/3 ac e riparian vege	tive channel tation due to	6 1 1 6 F
Zone Width (from stream edge to field)	channel widtl grasses), h i	arian zone >18 hs with trees, s numan activitie impacted zone	shrubs, or tall es have not	1 active cha grasses), hu	arian zone 12-1 nnel width w/tro man activities impacted zono	18 meters (1/2- ees, shrubs, or have minimally e.	Width of ripa meters (1 channel wid impacted by h	arian zone 6-12 /3-1/2 active fth vegetated), numan activities.	vegation le width), little h	rian zone < 6 r ess than 1/3 ac e riparian vege numan activitie	tive channel tation due to es.	6 1 1 6 F
Zone Width (from stream edge to field)	channel width grasses), h i	arian zone >18 hs with trees, s numan activitie impacted zone	shrubs, or tall es have not	1 active cha grasses), hu 7	arian zone 12-1 nnel width w/tre man activities i impacted zone 6 6	18 meters (1/2- ees, shrubs, or have minimally e.	Width of ripa meters (1 channel wid impacted by h	arian zone 6-12 /3-1/2 active tith vegetated), numan activities.	vegation le width), little h	rian zone < 6 i ess than 1/3 ac e riparian vege numan activitie	etive channel station due to es.	8 1 1 1 1 1 1 1
Zone Width (from stream edge to field)	channel width grasses), h i	arian zone >18 hs with trees, s numan activitie impacted zone	shrubs, or tall es have not	1 active cha grasses), hu 7	arian zone 12-1 nnel width w/tre man activities impacted zone 6 6 NDITION C	18 meters (1/2-ees, shrubs, or have minimally e.	Width of ripa meters (1 channel wid impacted by h	arian zone 6-12 /3-1/2 active tith vegetated), numan activities.	vegation le width), little h	rian zone < 6 r ess than 1/3 ac e riparian vege numan activitie	etive channel station due to es.	8 8 8
Zone Width (from stream edge to field) Grade (left) Grade (Right)	channel width grasses), h	arian zone >18 hs with trees, s numan activitie impacted zone 9 9 Optimal	shrubs, or tall as have not 8 8	1 active cha grasses), hu	arian zone 12-1 nnel width w/tre man activities i impacted zone 6 6 NDITION Co	18 meters (1/2-ees, shrubs, or have minimally e.	Width of rips meters (1 channel wic impacted by h	arian zone 6-12 /3-1/2 active fith vegetated), numan activities. 3 3 SCORE rginal	vegation le width), little h	rian zone < 6 i ess than 1/3 ac e riparian vege numan activitie	tive channel tation due to ss. 0 0 Avg.Score	8 8 8 8
Zone Width (from stream edge to field) Grade (left) Grade (Right) 6b. Riparian	channel width grasses), h	arian zone >18 hs with trees, summan activitie impacted zone 9 9 Optimal density of mar	shrubs, or tall as have not	1 active cha grasses), hu 7 7 7 COI	arian zone 12-1 nnel width w/tr nnel width w/tr impacted zone 6 6 NDITION C Suboptima eambank vege	18 meters (1/2-ees, shrubs, or have minimally e	Width of rips meters (1 channel wich impacted by hand) 4 4 GRADE or S Ma 50-75%	arian zone 6-12 /3-1/2 active tith vegetated), numan activities. 3 3 3 SCORE rginal streambank	vegation le width), little lit	rian zone < 6 i ss than 1/3 ac riparian vege numan activitie 1 1 Poor 60% streambai	tive channel tation due to es. 0 0 Avg.Score	8 8 8
Zone Width (from stream edge to field) Grade (left) Grade (Right) 6b. Riparian Zone	channel widtl grasses), h i 10 10	arian zone >18 hs with trees, s numan activitie impacted zone 9 9 Optimal density of mai e grasses, or	shrubs, or tall shave not	1 active cha grasses), hu 7 7 COI 75-90% str young speci	arian zone 12-1 nnel width witr man activities i impacted zone 6 6 NDITION C. Suboptima eambank vege es along chanr	18 meters (1/2-ees, shrubs, or have minimally e	Width of ripa meters (1 channel wice impacted by h	arian zone 6-12 //3-1/2 active tith vegetated), numan activities. 3 3 3 GCORE rginal streambank mixed grasses	vegation le width), little width), little h	rian zone < 6 iss than 1/3 ac riparian vege numan activities 1 1 Poor 60% streambal onsisting mos	tive channel tation due to es. 0 0 Avg.Score	8 8 8 8
Zone Width (from stream edge to field) Srade (left) Grade (Right) 6b. Riparian Zone Vegetation	channel widtl grasses), h i 10 10 10	arian zone >18 hs with trees, summan activitie impacted zone 9 9 Optimal density of mar	shrubs, or tall as have not	1 active cha grasses), hu 7 7 COI 75-90% str young speci trees behi	arian zone 12-1 nnel width w/tr nnel width w/tr impacted zone 6 6 NDITION C Suboptima eambank vege	18 meters (1/2-ees, shrubs, or have minimally e	Width of rips meters (1 channel wich impacted by hand) 4 4 GRADE or S Ma 50-75% vegetation of and sparse shrub spe	anian zone 6-12 //3-1/2 active this vegetated), numan activities. 3 3 3 SCORE rginal streambank r mixed grasses young free or cicles; breaks	vegation le width), little h	rian zone < 6 i sss than 1/3 ac e riparian vege numan activities 1 1 1 Poor 60% streambar onsisting mos w trees & shruk k deeply scarr	tive channel tation due to ses. O O O Avg.Score Ak vegetation tity of pasture bes; low plant ed with guillies	8 8
Zone Width (from stream edge to field) Srade (left) Frade (Right) 6b. Riparian Zone Vegetation Protection/	channel widtl grasses), h i 10 10 10	arian zone >18 hs with trees, shouman activitie impacted zone 9 9 Optimal density of male grasses, or lie intact or dis-	shrubs, or tall as have not	1 active cha grasses), hu 7 7 COI 75-90% str young speci trees behi	arian zone 12-1 nnel width witr man activities i impacted zone 6 6 NDITION C Suboptima earmbank vege ear blong chann nd; disruption	18 meters (1/2-ees, shrubs, or have minimally e	Width of ripa meters (1 channel wic impacted by h 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	arian zone 6-12 /3-1/2 active this vegetated), human activities. 3 3 3 CORE rginal streambank mixed grasses young tree or ccies; breaks h some gullies	vegation le width), little h	rian zone < 6 i sis than 1/3 ac e riparian vege enuman activitie 1 1 1 1 1 Poor 60% streambai onsisting mos w trees & shru	tive channel tation due to ses. O O O Avg.Score Ak vegetation tity of pasture bes; low plant ed with guillies	8 8 8
Zone Width (from stream edge to field) Srade (left) Grade (Right) 6b. Riparian Zone Vegetation	channel widtl grasses), h i 10 10 10	arian zone >18 hs with trees, shouman activitie impacted zone 9 9 Optimal density of male grasses, or lie intact or dis-	shrubs, or tall as have not	1 active cha grasses), hu 7 7 COI 75-90% str young speci trees behi	arian zone 12-1 nnel width wirth man activities i impacted zone 6 6 NDITION C, Suboptima eambank vege es along chanr ind; disruption courring at inter	18 meters (1/2-ees, shrubs, or have minimally e	Width of ripa meters (1 channel wic impacted by h 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	anian zone 6-12 //3-1/2 active this vegetated), numan activities. 3 3 3 SCORE rginal streambank r mixed grasses young free or cicles; breaks	vegation le width), little h	rian zone < 6 i sss than 1/3 ac e riparian vege numan activities 1 1 1 Poor 60% streambar onsisting mos w trees & shruk k deeply scarr	tive channel tation due to ses. O O O Avg.Score Ak vegetation tity of pasture bes; low plant ed with guillies	8 8
Zone Width (from stream edge to field) Grade (left) Grade (Right) 6b. Riparian Zone Vegetation Protection/ Completeness	channel width grasses), h	Agrian zone >18 hs with trees, she with trees, she with trees, she will be she with trees and she will be she with the she will be she wil	shrubs, or tall sis have not	1 active cha grasses), hu 7 7 7 COI 75-90% str young specitrees beh breaks oc	arian zone 12-1 nnel width wirt man activities i impacted zone 6 6 6 NDITION C/ Suboptima eambank vege eambank vege es along chann ind; disruption courring at inter meters.	18 meters (1/2-ees, shrubs, or have minimally e. 5 5 ATEGORY (all station, mixed mel and mature evident with rivals of >50	Width of ripa meters (1 channel wic impacted by h 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	arian zone 6-12 /3-1/2 active this vegetated), human activities. 3 3 3 COORE rginal streambank from item of the original streambank grasses young tree or cicles; breaks h some gullies very 50 meters.	vegation le width), little le width), little le le vidth), little le le vidth), little le vidth little le vidt	rian zone < 6 i siss than 1/3 ac i riparian vege numan activitie 1 1 1 Poor i rico stream activitie Poor i rico stream activitie stream activitie li along its length along its length along its length activities.	O O Avg.Score Avg.Score Avg.Station tly of pasture this; low plant ed with gullies gth.	8 8 8 8
Zone Width (from stream edge to field) Srade (left) Grade (Right) 6b. Riparian Zone Vegetation Protection/ Completeness	channel width grasses), h 10 10 10 >90% plant shrubs, prairi riparian zon grazir	arian zone >18 hs with trees, s hs with trees, s year and trees and trees 9 9 Optimal density of ma te grasses, or ne intact or dis	shrubs, or tall is have not 8 8 8 ture trees or marsh plants, ruption from himal.	1 active cha grasses), hu 7 7 75-90% str young specitrees beh breaks oc	arian zone 12-1 nnel width wirt man activities i impacted zone 6 6 6 NDITION C Suboptima earmbank vege earmbank vege es along chanr ind; disruption courring at inter meters.	18 meters (1/2-ees, shrubs, or have minimally e. 5 5 ATEGORY (all etation, mixed neel and mature evident with rvals of >50	Width of ripa meters (1 channel wic impacted by hand) 4 4 4 SRADE or S Ma 50-75% vegetation of and sparse shrub spe frequent wit and scars en	arian zone 6-12 /3-1/2 active thit vegetated), human activities. 3 3 GCORE rginal streambank mixed grasses young tree or cicles; breaks h some gullies //ery 50 meters.	vegation le width), little le width), little le le vidth), little le le vidth), little le vidth le le vidth le	rian zone < 6 i sss than 1/3 ac i piparian vege numan activitie 1 1 Poor 60% streambai onsisting mos w trees & shruk deeply scarr II along its leng	tive channel tation due to be seen and the to be seen and the to be seen and the total	8 8 8

II. WATER QUALITY/BIOGEOCHEMICAL FUNCTIONS

N20 (6-15')

1 FLOW REGI				AT FUNCTI		- (-	15')					SCORE	So
TYPE		Perennial		late en les	ant/ D	nial Deel	las	mittent		Fab	·al		KD
Grade	10	Perennial 9	1 8	Intermitte	ent w/ Perer	inial Pools	Interi	mittent	2	Ephemera	al	2	2 20
Sidde	10			<u>' ' </u>			, ,			· · ·	1 0	 	720
2 EPIFAUNAL	SUBSTRATE/A\		OVER				•						1
		Optimal	4b F00/	*****	Suboptima			rginal	1 - 2	Poor	1-151	4	1
	Within stream coverage by s	bed, greater stable habitat	tnan 50% features		stream bed, ov stable hab			n bed, 10-30% stable habitat			tat features at is obvious:		US
	favorable for str	ream faunal	colonization	favora	ble for stream	n faunal	features favor	able for stream	substrat	e unstable	or lacking;		20
	and/or fish/amph				on and/or fish			ization and/or	concrete I	lined chann	nels. Habitat		SA
Some	features non tr include snags, s				any habitat fe (See Excelle			n cover; habitat ay be less than		a pools buri el bottom ma	ied or lacking, av be flat.	,	Fo
features present but	banks, roots, cob	oble, rocks, p	ersistent leaf		at feature con		desirable, sul	bstrate may be					(pa
little to no	packs, pools ar habitat at a sta						frequently di	sturbed. (See					Ba al.
water.	nabitat at a sta	ige to allow e	Olornzadori					mponents.)					EP
													Pa
													al.,
													AU
Grade	10	9	8	7	6	5	4	3	2	1	0	0)
3 STREAM BO	TTOM SUBSTRA	ATE: Pool S Optimal	ubstrate Ch	aracterizati	on Suboptima	ı	Mai	rginal		Poor			
	Mixture of substr		, with gravel	Mixture of	soft sand, m			or sand bottom;	Hard pan		rock; no root	1	Ba
	and firm sand p				be dominant			root mat; no	mat or s	ubmerged v	vegetation.		al.
	submerged	vegetation or	ommon.	mats and	submerged present.	vegatation	submerged	d vegetation.					RB
	I			1	,								pag Pa
	1												al.,
Grade	10	9	8	7	6	5	4	3	2	1	0	0	ΑÚ
													1
4 POOL VARIA		Ontine -1		1	Cubantin			enia al		D			
	Even mix of lar	Optimal	argo doon	Majority	Suboptima of pools large			rginal Is much more	Majority	Poor f pools sma	all-shallow or	-	Ba
	small-shallow, s			iviajority o	few shallow	-ueep, very		an deep pools		pools abse			al.
													RB
													pag
													Pa
1													
												L .	al.,
Grade	10	9 COLIBING	8	7	6	5	4	3	2	1	0	1	
	10 DEPOSITION/SC		8	7					2	1 Poor	0	1	
	SEPOSITION/SC <5% of channel to	Optimal bottom affected		7 5-30% affe	Suboptima	I or deposition;	Mai 30-50% affec	rginal ted by scour or	More than 50	% of the bott	tom in a state of	1	al., 1 Ba
	SEPOSITION/SC <5% of channel to	Optimal		Scour at cor	Suboptima cted by scour on strictions and	I or deposition; wehre grades	Mai 30-50% affec deposition. Dep	rginal ted by scour or osits and scour at	More than 50 flux or char	% of the bott nge nearly ye	tom in a state of		al., 1 Ba al.
	SEPOSITION/SC <5% of channel to	Optimal bottom affected		Scour at cor	Suboptima	I or deposition; wehre grades	Mai 30-50% affect deposition. Depostructions, of	rginal ted by scour or	More than 50 flux or char minimal or ab	% of the bott nge nearly ye	tom in a state of aarlong. Pools heavy deposition		al., Ba al. RB
	SEPOSITION/SC <5% of channel to	Optimal bottom affected		Scour at cor	Suboptima cted by scour on strictions and	I or deposition; wehre grades	Mai 30-50% affect deposition. Depostructions, of	rginal ted by scour or sosits and scour at constrictions and	More than 50 flux or char minimal or ab	0% of the bott nge nearly ye sent due to h	tom in a state of aarlong. Pools heavy deposition		Ba al. RB pag
	SEPOSITION/SC <5% of channel to	Optimal bottom affected		Scour at cor	Suboptima cted by scour on strictions and	I or deposition; wehre grades	Mai 30-50% affect deposition. Depostructions, of	rginal ted by scour or sosits and scour at constrictions and	More than 50 flux or char minimal or ab	0% of the bott nge nearly ye sent due to h	tom in a state of aarlong. Pools heavy deposition		al., Ba al. RB
	SEPOSITION/SC <5% of channel to	Optimal bottom affected		Scour at cor	Suboptima cted by scour on strictions and	I or deposition; wehre grades	Mai 30-50% affect deposition. Depostructions, of	rginal ted by scour or sosits and scour at constrictions and	More than 50 flux or char minimal or ab	0% of the bott nge nearly ye sent due to h	tom in a state of aarlong. Pools heavy deposition		Ba al., RB pag
5 SEDIMENT D	DEPOSITION/SC <5% of channel to 10	Optimal bottom affected		Scour at cor	Suboptima cted by scour on strictions and	I or deposition; wehre grades	Mat 30-50% affec deposition. Dep obstructions, c bends. Some	rginal ted by scour or sosits and scour at constrictions and	More than 50 flux or char minimal or ab	0% of the bott nge nearly ye sent due to h	tom in a state of sarlong. Pools heavy deposition buring.		Ba al. RB pag Pa al.,
5 SEDIMENT D	DEPOSITION/SC <5% of channel to the state of th	Optimal bottom affected deposition.	by scour or	Scour at cor steepen.	Suboptima cted by scour o nstrictions and Some depositi	I or deposition; wehre grades ion in pools	Mai 30-50% affec deposition. Dep obstructions, c bends. Some	rginal ted by scour or osits and scour at constrictions and e filling of pools.	More than 50 flux or char minimal or ab or e	0% of the bott nge nearly ye sent due to h excessive sco	tom in a state of sarlong. Pools heavy deposition ouring.	0	Ba al., RB pag
5 SEDIMENT D	c5% of channel to the control of the	Optimal bottom affected deposition.	both lower	Scour at cor steepen.	Suboptima cted by scour or strictions and Some depositi 6 Suboptima >75% of the	I or deposition; wehre grades on in pools	Mai 30-50% affec deposition. Dep obstructions, c bends. Some	rginal ted by scour or osits and scour at constrictions and filling of pools. 3 rginal 15-75% of the	More than 50 flux or char minimal or ab or 6	0% of the bottinge nearly ye isent due to hexcessive sco	tom in a state of sarlong. Pools leavy deposition puring.	0	Baal., RB pag Pa al., Pa al., Pa Vr
5 SEDIMENT D	EPOSITION/SC <5% of channel to the control of the contro	Optimal potential is the base of of channel su	both lower	Scour at cor steepen.	Suboptima cted by scour or astrictions and Some depositi 6 Suboptima >75% of the of channel sul	I or deposition; wehre grades on in pools	Mai 30-50% affect deposition. Dep obstructions, c bends. Some	rginal ted by scour or osits and scour at oonstrictions and filling of pools. 3 rginal 15-75% of the nnel and/or riffle	More than 50 flux or char minimal or ab or e	0% of the bottinge nearly ye issent due to hexcessive scored and the second and t	tom in a state of carlong. Pools heavy deposition ouring.	0	Baal., RB pag Pa al., Pa al., PB Ba
5 SEDIMENT D	EPOSITION/SC <5% of channel to the control of the contro	Optimal bottom affected deposition.	both lower	Scour at cor steepen.	Suboptima cted by scour or strictions and Some depositi 6 Suboptima >75% of the	I or deposition; wehre grades on in pools	Mai 30-50% affect deposition. Dep obstructions, c bends. Some	rginal ted by scour or osits and scour at constrictions and filling of pools. 3 rginal 15-75% of the	More than 50 flux or char minimal or ab or e	0% of the bottinge nearly ye isent due to hexcessive sco	tom in a state of carlong. Pools heavy deposition ouring.	0	Baal., RB pag Pa al., Pa al., Pa al., Pa al., Pa al., Pa al., Pa al.
5 SEDIMENT D	EPOSITION/SC <5% of channel to the control of the contro	Optimal potential is the base of of channel su	both lower	Scour at cor steepen.	Suboptima cted by scour or astrictions and Some depositi 6 Suboptima >75% of the of channel sul	I or deposition; wehre grades on in pools	Mai 30-50% affect deposition. Dep obstructions, c bends. Some	rginal ted by scour or osits and scour at oonstrictions and filling of pools. 3 rginal 15-75% of the nnel and/or riffle	More than 50 flux or char minimal or ab or e	0% of the bottinge nearly ye issent due to hexcessive score	tom in a state of carlong. Pools heavy deposition ouring.	0	Baal., RB pag Pa al., Pa al., PB Ba
5 SEDIMENT D	EPOSITION/SC <5% of channel to the control of the contro	Optimal potential is the base of of channel su	both lower	Scour at cor steepen.	Suboptima cted by scour or astrictions and Some depositi 6 Suboptima >75% of the of channel sul	I or deposition; wehre grades on in pools	Mai 30-50% affect deposition. Dep obstructions, c bends. Some	rginal ted by scour or osits and scour at oonstrictions and filling of pools. 3 rginal 15-75% of the nnel and/or riffle	More than 50 flux or char minimal or ab or e	0% of the bottinge nearly ye issent due to hexcessive score	tom in a state of carlong. Pools heavy deposition ouring.	0	Ba al., RB pag Pa al., PB al., RB pag Pa al., RB pag Pa al., RB pag Pa
Grade 6 CHANNEL FI	c5% of channel to the control of the	Optimal 9 Optimal sthe base of of channel su exposed	by scour or	Scour at cor steepen.	Suboptima Suboptima Suboptima Some depositi 6 Suboptima >75% of the f channel sul exposed	or deposition; wehre grades on in pools 5	Mai 30-50% affec deposition. Dep obstructions, c bends. Some 4	rginal ted by sour or osits and sour at onstrictions and solid and filling of pools. 3 rginal 5-75% of the nnel and/or riffle mostly exposed	More than 50 flux or char minimal or ab or e	0% of the bottinge nearly ye issent due to hexcessive score	tom in a state of sardong. Pools neavy deposition ouring.	0	Ba al., RB pag Pa al., PB al., RB pag RB al., RB pag RB pag RB pag RB
5 SEDIMENT D	c5% of channel to the control of the	Optimal potential is the base of of channel su	both lower	Scour at cor steepen.	Suboptima cted by scour or astrictions and Some depositi 6 Suboptima >75% of the of channel sul	I or deposition; wehre grades on in pools	Mai 30-50% affect deposition. Dep obstructions, c bends. Some	rginal ted by scour or osits and scour at oonstrictions and filling of pools. 3 rginal 15-75% of the nnel and/or riffle	More than 50 flux or char minimal or ab or e	0% of the bottinge nearly ye issent due to hexcessive score	tom in a state of carlong. Pools heavy deposition ouring.	0	Ba al., RB pag Pa al., PB al., RB pag Pa al., RB pag Pa al., RB pag Pa
Grade Grade Grade Grade Grade	25% of channel to the control of the	Optimal 9 Optimal sthe base of of channel su exposed	by scour or	Scour at cor steepen.	Suboptima Suboptima Suboptima Some depositi 6 Suboptima >75% of the f channel sul exposed	or deposition; wehre grades on in pools 5 channel; or obstrate is	Mai 30-50% affec deposition. Dep obstructions, bends. Some 4 Mai Water fills 2 available char substrates are	rginal ted by sour or osits and sour at onstrictions and solid and filling of pools. 3 rginal 5-75% of the nnel and/or riffle mostly exposed	More than 55 flux or charminimal or ab or e	1% of the bott gige nearly ye seemed to the bott gige nearly ye seemed to the to tax cessive score and the total seemed to tax cessive score and the seemed to tax cessive sco	tom in a state of sardong. Pools serving servi	C	Baal., RB pag Pa al., PB al., RB pag al., PB a
Grade Grade Grade Grade Grade	25% of channel to the control of the	Optimal bottom affected deposition. 9 Optimal s the base of of channel su exposed 9 Optimal a lateration, of the control o	8 both lower bstrate is 8	Scour at cor steepen. 7 Water fills <25% 0	Suboptima cted by scour or strictions and Some deposition of Some depo	or deposition; wehre grades on in pools 5 channel; or obstrate is	Mai 30-50% affec deposition. Dep obstructions, c bends. Some 4	rginal ted by scour or a cosits and scour at constrictions and filling of pools. 3 rginal 55-75% of the mostly exposed mostly exposed	More than 50 flux or char minimal or at a for e	1% of the bott ge nearly ye seemed to the total content of the seemed to the total content of the seemed to the se	tom in a state of posts and posts of posts of the posts o	C	Baal., RB pag Pa al., PB al.,
Grade Grade Grade Grade Grade	25% of channel to the control of the	Optimal optimal street of control of the base of of channel su exposed optimal a lateration, a later	8 both lower bstrate is	Scour at cor steepen. 7 Water fills <25% o	Suboptima Suboptima Suboptima Some depositi Suboptima S75% of the f channel sul exposed Suboptima Suboptima Suboptima Suboptima Suboptima Suboptima Suboptima Suboptima	or deposition; wehre grades on in pools 5 I channel; or obstrate is 5 I limited and the second of the second o	Mai 30-50% affec deposition. Dep obstructions, bends. Some 4 4 Mai Water fills 2 available char substrates are 4 Mai Alteration or may be	rginal ted by scour or as onstituted by scour or as onstituted by scour or as onstituted and scour at a scour at a scour at a scour at a scour at a scour at a scour at a scour at a scour at a scour at a scour at a scour	More than 50 flux or charminimal or at a minim	9% of the bottnge nearly ye sent due to the sent due to the second of the sent due to the sent due to the sent due to the sent in the sent in the sent in stands stream is defined the sent due to the sent du	tom in a state of bardong. Pools heavy deposition ouring. O channel and ding pools; or firy O pools, or firy	C	Ba al., RB pag al., Pa al., RB pag al., RB pag al., RB pag al., RB pag pag al., No
Grade Grade Grade Grade Grade	25% of channel to the control of the	Optimal bottom affected deposition. 9 Optimal is the base of of channel su exposed 9 Optimal a, alteration, a mail, normal are pattern. A	8 both lower bstrate is 8 or dredging and stable literation by	Scour at cor steepen. 7 Water filis <25% o 7 Some alte presen struct.	Suboptima cted by scour or strictions and Some deposition of Some depo	in deposition; wehre grades on in pools 5 ichannel; or bestrate is 5 Innelization acent to shridge in the properties of the pool of the properties of th	Mai 30-50% affec deposition. Dep obstructions, c bends. Some 4 4 Mai Water fills 2 available rar substrates are 4 Mai Alteration or may be a embankments.	rginal ted by scour or a cosits and scour at constrictions and filling of pools. 3 rginal 55-75% of the mostly exposed mostly exposed	More than 50 flux or char minimal or ab arminimal or ab or e	9% of the bottnge nearly ye sent due to how sent due to how sent due to how sent due to how sent due to how sent in the sent in the sent in the sent in the sent in the sent in the due to how sent in the sent in	tom in a state of bardong. Pools heavy deposition ouring. O channel and ding pools; or firy O pools, or firy	C	Baal., RB pagal., Paal., RB pagal., RB pagal., RB pagal., RB pagal., RB pagal., Paal., No Dis
Grade Grade Grade Grade Grade	25% of channel to the control of the	Optimal bottom affected deposition. 9 Optimal is the base of of channel su exposed 9 Optimal a, alteration, a mail, normal are pattern. A	8 both lower bstrate is 8 or dredging and stable literation by	7 Water fills <25% o 7 Some alte presen struct abutments past alteral	Suboptima cted by scour or strictions and Some deposition of the strictions and Some deposition of the stric	ir deposition; wehre grades on in pools 5 I channel; or obstrate is 5 I unnelization accent to shridge evidence widence or annelization annelization annelization annelization annelization annelization annelization.	Mai 30-50% affec deposition. Dep obstructions, c bends. Some 4 Mai Water fills 2 available hard substrates are 4 Mai Alteration or may be embankments piles) or sho present on bot prese	rginal ted by scour or osolts and scour at osolts and scour at onorstrictions and filling of pools. 3 rginal 5-75% of the nnel and/or riffle mostly exposed 3 rginal channelization extensive; (including spoil ring structures hanks, normal	More than 50 flux or char minimal or ab a or e	Poor water in steam is defined by the both of the both	tom in a state of sariong. Pools serving. O channel and ding pools; or dry O point, riprap, or riprap lined m habitat y stormwater s 80% of the 80% of t	C	Baal., RB pag al., Pa al., RB pag al., Pa al.,
Grade Grade Grade Grade Grade	25% of channel to the control of the	Optimal bottom affected deposition. 9 Optimal is the base of of channel su exposed 9 Optimal a, alteration, a mail, normal are pattern. A	8 both lower bstrate is 8 or dredging and stable literation by	Towns alter fills cape alter presens structus abutments past alteral may be promable.	Suboptima Suboptima Suboptima Some depositi 6 Suboptima >75% of the f channel sul exposed Suboptima ration or chet, t, usually adj ures, (such a: or culverts); tion, (i.e., chessent, but str	or deposition; wehre grades on in pools 5 channel; or bettrate is	Mai 30-50% affec deposition. Dep obstructions, bends. Some 4 Mai Water fills 2 available char substrates are 4 Alteration or may be embankments piles) or sho present on bot stable stream in stable stream in the	rginal ted by scour or osits and scour ar osits and scour af osits and scour af filling of pools. 3 rginal 15-75% of the mostly exposed mostly exposed channelization extensive; (including spoil fing structures h banks; normal	More than 50 flux or char minimal or ab a or e	9% of the bottnge nearly yes sent due to hoxcessive scores and the total near the sent	tom in a state of sariong. Pools serving. O channel and ding pools; or dry O point, riprap, or riprap lined m habitat y stormwater s 80% of the 80% of t	C	Baal., RB pagal., Paal., RB pagal., RB pagal., RB pagal., RB pagal., RB pagal., Paal., No Dis
Grade Grade Grade Grade Grade	25% of channel to the control of the	Optimal bottom affected deposition. 9 Optimal is the base of of channel su exposed 9 Optimal a, alteration, a mail, normal are pattern. A	8 both lower bstrate is 8 or dredging and stable literation by	7 Water fills <25% o 7 Some alte present structual past alterat may be pre and stabilitation and stabilitation.	Suboptima cted by scour or histrictions and Some deposit 6 Suboptima >75% of the forhannels suit exposed Suboptima exposed Suboptima exposed Suboptima exposed Suboptima exposed yellowers in condition or chellenger in condition or chellenger yellowers y	or deposition; wehre grades on in pools 5 I channel; or bestrate is I mnelization acent to a bridge evidence of annelization pools annelization acent to a bridge evidence ered; recent erred; recent ered; recent ered; recent ered; recent	Mai 30-50% affec deposition. Dep obstructions, c bends. Some 4 Mai Water fills 2 available hard substrates are 4 Mai Atteration or may be embankments piles) or sho present on bot stable stream in has not recove.	rginal ted by scour or ossits and scour at onserticions and filling of pools. 3 rginal 5-75% of the nnel and/or riffle mostly exposed 3 rginal channelization extensive; (including spoil ring structures hanks, normal meander pattern meand. Alteration meander pattern meander pattern meander pattern meander pattern meand. Alteration meander pattern meand. Alteration	More than 50 flux or char minimal or ab a or e	Poor water in steam is defined by the both of the both	tom in a state of sariong. Pools serving. O channel and ding pools; or dry O point, riprap, or riprap lined m habitat y stormwater s 80% of the 80% of t	C	Baal., RB pag pag al., YO 199 Wr Ba al., Pag pag al., Pag pag 200 Diss 200 SA
Grade Grade Grade Grade Grade	25% of channel to the control of the	Optimal bottom affected deposition. 9 Optimal is the base of of channel su exposed 9 Optimal a, alteration, a mail, normal are pattern. A	8 both lower bstrate is 8 or dredging and stable literation by	Scour at cor steepen. 7 Water fills <25% 0 7 Some alte presenstruct. abutments past alterat may be pre and stabilit alteration.	Suboptima cted by scour critical score deposit 6 Suboptima >75% of the for channels use exposed suboptima exposed Suboptima exposed Suboptima exposed Suboptima exposed Suboptima exposed Universely exposed Suboptima exposed Suboptima exposed Suboptima exposed if channels use exposed if channels use exposed if channels use exposed if yether critical score in the suboptima exposed if yether critical score in the suboptima exposed in the suboptima expose	or deposition; wehre grades on in pools 5 channel; or betrate is strict channel; or betrate is strict channel; or deposition; or deposition channel; or deposition channel; or deposition; or deposition channel; or deposition	Mai 30-50% affec deposition. Dep obstructions, c bends. Some 4 Mai Water fills 2 available for a variable for a variable for may be embankments piles) or sho table stream in has not recove from stormwatt.	rginal ted by scour or osits and scour at osors and scour at on stand scour at on stand scour at one stand scour at one stand scour at stand scour at stand scour at stand scour at stand scour at stand scours at stand scour	More than 50 flux or char minimal or ab a or e	Poor water in steam is defined by the both of the both	tom in a state of sariong. Pools serving. O channel and ding pools; or dry O point, riprap, or riprap lined m habitat y stormwater s 80% of the 80% of t	C	Baaal. RB pagaal., Paaal., SR Baal.,
Grade Grade Grade Grade Grade	25% of channel to the control of the	Optimal bottom affected deposition. 9 Optimal is the base of of channel su exposed 9 Optimal a, alteration, a mail, normal are pattern. A	8 both lower bstrate is 8 or dredging and stable literation by	Scour at cor steepen. 7 Water fills <25% 0 7 Some alte presenstruct. abutments past alterat may be pre and stabilit alteration.	Suboptima set by sour or strictions and Some deposition of the sour or strictions and Some deposition of the source of the source of the source of the source of the source of the source, sounce of the source, sounce or culverts); tion, (i.e., chessent, but stry have recove its not source, source, source, its not present, but stry have recove in so not present, but stry is not present, but stry is not present, but stry is not present.	or deposition; wehre grades on in pools 5 channel; or betrate is strict channel; or betrate is strict channel; or deposition; or deposition channel; or deposition channel; or deposition; or deposition channel; or deposition	Mai 30-50% affec deposition. Dep obstructions, c bends. Some 4 Mai Water fills 2 available for a variable for a variable for may be embankments piles) or sho table stream in has not recove from stormwatt.	rginal ted by scour or a cosits and scour at constrictions and a filling of pools. 3 rginal 55-75% of the nnel and/or riffle mostly exposed channelization extensive; (including spoil ring structures a meander pattern ered. Alteration er inputs my eriputs my exposed	More than 50 flux or char minimal or ab a or e	Poor water in steam is defined by the both of the both	tom in a state of sariong. Pools serving. O channel and ding pools; or dry O point, riprap, or riprap lined m habitat y stormwater s 80% of the 80% of t	C	Baal., RB pag pag al., Pa al., RB pag pag al., RB pag pag al., Pa al., Pa al., Pa al., Pa Ba Ba Ba Ba Ba Ba Ba Ba Ba Ba Ba Ba Ba
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Grade Grade Grade Grade Grade	25% of channel to the control of the	Optimal bottom affected deposition. 9 Optimal is the base of of channel su exposed 9 Optimal a, alteration, a mail, normal are pattern. A	8 both lower bstrate is 8 or dredging and stable literation by	Scour at cor steepen. 7 Water fills <25% 0 7 Some alte presenstruct. abutments past alterat may be pre and stabilit alteration.	Suboptima cted by scour critical score deposit 6 Suboptima >75% of the for channels use exposed suboptima exposed Suboptima exposed Suboptima exposed Suboptima exposed Suboptima exposed Universely exposed Suboptima exposed Suboptima exposed Suboptima exposed if channels use exposed if channels use exposed if channels use exposed if yether critical score in the suboptima exposed if yether critical score in the suboptima exposed in the suboptima expose	or deposition; wehre grades on in pools 5 channel; or betrate is strict channel; or betrate is strict channel; or deposition; or deposition channel; or deposition channel; or deposition; or deposition channel; or deposition	Mai 30-50% affec deposition. Dep obstructions, c bends. Some 4 Mai Water fills 2 available forms a variable	rginal ted by scour or osits and scour at osors and scour at on stand scour at on stand scour at one stand scour at one stand scour at stand scour at stand scour at stand scour at stand scour at stand scours at stand scour	More than 50 flux or char minimal or ab a or e	Poor water in steam is defined by the both of the both	tom in a state of sariong. Pools serving. O channel and ding pools; or dry O point, riprap, or riprap lined m habitat y stormwater s 80% of the 80% of t	C	Baal., RB pag pag al., Pa al., RB pag pag al., RB pag pag al., Pa al., Pa al., Pa al., Pa Ba Ba Ba Ba Ba Ba Ba Ba Ba Ba Ba Ba Ba

8 CHANNEL		Optimal		1	Suboptimal		Marg	ginal		Poor		
	The bends in the	ne stream incre		The bends	in the stream inc		The bends in	n the stream		straight; water		
	stream length 3 to was in a straigh				m length 2 to 3 ti an if it was in a sti		increase the stimes longer that		been c	hannelized fo distance	or a long	
	braiding is consi	idered normal is	n coastal	longer the	line.	aigiit	straigh			distance		
	plains and othe	r low-lying area	as. This									
	parameter is no	ot easily rated i areas).	in tnese									
Cuada	10	0	0	7	6	-	4	3	2	1 4	0	3
Grade	10	9	8	7	6	5	4	3	2	1 1	0	3
9 BANK STA	BILITY (SCORE EA	ACH BANK)										
		Optimal			Suboptimal		Marg			Poor		
	Banks stable; evid failure absent or				stable; infrequent sion mostly healt		Moderately unsi vegetation to w			o perennial v severe erosi		
	affected), pe	rennial vegetat	tion to	5-30% of ba	ank in reach has a	areas of	(mainly scoured	d or stripped by	banks; red	ently expose	d tree roots	
	waterline; no raw erosion on outs				erosion and/or ba ng; perennial vege		lateral erosion) hard points), bank held by		tree falls and t trees comm		
	O.K.); no recently				in most places; r		outcrops) and			as; "raw" are		
	tı	ree falls;		exposed tre	e roots rare but p	resent.		60% of bank in		ight sections		
							reach has areas bank undercu	of erosion and		nk sloughing; has erosional		
							exposed tree		Dank	ilas crosiona	i Jours.	
							root hairs co					
							erosion potentia	al during floods				
	1											
				<u> </u>			<u></u>		<u></u>			
Grade	10	9	8	7	6	5	4	3	2	1	0	1
Grade	10	9	8	7	6	5	4	3	2	1	0	2
-										Avg.Score	1	1.5
10 VEGETATI	VE PROTECTION	(SCORE FAC	CH BANK)								
10 120211111		Optimal),, , , , , , , , , , , , , , , , , , ,		Suboptimal		Marg	ginal		Poor		
		% of the stream		70-90% of t	he streambank s		50-70% of the	e streambank		50% of the s		
	surfaces and im covered by nativ				y native vegetations of plants is not		surfaces of vegetation: disr	overed by uption obvious;		covered by v of streamban		
	trees, understor				d; disruption evid		patches of bare			gh; vegetation		
		vegetative disr			cting full plant gro		cropped vegeta			5 centimete		
	through grazing of evident; almost a				any great extent alf of the potentia		less than on potential plant		aver	age stubble h	neight.	
		naturally.	a to grow		air or the potentia e height remainin		remai					
		,						3				
Crada	10	9	0	7	6	-	4	1 2	2		0	5
Grade Grade			8	/	6	5	4	3		1	U	5
				7	6	5	4	3	2	1	0	
Glade	10	9	0	7	6	5	4	3	2	1 Avg.Score	0	5
			0	7	6	5	4	3	2			
	ZONE (SCORE EA	ACH BANK)	0			5			2	Avg.Score		
	ZONE (SCORE EA	ACH BANK) Optimal		I	Suboptimal		Marg	ginal		Avg.Score Poor		
	ZONE (SCORE EA	ACH BANK) Optimal zone >18 mete	rs; human	Width of		2-18	Marg Width of ripari		Width of r	Avg.Score	<6 meters;	5
	ZONE (SCORE EA	Optimal zone >18 mete king lots, roadb	rs; human beds, clear	Width of meters; h	Suboptimal f riparian zone 12	?-18 nave	Marg Width of ripari	ginal ian zone 6-12 activities have	Width of r	Avg.Score Poor iparian zone	<6 meters;	
	ZONE (SCORE EA Width of riparian activities (I.e., par	ACH BANK) Optimal zone >18 mete king lots, roadt	rs; human beds, clear	Width of meters; h	Suboptimal f riparian zone 12 human activities h	?-18 nave	Març Width of ripari meters; human	ginal ian zone 6-12 activities have	Width of r	Poor riparian zone riparian veget	<6 meters;	5
	ZONE (SCORE EA Width of riparian activities (I.e., par	Optimal zone >18 mete king lots, roadb	rs; human beds, clear	Width of meters; h	Suboptimal f riparian zone 12 human activities h	?-18 nave	Març Width of ripari meters; human	ginal ian zone 6-12 activities have	Width of r	Poor riparian zone riparian veget	<6 meters;	5
11 RIPARIAN	ZONE (SCORE EA Width of riparian activities (I.e., par cuts, lawns, or cu	ACH BANK) Optimal zone >18 mete king lots, roadt rops) have not zone.	ers; human beds, clear impacted	Width of meters; h	Suboptimal f riparian zone 12 human activities t zone only minim	2-18 nave ally).	Marg Width of ripar meters; human impacted zone	ginal ian zone 6-12 activities have e a great deal.	Width of r little or no r h	Poor riparian zone riparian veget	<6 meters; tation due to es.	5
11 RIPARIAN Grade	ZONE (SCORE EA Width of riparian activities (I.e., par cuts, lawns, or cu	ACH BANK) Optimal zone >18 mete king lots, roadt rops) have not zone.	ers; human beds, clear impacted	Width of meters; h	Suboptimal f riparian zone 12 human activities I zone only minim	2-18 nave ally).	Marg Width of ripar meters; human impacted zone	ginal ian zone 6-12 activities have e a great deal.	Width of r little or no r h	Poor riparian zone riparian veget	<6 meters; tation due to es.	5
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III. HABITAT FUNCTIONS N20 (6-15')

Record of Functional Assessment Results

St	ream Function	nal Capacity C	alculation		
	N20 (6-15	5')			
Date:	5/17/2005	,			
Project:	Lake Ralph H	all			
Assessment Area:	WP 5				
Assessors:	Holmes Voigh	nt Capps			
Project Status:	XPreproj	ect	Postproject		
		Stream	Stream	Multiplication	
Major Function Categories	FCI	Length (LF)*	Characterization	Factor**	FC
Hydrologic	0.13	6,084	E	0.00125	0.95
Water Quality Improvement	0.33	6,084	E	0.00125	2.52
Habitat	0.23	6,084	E	0.00125	1.71
Total	0.68	6,084			5.18
*Stream Length is the length of the Stre **Multiplication Factors Ephemeral = 0.00125 Intermittent = 0.0025 Perennial = 0.0038	am Assessme	nt Reach (SAF	₹)		

Pasture outside of riparian zone. Rip zone 20m or less.





SWAMPIM DATASHEETS – NORTH EPHEMERAL 16 TO >	·25°
PRE-PROJECT	

N12 (16-25')

PARAMET	ER]			
		CONDITION CATEGORY GRADE or SCORE													
		CONDITION CATEGORY GRADE or SCORE													
		Optimal			Suboptima	l	Mar	ginal		Poor		4			
0 1-	40	0	0	-	•	-		_	_						
Grade	10	9	8	/	ь	5	4	3		1	U				

Park area, surrounded by pasture and road. Reach crosses under road. Riparian zone is 0 to 100+ meters depending on proximity to road.

WP19 P 62, 61

VARIABLES FLOW REGIME	≣:	i. HYDROI	LOGIC FUN	ICTIONS		N12 (16)-Z5 <i>)</i>						SCORE	Source
TYPE		Perennial		Intermitte	ent w/ Perer	nial Pools	Inter	mittent		Ephem	oral			KDWP 2 Kansas
Grade	10	9	8	7	6	5	4	3	2	1	ciai	0	2	Subjectiv
CHANNEL CON		Measureme	nt or Obser	vation of Str	eam Chanr	el Condition	is .		U					, , , , , , , , , , , , , , , , , , , ,
		0-6		CON	IDITION CA					D	_			Barbour,
	Natural c	Optimal hannel; no st	ructures or	Some ch	Suboptima annelization			rginal hannel; 40-	Channel	Pool is actively		cutting or		EPA RB/ 5-21; N
		elization mini			reas) or pas			the reach				ch riprap or		1998 US
2a.Channel		ice of downc			on, but with s			elized or				on,dikes or		NRCS S
Condition/Alter		e lateral cuttin of hydrologica			channel bed e frequency			ed. Excess ion; braided	levee	s prevent a floodpla		s to the		page 7
ation (natural,		channel and			s onto flood			ith excessive		пооцра	aii i.			
altered, or								of overbank						
downcutting)								onto the						
								n. Historical ces or levees						
								floodplain.						
Grade	10	9	8	7	6	5	4	3	2	1 1		0	0	
Grade	10	J 9	0	l			I	ı	2	1		0	0	
		Ontire		CON	NDITION CA			SCORE rginal		D- 1				w/ assist
2b.Channel	Channel Ca	Optimal apacity to Flo	w Frequency	Channel Ca	Suboptima apacity to Flo			rginal Capacity to	Channel (Pool Capacity to		Frequency		and inpu Dr. Mike
Capacity to		that bank o			h that bank o			ency Ratio is				erflow from		Harvey a
Flow Frequency		nts occur at a			ts are more f			ank overflow				quent than		Travant
Ratio (for 2-)	ear frequent 0.75-1.25	cy.		5 years or les			n events are quent than	every hal	f year or les every 10 y		quent than		
year peak		0.73-1.23			<0.75 or >1.2			ear or less		<0.24 o		•		
flow)								han every 5						
								ears. or >1.5						
Grade	10	9	8	7	6	5	4	3	2	1		0	0	
				CO1	IDITION C	TECORY (DADE or	CCORE						Mourton
		Optimal		I	NDITION CA Suboptima			rginal		Poo	r			Newton, USDA/ N
	Banks stab	le; evidence	of erosion or	Moderately	stable; infre			ly unstable;	Unstable;			getation at		SVAP p
2c.Channel		absent or m			osion mostly			vegetation to		e; severe e				10; <i>Barb</i>
Bank Stability		k affected), p n to waterline			ank in reach erosion and/			parse (mainly r stripped by		ecently exp ; tree falls a				al., 1999
(score each		banks (some			g; perennial v			osion), bank				any eroded		RBA pag 26; USA
bank, left or		meander ben			in most place			nard points		raw" areas				Norfolk L
right facing	recently e	xposed roots tree falls;	, no recent	exposea tre	ee roots rare	but present.		ck outcrops) oded back				ds; obvious of bank has		2004
downstream)								e; 30-60% of		erosional				
								ich has areas						
								n and bank ing; recently						
							exposed tr	ee roots and						
Grade (Left)	10	9	8	7	6	5	fine root ha	airs common:	2	1		0	8	
Grade (Right)	10	9	8	7	6	5	4	3	2	1		0	0	
												Avg.Score	4	
CHANNEL ROL	UGHNESS	FACTORS												
				001	IDITION O	TECODY		2000						
		Optimal		CON	NDITION CA Suboptima			rginal	1	Poo	r			Barbour, EPA RB
3a.Channel	The bend	s in the strea	m increase	The bends	s in the strea			in the stream	Channels			y has been		Chapter
Sinuosity (bends in low	the strea	m length 2.5	to 4 times	the stream	n length 1.5 t	o 2.5 times	increase	the stream	channe	lized for a	long (distance.		5-25; KD
gradient		than if it was ngth/valley le			n if it was a s ength/valley le			to 1.5 times	Channel	length/vall	ey lei	ngth < 1.0		1996
	Channelle	ngtn/valley le >1.5.	ngin at least	Channelle	ngtn/valley li 1.5	zııgııı 1.∠ t0		an if it was a ne. Channel						
stream)	i	-		1	-			ey length 1.0	1				l	1
stream)														
stream)								1.2.						

			0 ::	_		COI			GORY	GRADE or			1						KDWP, 1996
	3b. Bottom Substrate Composition	resu	Optima no channel Iting from s lation; char	enla sedin	nent	Some gravand well-wasilt;		coars	sent, little	Sediment	d silt o	of rocks, common;	Channel d is channel sand, silt,	ivided elized; :	substrat	te is unit	form		Kansas Subjective Evaluation of Aquatic Habitats
	Grade	10	9	1	8	7	6	1	5	4		3	2		1	1 ()	0	
						100	IDITION (ΔTE	GORY (GRADE or	SCC)RE	·	1		1			KDWP, 1996;
			Optima				Suboptin	nal		Ma	argina	al			Poor				Newton et al.,
Enter Score for Only One Variable	3c. Instream Bottom Topography	boulders/ debris, overhan vegetate	ttom topoge following: gravel, log , backwate eging veger ed shallow t banks, or pools	dee s/larg rs/ox atior s, ro	p pools, ge woody bows, n, riffles, otwads,		ottom inclu ed in Optin			Chanr includes < listed i Ca	5 of 1	the items timal	Channel items li						1998 USDA/NRCS SVAP page 13
e for	Grade	10	Optimal 0.05 to 0.099				6		5	4		3	2		1	()	3	
Scor			Optimal				CONDITION CATEGORY GRADE or S				SCC	RE							
nter	or						Suboptimal			Marginal			0.464		oor				
Ē	3c. Manning's n					0.05 to 0.000					n to flov elization	w or 0.0	1 to 0.0	2 due					
	Grade	10	9		8	7	6		5	4		3	2		1	()		
						COI	NDITION (CATE	GORY (GRADE or	SCC	RE							USACE,
	3d. Channel Incision (TLB/BFD=BH R; 1/BHR*Adj Factor =CI)	Optimal Incision ratio ≥1.0 <1.2 and Where channel slope >2%; Entrenchment ratio >1.4; Where channel slope ≤2%; Entrenchment ratio >2.0			enchment nel slope	channel s ratio >1.4	Suboptim tio ≥1.2 <1 ope >2%, I ; Where cl htrenchmer	.4 and Entrer nanne	nchment el slope	Incision ra and Wh slop Entrenc >1.4; Wh	ere c e > 2 hmer ere c e <u><</u> 2'	1.4 < 2.0 hannel %, nt ratio channel %,		tio <u>≥</u> 2.0 6, Entre re char	enchme	nt ratio oe <2%,	<u><</u> 1.4;		Norfolk District 2004 SAAM Form 1 #1 and VT Stream Geomorphic Assessment Phase 2
	TLB =		10			BHR =	1												
	BFD = Grade	10	10	<u> </u>	8	7	6	1	5	4		3	2		1	1 ()	2	
	DYNAMIC SUR			ND A	-									1		<u> </u>			
4	DTNAMIC SUR	FACE WA	IER SIC	KA	JE														
			Optima	al le		100	NDITION (Suboptim		GORY	GRADE or	SCC argina		1	-	Poor				Newton, et al., 1998 USDA/
	4a.Pools (abundant, present or absent)	Deep and greater that is obscure at	shallow po in 30% of t	ools a he p th, o	ool bottom r pools are	from 10-3 obscure d	esent, but n 0% of the pue to depth at least 3 fe	ot abu loool b n, or th	ottom is ne pools	Pools p shallow; fi the pool obscure of or the pool than 3	reser om 5 ol bott due to	nt, but 5-10% of tom is 5 depth, are less	Pools abs discer	ent, or	the ent	ire botto er = zero			NRCS SVAP page 14; Barbour, et al. 1999
	Grade	10	9		8	7	6		5	4		3	2		1	()	1	
	4b. Channel					100	NDITION (CATE	GORY	GRADE or	SCC	RE						-	
	Flow Status		Optima				Suboptim	nal		Ma	argina	al			Poor				Barbour, et al.,
	(degree to which channel is filled)	banks a	aches base and minima I substrate	al am	ount of	channe	s >75% of t I; or <25% strate is ex	of cha	annel	Water fill the availa and /or riff are most	ible c	hannel, bstrates	Very little present as	standi					1999 EPA RB/ page 5-19 /A- 9#5; TCEQ 1999; VANR,
	Grade	10	9		8	7	6		5	4		3	2		1	()	1	2005
						L		Calcul	lation of	Function C	apac	ity Index	t = Total S	core/T	otal Po	ssible \$	Score	0.14	
																FCI =	#/100		

I. HYDROLOGIC FUNCTIONS

N12 (16-25')

ank, lafur absent or minimal; little areas of erosion mostly healed over. For right facing downstream) Bank lafure absent or minimal; little areas of erosion mostly healed over. For right facing downstream) Grade (Left) 10 9 8 7 6 5 4 3 Grade (Right) 10 9 8 7 6 5 4 3 Grade (Right) 10 9 8 7 6 5 4 3 Grade (Right) 10 9 8 7 6 5 4 3 Grade (Right) 10 9 8 7 6 5 4 3 Grade (Right) 10 9 8 7 6 5 4 3 Grade (Right) 10 9 8 7 6 5 4 3 Grade (Right) 10 9 8 7 6 5 4 3 Grade (Right) 10 9 8 7 6 5 4 3 Grade (Right) 10 9 8 7 6 5 5 4 3 Grade (Right) 10 9 8 7 6 5 4 3 Grade (Right) 10 9 8 7 6 5 5 4 3 Grade (Right) 10 9 8 7 6 5 4 3 Grade (Right) 10 9 8 7 6 5 5 4 3 Grade (Right					
SEDIMENT TRANSPORT/DEPOSITION					
CONDITION CATEGORY GRADE or SCORE Suboptimal Marginal Marg					7
1a. Bank Stability (score each bank, left or right facing downstream) Banks stable; evidence of erosion or located stable; infrequent, small both failure absent or minimal; little potential for future problems. < 5% of pright facing downstream) Sank affected.					†
Stability Grade (Left) Bortom Bank Stability To Condition Category Grade (Left) Grade (Left) Grade (Left) Grade (Left) Grade (Left) Grade (Left) To Potimal Stability To Condition Category Grade (Left) Grade (Left) Grade (Left) Grade (Left) To Potimal Stability To Condition Category Grade or scores or material. Bottom 1/3 of bank is generally highly resistant plant/soil matrix or material. Bottom 1/3 of bank is generally highly resistant plant/soil matrix or material. Bottom 1/3 of bank is generally highly resistant plant/soil matrix or material. Condition Category Grade or Score Stability To Condition Category Grade or Score Stability To Condition Category Grade or Score Stability To Condition Category Grade or Score Stability To Condition Category Grade or Score Stability To Condition Category Grade or Score Stability To Condition Category Grade or Score Stability To Condition Category Grade or Score Substrate Composition To Condition Category Grade or Score Substrate Composition Grade 10 9 8 7 6 5 4 3 To Condition Category Grade or Score Substrate					
(score each bank, left or right facing downstream) and failure absent or minimal; little areas of erosion mostly healed over, if the potential for future problems. <5% of bank in reach has areas of erosion, high erosion potential during floods. Grade (Left) 10 9 8 7 6 5 4 3 CONDITION CATEGORY GRADE or SCORE 1b. Channel Bottom Bank Stability 1c Grade (Left) 10 9 8 7 6 5 4 3 CONDITION CATEGORY GRADE or SCORE Optimal Suboptimal Marginal Bottom 1/3 of bank is generally highly resistant plant/soil matrix or material. Grade (Left) 10 9 8 7 6 5 4 3 CONDITION CATEGORY GRADE or SCORE Stability or material. Grade (Left) 10 9 8 7 6 5 4 3 CONDITION CATEGORY GRADE or SCORE Stability or material. Grade (Left) 10 9 8 7 6 5 4 3 CONDITION CATEGORY GRADE or SCORE Stability or material. Grade (Left) 10 9 8 7 6 5 4 3 CONDITION CATEGORY GRADE or SCORE Stability or material. Grade (Left) 10 9 8 7 6 5 4 3 CONDITION CATEGORY GRADE or SCORE CONDITION CATEGORY GRADE or SCORE Stability or Larger, stable or larger substrate; gravel with some finer sediments; stable st		Poor			
bank, left or right facing downstream) Grade (Left) Doptimal Stability Torrect (Left) Doptimal Stability Conder (Left) Doptimal Stability Conder (Left) Doptimal Stability Conder (Left) Doptimal Stability Conder (Left) Doptimal Stability Conder (Left) Doptimal Stability Conder (Left) Doptimal Stability Conder (Left) Doptimal Stability Conder (Left) Doptimal Stability Conder (Left) Doptimal Stability Conder (Left) Doptimal Stability Conder (Left) Doptimal Stability Conder (Left) Doptimal Stability Conder (Left) Doptimal Stability Conder (Left) Doptimal Stability Conder (Left) Doptimal Stability Conder (Left) Doptimal Suboptimal Stability Conder (Left) Doptimal Suboptimal Stability Conder (Left) Doptimal Suboptimal Suboptimal Marginal Composition Conder (Left) Doptimal Suboptimal Marginal Conder (Left) Doptimal Suboptimal Marginal Composition Conder (Left) Doptimal Suboptimal Marginal Composition Grade (Left) Doptimal Suboptimal Marginal Conder (Left) Doptimal Suboptimal Marginal Conder (Left) Doptimal Suboptimal Marginal Doptimal Suboptimal Marginal Doptimal Sub					'
right facing downstream) Construction Construc	sections and				
Grade (Left) 10 9 8 7 6 5 4 3 1b. Channel Bottom Bank Stability	sloughing; 60	60-100%	of b	bank has	
CONDITION CATEGORY GRADE or SCORE Suboptimal Bottom 1/3 of bank is generally highly resistant plant/soil matrix or material. Bottom 1/3 of bank is generally highly resistant plant/soil matrix or material. Bottom 1/3 of bank is generally highly recibile material. Bottom 1/3 of bank is generally	eros	osional sca	cars.		
CONDITION CATEGORY GRADE or SCORE Suboptimal Bottom 1/3 of bank is generally highly resistant plant/soil matrix or material. Bottom 1/3 of bank is generally highly resistant plant/soil matrix or material. Bottom 1/3 of bank is generally highly recibile material. Bottom 1/3 of bank is generally					
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Description Description	1 - 1		A	Avg.Score	
Description Description				<u> </u>	
Bottom 1/3 of bank is generally highly resistant plant/soil matrix or material. Grade (Left) 10 9 8 7 6 5 4 3 Grade (Right) 10 9 8 7 6 5 4 3 Opt					
Stability Stability Stability Stability Stability Inighly resistant plant/soil matrix or material. Inighly resistant plant/soil matrix or material. Inighly resistant plant/soil matrix or material. Inighly erodible material; plant/soil matrix compromised.	<u> </u>	Poor			
Grade (Left) 10 9 8 7 6 5 4 3 Or 1c. Channel Sediments or Substrate Composition Grade 10 9 8 7 6 5 4 3 Or 3ubstrate Composition Grade 10 9 8 7 6 5 4 3 Optimal Suboptimal Substrate type is mix of gravel with some finer sediments; moderately stable moderately stable gravel, cobble boulders; dominant substrate type is mix of gravel with some finer sediments; moderately stable substrate; dominant substrate type is mix of gravel with some finer sediments; moderately stable was provided in the provided in th	Bottom 1/3 of highly erodible				
Grade (Left) 10 9 8 7 6 5 4 3 Or 1c. Channel Sediments or Substrate Composition Grade 10 9 8 7 6 5 4 3 Or 3ubstrate Composition Grade 10 9 8 7 6 5 4 3 Optimal Suboptimal Substrate type is mix of gravel with some finer sediments; moderately stable moderately stable gravel, cobble boulders; dominant substrate type is mix of gravel with some finer sediments; moderately stable substrate; dominant substrate type is mix of gravel with some finer sediments; moderately stable was provided in the provided in th					
Grade (Left) 10 9 8 7 6 5 4 3 Or 1c. Channel Sediments or Substrate Composition Grade 10 9 8 7 6 5 4 3 Or 2 WATER APPEARANCE: Clarity or Visibility Water Clarity Water Clarity Fig. 10 9 8 7 6 5 4 3 Water Clarity Water Clarity Fig. 10 9 8 7 6 5 4 3 PRESENCE OF AQUATIC VEGETATION: Presence and Percent Coverage CONDITION CATEGORY GRADE or SCORE Substrate; gravel, cobble boulders; dominant substrate type is mix of gravel with some finer sediments; moderately stable of gravel with some finer sediments; moderately stable of gravel with some finer sediments; moderately stable of gravel with some finer sediments; moderately stable of gravel with some finer sediments; moderately stable of gravel with some finer sediments; moderately stable of gravel with some finer sediments; moderately stable of gravel with some finer sediments; moderately stable of gravel with some finer sediments; moderately stable of gravel with some finer sediments; moderately stable of gravel or larger substrate; dominant substrate type is finer than gravel, but may still be a gravel or larger substrate; dominant substrate type is mix of gravel with some finer sediments; abustrate type is mix of gravel with some finer sediments; abustrate type is mix of gravel with some finer sediments; abustrate typ		,	,		
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Or 1c. Channel Sediments or Substrate; Gravel or larger substrate; gravel or larger; stable Suboptimal Substrate type is gravel or larger; stable Substrate type is gravel or larger; stable Substrate type is mix of gravel with some finer sediments; moderately stable Substrate type is finer than gravel, but may still be a Substrate type is gravel or larger; stable Substrate type is mix of gravel with some finer sediments; moderately stable Substrate type is finer than gravel, but may still be a Substrate type is gravel or larger; substrate; dominant substrate type is finer than gravel, but may still be a Substrate type is mix of gravel or larger substrate; dominant substrate type is mix of gravel or larger substrate; dominant substrate type is mix of gravel or larger substrate; dominant substrate type is mix of gravel or larger substrate; dominant substrate type is mix of gravel or larger substrate; dominant substrate type is mix of gravel or larger substrate; dominant	2 2	<u>1</u> 1		0	
Sediments or Substrate Composition Sediments or Substrate Composition Sediments or Substrate Composition Grade 10 9 8 7 6 5 4 3 WATER APPEARANCE: Clarity or Visibility CONDITION CATEGORY GRADE or SCORE Optimal Very clear, or clear but tea-colored; objects visible at depth 3-6 feet (less if slightly colored); no oil sheen on submerged objects or rocks. Water Clarity Water		<u> </u>	A	Avg.Score	
Sediments or Substrate Composition Sediments or Substrate Composition Sediments or Substrate Composition Grade 10 9 8 7 6 5 4 3 WATER APPEARANCE: Clarity or Visibility CONDITION CATEGORY GRADE or SCORE Optimal Very clear, or clear but tea-colored; objects visible at depth 3-6 feet (less if slightly colored); no oil sheen on submerged objects or rocks. Water Clarity Water				.rg.coo.c	1
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Substrate type is gravel or larger; stable substrate type is gravel or larger; stable substrate type is gravel or larger; stable substrate type is gravel or larger; stable substrate type is finer than gravel, but may still be a gravel, but may substrate type is firer than gravel, but may substrate type is firer than gravel, but may substrate type is firer than gravel, but may substrate type is firer than gravel, but may substrate type is firer than gravel, but may substrate type is firer than gravel, but may substrate type is firer than gravel, but may su		Poor			
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Water Clarity Water					
Water Clarity Subup In Marginal Clarity Water Clarity Water Clarity Water Clarity Subwell A 15-3 ft; may bislet to depth 0.5-1.5 ft; slow sections may appear pea-green; bottom rocks or sumerged objected covered with film. Considerable cloudiness most of the time; objects visible at depth 1.5-3 ft; may bislet to depth 0.5-1.5 ft; slow sections may appear pea-green; bottom rocks or sumerged objected covered with film. Clarity is low sections may bea-green; bottom rocks or sumerged objected covered with film. Considerable cloudiness most of the time; objects visible at depth 1.5-3 ft; may bislet to depth 0.5-1.5 ft; slow sections may appear pea-green; bottom rocks or sumerged objected covered with film.	2	1		0	
Optimal Suboptimal Considerable cloudiness Suboptimal Considerable cloudiness Suboptimal Suboptimal Considerable cloudiness Suboptimal Suboptimal Considerable cloudiness Suboptimal Suboptimal Considerable cloudiness Suboptimal Suboptimal Suboptimal Considerable cloudiness Suboptimal Suboptimal Suboptimal Considerable cloudiness Suboptimal Subopt					
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Very clear, or clear but tea-colored; objects visible at depth 3-6 feet (less if slightly colored); no oil sheen on surface; no noticeable film on submerged objects or rocks. Occasionally cloudy, especially after storm event, but clears rapidly; objects visible at depth 1.5-3 ft; may have slightly green color; no oil sheen on water surface. Side to depth 0.5-1.5 ft; visible at depth 1.5-3 ft; may have slightly green color; no oil sheen on water surface. Side to depth 0.5-1.5 ft; visible at depth 1.5-3 ft; may have slightly green color; no oil sheen on water surface. Side to depth 0.5-1.5 ft; visible at depth 1.5-3 ft; may have slightly green color; no oil sheen on water surface. Side to depth 0.5-1.5 ft; visible at depth 1.5-3 ft; water slow sections may appear pea-green; bottom rocks or sumerged objected covered with film.		Poor			
Water Clarity Water Clarity with the colored control of the color of surface; no noticeable film on submerged objects or rocks. Grade 10 9 8 7 6 5 4 3 PRESENCE OF AQUATIC VEGETATION: Presence and Percent Coverage CONDITION CATEGORY GRADE or SCORE Optimal Suboptimal Organization of the color of the c	Very turbid or m			rance most	_
Water Clarity surface;no noticeable film on submerged objects or rocks. have slightly green color; no oil sheen on water surface. have slightly green color; no oil sheen on water surface. have slightly green color; no oil sheen on water surface. have slightly green color; no oil sheen on water surface. have slightly green color; no oil sheen on water surface. have slightly green; bottom rocks or sumerged objected covered with film. Grade 10 9 8 7 6 5 4 3 PRESENCE OF AQUATIC VEGETATION: Presence and Percent Coverage CONDITION CATEGORY GRADE or SCORE Optimal Suboptimal Marginal Clear water along entire reach; diverse aquatic plant community includes low quantaties of many species of macrophytes; little algal growth on stream substrates. green macrophytes; abundant algal growth, especially by green water along entire reach; moderate algal growth, especially by green macrophytes; abundant algal growth, especially by green macrophytes; abundant algal growth, especially by green macrophytes; abundant algal growth, especially by green macrophytes; abundant algal growth, especially by green macrophytes; abundant algal growth, especially					
submerged objects or rocks. Sheen on water surface. pea-green; bottom rocks or sumerged objected covered with film. Grade 10 9 8 7 6 5 4 3 PRESENCE OF AQUATIC VEGETATION: Presence and Percent Coverage CONDITION CATEGORY GRADE or SCORE Optimal Clear water along entire reach; diverse aquatic plant community Enrichment Clear water along entire reach; diverse aquatic plant community growth on stream substrates. Suboptimal Clear water along entire reach; along entire reach; moderate algal growth on stream substrates. Greenish water along entire reach; moderate algal growth on stream substrates. Greenish water along entire reach; along entire reach; moderate algal growth on stream substrates.					
Grade 10 9 8 7 6 5 4 3 PRESENCE OF AQUATIC VEGETATION: Presence and Percent Coverage CONDITION CATEGORY GRADE or SCORE Optimal Suboptimal Marginal Clear water along entire reach; diverse aquatic plant community includes low quantaties of many species of macrophytes; little algal growth on stream substrates.	algal mats, surface				y
Grade 10 9 8 7 6 5 4 3 PRESENCE OF AQUATIC VEGETATION: Presence and Percent Coverage CONDITION CATEGORY GRADE or SCORE Optimal Suboptimal Marginal Clear water along entire reach; diverse aquatic plant community includes low quantaties of many species of macrophytes; little algal growth on stream substrates.	coat of foam o	on surface zero.	ce. No	No water =	
3 PRESENCE OF AQUATIC VEGETATION: Presence and Percent Coverage CONDITION CATEGORY GRADE or SCORE		2010.			
3 PRESENCE OF AQUATIC VEGETATION: Presence and Percent Coverage CONDITION CATEGORY GRADE or SCORE					
3 PRESENCE OF AQUATIC VEGETATION: Presence and Percent Coverage CONDITION CATEGORY GRADE or SCORE	2	1		0	
3a. Nutrient Enrichment Clear water along entire reach; species of macrophytes; little algal		<u> </u>		U	1
3a. Nutrient Enrichment Clear water along entire reach; species of macrophytes; little algal					1
Optimal Suboptimal Marginal Clear water along entire reach; diverse aquatic plant community includes low quantaties of many species of macrophytes; little algal					
3a. Nutrient Enrichment Clear water along entire reach; diverse aquatic plant community includes low quantaties of many species of macrophytes; little algal	_				
3a. Nutrient diverse aquatic plant community includes low quantaties of many species of macrophytes; little algal	Pea green, gra	Poor	מאר עייי	vater along	-
Enrichment includes low quantaties of many species of macrophytes; little algal growth on stream substrates. growth on stream substrates. green macrophytes; abundant algal growth, especially because of the property of th		ray, or brow ach; dense			
species of macrophytes, little aigal	t macrophytes cle	clog stream	am; se	evere algal	
quillo warner nomis.	blooms create the or NO algae pr				
growth present.		te. No wate			
Grade 10 9 8 7 6 5 4 3	2	1		0	
CONDITION CATECORY CRADE COCCRE					
CONDITION CATEGORY GRADE or SCORE OF Optimal Suboptimal Marginal	T	Poor			
3b. Aquatic When present, aquatic vegetation Algae dominant in pools, larger Algal mats present, some	Algal mats c		ottom	m, larger	1
Vegetation consists of moss and patches of plants along edge. larger plants, few mosses.	. plants domina	nate the ch	chanr	nel or NO	
algae.	I alasa assassi	sent due t			
	substrate.	Nic ·······			

				CON	NDITION CA	ATEGORY (GRADE or S	CORE				F
		Optimal			Suboptima			rginal		Poor		e
		onsisting of le			and wood so ebris without		debris; coa organic i	s or woody arse and fine matter with iment.	color and fo		nt - black in aerobic) or no to excessive	1 F
Grade	10	9	8	7	6	5	4	3	2	1	0	0
Grade (Left) Grade (Right) Grade (Right) Ga. Riparian Zone Width (from stream edge to field)	Undisturbe pristine native pri	Optimal ed, consisting very prairie, ar wetlands. 9 9 AND CONT Optimal arian zone >18 ths with trees, shown an activitic impacted zone	g of forest, nd/or natural 8 8 8 FINUITY: B meters (1-2 shrubs, or tall es have not b.	Permane woodlots 7 7 CON Width of ripa 1 active char grasses), hur	Suboptima ent pasture n and swamp: crops 6 6 6 NDITION C/ Suboptima rian zone 12-1 anel width wtre nan activities I impacted zone	inixed with s, few row 5 5 5 ATEGORY (IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII	Mixed rov pasture; so areas may be as isolated 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	rginal w crops and owne wooded be present but ed patches 3 3 3 CCORE rginal arian zone 6-12 (3-1/2 active tth vegetated), numan activities.	2 2 Width of ripa vegation le width), little	ess than 1/3 ac e riparian vege numan activitie	0 0 Avg.Score	3 3 3 3 3 4 1 6 8 8
Grade (left)	10	9	8	7	6	5	4	3	2	1	0	5
	10	9	8	7	6	5	4	3	2	1	0	5
Grade (Right)	•											
Grade (Right)				001	IDITION	TECORY		CORE			Avg.Score	5
Grade (Right)		Optimal		CON	NDITION CA		GRADE or S			Poor	Avg.Score	E
6b. Riparian Zone Vegetation Protection/	shrubs, prairi riparian zon grazir	Optimal density of ma ie grasses, or ne intact or dis ng/mowing min	marsh plants, ruption from	75-90% stre young specie trees behi	Suboptima eambank vege	tation, mixed el and mature evident with	Ma 50-75% s vegetation of and sparse shrub spe frequent wit	core rginal streambank mixed grasses young tree or cies; breaks h some gullies very 50 meters.	coverage c grasses, fe density; ban	60% streambar onsisting mos w trees & shru	nk vegetation stly of pasture ubs; low plant red with gullies	
6b. Riparian Zone Vegetation Protection/ Completeness	shrubs, prairi riparian zon grazir	t density of ma ie grasses, or ne intact or dis	marsh plants, ruption from	75-90% stre young specie trees behi	Suboptima eambank vege es along chann nd; disruption curring at inter	tation, mixed el and mature evident with	Ma 50-75% s vegetation of and sparse shrub spe frequent wit	rginal streambank mixed grasses young tree or cies; breaks h some gullies	coverage c grasses, fe density; ban	60% streambar onsisting mos w trees & shruk k deeply scarr	nk vegetation stly of pasture ubs; low plant red with gullies	E 6 1 1 F 6 1 1 F 6 1 1 F 7 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
6b. Riparian Zone Vegetation Protection/ Completeness	shrubs, prairi riparian zon grazir	density of ma ie grasses, or ne intact or dis ng/mowing mi	marsh plants, ruption from nimal.	75-90% stre young specie trees behi breaks oc	Suboptima eambank vege es along chanr nd; disruption curring at inter meters.	tation, mixed el and mature evident with vals of >50	Ma 50-75% s vegetation of and sparse shrub spar frequent wit and scars ev	rginal streambank mixed grasses young tree or cies; breaks h some gullies very 50 meters.	coverage c grasses, fe density; ban ai	00% streambai onsisting mos w trees & shruk deeply scarr Il along its len	nk vegetation tity of pasture .bs; low plant red with gullies gth.	E 6 1 F 6 1
Zone Vegetation	shrubs, praiririparian zon grazir	density of ma ie grasses, or ne intact or dis ng/mowing min	marsh plants, ruption from nimal.	75-90% strr young specie trees behi breaks oc	Suboptima sambank vege sa along chann and; disruption curring at inter meters.	lation, mixed led and mature evident with vals of >50	Ma 50-75% to vegetation of and sparse shrub spe frequent with and scars eventually eventually and scars eventually	rginal streambank mixed grasses young tree or cies; breaks h some gullies very 50 meters.	coverage of grasses, fe density; ban al	60% streambai onsisting mos w trees & shr. k deeply scarr il along its len	nk vegetation titly of pasture ubs; low plant red with gullies gth. 0 0 Avg.Score	E 6 7 1 F 6 1 F 7 5 5

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(pools) but in placks pools and girlices, or other stable to following water. Crede		banks, roots, col	bble, rocks, pe	ersistent leaf				desirable, sub	strate may be	CHAIRE	i DOLLOITI III	iay be iiai.	
water. Grade 10 9 8 7 6 5 4 3 2 1 0 1 Grade 10 9 8 7 6 5 4 3 2 1 0 1 From mix of large-shafely isrge-deep, small-shafely isrge-deep, small-shafely isrge-deep, small-shafely isrge-deep, small-shafely isrge-deep, small-shafely isrge-deep, small-shafely isrge-deep, small-shafely isrge-deep, small-shafely isrge-deep, small-shafely isrge-deep, small-shafely isrge-deep, small-shafely isrge-deep, small-shafely isrge-deep, small-shafely isrge-deep, small-shafely isrge-deep, small-shafely isrge-deep, small-shafely isrge-deep, small-shafely isrge-deep, small-shafely isrge-deep isrge-episteria is stopped is speech is		packs, pools a	nd glides, or o	ther stable			,	frequently dis	sturbed. (See				
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4 POOL VARIABILITY Suboptimal Even mix of large-station, large-steep, small-shallow, small-deep pools present Suboptimal Even mix of large-station, large-steep, small-shallow, small-deep pools present SEDIMENT DEPOSITION/SCOURING Optimal -d% of channel bottom affected by scour or deposition. Some deposition in pools Suboptimal -d% of channel bottom affected by scour or deposition. Some deposition in pools Suboptimal -d% of channel bottom affected by scour or deposition. Some deposition in pools Suboptimal -d% of channel bottom affected by scour or deposition. Some deposition in pools Suboptimal Water reaches the base of both lower banks; d% of channel substrate is exposed Water reaches the base of both lower banks; d% of channel substrate is exposed Water fills >75% of the channel; or caption and state is exposed Water fills >75% of the channel; or caption and state is exposed Suboptimal Water reaches the base of both lower banks; d% of channel substrate is exposed Water fills >75% of the channel; or caption and state is exposed Suboptimal Water reaches the base of both lower banks; d% of channel substrate is exposed Suboptimal Water fills >25.75% of the channel; or caption and state is exposed Water fills >25.75% of the channel; or caption and state is exposed Suboptimal Water fills >25.75% of the channel; or caption and state is exposed Water fills >25.75% of the channel; or caption and state is exposed Suboptimal Channelization, afteration, or dredging absent or minimal and state is stream meander pattern. Alteration by stomwater inputs absent or minimal and state is exposed or minimal. The caption and state is a caption or channelization patterns and state is a caption or channelization patterns and statelity is a caption or channelization patterns and statelity is an exposition of channelization patterns or caption and statelity and patterns or caption and statelity and patterns or caption and patterns or caption and patterns or caption and patterns or caption and pattern													
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Water fills 2-75% of the channel; or banks; <5% of channel substrate is exposed Grade 10 9 8 7 6 5 4 3 2 1 0 0 CHANNEL ALTERATION Channelization, alteration, or dredging absent or minimal; normal and stable stream meander pattern. Alteration by stormwater inputs absent or minimal and stable at alteration for may be present, but stream pattern and stability have recovered; recent alteration from stormwater or other inputs. Water fills 2-75% of the available channel and/or rifle substrates are mostly exposed Water fills 2-75% of the available channel and/or rifle substrates are mostly exposed Water fills 2-75% of the available channel and/or rifle substrates is evaluable channel and/or rifle substrates are mostly exposed Water fills 2-75% of the available channel and/or rifle substrates is evaluable channel and/or rifle substrates are mostly exposed Water fills 2-75% of the available channel and/or rifle substrates are mostly exposed Water fills 2-75% of the available channel and/or rifle substrates are mostly exposed Water fills 2-75% of the available channel and/or rifle substrates are mostly exposed Water fills 2-75% of the available channel and/or rifle substrates are mostly exposed Water fills 2-75% of the available channel and/or rifle substrates are mostly exposed Water fills 2-75% of the available channel and/or rifle substrates are mostly exposed Water fills 2-75% of the available channel and/or rifle substrates are mostly exposed Water fills 2-75% of the available channel and/or rifle substrates are mostly exposed Water fill 2-75% of the available channel and/or rifle substrates are mostly exposed Water fills 2-75% of the available channel and/or rifle substrates are mostly exposed Balance for the channel and mostly present in standing policy of the substrates are mostly exposed. Alteration or channelization and place and place and place and place and place and place and place and place and place and place and place and place and place and place and place and place and place and place	6 CHANNEL F	LOW STATUS	Ontimal		1	Subontima	ı .	Mar	rainal	1	Poor		
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Optimal Channelization, atteration or dredging absent or minimal; normal and stable stream meander pattern. Alteration by stormwater inputs absent or minimal absent or minimal stable stream meander pattern. Alteration by stormwater inputs absent or minimal absent			9	8	7	6	5	4	3	2	1	0	0
Channelization, alteration or drawnelization may absent or minimal; normal and stable stream meander pattern. Alteration by stormwater inputs absent or minimal absent or minimal by stormwater inputs absent or minimal absolute of structures, (such as bridge abutments or culvers); vidence of abst alteration, (i.e., channelization) may be present, but stream pattern and stability have recovered; recent alteration from stormwater or other inputs. Some alteration or channelization may be extensive; embankments (including spoil piles) or shoring structures present on both banks; normal stable stream meander pattern has not meander pattern has not stormwater inputs may be extensive. 40-80% of stream reach altered.	7 CHANNEL A	LTERATION	Ontime!		1	Cubontin -		8.7	rainal	1	Daa-		
absent or minimal; normal and stable stream meander pattern. Alteration by stormwater inputs absent or minimal stability have recovered; recent alteration from stormwater or other inputs. present, usually adjacent to structures, (such as bridge abutments or culverts); evidence of past alteration, (l.e., channelization) may be present, but stream pattern and stability have recovered; recent alteration is not present. Minor alteration from stormwater or other inputs may be extensive; embankments (including spoil piles) or storing structures present on both sanks; normal stable stream meander pattern has not recovered. Alteration from stormwater or other inputs may be extensive; embankments (including spoil piles) or storing structures present on both sanks; normal stable stream meander pattern has not recovered. Alteration from stormwater inputs may be extensive; embankments (including spoil piles) or storing in structures present on both sanks; normal stable stream meander pattern has not recovered. Alteration from stormwater inputs may be extensive; embankments (including spoil piles) or storing structures present on both sanks; normal stable stream meander pattern has not recovered. Alteration from stormwater or other inputs may be extensive; embankments (including spoil piles) or storing structures present on both sanks; normal stable stream meander pattern has not recovered. Alteration from stormwater or other inputs may be researched by stormwater or other inputs.		Channelization		r dredging	Some alte					Banks shor		bion, riprap, or	1
stream meander pattern. Alteration by stormwater inputs absent or minimal abutments or culverts); evidence of past alteration, (i.e., channelization) may be present, but stream pattern and stability have recovered; recent alteration from stormwater or other inputs. structures, (such as bridge including spoil piles) or shoring structures present on both shoring structures present on both shoring structures present on both shoring structures present on both shoring structures present on both shoring structures present on both shoring structures present on both shoring reached alteration from stormwater or other inputs may be extensive. 40-80% of stream reach altered.	1	absent or min	imal; normal a	ind stable	presen	t, usually adja	acent to	be extensive;	embankments '	concrete.	Concrete of	or riprap lined	
past alteration, (I.e., channelization) may be present, but stream pattern and stability have recovered; recent alteration is not present. Minor alteration from stormwater or other inputs. alteration from stormwater or other inputs. other inputs. Over 80% of the meander pattern has not recovered. Alteration from stormwater inputs may be extensive. 40-80% of stream of stream of stream reach altered.	1							(including spoil	piles) or shoring				
may be present, but stream pattern and stability have recovered, recent alteration is not present. Minor alteration from stormwater or other inputs. meander pattern has not stream reach altered. recovered. Heration from stormwater inputs may be extensive. 40-80% of stream reach altered.	1	stormwater in	iputs absent o	r minimal									
and stability have recovered; recent alteration from stormwater or other alteration from stormwater or other inputs.	1	I											
alteration from stormwater or other inputs. extensive. 40-80% of stream reach altered.	1	1											
inputs. reach altered.	1	I											
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		_		Marginal						NUOSITY		
		Poor				Suboptimal			Optimal			
E		Channel straight; waterw		e bends in the st		the stream in				The bends in the		
a	gaistance	channelized for a long		ease the stream longer than if it		th 2 to 3 times as in a straig	than if it			stream length 3 t was in a straigl		
F			vas III a	straight line	inic.	as iii a stiai	triair ii it			braiding is cons		
F								eas. This	r low-lying ar	plains and other		
a A								d in these		parameter is n		
,									areas).			
1	0	2 1	3	4	5	6	7	8	9	10	Grade	
									CH DVVIK)	ITY (SCORE EA	DANK CTADI	0
		Poor		Marginal		uboptimal			Optimal		DAIN STADI	8
E	enetation at	Jnstable; no perennial v	erennial	rately unstable;	ehoM Ilems t	table; infrequ	Moderately	sion or bank		Banks stable; evi		
a		waterline; severe erosi		ation to waterline		ion mostly he				failure absent of		
F	d tree roots	banks; recently exposed	oped by	ly scoured or str	reas of (main	k in reach ha	5-30% of ba	to waterline;	al vegetation	affected), perenni		
F		common; tree falls and/		al erosion), bank		osion and/or				no raw or undercu		
a		undercut trees commo		rd points (trees,		perennial ve				outside of me		
A		eroded areas; "raw" are along straight sections a		rops) and erode here; 30-60% of		most places roots rare b		ent tree rails;	oots; no rec	recently exposed		
L		bbvious bank sloughing;		has areas of ero		100tS rate D	exposed tie					
1		bank has erosional		cundercutting; r								
Ĺ	· coarc.	barne rido orodionar		ed tree roots and								
2				common; high								
#				otential during flo								
а												
fi												
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8	0	2 1	3	4	5	6	7	8	9	10	Grade	
0	0	2 1	3	4	5	6	7	8	9	10	Grade	
4		Avg.Score						•				
								CH BANK)	SCORE EA	PROTECTION	VEGETATIVE	10
		Poor		Marginal		uboptimal			Optimal			
E		Less than 50% of the st	nbank	'0% of the strea		e streambar		ank surfaces	the streamb	More than 90% of		
a		surfaces covered by ve		es covered by ve		itive vegetati				and immediate ri		
F		disruption of streambank		tion obvious; pa		plants is not				native vegeta		
F		is very high; vegetation removed to 5 centimete		soil or closely c ation common; I		disruption e ing full plant				understory s macrophytes; veg		
a		average stubble h		ation common; i half of the potent		ing full plant any great ext				grazing or mowin		
A	ioigi it.	average stubble in		bble height rema		If of the pote				almost all plants		
P			9.	g		height rema		,.				
			I			•						
2												
2												
2 F 6 F												
2 F 6	0	2 1	3	4	5	6	7	8	9	10	Grade	
2 F 6 5	0	2 1	3 3	4 4	5 5	6	7	8 8	9	10 10	Grade Grade	
2 F 6	0						7					
2 F 6 5	0	2 1					7		9	10	Grade	44
2 F 6 5	0	2 1 Avg.Score		4		6	·		9 CH BANK)	10 ONE (SCORE EA	Grade	11
2 F 6 5 5.5	0	2 1 Avg.Score	3	4 Marginal	5	6 Suboptimal	·	8	9 CH BANK) Optimal	10 DNE (SCORE EA	Grade	11
6 5 5.5	0 <6 meters;	2 1 Avg.Score	3 e 6-12	4	meters; Wid	6	Width of ripa	8 eters; human	9 CH BANK) Optimal zone >18 me	10 ONE (SCORE EA	Grade	11
2 F 6 5 5.5	0 <6 meters; tation due to	2 1 Avg.Score Poor Width of riparian zone	e 6-12 es have	4 Marginal	meters; Wided zone mete	6 Suboptimal ian zone 12-	Width of rip: human activ	8 ters; human dbeds, clear-	9 CH BANK) Optimal zone >18 me king lots, roae	10 ONE (SCORE EA Width of riparian	Grade	11
2 F 6 5 5.5	0 <6 meters; tation due to	2 1 Avg.Score Poor Width of riparian zone ittle or no riparian veget:	e 6-12 es have	Marginal th of riparian zors; human activit	meters; Wided zone mete	6 Suboptimal ian zone 12- es have imp	Width of rip: human activ	8 ters; human dbeds, clear-	9 CH BANK) Optimal zone >18 me king lots, roae	DNE (SCORE EA Width of riparian activities (I.e., par	Grade	11
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III. HABITAT FUNCTIONS N12 (16-25')

Record of Functional Assessment Results

St	ream Function	nal Capacity C	alculation		
	N12 (16-2	25')			
Date:	5/19/2006	,			
Project:	Lake Ralph H	all			
Assessment Area:	WP 19				
Assessors:	Holmes Voigh	nt Capps			
Project Status:	X_Preproj	ect	Postproject		
		Stream	Stream	Multiplication	
Major Function Categories	FCI	Length (LF)*	Characterization	Factor**	FC
Hydrologic	0.14	5,435	E	0.00125	0.95
Water Quality Improvement	0.24	5,435	E	0.00125	1.61
Habitat	0.24	5,435	E	0.00125	1.61
Total	0.62	5,435			4.18
*Stream Length is the length of the Stre	eam Assessme	nt Reach (SAF	?)		
**Multiplication Factors					
Ephemeral = 0.00125					
Intermittent = 0.0025					
Perennial = 0.0038					

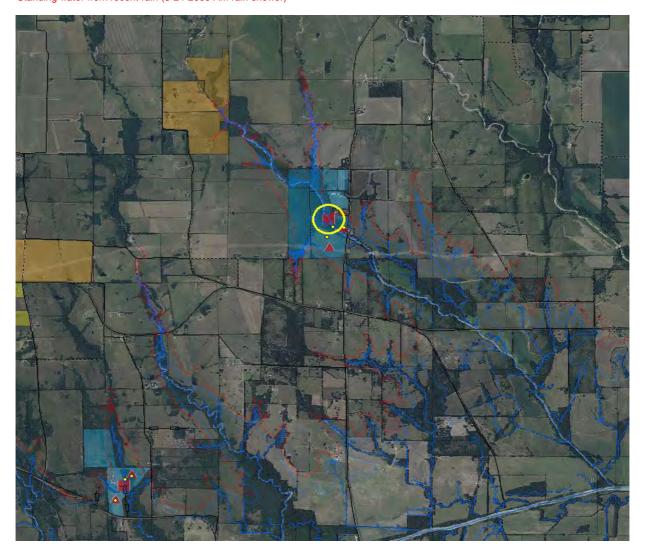
Pasture outside of riparian zone. Rip zone 20m or less.



SWAMPIM DATASHEETS – NORTH EPHEMERAL 16	TO >25'
PRE-PROJECT	

24,578 linear foot reach

Forested riparian buffer on either side of reach, tapering to young forest on the west bank as the reach nears the NSR Standing water from recent rain (8-24-2009 AM rain shower)



VARIABLES FLOW REGIM	E: Standing	g water from			NCTIONS 9 AM rain s		25')					SCORE	Source
TYPE	L. Gtaridin	Perennial	Trecentran		ent w/ Perer		Intor	mittent		Enhamaral			KDWP 2 Kansas
Grade	10	9	8	7	6	5	4	3	2	Ephemeral 1	0	1	Subjectiv
CHANNEL CO	NDITION:	Measureme	ent or Obser	vation of S	tream Chan	nel Conditio	ns						
				CON	IDITION CA	ATEGORY (SRADE or	SCORE					Barbour,
		Optimal			Suboptima			rginal		Poor		z	EPA RB
		nannel; no st			annelization			hannel; 40-		l is actively dow		Natural, active, downcutting	5-21;
2a.Channel		elization mini			areas) or pas on, but with s			the reach elized or		>80% of the realized. Degradat		<u>a</u>	Newton, USDA/ N
Condition/Alte	excessive	e lateral cuttii	ng. Normal	recovery of	f channel bed	d and banks.		d. Excess	levee	s prevent acces	ss to the	ctiv	SVAP p
ration (natural,		of hydrologica channel and			e frequency s onto flood			on; braided th excessive		floodplain.		e, d	
altered, or			·					of overbank				own	
downcutting)								onto the n. Historical				cut	
							incision,dil	es or levees				ting.	
							restrict	floodplain.					
	- 10		1 .	_						1 .			
Grade	10	9	8	7	6	5	4	3	2	1	0	0	
0.0.		Optimal		CON	NDITION CA Suboptima	ATEGORY (SCORE rginal		Poor		1	w/ assist
2b.Channel Capacity to		nel Capacity			nel Capacity	to Flow	Channel	Capacity to		Capacity to Flow		1	Dr. Mike
Flow		/ Ratio is suc om storm eve			y Ratio is suc from storm of			ency Ratio is ank overflow		uch that bank o			Harvey a
Frequency Ratio (for 2-		o 2.5 year fre		more freque	ent than eve	ry 1.25 years	from storn	n events are		f year or less fr	equent than		Travant
year peak		0.75-1.25		or less f	requent than years.	every 2.5		quent than ear or less		every 10 years <0.24 or >2	3.		
flow)					<0.75 or >1.2	25	frequent t	han every 5					
								ears. or >1.5					
Grade	10	9	8	7	6	5	4	3	2	1	0	0	
				CON	IDITION CA	ATEGORY (RADE or	SCORE					Newton,
		Optimal			Suboptima	al	Ma	rginal		Poor			USDA/ N
			of erosion or inimal; (<5%			equent, small healed over.		ly unstable; regetation to		; no perennial v ne; severe erosi			SVAP p
2c.Channel	of banl	k affected), p	erennial	5-30% of b	ank in reach	has areas of	waterlin	ne sparse	banks; r	ecently expose	d tree roots		10; Barb al., 1999
Bank Stability (score each		n to waterline banks (some			erosion and/ g: perennial	or bank vegetation to		scoured or by lateral		; tree falls and/ rees common;			RBA pag
bank, left or	outside of r	meander ben	ds O.K.); no	waterline	in most place	es; recently	erosion), I	oank held by	areas; "	raw" areas freq	uent along		26; USA Norfolk
right facing	recently e	xposed roots tree falls;	s; no recent	exposed tre	ee roots rare	but present.		s (trees, rock and eroded		ections and ber ghing; 60-100%			District,
downstream)							back else	where; 30-		erosional scar			
								ank in reach s of erosion					
								undercutting;					
		-		_			roots and f	xposed tree ine root hairs			-		
Grade (East) Grade (West)	10 10	9	8	7	6	5 5	4	3	2	1 1	0	1 3	
Olddo (1100t)											Avg.Score	2	
CHANNEL RO	UGHNESS	FACTORS	<u> </u>									1	
				CON	IDITION CA	ATEGORY (SRADE or	SCORE					Barbour,
3a.Channel		Optimal			Suboptima	al	Ma	rginal	0.	Poor		1	EPA RB
Sinuosity		s in the strea m length 2.5			s in the strea n length 1.5 t			nds in the acrease the		straight; waterw elized for a long			Chapter 5-25; KE
(bends in low	longer	than if it was	straight.	longer tha	n if it was a s	straight line.	stream le	ngth 1 to 1.5		l length/valley le			5-25; KL 1996
gradient stream)	Channel le	ngth/valley le >1.5.	ngth at least	Channel le	ength/valley l 1.5	ength 1.2 to		ger than if it raight line.					
/							Channel I	ength/valley					
0 4-	40			-	^	1 -	·	1.0 to 1.2.		1 4			
Grade	10	9	8	7	6	5	4	3	2	1	0	1	
		Optimal		CON	NDITION CA Suboptima	ATEGORY (SCORE rginal		Poor		-	KDWP, 1 Kansas
	Little or n	o channel er	largement		el bars of co	arse stones		ars of rocks,	Channel	divided into brai	ds or stream	1	Subjectiv
3b. Bottom Substrate		ting from sec ation; channe			washed debr ilt; moderatel			, and silt moderately		elized; substrat , clay, or bedro			Evaluation
Composition	accumul	anon, onanih	or io orable	iiile Si	iii, moderalei	Jacobie		stable	Janu, Sill	, siay, or beard	on, unotable		Aquatic Habitats
·													
Grade	10	9	8	7	6	5	4	3	2	1	0	2	

				CON	IDITION C	ATEGORY (GRADE or	SCORE						KDWP, 1996
		Optimal		1	Suboptima			rginal		Poo	or			Newton et a
	Diverse bo		phy including	Channel be		es 5-7 of the		el bottom	Channel			<3 of the		1998
3c. Instream Bottom Topography	>7 of the boulders/g debris, overhan	e following: d gravel, logs/l backwaters, ging vegetat ed shallows,	leep pools, large woody /oxbows, tion, riffles,		ed in Optima		includes	s < 5 of the ed in Optimal egory		sted in Op				USDA/NRC SVAP page
		banks, or si pools												
Grade	10	9	8	7	6	5	4	3	2	1		0	5	
				001	IDITION O	ATEGORY (2D 4 D E	00005						
or		Optimal		CON	Suboptima			rginal		Poo	or			
3c.		0.05 to 0.09	9		0.035 to 0.0			.03 or >0.10	0.16 to	0.20 due		cessive		
Manning's n							to	0.15			nd clea	to 0.02 due an, smooth		
Grade	10	9	8	7 6 5			4	3	2	1		0		
	Optimal			CONDITION CATEGORY G										
			CONDITION CATEGORY G Suboptimal				rginal	1	Poo	or			USACE, Norfolk	
3d. Channel	Incision ra		and Where	Incision ra		and Where		io <u>></u> 1.4 < 2.0	Incision rat			ere channel		District, 200
Incision			ntrenchment			ntrenchment		ere channel				ratio <1.4;		SAAM Form
(TLB/BFD=BH		1; Where cha			; Where cha			e > 2%,		re channe				#1 and VT
R; 1/BHR*Adj	<u><</u> 2%; Er	ntrenchment	ratio >2.0	<2%, Er	ntrenchment	ratio >2.0		nment ratio ere channel	Ent	renchmen	nt ratio	<u><</u> 2.0		Stream
Factor =CI)								ere channel e <2%,						Geomorphi
								ent ratio >2.0						Assessmer Phase 2
TLB =		45		5115										
BFD =		15		BHR =	3									
		5												
Grade	10		8	7	6	5	4	3	2	1		0	0	<u> </u>
		5 9	1			5	4	3	2	1		0	0	-
Grade		5 9	1	7	6				2	1		0	0	=
Grade		5 9 ATER STOR	1	7	6 IDITION CA	ATEGORY (GRADE or	SCORE	2	1	or	0	0	Newton, et
Grade	RFACE WA	5 9 ATER STOR Optimal shallow pool	RAGE	7 CON	6 IDITION Consultation Suboptimal Sent, but no	ATEGORY (GRADE or Ma	SCORE rginal resent, but		Poo		0 e bottom is	0	Newton, et
DYNAMIC SUE 4a.Pools (abundant,	Deep and greater tha	5 9 ATER STOR Optimal shallow pool in 30% of the	RAGE Is abundant;	CON Pools pre from 10-36	IDITION Consumption of the poor of the poor of the poor of the poor of the poor of the poor of the poor of the poor of the poor of the poor of the poor of the poor of the poor of the poor of the poor of the poor of the po	ATEGORY (al t abundant; bol bottom is	GRADE or Ma	SCORE rginal resent, but om 5-10% of	Pools abs	Poo	e entire	e bottom is	0	Newton, et 1998 USDA NRCS SVA page 14;
Grade DYNAMIC SUI 4a.Pools (abundant, present or	Deep and greater that is obscure	5 9 ATER STOR Optimal shallow pool in 30% of the due to depth	RAGE Is abundant; e pool bottom i, or pools are	7 CON Pools pre from 10-3i obscure di	6 IDITION C. Suboptime sent, but no	ATEGORY (al t abundant; bol bottom is or the pools	GRADE or Ma Pools pi shallow; fri	SCORE rginal resent, but om 5-10% of I bottom is	Pools abs	Poo	e entire	e bottom is	0	Newton, et a 1998 USDA NRCS SVA page 14; Barbour, et
DYNAMIC SUE 4a.Pools (abundant,	Deep and greater that is obscure	5 9 ATER STOR Optimal shallow pool in 30% of the	RAGE Is abundant; e pool bottom i, or pools are	7 CON Pools pre from 10-3i obscure di	IDITION Consumption of the poor of the poor of the poor of the poor of the poor of the poor of the poor of the poor of the poor of the poor of the poor of the poor of the poor of the poor of the poor of the poor of the po	ATEGORY (al t abundant; bol bottom is or the pools	GRADE or Ma Pools processed the pools obscure of the pools of the pools obscure of the pools of	SCORE rginal resent, but om 5-10% of I bottom is lue to depth,	Pools abs	Poo	e entire	e bottom is	0	Newton, et a 1998 USDA NRCS SVA
Grade DYNAMIC SUI 4a.Pools (abundant, present or	Deep and greater that is obscure	5 9 ATER STOR Optimal shallow pool in 30% of the due to depth	RAGE Is abundant; e pool bottom i, or pools are	7 CON Pools pre from 10-3i obscure di	6 IDITION C. Suboptime sent, but no	ATEGORY (al t abundant; bol bottom is or the pools	GRADE or Ma Pools pi shallow; fr the poo obscure of or the po	SCORE rginal resent, but om 5-10% of I bottom is	Pools abs	Poo	e entire	e bottom is	0	Newton, et 1998 USDA NRCS SVA page 14; Barbour, et
Grade DYNAMIC SUI 4a.Pools (abundant, present or	Deep and greater that is obscure	5 9 ATER STOR Optimal shallow pool in 30% of the due to depth	RAGE Is abundant; e pool bottom i, or pools are	7 CON Pools pre from 10-3i obscure di	6 IDITION C. Suboptime sent, but no	ATEGORY (al t abundant; bol bottom is or the pools	GRADE or Ma Pools pi shallow; fr the poo obscure of or the po	SCORE rginal resent, but om 5-10% of I bottom is lue to depth, ols are less	Pools abs	Poo	e entire water	e bottom is	0	Newton, et 1998 USDA NRCS SVA page 14; Barbour, et
Grade DYNAMIC SUM 4a.Pools (abundant, present or absent) Grade	Deep and greater that is obscure at	5 9 ATER STOR Optimal shallow pool n 30% of the due to depth least 5 feet o	RAGE Is abundant; e pool bottom i, or pools are deep.	Pools pre from 10-3i obscure di are a	IDITION C. Suboptima sent, but no yow of the pe use to depth, it least 3 fee	ATEGORY (a) al at abundant; ool bottom is or the pools t deep.	GRADE or Ma Pools pi shallow; fr the poo obscure of or the po than 3 l	SCORE rrginal resent, but om 5-10% of I bottom is lue depth, lots are less feet deep.	Pools abs discer	Poo sent, or the nible. No	e entire water	e bottom is = zero.		Newton, et a 1998 USDA NRCS SVA page 14; Barbour, et
Grade DYNAMIC SUI 4a.Pools (abundant, present or absent) Grade 4b. Channel	Deep and greater that is obscure at	5 9 ATER STOP Optimal shallow pool in 30% of the due to depth least 5 feet of	RAGE Is abundant; e pool bottom i, or pools are deep.	Pools pre from 10-3i obscure di are a	iDITION C. Suboptima sent, but no 0% of the po ue to depth, tt least 3 fee	ATEGORY (all at abundant; not bottom is or the pools t deep.	GRADE or Ma Pools processed from the pool obscure of the pool than 3 to the pool of the po	SCORE rginal resent, but om 5-10% of I bottom is tue to depth, ols are less feet deep. 3 SCORE	Pools abs discer	Pocent, or the nible. No	e entire water	e bottom is = zero.		Newton, et a 1998 USDA NRCS SVA page 14; Barbour, et 1999
Grade DYNAMIC SUI 4a.Pools (abundant, present or absent) Grade 4b. Channel Flow Status	Deep and greater that is obscure at 1	5 9 ATER STOP Optimal Shallow pool in 30% of the due to depth least 5 feet co	RAGE Is abundant; a pool bottom, or pools are deep.	7 CON Pools prefrom 10-3i obscure di are a	DITION C, Suboptimassent, but no. % of the pcue to depth, tt least 3 fee	ATEGORY (al It abundant; sool bottom is or the pools t deep.	GRADE or Mal Pools pi shallow, fr the poo obscure of or the po than 3 i	SCORE rginal resent, but om 5-10% of I bottom is lue to depth, ols are less ieet deep. 3 SCORE rginal	Pools abs discer	Poc sent, or the nible. No	e entire water	e bottom is = zero.		Newton, et 1998 USD/ NRCS SV/ page 14; Barbour, et 1999
Grade DYNAMIC SUI 4a.Pools (abundant, present or absent) Grade 4b. Channel Flow Status (degree to	Deep and greater that is obscure at 1	5 9 ATER STOP Optimal shallow pool n 30% of the due to depth least 5 feet c	RAGE Is abundant; e pool bottom i, or pools are deep. 8	7 CON Pools pre from 10-3i obscure di are a	IDITION C. Suboptims sent, but no pue to depth, it least 3 fee	ATEGORY (al at abundant; ool bottom is or the pools t deep. 5 ATEGORY (al le available	GRADE or Man Pools pi Shallow, fr the poo obscure c or the po than 3 t	SCORE rginal resent, but om 5-10% of I bottom is lue to depth, ols are less reet deep. 3 SCORE rginal s 25-75% of	Pools abs discer	Poceent, or the nible. No	e entire water	e bottom is = zero.		Newton, et 1998 USDA NRCS SVA page 14; Barbour, et 1999 Barbour, et 1999 EPA
Grade DYNAMIC SUI 4a.Pools (abundant, present or absent) Grade 4b. Channel Flow Status	Deep and greater that is obscure at 10	5 9 ATER STOP Optimal Shallow pool in 30% of the due to depth least 5 feet co	RAGE Is abundant; p pool bottom, , or pools are deep. 8	Pools pred from 10-34 obscure di are a	DITION C, Suboptimassent, but no. % of the pcue to depth, tt least 3 fee	ATEGORY (all tabundant; sol bottom is or the pools t deep.	GRADE or Man Pools pi Shallow, fr the poo obscure of or the poot than 31 4 GRADE or Man Water fills and /or mild and /or mild water fills and /or mild water fills and /or mild water fills and /or mild water fills and /or mild water fills and /or mild water fills and /or mild water fills water	SCORE rginal resent, but om 5-10% of I bottom is lue to depth, ols are less eet deep. 3 SCORE rginal s 25-75% of le substrates	Pools abs discer	Poceent, or the nible. No	e entire water or hannel pools	e bottom is = zero.		Newton, et 1998 USD/ NRCS SV/ page 14; Barbour, et 1999 Barbour, et 1999 EPA RBA page 5
Grade DYNAMIC SUI 4a.Pools (abundant, present or absent) Grade 4b. Channel Flow Status (degree to which channel	Deep and greater that is obscure at 10	5 9 ATER STOR Optimal shallow pool n 30% of the due to depth least 5 feet of Optimal Optimal chest base o	RAGE Is abundant; p pool bottom, , or pools are deep. 8	Pools pred from 10-34 obscure di are a	iDITION C. Suboptima sent, but no 0% of the pc ue to depth, tt least 3 fee IDITION C. Suboptima s > 75% of th t; or <25% of	ATEGORY (all tabundant; sol bottom is or the pools t deep.	GRADE or Man Pools pi Shallow, fr the poo obscure of or the poot than 31 4 GRADE or Man Water fills and /or mild and /or mild water fills and /or mild water fills and /or mild water fills and /or mild water fills and /or mild water fills and /or mild water fills and /or mild water fills water	SCORE rginal resent, but om 5-10% of 1 bottom is lue to depth, ols are less feet deep. 3 SCORE rginal s 25-75% of ble channel,	Pools abs discer	Pocent, or the nible. No	e entire water or hannel pools	e bottom is = zero.		Newton, et 1998 USD/ NRCS SV/ page 14; Barbour, et 1999 Barbour, et 1999 EPA RBA page 5 /A-9#5; TCI
Grade DYNAMIC SUI 4a.Pools (abundant, present or absent) Grade 4b. Channel Flow Status (degree to which channel	Deep and greater that is obscure at 10	5 9 ATER STOR Optimal shallow pool n 30% of the due to depth least 5 feet of Optimal Optimal chest base o	RAGE Is abundant; p pool bottom, , or pools are deep. 8	Pools pred from 10-34 obscure di are a	iDITION C. Suboptima sent, but no 0% of the pc ue to depth, tt least 3 fee IDITION C. Suboptima s > 75% of th t; or <25% of	ATEGORY (all tabundant; sol bottom is or the pools t deep.	GRADE or Man Pools pi Shallow, fr the poo obscure of or the poot than 31 4 GRADE or Man Water fills and /or mild and /or mild water fills and /or mild water fills and /or mild water fills and /or mild water fills and /or mild water fills and /or mild water fills and /or mild water fills water	SCORE rginal resent, but om 5-10% of I bottom is lue to depth, ols are less eet deep. 3 SCORE rginal s 25-75% of le substrates	Pools abs discer	Pocent, or the nible. No	or hannel g pools	e bottom is = zero.		Newton, et 1998 USD/ NRCS SV/ page 14; Barbour, et 1999 Barbour, et 1999 EPA RBA page 5 IA-9#5; TCI 1999; VANI
Grade 4a.Pools (abundant, present or absent) Grade 4b. Channel Flow Status (degree to which channel is filled)	Deep and greater that is obscure at 1	5 9 ATER STOR Optimal shallow pool n 30% of the due to depth least 5 feet c	RAGE is abundant; p pool bottom, or pools are deep. 8 of both lower amount of exposed.	Pools prefrom 10-31 obscure di are a	IDITION C, Suboptimassent, but no no 2% of the pcue to depth, tt least 3 fee IDITION C. Suboptimas > 75% of tt l; or <25% of strate is exp	ATEGORY (all trabundant; to abundant; to abundant; to the pools trabe t	GRADE or Ma Pools pi Shallow, fr the poo obscurse or the po than 3 l 4 GRADE or Ma Water fills the availa and /or riff are most	SCORE rginal resent, but om 5-10% of bottom is lue to depth, ols are less eet deep. 3 SCORE rginal s 25-75% of ble channel, le substrates ly exposed.	Pools abs discer	Pocent, or the nible. No	or hannel g pools	e bottom is = zero. 0 and mostly . No water	1	Newton, et 1998 USD/ NRCS SV/ page 14; Barbour, et 1999 Barbour, et 1999 EPA RBA page \$2 IA-9#5; TCI 1999; VANI
Grade 4a.Pools (abundant, present or absent) Grade 4b. Channel Flow Status (degree to which channel is filled)	Deep and greater that is obscure at 1	5 9 ATER STOR Optimal shallow pool n 30% of the due to depth least 5 feet c	RAGE is abundant; p pool bottom, or pools are deep. 8 of both lower amount of exposed.	Pools prefrom 10-31 obscure di are a	IDITION C. Suboptima sent, but no % of the pc ue to depth, it least 3 fee 6 IDITION C. Suboptima s > 75% of it least l; or <25% o strate is exp	ATEGORY (all trabundant; to abundant; to abundant; to the pools trabe t	GRADE or Man Pools pi Shallow; fr the poo obscure of or the po than 3 t GRADE or Man Water fillt the availal and /or riff are most	SCORE rginal resent, but om 5-10% of I bottom is lue to depth, ols are less reet deep. 3 SCORE rginal s 25-75% of ble channel, le substrates ly exposed. 3	Pools abs discer	Pocent, or the nible. No	or hannel g pools	and mostly . No water	1	Newton, et. 1998 USDA NRCS SVA page 14; Barbour, et 1999 Barbour, et 1999 EPA RBA page 5 /A-9#5; TCL 1999; VANA 2005
Grade 4a.Pools (abundant, present or absent) Grade 4b. Channel Flow Status (degree to which channel is filled)	Deep and greater that is obscure at 1	5 9 ATER STOR Optimal shallow pool n 30% of the due to depth least 5 feet c	RAGE is abundant; p pool bottom, or pools are deep. 8 of both lower amount of exposed.	Pools prefrom 10-31 obscure di are a	IDITION C. Suboptima sent, but no % of the pc ue to depth, it least 3 fee 6 IDITION C. Suboptima s > 75% of it least l; or <25% o strate is exp	ATEGORY (al al at abundant; ool bottom is or the pools t deep. 5 ATEGORY (al le available of channel loosed.	GRADE or Man Pools pi Shallow; fr the poo obscure of or the po than 3 t GRADE or Man Water fillt the availal and /or riff are most	SCORE rginal resent, but om 5-10% of I bottom is lue to depth, ols are less reet deep. 3 SCORE rginal s 25-75% of ble channel, le substrates ly exposed. 3	Pools abs discer	Pocent, or the nible. No	or hannel g pools ro.	and mostly . No water	1	Newton, et 1998 USDI NRCS SVI page 14; Barbour, et 1999 Barbour, et 1999 EPA RBA page 9 /A-9#5; TC. 1999; VAN.

I. HYDROLOGIC FUNCTIONS N1 (16 - >25')

	TER QUALITY/E VARIABLES	BIOGEOCH	EMICAL F	UNCTIONS		-		N1 (16 - >2	25')				SCORE	Refe
LIVI	Standing water	from recer	ıt rain (8-24	-2009 AM ra	in shower)								J	Sour
	TYPE				,								İ	
	NOTES												_	
1.	SEDIMENT TR	ANSPORT	/DEPOSITI	ON										
	4. 5				CON			SRADE or S						New
	1a. Bank		Optimal			Suboptima			rginal		Poor			et al
	Stability		ile; evidence e absent or r	of erosion or		stable; infre			unstable; 30- k in reach has		nany eroded equently alor			1998
	(score each			ems. <5% of		ank in reach			rosion; high		ind bends; ol			USD
	bank, left or		bank affecte		3-30 /0 OI D	erosion.	nas arcas or		tential during		g; 60-100% c			CS S
	right facing downstream)								ods.		erosional sca			page
	downstream)													Bark
														et al
	Grade (East)	10	9	8	7	6	5	4	3	2	1	0	1	1999
	Grade (West)	10	9	8	7	6	5	4	3	2	1	0	3	<u>'</u>
	Grade (West)	10									'	Avg.Score		
												Avg.ocoic		1
	•				CON	IDITION C	TECOPY (GRADE or S	CORE					Galli
			Optimal		I	Suboptima			rginal		Poor		-	1996
a	1b. Channel	Bottom :	1/3 of bank is	nenerally	Bottom 1	/3 of bank is			3 of bank is	Rottom 1	1/3 of bank is	nenerally	-	Was
apl	Bottom Bank		istant plant/s			ant/soil matrix			ighly erodible		dible materia			COG
arić	Stability		material.		l III.				ant/soil matrix		everely com			RSA
Š	1 !								omised.		, ,			No.
One Variable	1 !							· .						INO.
γ	Grade (East)	10	9	8	7	6	5	4	3	2	1	0	1	1
Only	Grade (West)	10	9	8	7	6	5	4	3	2	1	0	3	3
or (Avg.Score		
Score for														
cor	or				CON	NDITION CA	ATEGORY (GRADE or S	CORE					Bark
	1c. Channel		Optimal			Suboptima	l	Ma	rginal		Poor			et al
Enter	Sediments or		avel or larger			avel or large		10-29.9% g	ravel or larger	Substrate i	is uniform sa	nd, silt, clay,		199
Ē	Substrate		bble boulder			substrate typ			; dominant	or b	pedrock; uns	table		Pete
	Composition	substrate	type is grave	el or larger;		n some finer			oe is finer than					et a
			stable		m	oderately sta	ble	gravel, but	may still be a					199
	Grade	10	9	8	7	6	5	4	3	2	1	0		
2	WATER APPEA	ARANCE:	Clarity or V	isibility										
]	
					CON	NDITION CA	ATEGORY (GRADE or S	CORE					New
			Optimal			Suboptima			rginal		Poor			et al
			or clear but			ly cloudy, esp			le cloudiness		or muddy app			1998
				3-6 feet (less		ent, but clea			time; objects		jects visible to	depth <0.5 ft; bright-green;		USD
	Water Clarity		colored); no c			ble at depth			pth 0.5-1.5 ft;		us water pollut			NRC
	"" , "		;no noticeab rged objects			htly green co n on water su			s may appear bottom rocks			sheen or heavy	,	SVA
		Subine	ged objects	or rocks.	311661	1 OII Water St	illace.		ed objected	coat of foa	am on surface.	No water =		page
									l with film.		zero.			
	1													
	1													1
	Grade	10	9	8	7	6	5	4	3	2	1	0	1	-
	Grade	10	<u> </u>	. 0	<u> </u>	1 0	1 3	. →	3		<u> </u>	1 0	 	Η
3	PRESENCE OF	AQUATIO	: VEGETAT	FION: Press	ence and Pa	ercent Cove	rage						†	1
Ť						30.11 0070	9~						1	1
	1 1				001	IDITION C	TEGORY (GRADE or S	CORE				i	New
	1 1		Optimal			Suboptima			rginal		Poor			et al
	1	Clear wa	ater along en	tire reach:	Fairly clear	or slightly gre			ter along entire	Pea green	gray, or brown	n water along	1	1998
	,	Cioai Wa		community		e reach; mo			undance of lush		reach; dense s			USD
	3a. Nutrient	diverse a	quatic biant			on stream su		green macrop	hytes; abundant		s clog stream			JUSE
	3a. Nutrient Enrichment		low quantatie	es of many					th, especially	blooms crea	te thick algal r	nats in stream	İ	NIDC
		includes			3.4					NIO				
		includes species of	low quantation	s; little algal	9.2				mer months.		ae present due	to unstable		SVA
		includes species of	low quantation from the community of the	s; little algal	g. 2						ae present due rate. No water	to unstable		SVA
	Enrichment	includes species of	low quantation for macrophyte growth presented	s; little algal nt.		1 -	T =	during war	mer months.	substi	rate. No water	to unstable r = zero.		SVA
		includes species of	low quantation from the community of the	s; little algal	7	6	5					to unstable		SVA
,	Enrichment	includes species of	low quantation for macrophyte growth presented	s; little algal nt.	7	•		during war	mer months.	substi	rate. No water	to unstable r = zero.		SVA page
	Enrichment Grade	includes species of	low quantatie f macrophyte growth preser	s; little algal nt.	7	NDITION CA	ATEGORY (during war 4 GRADE or S	3 CORE	substi	rate. No water	to unstable r = zero.		SVA page
	Enrichment Grade Or	includes species of	low quantatie f macrophyte growth preser 9	s; little algal nt.	7	NDITION CA Suboptima	ATEGORY (during war 4 GRADE or S Ma	3 CORE rginal	substi	1 Poor	e to unstable r = zero.		SVA page
	Grade Or 3b. Aquatic	includes species of 9	low quantatie macrophyte growth preser 9 Optimal esent, aquatic	s; little algal nt. 8	7 CON	NDITION CA Suboptima minant in po	ATEGORY (I ols, larger	4 GRADE or S Ma Algal mats p	3 CORE rginal present, some	2 Algal ma	1 Poor tts cover bott	to unstable r = zero. 0 com, larger		Pete et ai
Line cole of Ciny Cite valiable	Enrichment Grade Or	includes species of 9	ow quantatie macrophyte growth preser 9 Optimal sent, aquatic of moss and	s; little algal nt. 8	7 CON	NDITION CA Suboptima	ATEGORY (I ols, larger	4 GRADE or S Ma Algal mats p	3 CORE rginal	2 Algal ma plants dom	Poor ts cover bott	o to unstable r = zero. 0 com, larger annel or NO		Pete et al 1992
,	Grade Or 3b. Aquatic	includes species of 9	low quantatie macrophyte growth preser 9 Optimal esent, aquatic	s; little algal nt. 8	7 CON	NDITION CA Suboptima minant in po	ATEGORY (I ols, larger	4 GRADE or S Ma Algal mats p	3 CORE rginal present, some	2 Algal ma plants dom algae pi	Poor ats cover bott innate the chresent due to	tom, larger annel or NO o unstable		Pete et al 1992
	Grade Or 3b. Aquatic	includes species of 9	ow quantatie macrophyte growth preser 9 Optimal sent, aquatic of moss and	s; little algal nt. 8	7 CON	NDITION CA Suboptima minant in po	ATEGORY (I ols, larger	4 GRADE or S Ma Algal mats p	3 CORE rginal present, some	2 Algal ma plants dom algae pi	Poor ts cover bott	tom, larger annel or NO o unstable	1	Pete et al 1992 RCE No.

				CON	NDITION C	ATEGORY (GRADE or S	CORE				F
		Optimal			Suboptima			rginal		Poor		ϵ
		onsisting of le d without sedi			and wood so ebris withou		debris; coa organic i	es or woody arse and fine matter with iment.	color and fo	anic sediment oul odor (ana present due t scouring	erobic) or no	1 F
Grade	10	9	8	7	6	5	4	3	2	1	0	1
AND USE PA	I TTERN: Be	eyond Imme	diate Riparia	an Zone								+
	Wide riparia	an zone of for	est at ass't s			yond. Narrov ATEGORY (ones typical do	wnstream of	ass't site.		
		Optimal		COI	Suboptima			rginal		Poor		6
		ed, consisting ive prairie, ar wetlands.			ent pasture r and swamp crops		pasture; so areas may b	w crops and ome wooded be present but ed patches	M	lainly row cro	ops	F N
Grade (East)	10	9	8	7	6	5	4	3	2	1	0	4 u
Grade (West)	10	9	8	7	6	5	4	3	2	1	0	4 re
				CON	NOTTION C	ATEGORY (GRADE or S	CORE				E
Zone Width (from stream	channel widt grasses),	Optimal parian zone >18 optimal parian zone >18 optimal parian zone Optimal parian zone Optimal parian zone Optimal parian zone Optimal parian zone Optimal zone	shrubs, or tall es have not	Width of ripa 1 active char grasses), hur	Suboptima rian zone 12-1 nnel width w/tro	l 8 meters (1/2- ees, shrubs, or have minimally	Ma Width of ripa meters (1, channel wid	rginal arian zone 6-12 /3-1/2 active th vegetated), numan activities.	vegation le width), little	Poor rian zone < 6 r ss than 1/3 ac r riparian vege numan activitie	tation due to	а
(from stream edge to field)	channel widt grasses),	arian zone >18 ths with trees, s human activitie impacted zone	shrubs, or tall es have not	Width of ripa 1 active char grasses), hur	Suboptima rian zone 12-1 nnel width w/tro nan activities impacted zono	al 18 meters (1/2- ees, shrubs, or have minimally e.	Ma Width of ripa meters (1, channel wid impacted by h	rginal arian zone 6-12 /3-1/2 active tth vegetated), numan activities.	vegation le width), little h	rian zone < 6 r ss than 1/3 ac riparian vege numan activitie	tive channel tation due to es.	a 1 <i>F</i> 6
Zone Width (from stream edge to field)	channel widt grasses),	arian zone >18 ths with trees, s human activitie	shrubs, or tall es have not	Width of ripa 1 active char grasses), hur	Suboptima rian zone 12-1 nnel width w/tro nan activities	l 8 meters (1/2- ees, shrubs, or have minimally	Ma Width of ripa meters (1, channel wid	rginal arian zone 6-12 /3-1/2 active dth vegetated),	vegation le width), little	rian zone < 6 r ss than 1/3 ac riparian vege	tive channel tation due to	a 1 F e R
Zone Width (from stream edge to field)	channel widt grasses),	arian zone >18 ths with trees, s human activitie impacted zone	shrubs, or tall es have not e.	Width of ripa 1 active char grasses), hur 7	Suboptima rian zone 12-1 nnel width w/tr nan activities impacted zone 6 6	al 8 meters (1/2-ees, shrubs, or have minimally e. 5	Ma Width of ripa meters (1, channel wid impacted by h	rginal arian zone 6-12 /3-1/2 active tht vegetated), numan activities.	vegation le width), little h	rian zone < 6 i ss than 1/3 ac riparian vege numan activitie	etive channel station due to es.	7 7
Zone Width (from stream edge to field)	channel widt grasses),	arian zone >18 ths with trees, s human activitie impacted zone	shrubs, or tall es have not e.	Width of ripa 1 active char grasses), hur 7	Suboptima rian zone 12-1 nnel width w/tr nan activities impacted zone 6 6 NDITION C	al 8 meters (1/2-ees, shrubs, or have minimally e. 5	Ma Width of ripa meters (1, channel wic impacted by h	rginal arian zone 6-12 //3-1/2 active tith vegetated), numan activities. 3 3	vegation le width), little h	rian zone < 6 i ss than 1/3 ac riparian vege numan activitie	etive channel station due to es.	7 7
Zone Width (from stream edge to field) Grade (East) Grade (West) 6b. Riparian Zone Vegetation Protection/	channel widt grasses), l 10 10	arian zone >18 ths with trees, s human activitie impacted zone	shrubs, or tall as have not be a share not be a sha	Width of ripa 1 active char grasses), hur 7 7 7 CON 75-90% stre young specie trees behir	Suboptima rian zone 12-1 nnel width w/tr nan activities impacted zone 6 6 NDITION C. Suboptima sambank vege	II II II II II II II II II II II II II	Ma Width of rips meters (1,1 channel wid impacted by h 4 4 4 GRADE or S Ma 50-75% s vegetation of and sparse shrub spe frequent wit	rginal arian zone 6-12 /3-1/2 active tht vegetated), numan activities.	vegation le width), little le width), little le le vidth), little le le vidth), little le vidth le le vidth little le vidth le vi	rian zone < 6 i ss than 1/3 ac r iparian vege numan activitie 1 1 1 Poor :0% streambai onsisting mos w trees & shr.	tive channel tation due to es. 0 0 Avg.Score nk vegetation tity of pasture bis; low plant ed with gullies	77 77 77 86
Zone Width (from stream edge to field) Grade (East) Grade (West) 6b. Riparian Zone Vegetation Protection/ Completeness	channel widt grasses), l 10 10 10 >90% plant shrubs, prain riparian zor grazi	erian zone >18 ths with trees, s this with trees, s one of the property of the	shrubs, or tall se have not be a second seco	Width of ripa 1 active char grasses), hur 7 7 7 CON CON 575-90% stress behir breaks oc	Suboptima rian zone 12-1 nnel width w/tm nan activities impacted zone 6 6 NDITION C. Suboptima earnbank vege sa along chann nd; disruption curring at inte meters.	Il B meters (1/2- 18 meters (1/2- 18 meters (1/2- 19 meters (1	Ma Width of ripe meters (1, channel wid impacted by h 4 4 4 GRADE or S Ma 50-75% i vegetation of and sparse shrub spe frequent wit and scars ev	rginal arian zone 6-12 /3-1/2 active tith vegetated), numan activities. 3 3 3 CCORE rginal streambank rinixed grasses young tree or cicles; breaks h some gullies very 50 meters.	Less than 5 coverage c grasses, fe density; banl al	rian zone < 6 i ss than 1/3 ac i riparian vege numan activitie 1 1 1 Poor 0% streambar mos wirees & shr. k deeply scarr I along its length	tive channel tation due to ses. O O Avg.Score Avg.Score nk vegetation thy of pasture bis; low plant ed with gullies gth.	7 7 7 F F F F F F F F F F F F F F F F F
Zone Width (from stream edge to field) Grade (East) Grade (West) 6b. Riparian Zone Vegetation	channel widt grasses), l 10 10 >90% plant shrubs, prair riparian zor grazi	erian zone >18 ths with trees, s thuman activitie impacted zone 9 9 Optimal t density of ma rie grasses, or ne intact or dis- ing/mowing mir	shrubs, or tall se have not 8 8 8 ture trees or marsh plants, ruption from nimal.	Width of ripa 1 active char grasses), hur 7 7 7 CON 75-90% stre young specie trees behit breaks oc	Suboptima rian zone 12-1 nnel width witn nan activities impacted zon 6 6 NDITION C. Suboptima sambank vege sambank vege sambank vege meters.	al 18 meters (1/2-ees, shrubs, or have minimally e. 5 5 ATEGORY (al 1-ees) and mature evident with rivals of >50	Ma Width of rips meters (1, channel wid impacted by h 4 4 4 GRADE or S Ma 50-75% vegetation of and sparse shrub spe frequent wit and scars ev	rginal arian zone 6-12 3-1/2 active th vegetated), numan activities. 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	Less than 5 coverage c grasses, fe density; banl	rian zone < 6 is ss than 1/3 ac in parian vege numan activitie 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	tive channel tation due to be seen and the total content of the total co	77 77 77 78 66 11 11

1 FLOW REG			vater from r			AM rain sho		oittont	1	Eshaman'	
TYPE Grade	10	Perennial 9	8	Intermitte 7	nt w/ Pere 6	nnial Pools 5	4	nittent 3	2	Ephemeral 0	1
2 EPIFALINAI	L SUBSTRATE/A	AVAILABLE C	OVER								
		Optimal			Suboptim			ginal	L	Poor	7
		n bed, greater t stable habitat f				50% coverage res favorable	Within stream coverage by :	bed, 10-30% stable habitat		10% habitat features ck of habitat is obvious	;
	favorable for s	stream faunal co	olonization	for stream f	aunal colon	ization and/or	features favora	able for stream	substrate	unstable or lacking;	
		transient. Feat	ures may	features no	t transient. (Many habitat See Excellent	faunal coloni fish/amphibian	cover; habitat	features and	ned channels. Habitat I pools buried or lackin	
Exposed	include snags, banks, roots, co				ory for habita components			y be less than strate may be	channel	bottom may be flat.	
roots but no water.	packs, pools a	and glides, or of	her stable		component	s. <i>)</i>	frequently dis	turbed. (See			
water.	habitat at a st	age to allow co	Ionization				Excellent Cate feature cor	gory for habitat			
Grade	10	9	8	7	6	5	4	3	2	1 0	1
3 STREAM BO	OTTOM SUBSTI	RATE: Pool S	ubstrate Ch	naracterizat	ion						
	Misture of oute	Optimal	with around	Misture of	Suboptim			ginal	Hord pop o	Poor	.]
		prevalent; root	mats and	mud may	be dominan	nud, or clay; it; some root	All mud or clay little or no r	oot mat; no		lay or bedrock; no root bmerged vegetation.	
	submerged	d vegetation co	mmon.	mats and	submerged present.	d vegatation	submerged	vegetation.			
					F. 000116.						
<u> </u>	<u> </u>				-	1 -		1 -	ļ <u>, , , , , , , , , , , , , , , , , , ,</u>		_
Grade	10	9	8	7	6	5	4	3	2	1 0	1
4 POOL VARI	ABILITY	Optimal		l	Suboptim	al	Mare	ginal	ı	Poor	-
		arge-shallow, la		Majority o	f pools large	e-deep; very	Shallow pool	s much more		pools small-shallow or	٦
	small-shallow,	small-deep po	ois present		few shallov	v.	prevalent tha	n deep pools		oools absent	
Grade	10	9	8	7	6	5	4	3	2	1 0	1
5 SEDIMENT	DEPOSITION/S		•								
	<5% of channel	Optimal I bottom affected	by scour or	5-30% affect	Suboptim ted by scour	or deposition;		ginal ed by scour or	More than 509	Poor % of the bottom in a state	of
		deposition.	,	Scour at con		d wehre grades	deposition. Depo		flux or chang	ge nearly yearlong. Pools or absent due to heavy	
				окоорон	como dopos	Morr III poolo	bends. Some			or excessive scouring.	
0 4-	40		0	7		1 -	4		0	4 0	+
Grade	10	9	8	/	6	5	4	3	2	1 0	1
6 CHANNEL I	FLOW STATUS	Ontino		1	Out antin	-1				Dana	
		Optimal es the base of b		Water fills	Suboptim >75% of the	e channel; or	Water fills 25	ginal 5-75% of the		Poor ater in the channel and	
	banks; <5%	of channel sub exposed	strate is	<25% o	f channel su exposed	ubstrate is	available chans substrates are i			ent in standing pools; o stream is dry	r
		exposed			exposed		Substitutes are i	mostry exposed		stream is dry	
			8	7	6	5	4	3	2	1 0	1
Grade	10	9									_
	10 ALTERATION	9 Optimal			Suboptim			ginal		Poor	
	Channelizatio	Optimal on, alteration, or	dredging		Suboptim ration or ch	al annelization	Marg Alteration or d	hannelization		ed with gabion, riprap, o	
	Channelizatio absent or mir stream means	Optimal on, alteration, or nimal; normal a der pattern. Alt	dredging nd stable eration by	presen structu	Suboptimeration or ch t, usually actives, (such a	al annelization ljacent to as bridge	Marg Alteration or o may be e embankments	channelization extensive; (including spoil	concrete. (ed with gabion, riprap, o Concrete or riprap lined ls. Instream habitat	t
	Channelizatio absent or mir stream means	Optimal on, alteration, or nimal; normal a	dredging nd stable eration by	presen structu abutments	Suboptimeration or ch t, usually acures, (such a or culverts)	al annelization djacent to as bridge ; evidence of	Alteration or o may be e embankments piles) or shori	channelization extensive; (including spoil ing structures	concrete. (channe significantly	ed with gabion, riprap, of Concrete or riprap lined ls. Instream habitat altered by stormwater of	t
	Channelizatio absent or mir stream means	Optimal on, alteration, or nimal; normal a der pattern. Alt	dredging nd stable eration by	presen structu abutments past alteral may be pre	Suboptimeration or chet, usually actives, (such a or culverts) cion, (l.e., chesent, but st	al annelization djacent to as bridge ; evidence of annelization) ream pattern	Mary Alteration or or may be e embankments piles) or shori present on both stable stream m	channelization extensive; (including spoil ing structures a banks; normal neander pattern	concrete. (channe significantly other inp	ed with gabion, riprap, o Concrete or riprap lined ls. Instream habitat	t
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Bowless states, exclusive of encours or borns and belongia states or better control and state of the control of	9 [BANK STAB	LITY (SCORE E	ACH BAN	K)									
labluse aboest or minimals (-5% of bark). Indicated, personal expectation to seatherine sparse all effects, severe excess of both process of effects of the control of the	٦		. (Optimal										
Grade (East) 10 0 8 7 6 5 4 3 2 1 0 0 Grade (East) 10 0 9 8 7 6 5 4 3 2 2 1 0 0 Grade (East) 10 0 9 8 7 6 5 4 3 2 2 1 0 0 Wegetative protection (Score Each Bank) Optimal Allow the emotive protection of the emotivation of the emotive protection of the emotive protection of the emotive protection of the emotive protection of the emotive protection of the emotive protection of the emotive protection of the emotive protection of the emotive protection of the emotive protection of the emotive protection of the emotive protection of the emotive protection of the emotive protection of the emotive protection of the emotive protection of the emotive protection of the emotive protection of the emotive protection of the emotivation of the emotive protection of the emotive protection of the emotive protection of the emotive protection of the emotive protection of the emotive protection of the emotive protection of the emotive protection of the emotive protection of the emotive protection of the emotive protection of the emotive protection of the emotive protection of the emotive protection of the emotive protection of the emotive protection of the emotive protection of the emotive protection of the emotive protection of the emot			failure absent or affected), perenni- no raw or undercu outside of mea	r minimal; (al vegetation t banks (so ander bend	<5% of bank on to waterline ome erosion or is O.K.); no	areas of en 5-30% of b minor undercuttin	osion mostly ank in reach erosion and g; perennial	healed over. has areas of or bank vegetation to	vegetation to w (mainly scource lateral erosion) hard points	raterline sparse d or stripped by), bank held by (trees, rock	waterline banks; red common; undercu	e; severe eros cently expose tree falls and it trees comm	sion of both ed tree roots d/or severely non; many	
Carade (East) 10 9 8 7 6 5 4 3 2 1 0									reach has areas bank undercu exposed tree ro hairs common	s of erosion and atting; recently ots and fine root n; high erosion	along stra obvious ba bank	ight sections nk sloughing	and bends; ; 60-100% of	
VEGETATIVE PROTECTION (SCORE EACH BANK) Suborptimal and immediate repairant sortees covered by registration and immediate repairant sortees covered by registration and immediate repairant sortees covered by registration. Sorting the representation of the protection of the prote	(Grade (East)	10	9	8	7	6	5	4	3	2	1	0	1
VEGETATIVE PROTECTION (SCORE EACH BANK)	(Grade (West	10	9	8	7	6	5	4	3	2	1		3
Deptimal Suboptimal More than 90% of the streambank surfaces and immediate (parain zones covered by respetation, not the preparation of the	_											Avg.Score	е	2
Strade (East) 10 9 8 7 6 5 4 3 2 1 0 0 0 0 0 0 0 0 0	10	VEGETATIVI			EACH BANK	<u>()</u>								
and immediate riparian zones covered by registron, but one justification of the protection of the prot					hank surfaces	s 70-90% of					Less than		streamhank	
understory shrubs, or norwoody macrophysics, wegetained sizepion strough grazing or mowing mismal or not evident almost all plants allowed to grow naturally. Grade (East) 10 9 8 7 6 5 4 3 2 1 0 Grade (West 10 9 8 7 6 5 4 3 2 1 0 Grade (West 10 9 8 7 6 5 4 3 2 1 0 Grade (West 10 9 8 7 6 5 4 3 2 1 0 Grade (West 10 9 8 7 6 5 4 3 2 1 0 Grade (West 10 9 8 7 6 5 4 3 2 1 0 Grade (West 10 9 8 7 6 5 4 3 2 1 0 Grade (West 10 9 8 7 6 5 4 3 2 1 0 Grade (West 10 9 8 7 6 5 4 3 2 1 0 Grade (West 10 9 8 7 6 5 4 3 2 1 0 Grade (West 10 9 8 7 6 5 4 3 2 1 0 Grade (West 10 9 8 7 6 5 4 3 2 1 0 Grade (West 10 9 8 7 6 5 4 3 2 1 0 Grade (West 10 9 8 7 6 5 4 3 2 1 0 Grade (West 10 9 8 7 6 5 4 3 2 1 0 Grade (West 10 9 8 8 7 6 6 5 4 3 2 2 1 0 Grade (West 10 9 8 8 7 6 6 5 4 3 2 2 1 0 Grade (West 10 9 8 8 7 6 6 5 4 3 2 2 1 0 Grade (West 10 9 8 8 7 6 6 5 4 3 2 2 1 0 Grade (West 10 9 8 8 7 6 6 5 4 3 2 2 1 0 Grade (West 10 9 8 8 7 6 6 5 4 3 2 2 1 0 Grade (West 10 9 8 8 7 6 6 5 4 3 2 2 1 0 Grade (West 10 9 8 8 7 6 6 5 4 3 2 2 1 0 Grade (West 10 9 8 8 7 6 6 5 4 3 2 2 1 0 Grade (West 10 9 8 8 7 6 6 5 4 3 2 2 1 0 Grade (West 10 9 8 8 7 6 6 5 4 3 2 2 1 0 Grade (West 10 9 8 8 7 6 6 5 4 3 2 2 1 0 Grade (West 10 9 8 8 7 6 6 5 4 3 2 2 1 0 Grade (West 10 9 8 8 7 6 6 5 4 3 2 2 1 0 Grade (West 10 9 8 8 7 6 6 5 4 3 2 2 1 0 Grade (West 10 9 8 8 7 6 6 5 4 3 2 2 1 0 Grade (West 10 9 8 8 7 6 6 5 4 3 2 2 1 0 Grade (West 10 9 8 8 7 6 5 4 3 2 2 1 0 Grade (West 10 9 8 8 7 6 6 5 4 3 2 2 1 0 Grade (West 10 9 8 8 7 6 6 5 4 3 3 2 1 0 Grade (West 10 9 8 8 7 6 6 5 4 3 3 2 1 0 Grade (West 10 9 8 8 7 6 6 5 4 3 3 2 1 0 Grade (West 10 9 8 8 7 6 6 5 4 3 3 2 1 0 Grade (West 10 9 8 8 7 6 6 5 4 3 3 2 1 0 Grade (West 10 9 8 8 7 6 6 5 4 3 3 2 1 0 Grade (West 10 9 8 8 7 6 6 5 4 3 3 2 1 0 Grade (West 10 9 8 8 7 6 6 5 4 3 3 2 1 0 Grade (West 10 9 8 8 7 6 6 5 4 3 3 2 1 0 Grade (West 10 9 8 8 7 6 6 5 4 3 3 2 1 0 Grade (West 10 9 8 8 7 6 6 5 4 3 3 2 1 0 Grade (West 10 9 8 8 7 6 6 5 4 3 3 2 1 0 Grade (West 10 9 8 8 7 6 6 5 4 3 3 2 1 0 Grade (West 10 9 8 8 7 6 6 5 4 3 3 2 1 0 Grade (Wes			and immediate ri	parian zone	es covered by	covered by	native veget	ation, but one	surfaces covere	d by vegetation;	surfaces	covered by	vegetation;	
macrophyses, vegetables disruption through grazing or moving mism all or not evident almost all plants allowed to grow naturally stabble height emaining. Grade (East) 10 9 8 8 7 6 5 4 3 2 1 0 0 Avg Score Transport of Francisco Score														
almost all plants allowed to grow naturally. The non-ental of the potential plant stubble height remaining. Stubble height rema			macrophytes; veg	etative disr	uption through	not affe	ecting full pla	int growth	vegetation com	mon; less than	removed t	o 5 centimete	ers or less in	
Grade (East) 10 9 8 7 6 5 4 3 2 1 0 Avg.Score RIPARIAN ZONE (SCORE EACH BANK)											aver	age stubble	neignt.	
RIPARIAN ZONE (SCORE EACH BANK)						stubb	le height ren	naining.						
RIPARIAN ZONE (SCORE EACH BANK)														
RIPARIAN ZONE (SCORE EACH BANK)	(Grade (East)	10	9	8	7	6	5	4	3	2	1 1	0	1
RIPARIAN ZONE (SCORE EACH BANK)												1	0	1
Suboptimal Suboptimal Poor Width of rparian zone > 18 meters; human activities (le., parking lots, roadbeds, clear cuts, lawns, or crops) have not impacted Poor cuts, lawns, or crops) have not impacted Poor cuts, lawns, or crops) have not impacted Poor cuts, lawns, or crops) have not impacted Poor cuts, lawns, or crops) have not impacted Poor cuts, lawns, or crops) have not impacted Poor cuts, lawns, or crops) have not impacted Poor cuts, lawns, or crops) have not impacted Poor cuts, lawns, or crops) have not impacted Poor cuts, lawns, or crops have not impacted Poor cuts, lawns, or crops have not impacted Poor cuts, lawns, or crops have not impacted Poor cuts, lawns, or crops have not impacted Poor cuts, lawns, or crops have not impacted Poor cuts, lawns, or crops have not												Avg.Score	е	1
Width of nparian zone >18 meters; human activities (le., parting) lots; roadedes, club, are consistent on the consistency of t	11 F	RIPARIAN ZO	ONE (SCORE EA	ACH BANK	()									
activities (i.e., parking lots, roadbeds, clear cuts, lawns, or crops) have not impacted zone only minimally). Grade (East) 10 9 8 7 6 5 4 3 2 1 0 Avg. Score late that the conditions of the						MC M C					Mar Int.			
Strade (East) 10 9 8 7 6 5 4 3 2 1 0 0 0 0 0 0 0 0 0														
Grade (East) 10 9 8 7 6 5 4 3 2 1 0			cuts, lawns, or ci		not impacted	(only minimal	ly).	impacted zone	e a great deal.	h	uman activiti	ies.	
Tree stratum (dbh-3 inches) present, with 30% to 60% tree canopy cover. (Additional forest layers any include: sapling, shrub, herbaceous, and leaf litter including mosses/lichens and woody debris. Score at the high end of Excellent range if ≥2 additional layers are present. Score at the high end of Excellent range if ≥4 additional layers are present. Score at the high end of Excellent range if ≥4 additional forest layers are present. Score at the high end of Excellent range if ≥4 additional forest layers are present. Score at the high end of Excellent range if ≥4 additional forest layers are present. Score at the wend if ≤1 additional forest layers are present. Score at low end if ≤1 additional layers are present. Score at low end if ≤1 additional forest layers are present. Score at low end if ≤1 additional forest layers are present. Score at low end if ≤1 additional layers are present. Score at low end if ≤1 additional forest layers are present. Score at low end if ≤1 additional layers are present. Score at low end if ≤1 additional layers are present. Score at low end if ≤1 additional layers are present. Score at low end if ≤1 additional layers are present. Score at low end if ≤1 additional layers are present. Score at low end if ≤1 additional layers are present. Score at low end if ≤1 additional layers are present. Score at low end if ≤1 additional layers are present. Score at low end if ≤1 additional layers are present. Score at low end if ≤1 additional layers are present. Score at low end if ≤1 additional forest layers are present. Score at low end if ≤1 additional layers are present. Score at low end if ≤1 additional layers are present. Score at low end if ≤1 additional layers are present. Score at low end if ≤1 additional layers are present. Score at low end if ≤1 additional layers are present. Score at low end if ≤1 additional layers are present. Score at low end if ≤1 additional layers are present. Score at low end if ≤1 additional layers are present. Score at low end if ≤1 additional layers are pre				zone.										
Tree stratum (dbh-3 inches) present, with soft tree canopy cover. (Additional forest layers any include: sapling, shrub, herbaceous, and leaf litter including mosses/lichens and woody debris.) Score at the high end of Excellent range if ≥2 additional layers are present. Score at the high end of Excellent range if ≥2 additional forest layers are present. Care and woody debris. Care and woody debris. Score at low end if ≤1 additional layers are present. Core at low end if ≤1 additional layers are present. Core at low end if ≤2 additional forest layers are present. Core at low end if ≤2 additional layers are present. Core at low end if ≤3 additional layers are present. Core at low end if ≤4 additional layers are														
Avg.Score RIPARIAN HABITAT CONDITION (SCORE EACH BANK) Optimal Tree stratum (bth3-3 inches) present, with 30% to 60% tree canopy cover. (Additional forest layers may include: sapling, shrub, herbaceous, and leaf litter including mosses/lichens and woody debris), Score at the high end of Excellent trange if ≥2 additional layers are present. OR cutver areas with stumps remaining. Score at low end if ≤1 additional layers are present. OR cutver areas with stumps remaining. Optimal Optima	(Grade (East)		9	8	7	6	5	4		2	1	0	7
Tree stratum (dbh-3 inches) present, with Suboptimal Tree stratum (dbh-3 inches) present, with 30% to 60% tree canopy cover. (Additional forest layers may include: sapling, shrub, herbaceous, and leaf litter including mosses/lichens and woody debris), Score at the high end of Excellent range if ≥2 additional layers are present. OR cutver areas with stumps remaining. Score at low end if ≤1 additional layers are present. OR cutver areas with stumps remaining. OR cutver areas with stumps remaining and an areas along each stream bank into Condition Categories and Condition Scores using the above descriptors Score at low end if ≤2 betermine square footage for each by measuring or estimating length and width) and Score for each rigarian Area 30 Suboptimal Su	(Grade (West	10	9	8	7	6	5	4	3	2	1 Ava Coore		7
Suboptimal Suboptimal Marginal Poor	F											Avg.Score	B	,
Tree stratum (dbh-3 inches) present, with 30% to 60% tree canopy cover. (Additional forest layers may include: sapling, shrub, herbaceous, and leaf litter including mosses/liches and woody debris). Score at the high end of Excellent range if ≥2 additional layers are present. Score at low end if ≤1 additional layers are present. Score at low end if ≤1 additional layers are present. Score at low end if ≤1 additional layers are present. OR cutover areas with stumps remaining. Grade 10 9 8 7 6 5 4 3 2 2 1 0 0 1.6	12 F	RIPARIAN H.			RE EACH E	BANK)								
Se0% tree canopy cover. (Additional forest layers may include: sapling, shrub, herbaceous, and leaf litter including mosses/lichens and woody debris.) Score at the high end of Excellent range if ≥2 additional layers are present. Score at low end if ≤1 additional layers are present. Score at low end if ≤1 additional layers are present. Sea Excellent Category for examples of additional forest layers.) Score at the high end of Excellent range if ≥2 additional layers are present. Score at low end if ≤1 additional layers are present. Score at low end if ≤1 additional layers are present. Score at low end if ≤1 additional layers are present. OR cutover areas with stumps remaining. Sea Excellent Category for examples of additional forest layers.) Score at the high end of examples of additional layers are present. Score at low end if ≤1 additional layers are present. OR cutover areas with stumps remaining. Sea Excellent Category for examples of additional forest layers.) Score at the high end of examples of additional layers are present. Score at low end if ≤1 additional layers are present. OR area consists of non-maintained and naturalized dense herbaceous and/or woody vegetation. Sea Excellent Category in the specific parameter of the present of th) present with	Tree stratu					Tree stra		impervious	
herbaceous, and leaf litter including mosses/lichens and woody debris.) Score at the high end of Good range in the high end of Excellent range if ≥2 additional layers are present. Score at low end if ≤1 additional layers are present. Score at low end if ≤1 additional layers are present. Score at low end if ≤1 additional layers are present. Score at low end if ≤1 additional layers are present. Score at low end if ≤1 additional layers are present. Score at low end if ≤1 additional forest layers are present. Score at low end if ≤1 additional forest layers are present. Score at low end if ≤1 additional forest layers are present. One are consists of non-maintained and naturalized dense herbaceous and/or woody vegetation. Grade 10 9 8 7 6 5 4 3 2 1 0 1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the above descriptors 2. Determine square footage for each by measuring or estimating length and width. Land Use GIS maps may be used for this. 3. Enter the %Riparian Area (or for field purposes, enter length and width) and Score for each riparian category in the blocks below. Optimal Suboptimal Marginal Poor Marginal Area 30 40 30 100 East Bank Score 10 40 30 100 West Bank Score 10 40 30 100 SubCI 3 0 1.6 SubCI 3 0 1.6 SubCI 3 0 1.6 SubCI 4.6			>60% tree canopy	cover. (A	dditional fores	t with 30% to	o 60% tree o	anopy cover.	present, with <3	0% tree canopy	surfaces	s, croplands,	mine spoil	
mosses/lichens and woody debris). Score at the high end of Good range if ≥2 additional forest layers are present. Score at the high end of deficient if ≥2 additional forest layers are present. Score at low end if ≤1 additional layers are present. Score at low end if ≤1 additional layers are present. OR cutover areas with stumps remaining. Grade 10 9 8 7 6 5 4 3 2 1 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0														
additional layers are present. Score at low end if ≤1 additional layers are present. Additional layers are present. Sore at low end if ≤1 additional layers are present.			mosses/lichens an	nd woody d	ebris.) Score a	at Score at th	e high end o	f Good range	layers.) Score a	t the high end of	denuded:			
Grade 10 9 8 7 6 5 4 3 2 1 0			additional layers	are present	t. Score at low	present.	Score at lo	w end if <u><</u> 1	are present. So	ore at low end it		asiure, anu i	eic.	
Grade 10 9 8 7 6 5 4 3 2 1 0			end if ≤1 addition	onal layers	are present.									
Grade 10 9 8 7 6 5 4 3 2 1 0						Oit out			maintained ar	nd naturalized				
Grade														
1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the above descriptors 2. Determine square footage for each by measuring or estimating length and width. Land Use GIS maps may be used for this. 3. Enter the %Riparian Area (or for field purposes, enter length and width) and Score for each riparian category in the blocks below. Optimal Suboptimal Marginal Poor														
1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the above descriptors 2. Determine square footage for each by measuring or estimating length and width. Land Use GIS maps may be used for this. 3. Enter the %Riparian Area (or for field purposes, enter length and width) and Score for each riparian category in the blocks below. Optimal Suboptimal Marginal Poor						<u> </u>								
2. Determine square footage for each by measuring or estimating length and width. Land Use GIS maps may be used for this. 3. Enter the %Riparian Area (or for field purposes, enter length and width) and Score for each riparian category in the blocks below. Optimal Suboptimal Marginal Poor %Riparian Area 30 40 30 100 East Bank Score 10 4 1 SubCl 3 0 1.6 West Bank Score 10 40 30 100 West Bank Score 10 40 30 100 West Bank Score 10 40 30 100 SubCl 3 0 1.6 SubCl 3 0 1.6 SubCl 3 0 1.6 SubCl 3 0 1.6 SubCl 3 0 1.6 SubCl 3 0 1.6 SubCl 3 0 1.6 SubCl 3 0 1.6 SubCl 3 0 1.6 SubCl 3 0 1.6 SubCl 3 0 1.6 SubCl 3 0 1.6 SubCl 3 0 1.6 SubCl 3 0 1.6 SubCl 3 0 1.6 SubCl 3 0 1.6 SubCl 3 0 1.6 SubCl 3 0 1.6 SubCl 3 0.3				9	8	7			4	3	2	1		0.011001
Subcl Subc														
Riparian Area 30			%Riparian Area	or for field			and width)	and Score	or each riparia	n category in t	he blocks b	oelow.		
East Bank Score 10			%Riparian Area	Optimal	30		Suboptima	al					100	
West Bank %Riparian Area 30 40 30 100	E	East Bank			10								100	
Vest Bank Score 10 4 1	Į		SubCl		3		0		1.	.6				
Vest Bank Score 10 4 1	Ļ		%Rinarian Area		30					.0		30	100	
SubCl 3 0 1.6 0.3	١	West Bank											100	
Rt Bank Cl> 4.6	_						0							
														CI
Calculation of Function Capacity Index = Total Score/Total Possible Score FCI = #/120											LT Bank C		4.9	4.75 0.18

Record of Functional Assessment Results

Stı	eam Function	nal Capacity C	alculation		
	N1 (16 - >25')		<u> </u>	·	
Date:	8/26/2009				
Project:	Lake Ralph H	all			
Assessment Area:	WP 23				
Assessors:	Voight Capps				
Project Status:	XPreproj	ect	Postproject		
		Stream	Stream	Multiplication	
Major Function Categories	FCI	Length (LF)*	Characterization	Factor**	FC
Hydrologic	0.12	24,057	Е	0.00125	3.61
Water Quality Improvement	0.24	24,057	E	0.00125	7.14
Habitat	0.18	24,057	Е	0.00125	5.45
Total	0.54	24,057			16.20
*Stream Length is the length of the Stre	am Assessme	nt Reach (SAF	₹)		

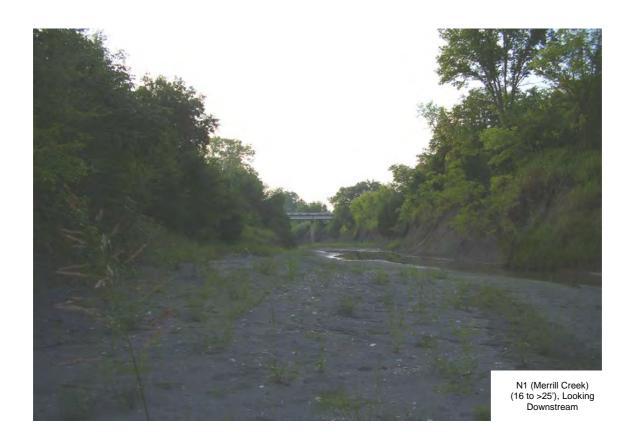
^{**}Multiplication Factors

Ephemeral = 0.00125

Intermittent = 0.0025

Perennial = 0.0038

Standing water from recent rain (8-24-2009 AM rain shower)

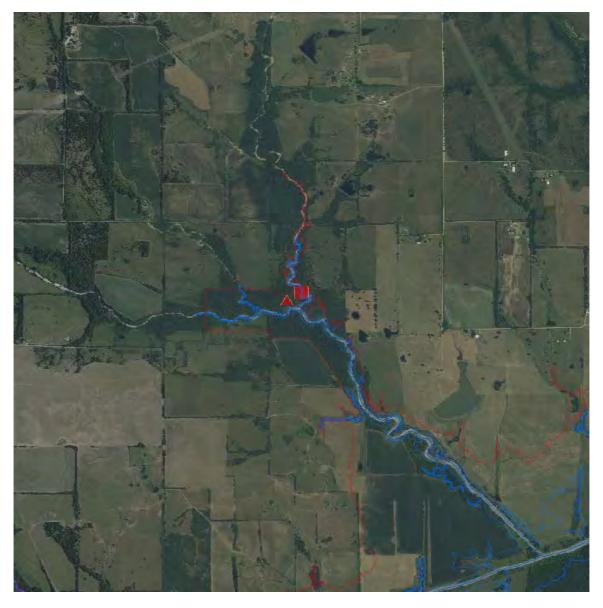




SWAMPIM DATASHEETS – NORTH EPHEMERAL 16	ΓΟ >25'
PRE-PROJECT	

15,660 linear foot reach

Forested riparian buffer on either side of reach, tapering to young forest on the west bank as the reach nears the NSR Standing water from recent rain (8-24-2009 AM rain shower)



Perennial	VARIABLES FLOW REGIM	IE: Standin	g water fron		OGIC FUN 1 (8-24-200			>25')					SCORE	Source
CHANNEL CONDITION Measurement or Chemotor Channel Care Channel Condition Channel Care Channel Ch							•	Inter	mittent		Enhemera	ı		KDWP 2
CHANNEL CORDITION: Measurement or Observation of Stream Channel Conditions Company of the Channel Condition of Condition (Channel Cha	Grade		9		7	6	5	4		2			1	
Subcodimal Marginal Poor Channel cannel constructures or characteristic interiors. No visibility of the reach of the state of characteristic interiors. No visibility of the reach of state of the cannel construction of the construction of	CHANNEL CO	NDITION:	Measureme	ent or Obser	rvation of S	tream Char	nnel Conditio	ons						7
Subcodimal Marginal Poor Channel cannel constructures or characteristic interiors. No visibility of the reach of the state of characteristic interiors. No visibility of the reach of state of the cannel construction of the construction of					001	IDITION	ATECORY (DADE of	SCORE				-	Barbar
Natural charance for ossessive services of control control (usually in Marchael Carmet). A Based charance 40 Movement of the excellation of the mach region of the ma			Optimal		LON						Poor		z	
Common Capacity to Capacity			hannel; no st			annelization	(usually in	Altered cl	hannel; 40-		l is actively dov		atu	
Common Capacity to Capacity													<u></u>	Newton,
Common Capacity to Capacity		cutting											act	
Common Capacity to Capacity		r hydrologi	ical connectio	n between	Acceptabl	e frequency	of overbank				floodplain.		ve,	SVAP L
Common Capacity to Capacity		char	nnel and flood	dplain.	flow	s onto flood	plain.						g	
Common Capacity to Capacity	,												Nn C	
Common Capacity to Capacity													ü#:	
Contained 10 9 8 7 6 5 4 3 2 1 0 1													ng.	
Condition Capacity to Flow Frequency Capacity to Flow Frequency Ratio (or 2-bycard to that bank overflow from Flow Frequency Ratio (or 2-bycard peak flow) Condition C								restrict	юбаріант.					
26. Channel Capacity to Flow Frequency Channel Capacity to Flow Frequency Channel Capacity to Flow Frequency Ratio (17.2 by Channel Capacity to Flow Frequency Ratio (17.2 by Channel Capacity to Flow Frequency Ratio (17.2 by Channel Capacity to Flow Frequency Ratio (17.2 by Channel Capacity to Flow Frequency Ratio (17.2 by Channel Capacity to Flow Frequency Ratio (17.2 by Channel Capacity to Flow Frequency Ratio (17.2 by Channel Capacity to Flow Frequency Ratio (17.2 by Channel Capacity to Flow Frequency Ratio (17.2 by Channel Capacity to Flow Frequency Ratio (17.2 by Channel Capacity to Flow Frequency Ratio (17.2 by Channel Capacity to Flow Frequency Ratio (17.2 by Channel Capacity to Flow Frequency Ratio (17.2 by Channel Capacity to Flow Frequency Ratio (17.2 by Channel Capacity to Flow Frequency Ratio (17.2 by Channel Capacity to Flow Frequency Ratio (17.2 by Channel Capacity	Grade	10	9	8	7	6	5	4	3	2	1	0	1	
26. Channel Capacity to Flow Frequency Channel Capacity to Flow Frequency Channel Capacity to Flow Frequency Ratio (16 or 2-by 18 or 12 to 15 to 18 or					CON	IDITION C	ATEGORY (GRADE or S	SCORE					w/ assis
Flow Prequency Ratio is such that bank overflow from Flow Frequency Ratio is such that bank overflow from Flow Frequency Ratio is such that bank overflow from storm events are more frequent than every 2.5 years or less frequent stand every 1.25 years or less frequent from storm events are more frequent than every 2.5 years. 4.7.5 or > 1.25 Grade 10 9 8 7 6 5 6 6 6 10 9 8 7 6 6 6 7 6 7 7 7 7 7 7 7	2b.Channel	Ob				Suboptima	al	Mai	rginal	CI ·			1	and inpu
Frequency Ratio (for 2- year frequency 0.75-1.25 some events are more frequent than every 12.5 years roles frequent than every 12.5 years roles frequent than every 12.5 years roles frequent than every 12.5 years roles frequent than every 15.5 years role frequent than every 15.5 years role frequent than every 15.5 years roles frequent than every 15.5 years roles frequent than every 15.5 years roles frequent than every 15.5 years roles frequent than every 15.5 years roles frequent than every 15.5 years roles frequent than every 15.5 years roles frequent than e														
Action (or 2 year peak frow) Grade 10 9 8 7 6 5 4 3 2 1 0 0 Suboptimal Banks stable; evidence of erosion or bank fature expects or erosion and for bank fature expect to minimal, (45% core each bank, left or right facing downstream) Condition Cattedown expects and or the falls; Grade (East) Grade (Bast)		storm ever	nts occur at a	a 1.25 to 2.5	storm even	ts are more t	frequent than	such that b	ank overflow	storm eve	ents are more f	requent than		
Comparison Co		,		cy.						every ha				
Companies Comp	year peak		0.73-1.23					every ye	ear or less					
Grade 10 9 8 7 6 5 4 3 2 1 0 0 0 Newton CATEGORY GRADE or SCORE Optimal Banks stable; evidence of erosion or bank fallure absent or minima; (c94) areas of erosion mostly headed over or stark fallure absent or minima; (c94) areas of erosion and/or bank fallure absent or minima; (c94) areas of erosion and/or bank great or of bank affectad), perennial wegetation to water the stable scene or erosion and/or bank wegetation to water the stable scene or erosion and/or bank undercuting; perennial wegetation to water the stable scene or erosion and/or bank wegetation to water the stable scene or erosion and/or bank wegetation to water the stable scene or erosion and/or bank undercuting; perennial wegetation to water the stable scene or erosion and/or bank undercuting; perennial wegetation to water the stable water to stable in the stable of banks; recently exposed tree roots and erosion, bank water or expensed tree roots and erosion banks; recently exposed tree roots and erosion, bank scenely expensed tree roots and erosion, bank sclowling; share sclowling; even and bank undercuting; recently exposed tree roots and erosion and bank undercuting; recently exposed tree roots and banks of the stable water or exposed tree roots and erosion and bank undercuting; recently exposed tree roots and banks of the stable water or exposed tree roots and erosion and bank undercuting; recently exposed tree roots and bends of the stable water or exposed tree roots and erosion and bank undercuting; recently exposed tree roots and erosion, bank sloughing; 60-100% of bank has erosional scars. CONDITION CATEGORY GRADE or SCORE Optimal	flow)													
Deltmal Deltmal Suboptimal Suboptimal Suboptimal Suboptimal Marginal Margi														
Suboptimal Suboptimal Suboptimal Marginal Poor	Grade	10	9	8	7	6	5	4	3	2	1	0	()
Banks stable; evidence of erosion or blank failure absent or minimal; call areas of erosion mostly headed over, law failure absent or minimal; call areas of erosion mostly headed over, law failure absent or minimal; calls areas of erosion mostly headed over, law failure absent or minimal; calls areas of erosion mostly headed over, law failure and the control of the part of t					CON									
2c.Channel Bank Stability (classical personnial season of mainmat, (c5%) of bank affected, personnial vegetation to of bank affected, personnial vegetation to waterline; no raw of loans the steam increase the stream length valley length at least > 1.5 killed in the stream increase the stream length valley length at least > 1.5 killed in the stream increase the stream length valley length at least > 1.5 killed in the stream increase the stream length valley length at least > 1.5 killed in composition of bank in composition in the stream increase the stream length valley length at least > 1.5 killed in composition in composition in composition in the stream increase the stream length valley length at least > 1.5 killed in composition in composition in composition in control in the stream increase in composition in composition in composition in control in the stream increase in composition in composition in control in composition in control in composition in control in composition in control in control in composition in control in		Panke etak		of orogion or	Modoratoly					Unetable		rogotation at	4	
2c.Channel Bank Stability (score each bank stream) or oresion and/or bank (and oresion and/or bank (and oresion) and/or bank (and oresion) and/or bank (and oresion) and/or bank (and oresion) and/or bank (and oresion) and/or bank (and oresion) and/or bank (and oresion) and/or bank (and oresion) and/or bank (and oresion) and/or bank (and oresion) and/or bank (and oresion) and/or oresion and/or bank (and oresion) and/or oresion and/or bank (and oresion) and/or oresion and/or bank (and oresion) and/or oresion and/or bank (and oresion) and/or oresion and/or bank (and oresion) and/or oresion and/or bank (and oresion) and/or oresion and/or bank (and ore oreded back elsewhere; 30-60% of bank in reach has areas of erosion and bank undercutting: recently exposed tree rosts and fine to bank (and ore oreded back elsewhere; 30-60% of bank in reach has areas of erosion and bank undercutting: recently exposed tree rosts and fine to bank (and ore ore ore ore ore ore ore ore ore ore														
Index Ind														
bank, left or right facing downstream) and the period of the stream length / 2.5 to 4 times longer than if it was straight. Channel length/valley length at least >1.5. Barbour gradient stream) and composition and better a composition barbank left or rochannel enlargement resulting from security exposed tree roots rare but present. was posed tree roots rare but present. exposed tree roots are but present. exposed tree roots are but present. exposed tree roots are but present. exposed tree roots are but present. exposed tree roots and bank undercutting; recently exposed tree roots and bank undercutting; recently exposed tree roots and bank undercutting; recently exposed tree roots and in reach has areas of errosion and bank undercutting; recently exposed tree roots and form of the proposition and bank undercutting recently exposed tree roots and form of the proposition and bank undercutting; recently exposed tree roots and form of the proposition and bank undercutting; recently exposed tree roots and form of the proposition and bank undercutting recently exposed tree roots and form of the proposition and bank undercutting; recently exposed tree roots and form of the proposition and bank undercutting research to the proposition and bank undercutting research to the proposition and bank undercutting research to the proposition and bank undercutting research to the proposition and bank undercutting research to the proposition and bank undercutting research to the proposition and bank undercutting research to the proposition and bank undercutting research to the proposition and bank undercutting research to the proposition and bank undercutting research to the proposition and bank undercutting research to the proposition and bank undercutting research to the proposition and bank undercutting research to the proposition and bank undercutting research to the proposition and bank undercutting research to the proposition and proposition and proposition and proposition and proposition and proposition and propo	,												ı	
inght facing downstream) Tree falls; Treen	bank, left or													
Sarbour Siruosity (bends in low gradient stream) Siruosity (bends in low gradient stream) Sarbour				s; no recent	exposed tre	ee roots rare	but present.							
Grade (East) 10 9 8 7 6 5 4 3 2 1 0 2 Grade (West) 10 9 8 7 6 5 4 3 2 1 0 2 CHANNEL ROUGHNESS FACTORS CONDITION CATEGORY GRADE or SCORE Stream length 1.5 to 2.5 times longer than if it was straight. Channel length/valley length at least >1.5.	downstream)										erosional sca	rs.		
Undercutting; recently exposed tree roots and fine roots and fine roots and fine root hairs common.														
Grade (East) 10 9 8 7 6 5 4 3 2 1 0 2 Grade (West) 10 9 8 7 6 5 5 4 3 2 1 0 2 CHANNEL ROUGHNESS FACTORS Condition Category Grade of Score of								undercutti	ng; recently					
Composition 10 9 8 7 6 5 4 3 2 1 0 2 2 2 3 4 3 2 1 0 2 2 4 3 2 1 0 2 2 4 3 2 1 0 2 2 4 3 2 1 0 2 2 4 3 2 1 0 4 4 3 2 1 0 2 4 4 3 2 1 0 2 4 4 3 2 1 0 2 4 4 3 2 1 0 2 4 4 3 2 1 0 2 4 4 3 2 1 0 4 4 4 4 4 4 4 4 4														
CONDITION CATEGORY GRADE or SCORE Optimal Suboptimal Marginal Poor								4	3					
CHANNEL ROUGHNESS FACTORS 3a.Channel Sinusity (bends in low gradient stream) Grade 10 9 8 7 6 5 4 3 2 1 0 4 CONDITION CATEGORY GRADE or SCORE Suboptimal The bends in the stream increase the stream length 1.2 to 1.5 to 4 times longer than if it was straight. Channel length/valley length at least >1.5. Grade 10 9 8 7 6 5 4 3 2 1 0 4 CONDITION CATEGORY GRADE or SCORE Channel straight, waterway has been channelized for a long distance. Channel length/valley length 1.0 to 1.2. Grade 10 9 8 7 6 5 4 3 2 1 0 4 CONDITION CATEGORY GRADE or SCORE Optimal CONDITION CATEGORY GRADE or SCORE Channel length/valley length ≤1.0 Suboptimal CONDITION CATEGORY GRADE or SCORE Optimal Little or no channel enlargement resulting from sediment accumulation; channel is stable Some gravel bars of coarse stones and well-washed debris present, little silt; moderately stable Some gravel bars of coarse stones and well-washed debris present, little silt; moderately unstable Some gravel bars of coarse stones and well-washed debris present, little silt; moderately stable Some gravel bars of coarse stones and well-washed debris present, little silt; moderately stable Some gravel bars of coarse stones stones and well-washed debris present, little silt; moderately unstable Some gravel bars of coarse stones stones and well-washed debris present, little silt; moderately unstable	Grade (West)	10	9	8	7	6	5	4	3	2	1			
Sinuosity (bends in low gradient stream) 3a. Channel Sinuosity (bends in low gradient stream) The bends in the stream increase the stream length 2.5 to 4 times longer than if it was straight. Channel length/valley length at least >1.5. Grade 10 9 8 7 6 5 4 3 2 1 0 4 CONDITION CATEGORY GRADE or SCORE Channel length/valley length 1.0 to 1.2. CONDITION CATEGORY GRADE or SCORE Channel length/valley length 1.0 to 1.2. CONDITION CATEGORY GRADE or SCORE Optimal Suboptimal Channel straight; waterway has been channel length/valley length ≤1.0 length 1 to 1.5 times longer than if it was a straight line. Channel length/valley length 1.0 to 1.2. CONDITION CATEGORY GRADE or SCORE Optimal Suboptimal Little or no channel enlargement resulting from sediment accumulation; channel is stable Some gravel bars of coarse stones and well-washed debris present, little silt; moderately stable CONDITION CATEGORY GRADE or SCORE Some gravel bars of coarse stones and well-washed debris present, little silt; moderately stable Condition or scale the stream increase the stream incre												Avg.Score	5 2	1
3a.Channel Sinuosity (bends in low gradient stream) The bends in the stream increase the stream length 2.5 to 4 times longer than if it was straight. Channel length/valley length at least >1.5. Grade 10 9 8 The bends in the stream increase the stream increase the stream length 1.5 to 2.5 times longer than if it was straight. Channel length/valley length 1.2 to 1.5 Indicate the stream length 2.5 to 4 times longer than if it was a straight line. Channel length/valley length 1.0 to 1.2. Grade 10 9 8 7 6 5 4 3 2 1 0 4 CONDITION CATEGORY GRADE or SCORE Optimal Little or no channel enlargement resulting from sediment accumulation; channel is stable Suboptimal CONDITION CATEGORY GRADE or SCORE Suboptimal Suboptimal Marginal The bends in the stream increase the stream increase the stream length 1.5 to 2.5 times longer than if it was a straight line. Channel length/valley length 1.0 to 1.2. Condition Condition Category Grade or Score Suboptimal Suboptimal Marginal Poor Channel length/valley length 2.1.0 Channel length/valley length 2.1.0 Marginal Poor Suboptimal Suboptimal Marginal Poor Channel divided into braids or stream increase the stream length 1.5 to 2.5 times longer than if it was a straight line. Channel length/valley length 1.0 to 1.2. Marginal Poor Condition Category Grade or Score Suboptimal Suboptimal Marginal Poor Channel length/valley length 2.1.0 Apuatic Stream length 2.5 to 4 ims stream length 1.5 to 2.5 times longer than if it was a straight line. Channel length/valley length 2.1.0 Apuatic Stream length 2.5 to 4 ims stream length 1.5 to 2.5 times longer than if it was a straight line. Channel length/valley length 2.1.0 Apuatic Stream length 2.5 to 4 ims stream length 1.5 to 2.5 times longer than if it was a straight line. Channel length/valley length 2.1.0 Apuatic Stream length 2.5 to 4 ims stream length 1.5 to 2.5 times longer than if it was a straight line. Channel length/valley length 2.1.0 Apuatic Stream length 2.5 to 4 ims stream length 1.5	CHANNEL RO	UGHNESS	FACTORS	·									-	
The bends in the stream increase the stream increase the stream length 2.5 to 4 times longer than if it was a straight line. Channel length/valley length at least >1.5. The bends in the stream increase the stream increase the stream length 2.5 to 4 times longer than if it was a straight line. Channel length/valley length 1.0 to 1.5 times longer than if it was a straight line. Channel length/valley length 1.0 to 1.2. Grade 10 9 8 7 6 5 4 3 2 1 0 Channel straight; waterway has been channelized for a long distance. Channel length 1.0 to 1.5 times longer than if it was a straight line. Channel length/valley length 1.0 to 1.2. CONDITION CATEGORY GRADE or SCORE Optimal Little or no channel enlargement resulting from sediment accumulation; channel is stable Some gravel bars of coarse stones and well-washed debris present, little soll, silt; moderately stable The bends in the stream increase the stream line passes the stream length 1 to 1.5 times longer than if it was a straight line. Channel length 1.0 to 1.2. Channel length/valley length ≤ 1.0 Channel			Ontimal		CON						Poor			Barbour
stream length 2.5 to 4 times longer than if it was straight. Channel length/valley length at least >1.5. Stream length 2.5 to 4 times longer than if it was straight. Channel length/valley length 1.2 to 1.5 length/valley length 1.2 to 1.5 length/valley length 1.0 to 1.2. Grade			in the stream			n the stream	n increase the	The bends	in the stream		straight; waterv		1	Chapter
gradient stream) International Composition Internatio	,	stream len	ngth 2.5 to 4 t	imes longer	stream leng					channe	elized for a long	distance.		5-25; KI
Stream) Stream Straight line. Channel length/valley length 1.0 to 1.2. Grade	gradient	unannı								Channe	i iength/valley l	ength <u>< </u> 1.0		1996
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3b. Bottom Substrate Composition CONDITION CATEGORY GRADE or SCORE Suboptimal Suboptimal Marginal Poor Subject on ochannel enlargement resulting from sediment accumulation; channel is stable Some gravel bars of coarse stones and well-washed debris present, little sands, and silt common; is channelized; substrate is uniform sediment accumulation; channel is stable Some gravel bars of coarse stones sands, and silt common; is channelized; substrate is uniform sediment accumulation; channel is stable Some gravel bars of coarse stones and well-washed debris present, little sands, and silt common; is channelized; substrate is uniform sediment accumulation; channel is stable Habitats														
Optimal Suboptimal Marginal Poor Little or no channel enlargement resulting from sediment accumulation; channel is stable Composition Optimal Suboptimal Suboptimal Poor Some gravel bars of coarse stones and well-washed debris present, little silt; moderately stable of coarse stones and well-washed debris present, little silt; moderately stable of coarse stones and silt common; moderately unstable of coarse stones and silt common; moderately unstable of coarse stones and silt common; moderately unstable of coarse stones and silt common; moderately unstable of coarse stones and silt, clay, or bedrock; unstable of coarse stones and silt common; moderately unstable of coarse stones and silt, clay, or bedrock; unstable of coarse stones and silt common; moderately unstable of coarse stones and si	Grade	10	9	8	7	6	5	4	3	2	1	0	4	Ī
3b. Bottom Substrate Composition Little or no channel enlargement resulting from sediment accumulation; channel is stable composition Little or no channel enlargement resulting from sediment accumulation; channel is stable silt; moderately stable silt; moderately stable silt; moderately stable silt; moderately unstable sand, silt, clay, or bedrock; unstable sand, s			0		CON									KDWP,
3b. Bottom Substrate Composition resulting from sediment accumulation; channel is stable composition resulting from sediment accumulation; channel is stable composition resulting from sediment and well-washed debris present, little silt; moderately stable sands, and silt common; moderately unstable sands, and silt common; is channelized; substrate is uniform sediment accumulation; channel is stable silt; moderately stable sands, and silt common; moderately unstable sand, silt, clay, or bedrock; unstable Habitats		Little or r		nlargement	Some aray					Channel		ids or stream	4	
Substrate Composition Substrate accumulation; channel is stable silt; moderately stable moderately unstable sand, silt, clay, or bedrock; unstable Habitats		resu	ılting from sec	diment	and well-wa	shed debris	present, little	sands, and	silt common;	is chann	elized; substra	te is uniform		Evaluati
	Substrate	accumul	ation; channe	el is stable	silt;	moderately	stable	moderate	ly unstable	sand, silt	, clay, or bedro	ck; unstable		Aquatic
Grade 10 9 8 7 6 5 4 3 2 1 0 1														
Grade 10 9 8 7 6 5 4 3 2 1 0 1														Habitats
Grade 10 9 8 7 6 5 4 3 2 1 0 1														Habitats
														Habitats

				CO	NDITION C	ATEGORY	GRADE or	SCORE							KDWP, 1996	
		Optima	ı	1	Suboptim			rginal		Po	or				Newton et al.	
3c. Instream Bottom Topography	Diverse bottom topography including >7 of the following: deep pools, boulders/gravel, logs/large woody debris, backwaters/oxbows, overhanging vegetation, riffles, vegetated shallows, rootwads,			Channel bottom includes 5-7 of the			Channel bottom includes < 5 of the items listed in Optimal Category		Channel bottom includes <3 of the					1998 USDA/NRCS SVAP page		
			side channel													
Grade	10	9	8	7	6	5	4	3	2	1			0	1		
Grade				00	UDITION	ATEOORY	ODADE	20005								
or		Optima	al .	T	Suboptim	ATEGORY		rginal	1	Po	or					
Or 3c.		0.05 to 0.0			0.035 to 0.0			.03 or >0.10	0.16 t	o 0.20 du		excessi	ve			
Manning's n							to	0.15	obstructio to channe	n to flow o elization a chan	and cle					
Grade	10	9	8	7	6	5	4	3	2	1			0			
				CO	NDITION C	ATEGORY	GRADE or	SCORE							USACE,	
2d Char		Optima			Suboptim			rginal		Po					Norfolk	
3d. Channel Incision (TLB/BFD=BH R; 1/BHR*Adj	channel s ratio >1.	lope >2%; E	.2 and Where Entrenchment hannel slope ht ratio >2.0	channel s ratio >1.	Incision ratio ≥1.2 <1.4 and Where channel slope >2%, Entrenchment ratio >1.4; Where channel slope ≤2%, Entrenchment ratio >2.0			Incision ratio ≥ 1.4 < 2.0 and Where channel slope > 2%, Entrenchment ratio		l Incision ratio ≥2.0 and Where channel slope >2%, Entrenchment ratio ≤1.4; Where channel slope ≤2%, Entrenchment ratio ≤2.0			o <u><</u> 1.4; 6,		District, 200 SAAM Forn #1 and VT Stream	
Factor =CI)							slop	ere channel e <u><</u> 2%, ent ratio >2.0							Geomorphic Assessment Phase 2	
TLB =		20		BHR =	4											
BFD =	40	5		7	1 0								0			
Grade	10	9	8	/	6	5	4	3	2	1			0	0		
DYNAMIC SU	RFACE WA	TER STO	RAGE													
				CO	NDITION C	ATEGORY	GRADE or	SCORE							Newton, et a	
		Optima			Suboptim			rginal		Po					1998 USDA	
4a.Pools (abundant,			ols abundant; ne pool bottom		esent, but no	ot abundant; ool bottom is		resent, but om 5-10% of	Pools absent, or the entire bottom is discernible. No water = zero.						NRCS SVA page 14;	
present or absent)	is obscure		th, or pools are	obscure of		or the pools	the pools	I bottom is e to depth, or are less than it deep.			, water	s. – 20			Barbour, et	
Grade	10	9	8	7	6	5	4	3	2	1			0	1		
4b. Channel				CO	NDITION O	ATEGORY	GRADE or	SCORF								
Flow Status		Optima	ıl		Suboptim	al	Ma	rginal		Po					Barbour, et	
(degree to which channel		aches base and minimal	of both lower I amount of		lls >75% of to el; or <25% of			s 25-75% of ble channel,	Very little present as						1999 EPA RBA page 5	
is filled)	channe	el substrate i	is exposed.				and /or riffle substrates are mostly exposed.			zer	ro.				/A-9#5; <i>TCEQ</i> 1999; <i>VANR</i> ,	
0	10	9	8	7	6	5	4	3	2	1			0	1	2005	
Grade																
Grade				<u>l</u>	Ca	Iculation of F	Function Ca	pacity Index	= Total So	core/Tota	al Pos	ssible	Score	0.12		

I. HYDROLOGIC FUNCTIONS N18 (16 - >25')

M	VARIABLES	BIOGEOCH	HEMICAL F	JNCTIONS		-		N18 (16 - >	-25')				SCORE F
	Standing water	from recen	nt rain (8-24	-2009 AM ra	in shower)								7 s
	TYPE		,										
	NOTES												,
1.	SEDIMENT TR	ANSPORT	/DEPOSITI	ON									↓
					001	IDITION C	ATECORY	ND ADE C	CODE				-l,
	1a. Bank		Ontimal		COr		ATEGORY (rginal	l	Poor		
	Stability	Ranke etah	Optimal le; evidence	of erosion or	Moderately	Suboptima stable; infre			unstable; 30-	Linetable: n	nany eroded	areas: "raw"	_ e
	(score each		e absent or r			osion mostly			k in reach has		equently alon		ľ
	bank, left or			ems. <5% of	5-30% of ba	ank in reach	has areas of		rosion; high		nd bends; ob		
	right facing		bank affecte	d.		erosion.			tential during		; 60-100% o		p
	downstream)							IIC	ods.	е	rosional scar	S.	E
													ϵ
									1		,		1
	Grade (East)	10	9	8	7	6	5	4	3	2	1	0	2
	Grade (West)	10	9	8	7	6	5	4	3	2	1	0	2
_												Avg.Score	2
					001	IDITION	ATE 0.0 D.V. (DADE	0005				-l .
			Ontimal		LOI		ATEGORY (1	Poor		<u> </u>
a)	1b. Channel	Rottom 1	Optimal 1/3 of bank is	generally	Rottom 1	Suboptima 1/3 of bank is			rginal 3 of bank is	Rottom 1	/3 of bank is	generally	
gor	Bottom Bank		istant plant/s			ant/soil matri:			ighly erodible		dible materia		V
ari	Stability		material.		l				ant/soil matrix		everely comp		F
<u>`</u>									romised.				N
S	<u> </u>	<u></u>			<u> </u>					<u> </u>			l'`
إ	Grade (East)	10	9	8	7	6	5	4	3	2	1	0	1
ō	Grade (West)	10	9	8	7	6	5	4	3	2	1	0	1
ō												Avg.Score	1
Score for Only One Variable					CONDITION OF TOO DAY			ODADE CCODE					-l .
Scc	or		Ontime		CONDITION CATEGORY C								
er:	1c. Channel	>500/. cm	Optimal avel or larger	euhetrata:	30-50% ~	Suboptima			rginal	Substrata :	Poor	nd eilt alau	<u> </u>
Enter	Sediments or		bble boulder		30-50% gravel or larger substrate; dominant substrate type is mix of			10-29.9% gravel or larger substrate; dominant		Substrate is uniform sand, silt, clay, or bedrock; unstable			1
ш	Substrate		type is grave					substrate type is finer than					F
	Composition		stable	g,		oderately sta			may still be a				ϵ
	Grade	10	9	8	7	6	5	4	3	2	1	0	1
2	WATER APPE							•	Ü	_	'		+
-	WATERAITE	TOTIVOL.	Clarity Or V	ioibility									†
						IDITION C	ATECODY (·
	,				CON	NDITION C	ALEGURY	SRADE or S	CORE				
	1		Optimal		CON	Suboptima		SRADE or S Ma	CORE rginal		Poor		· ·
			or clear but		Occasional	Suboptima lly cloudy, es	ıl pecially after	Ma			or muddy appe		-1
		objects visil	or clear but ble at depth	3-6 feet (less	Occasional storm ev	Suboptima lly cloudy, es rent, but clea	al pecially after ars rapidly;	Ma Considerate most of the	rginal ble cloudiness time; objects	the time; obj	or muddy appe ects visible to	depth <0.5 ft;	ϵ
	Water Clarity	objects visil if slightly of	or clear but ble at depth a colored); no c	3-6 feet (less oil sheen on	Occasional storm ev objects visi	Suboptima lly cloudy, es vent, but clea ble at depth	pecially after rs rapidly; 1.5-3 ft; may	Ma Considerate most of the visible to de	rginal ble cloudiness time; objects epth 0.5-1.5 ft;	the time; obj	or muddy appe ects visible to water may be	depth <0.5 ft; bright-green;	ϵ
	Water Clarity	objects visil if slightly o surface	or clear but ble at depth a colored); no colored);	3-6 feet (less oil sheen on le film on	Occasional storm ev objects visi have slig	Suboptima lly cloudy, es vent, but clea ble at depth ghtly green co	pecially after ars rapidly; 1.5-3 ft; may olor; no oil	Ma Considerate most of the visible to de slow section	rginal ble cloudiness time; objects epth 0.5-1.5 ft; ns may appear	the time; obj slow moving other obvious	or muddy appe ects visible to water may be us water pollut	depth <0.5 ft; bright-green;	ε 1 L
	Water Clarity	objects visil if slightly o surface	or clear but ble at depth a colored); no c	3-6 feet (less oil sheen on le film on	Occasional storm ev objects visi have slig	Suboptima lly cloudy, es vent, but clea ble at depth	pecially after ars rapidly; 1.5-3 ft; may olor; no oil	Ma Considerate most of the visible to de slow section pea-green;	rginal ble cloudiness time; objects pth 0.5-1.5 ft; ns may appear bottom rocks	the time; obj slow moving other obvior algal mats, so	or muddy appe ects visible to water may be us water pollut- urface scum, s m on surface.	depth <0.5 ft; bright-green; ants; floating heen or heavy	ε 1 L
	Water Clarity	objects visil if slightly o surface	or clear but ble at depth a colored); no colored);	3-6 feet (less oil sheen on le film on	Occasional storm ev objects visi have slig	Suboptima lly cloudy, es vent, but clea ble at depth ghtly green co	pecially after ars rapidly; 1.5-3 ft; may olor; no oil	Ma Considerate most of the visible to de slow section pea-green; or sumerg	rginal ble cloudiness time; objects epth 0.5-1.5 ft; ns may appear	the time; obj slow moving other obvior algal mats, so	or muddy appe ects visible to water may be us water pollut urface scum, s	depth <0.5 ft; bright-green; ants; floating heen or heavy	ε 1 L N
	Water Clarity	objects visil if slightly o surface	or clear but ble at depth a colored); no colored);	3-6 feet (less oil sheen on le film on	Occasional storm ev objects visi have slig	Suboptima lly cloudy, es vent, but clea ble at depth ghtly green co	pecially after ars rapidly; 1.5-3 ft; may olor; no oil	Ma Considerate most of the visible to de slow section pea-green; or sumerg	rginal ple cloudiness time; objects pth 0.5-1.5 ft; ns may appear bottom rocks ged objected	the time; obj slow moving other obvior algal mats, so	or muddy appe ects visible to water may be us water pollut- urface scum, s m on surface.	depth <0.5 ft; bright-green; ants; floating heen or heavy	ε 1 L N
	Water Clarity	objects visil if slightly o surface	or clear but ble at depth a colored); no colored);	3-6 feet (less oil sheen on le film on	Occasional storm ev objects visi have slig	Suboptima lly cloudy, es vent, but clea ble at depth ghtly green co	pecially after ars rapidly; 1.5-3 ft; may olor; no oil	Ma Considerate most of the visible to de slow section pea-green; or sumerg	rginal ple cloudiness time; objects pth 0.5-1.5 ft; ns may appear bottom rocks ged objected	the time; obj slow moving other obvior algal mats, so	or muddy appe ects visible to water may be us water pollut- urface scum, s m on surface.	depth <0.5 ft; bright-green; ants; floating heen or heavy	ε 1 L N
	Water Clarity Grade	objects visil if slightly o surface	or clear but ble at depth a colored); no colored);	3-6 feet (less oil sheen on le film on	Occasional storm ev objects visi have slig	Suboptima lly cloudy, es vent, but clea ble at depth ghtly green co	pecially after ars rapidly; 1.5-3 ft; may olor; no oil	Ma Considerate most of the visible to de slow section pea-green; or sumerg	rginal ple cloudiness time; objects pth 0.5-1.5 ft; ns may appear bottom rocks ged objected	the time; obj slow moving other obvior algal mats, so	or muddy appe ects visible to water may be us water pollut- urface scum, s m on surface.	depth <0.5 ft; bright-green; ants; floating heen or heavy	ε 1 L N
	Grade	objects visil if slightly of surface submer	or clear but ble at depth : colored); no o c;no noticeab rged objects	3-6 feet (less oil sheen on le film on or rocks.	Occasional storm ev objects visi have slig sheet	Suboptima lly cloudy, es rent, but clea ble at depth ghtly green co n on water su	al pecially after ras rapidly; 1.5-3 ft; may olor; no oil urface.	Ma Considerat most of the visible to de slow section pea-green; or sumero covered	rginal ple cloudiness time; objects opth 0.5-1.5 ft; ss may appear bottom rocks ged objected d with film.	the time; obj slow moving other obvior algal mats, si coat of foa	or muddy appe ects visible to water may be us water pollut urface scum, s m on surface. zero.	depth <0.5 ft; bright-green; ants; floating heen or heavy No water =	6 1 1 N S
3	·	objects visil if slightly of surface submer	or clear but ble at depth : colored); no o c;no noticeab rged objects	3-6 feet (less oil sheen on le film on or rocks.	Occasional storm ev objects visi have slig sheet	Suboptima lly cloudy, es rent, but clea ble at depth ghtly green co n on water su	al pecially after ras rapidly; 1.5-3 ft; may olor; no oil urface.	Ma Considerat most of the visible to de slow section pea-green; or sumero covered	rginal ple cloudiness time; objects opth 0.5-1.5 ft; ss may appear bottom rocks ged objected d with film.	the time; obj slow moving other obvior algal mats, si coat of foa	or muddy appe ects visible to water may be us water pollut urface scum, s m on surface. zero.	depth <0.5 ft; bright-green; ants; floating heen or heavy No water =	6 1 1 N S
3	Grade	objects visil if slightly of surface submer	or clear but ble at depth : colored); no o c;no noticeab rged objects	3-6 feet (less oil sheen on le film on or rocks.	Occasional storm ev objects visi have slig sheet	Suboptima lly cloudy, es rent, but clea ble at depth ghtly green cu n on water su 6 ercent Cove	al pecially after rars rapidly; 1.5-3 ft; may olor; no oil urface.	Ma Considerat most of the visible to de slow sectior pea-green; or sumer covered	rginal le cloudiness time; objects pyth 0.5-1.5 ft; ss may appear bottom rocks jed objected with film.	the time; obj slow moving other obvior algal mats, si coat of foa	or muddy appe ects visible to water may be us water pollut urface scum, s m on surface. zero.	depth <0.5 ft; bright-green; ants; floating heen or heavy No water =	6 1 1 N S
3	Grade	objects visil if slightly o surface submer	or clear but ble at depth : colored); no c ;;no noticeab ged objects	3-6 feet (less oil sheen on le film on or rocks.	Occasional storm ev objects visi have slig sheet	Suboptima lly cloudy, es vent, but clea ble at depth ghtly green co n on water st 6 ercent Cove	al pecially after pecially after pecially after pecially; 1.5-3 ft; may olor; no oil urface.	Ma Considerat most of the visible to de slow sectior pea-green; or sumer covered	rginal le cloudiness time; objects pyth 0.5-1.5 ft; ss may appear bottom rocks jed objected with film.	the time; obj slow moving other obvior algal mats, si coat of foa	or muddy appe ects visible to water may be us water pollut urface scum, s m on surface. zero.	depth <0.5 ft; bright-green; ants; floating heen or heavy No water =	6 1 1 N S
	Grade	objects visil if slightly of surface submer	or clear but ble at depth : colored); no c c;no noticeab rged objects	3-6 feet (less ill sheen on le film on or rocks.	Occasional storm ev objects visi have slig sheel	Suboptima lly cloudy, es vent, but clea ble at depth ghtly green co n on water so 6 ercent Cove	al pecially after are rapidly; 1.5-3 ft; may olor; no oil urface.	Ma Considerat most of the visible to de slow section pea-green; or sumere covered 4 GRADE or S Ma	rginal le cloudiness time; objects ppth 0.5-1.5 ft; as may appear bottom rocks gled objected d with film. 3 GCORE rginal	the time; obj slow moving other obvior algal mats, si coat of foa	or muddy appe ects visible to water may be us water pollut urface scum, s m on surface. zero.	depth <0.5 ft; bright-green; ants; floating heen or heavy No water =	E E I
	Grade PRESENCE OF	objects visil if slightly o surface submer	or clear but ble at depth : colored); no c c;no noticeab rged objects 9 C VEGETAT Optimal ater along en	3-6 feet (less ill sheen on le film on or rocks. 8 TION: Prese	Occasional storm ev objects visi have slig sheel 7 ence and Pe	Suboptima ly cloudy, es vent, but clea ble at depth ghtly green co n on water so 6 ercent Cove NDITION C/ Suboptima or slightly gre	al pecially after rs rapidly; 1.5-3 ft; may olor; no oil urface. 5 erage ATEGORY (all eenish water	Ma Considerat most of the visible to de slow section pea-green; or sumerg covered 4 GRADE or S Ma Greenish was	rginal le cloudiness time; objects ppth 0.5-1.5 ft; ss may appear bottom rocks ded objected d with film. 3 CCORE rginal ter along entire	the time; obj slow moving other obvior algal mats, si coat of foa	or muddy appeted visible to water may be us water polluturface scum, s m on surface. zero.	depth <0.5 ft; bright-green; ants; floating heen or heavy No water =	1 L N S P
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	Grade PRESENCE OF	objects visii if slightly o surface submer 10 F AQUATIC Clear wa diverse a includes	or clear but ble at depth: colored); no clear but ble at depth: colored); no clear brown of colored by colored; no noticeab rged objects Optimal atter along en quatic plant low quantatie low quantatie	8-6 feet (less ill sheen on le film on or rocks. 8 TON: Presective reach; community so of many	Occasional storm ev objects visi have slig sheel 7 ence and Pe	Suboptima ly cloudy, es vent, but clea ble at depth ghtly green co n on water so 6 ercent Cove NDITION C/ Suboptima or slightly gre	al pecially after rars rapidly; 1.5-3 ft; may olor; no oil urface. 5 ATEGORY (II) eenish water derate algal	Ma Considerat most of the visible to de slow sectior pea-green; or sumer covered 4 GRADE or S Ma Greenish wa reach; overate	rginal le cloudiness time; objects spth 0.5-1.5 ft; ss may appear bottom rocks led objected d with film. 3 COORE rginal ter along entire undance of lush hytes; abundant	the time; obj slow moving other obvior algal mats, si coat of foa	por muddy appe ects visible to water may be us water pollut ufface scum, s m on surface. zero.	depth <0.5 ft; bright-green; ants; floating heen or heavy No water = 0 water along tands of severe algal	1 L N N S P
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	Grade PRESENCE OF	objects visii if slightly o surface submer 10 AQUATIC Clear wa diverse a includes species of	or clear but ble at depth : colored); no celeored); no celeored; no ce	8-6 feet (less il sheen on le film on or rocks. 8 TION: Prese	Occasional storm ev objects visi have slig sheel 7 ence and Pe	Suboptima ly cloudy, es vent, but clea ble at depth ghtly green co n on water st 6 ercent Cove NDITION C/ Suboptima or slightly gree reach; more	al pecially after rars rapidly; 1.5-3 ft; may olor; no oil urface. 5 ATEGORY (II) eenish water derate algal	Ma Considerat most of the visible to de slow section pea-green; or sumerg covered 4 GRADE or S Ma Greenish wa reach; overat green macrog algal grow	rginal le cloudiness time; objects pth 0.5-1.5 ft; s may appear bottom rocks led objected d with film. 3 CCORE rginal ter along entire undance of lush hytes; abundant th, especially	the time; obj slow moving other obvior algal mats, st coat of foa 2 Pea green, entire r macrophyte blooms crea or NO alga	por muddy appe ects visible to water may be us water pollut urface scum, s m on surface. zero. 1 Poor gray, or brown each; dense s s clog stream; te thick algal n	depth <0.5 ft; bright-green; ants; floating heen or heavy No water = 0 water along tands of severe algal atas in stream to unstable	1 L N S P
	Grade PRESENCE OF 3a. Nutrient Enrichment	objects visii if slightly of surface submert 10 F AQUATIC Clear was diverse a diverse a includes species of g	or clear but ble at depth : colored); no celored); no celored; no	8-TION: Presective reach; sittle algal nt.	Occasional storm ev objects visi have slig sheel	Suboptimally cloudy, escent, but cleated ble at depth shifty green con on water suit of the control of the cont	al pecially after rars rapidly; 1.5-3 ft; may olor; no oil urface. 5 erage ATEGORY (al eenish water derate algal abstrates.	Ma Considerat most of the visible to de slow section pea-green; or sumer covered 4 GRADE or S Ma Greenish wa Greenish wa green macrop algal grow during war	rginal le cloudiness time; objects ppth 0.5-1.5 ft; ss may appear bottom rocks led objected d with film. 3 COORE rginal ter along entire undance of lush hytes; abundant th, especially mer months.	the time; obj slow moving other obvior algal mats, st coat of foa 2 Pea green, entire r macrophyte blooms crea or NO algas substr	pr muddy appects visible to water may be us water polluturface scum, s m on surface. zero. 1 Poor gray, or brown each; dense s s clog stream; te thick algal n e present due ate. No water	depth <0.5 ft; bright-green; ants; floating heen or heavy No water = 0 water along tands of severe algal nats unstable = zero.	1 L N S P
	Grade PRESENCE OF 3a. Nutrient Enrichment	objects visii if slightly of surface submert 10 F AQUATIC Clear was diverse a diverse a includes species of g	or clear but ble at depth : colored); no celored); no celored; no	8-TION: Presective reach; sittle algal nt.	Occasional storm ev objects visi have slig sheel 7 ence and Percent along enting growth of the storm occurrence of the storm occurrence of the storm occurrence of the storm occurrence of the storm occurrence of the storm occurrence of the storm occurrence of the storm occurrence occur	Suboptima lly cloudy, es yent, but clea ble at depth phtly green co n on water st 6 Exercent Cove NDITION C/ Suboptima or slightly green cach; mo on stream su 6	al pecially after rars rapidly; 1.5-3 ft; may olor; no oil urface. 5 erage ATEGORY (al eenish water derate algal abstrates.	Ma Considerat most of the visible to de slow sectior pea-green; or sumere covered 4 GRADE or S Ma Greenish wareach; overate green macrop algal grow during war	rginal le cloudiness time; objects pth 0.5-1.5 ft; ss may appear bottom rocks ded objected with film. 3 CORE rginal ter along entire undance of lush hytes; abundant th, especially mer months.	the time; obj slow moving other obvior algal mats, st coat of foa 2 Pea green, entire r macrophyte blooms crea or NO algas substr	pr muddy appects visible to water may be us water polluturface scum, s m on surface. zero. 1 Poor gray, or brown each; dense s s clog stream; te thick algal n e present due ate. No water	depth <0.5 ft; bright-green; ants; floating heen or heavy No water = 0 water along tands of severe algal nats unstable = zero.	1 L N S P
	Grade PRESENCE OF 3a. Nutrient Enrichment	objects visii if slightly of surface submer 10 Clear war diverse a includes species of 9 10 10	or clear but ble at depth: colored); no colored); no colored); no corone colored process of colored process	8-Tion: Prese	Occasional storm ev objects visi have slig sheel 7 ence and Pe CON Fairly clear along entin growth of the control of the co	Suboptimally cloudy, escent, but cleated ble at depth shifty green con on water suit of the control of the cont	al pecially after rars rapidly; 1.5-3 ft; may olor; no oil urface. 5 erage ATEGORY (al eenish water derate algal abstrates.	Ma Considerat most of the visible to de slow section pea-green; or sumer covered 4 GRADE or S Ma Greenish wa reach; overat green macrop algal grow during war 4 GRADE or S Ma Ma	rginal le cloudiness time; objects spth 0.5-1.5 ft; ss may appear bottom rocks led objected d with film. 3 COORE rginal ter along entire undance of lush hytes; abundant th, especially mer months. 3 COORE rginal	the time; obj slow moving other obvior algal mats, st coat of foa 2 Pea green, entire macrophyte blooms crea or NO alga substr	pr muddy appects visible to water may be us water polluturface scum, s m on surface. zero. 1 Poor gray, or brown each; dense s s clog stream; te thick algal m e present due ate. No water	depth <0.5 ft; bright-green; nuts; floating heen or heavy No water = 0 uwater along tands of severe algal hats in stream to unstable zero.	T I
	Grade PRESENCE OF 3a. Nutrient Enrichment Grade	objects visii if slightly or surface submer 10 Clear war diverse a includes species of 9 10 When pre	or clear but ble at depth : colored); no colored); no colored); no colored; no noticeab rged objects 9 Optimal ater along en quatic plant low quantatic macrophyte growth preserved as sent, aquatic sent, aquatic sent, aquatic	8-FION: Prese	Occasional storm ev objects visi have slig sheel 7 ence and Pe CON Fairly clear along entin growth of Algae do	Suboptimally cloudy, es reent, but clea ble at depth shifty green can on water suit of the control of the contr	Il pecially after rars rapidly; 1.5-3 ft; may olor; no oil urface. 5 erage ATEGORY (II) eenish water derate algal ubstrates. 5 ATEGORY (II) lools, larger	Ma Considerat most of the visible to de slow section pea-green; or sumerg covered 4 GRADE or S Ma Greenish wa reach; overate green macrop algal grow during war 4 GRADE or S Ma Algal mats	rginal le cloudiness time; objects ppth 0.5-1.5 ft; ss may appear bottom rocks led objected d with film. 3 CCORE rginal ter along entire undance of lush hytes; abundant th, especially mer months. 3 CCORE rginal oresent, some	the time; obj slow moving other obvior algal mats, st coat of foa 2 Pea green, entire: macrophyte blooms crea or NO alga substr	pr muddy appects visible to water may be us water pollut urface scum, s m on surface. Zero. 1 Poor gray, or brown each; dense s s clog stream; te thick algal n te present due ate. No water 1 Poor ts cover botti.	depth <0.5 ft; bright-green; nants; floating heen or heavy No water = 0 water along tands of severe algal nats in stream to unstable = zero.	1 1 1 N 6 1 1 L L N S 5 P
	Grade PRESENCE OF 3a. Nutrient Enrichment Grade Or	objects visii if slightly or surface submer 10 Clear war diverse a includes species of 9 10 When pre	or clear but ble at depth : colored); no colored); no colored); no colored; no colored; no colored; no colored by colored	8-FION: Prese	Occasional storm ev objects visi have slig sheel 7 ence and Pe CON Fairly clear along entin growth of Algae do	Suboptimally cloudy, escent, but cleated ble at depth shifty green con on water suit of the control of the cont	Il pecially after rars rapidly; 1.5-3 ft; may olor; no oil urface. 5 erage ATEGORY (II) eenish water derate algal ubstrates. 5 ATEGORY (II) lools, larger	Ma Considerat most of the visible to de slow section pea-green; or sumerg covered 4 GRADE or S Ma Greenish wa reach; overate green macrop algal grow during war 4 GRADE or S Ma Algal mats	rginal le cloudiness time; objects spth 0.5-1.5 ft; ss may appear bottom rocks led objected d with film. 3 COORE rginal ter along entire undance of lush hytes; abundant th, especially mer months. 3 COORE rginal	the time; obj slow moving other obvior algal mats, st coat of foa 2 Pea green, entire r macrophyte r macrophyte slooms crea or NO alga substr 2 Algal ma plants dom	pr muddy appects visible to water may be us water polluturface scum, s m on surface. Zero. 1 Poor gray, or brown each; dense s s clog stream; te thick algal n te present due ate. No water 1 Poor ts cover bottuinate the chains the chains appears to the chains and the chains are the chain	depth <0.5 ft; bright-green; ants; floating heen or heavy No water = 0 water along tands of severe algal nats in stream to unstable = zero.	T I
	Grade PRESENCE OF 3a. Nutrient Enrichment Grade Or 3b. Aquatic	objects visii if slightly or surface submer 10 Clear war diverse a includes species of 9 10 When pre	or clear but ble at depth : colored); no colored); no colored); no colored; no noticeab rged objects 9 Optimal ater along en quatic plant low quantatic macrophyte growth preserved as sent, aquatic sent, aquatic sent, aquatic	8-FION: Prese	Occasional storm ev objects visi have slig sheel 7 ence and Pe CON Fairly clear along entin growth of Algae do	Suboptimally cloudy, es reent, but clea ble at depth shifty green can on water suit of the control of the contr	Il pecially after rar rapidly; 1.5-3 ft; may olor; no oil urface. 5 erage ATEGORY (II) eenish water derate algal ubstrates. 5 ATEGORY (II) lools, larger	Ma Considerat most of the visible to de slow section pea-green; or sumerg covered 4 GRADE or S Ma Greenish wa reach; overate green macrop algal grow during war 4 GRADE or S Ma Algal mats	rginal le cloudiness time; objects ppth 0.5-1.5 ft; ss may appear bottom rocks led objected d with film. 3 CCORE rginal ter along entire undance of lush hytes; abundant th, especially mer months. 3 CCORE rginal oresent, some	the time; obj slow moving other obvior algal mats, st coat of foa 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	pr muddy appects visible to water may be us water polluturface scum, s m on surface. zero. 1 Poor gray, or brown each; dense s s clog stream; te thick algal m te present due ate. No water 1 Poor ts cover bottk initiate the chaeses the chaeses the chaese seemt due to the chaese the	depth <0.5 ft; bright-green; bright-green; stants; floating heen or heavy No water = 0 water along tands of severe algal hats in stream to unstable = zero. 0 om, larger annel or NO unstable unstable	1 1 1 N 6 1 1 L L N S 5 P
	Grade PRESENCE OF 3a. Nutrient Enrichment Grade Or 3b. Aquatic	objects visii if slightly or surface submer 10 Clear war diverse a includes species of 9 10 When pre	or clear but ble at depth : colored); no colored); no colored); no colored; no colored; no colored; no colored by colored	8-FION: Prese	Occasional storm ev objects visi have slig sheel 7 ence and Pe CON Fairly clear along entin growth of Algae do	Suboptimally cloudy, es reent, but clea ble at depth shifty green can on water suit of the control of the contr	Il pecially after rar rapidly; 1.5-3 ft; may olor; no oil urface. 5 erage ATEGORY (II) eenish water derate algal ubstrates. 5 ATEGORY (II) lools, larger	Ma Considerat most of the visible to de slow section pea-green; or sumerg covered 4 GRADE or S Ma Greenish wa reach; overat green macrop algal grow during war 4 GRADE or S Ma Algal mats	rginal le cloudiness time; objects ppth 0.5-1.5 ft; ss may appear bottom rocks led objected d with film. 3 CCORE rginal ter along entire undance of lush hytes; abundant th, especially mer months. 3 CCORE rginal oresent, some	the time; obj slow moving other obvior algal mats, st coat of foa 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	pr muddy appects visible to water may be us water polluturface scum, s m on surface. Zero. 1 Poor gray, or brown each; dense s s clog stream; te thick algal n te present due ate. No water 1 Poor ts cover bottuinate the chains the chains appears to the chains and the chains are the chain	depth <0.5 ft; bright-green; bright-green; stants; floating heen or heavy No water = 0 water along tands of severe algal hats in stream to unstable = zero. 0 om, larger annel or NO unstable unstable	T I

				200	IDITION C	ATEGORY (DADE or C	CORE				_/
		Optimal		I	Suboptima			rginal	ı	Poor		
	Mainly co	onsisting of le	aves and	Leaves	and wood sc			s or woody	Fine orga	nic sedimen	t - hlack in	
		d without sed			ebris without		debris; coa organic i	arse and fine matter with iment.	color and fo		erobic) or no	F
Grade	10	9	8	7	6	5	4	3	2	1	0	1
LAND USE PA	TTERN: Be	eyond Imme	diate Ripari	an Zone								
				CON		ATEGORY (ļ
		Optimal			Suboptima			rginal		Poor		6
		ed, consisting tive prairie, ar wetlands.			ent pasture n and swamp crops		pasture; se	w crops and ome wooded be present but		ainly row cro	ops	F
							as isolate	ed patches				
Grade (East)	10	9	8	7	6	5	4	3	2	1	0	4
Grade (West)	10	9	8	7	6	5	4	3	2	1	0	4 1
											Avg.Score	4 p
RIPARIAN ZOI												ļ I
	Riparian z	one wider a	nd more wo					existant as it r	nears the N	SR		
0 - D' '				CON	NDITION CA	ATEGORY (
6a. Riparian		Optimal			Suboptima			rginal		Poor		ĺ
Zone Width (from stream		arian zone >18 ths with trees.				8 meters (1/2- ees, shrubs, or		rian zone 6-12 /3-1/2 active		ian zone < 6 r ss than 1/3 ac	neters (natural	1
	channel wid		sniuds, or tail		nan activities l							
	grasses).		es have not	grasses), hur			channel wid	lth vegetated).	width), little	riparian vege	tation due to	1 6
,		human activitie impacted zone			impacted zone			Ith vegetated), numan activities.		riparian vege uman activitie		€ F L
edge to field)	- '	human activitie impacted zone).		impacted zone	e		numan activities.	, h		es.	l le
edge to field) Grade (East)		human activitie		,			impacted by h			uman activitie		F L
edge to field) Grade (East)	10	human activities impacted zone	8	7	impacted zone	ē	impacted by h	numan activities.	2	uman activitie	es. 0	3
edge to field) Grade (East)	10	human activities impacted zone	8	7	impacted zone	ē	impacted by h	3 3	2	uman activitie	0 0	3 3
Grade (East) Grade (West)	10 10	human activitie impacted zone 9 9 Optimal	8 8	7 7 7 CON	6 6 NDITION CA	5 5 ATEGORY (impacted by h 4 4 GRADE or S Ma	3 3 CORE	2 2	uman activitie	0 0 Avg.Score	3 3 3 4
Grade (East) Grade (West) 6b. Riparian	10 10	human activitie impacted zone 9 9 Optimal t density of ma	8 8 ture trees or	7 7 CON 75-90% stre	6 6 NDITION C/Suboptima	5 5 ATEGORY (4 4 4 GRADE or S Ma 50-75%	3 3 6CORE rginal streambank	2 2 2	1 1 Poor 0% streambar	0 0 Avg.Score	3 3 3
Grade (East) Grade (West) 6b. Riparian Zone	10 10 >90% plan shrubs, prain	human activitie impacted zone 9 9 Optimal t density of ma rie grasses, or	8 8 ture trees or	7 7 CON 75-90% stre young specie	6 6 NDITION C/Suboptima eambank veges along chann	5 5 ATEGORY (4 4 GRADE or S Ma 50-75% s vegetation of	3 3 SCORE rginal streambank mixed grasses	2 2 2 Less than 5	uman activitie 1 1 1 Poor 0% streambar onsisting most	0 0 Avg.Score	3 3 3 4
Grade (East) Grade (West) 6b. Riparian Zone Vegetation	10 10 >90% plan: shrubs, prair riparian zor	human activitie impacted zone 9 9 9 Optimal t density of ma rie grasses, or ne intact or dis	8 8 ture trees or marsh plants, ruption from	7 7 7 CON 75-90% stre young specie trees behir	6 6 NDITION C/Suboptima es along channel; disruption	5 ATEGORY (impacted by h 4 4 GRADE or S Ma 50-75% s vegetation of and sparse	3 3 3 GCORE rginal streambank mixed grasses young tree or	2 2 2 Less than 5 coverage or grasses, fer	Poor 0% streambar onsisting most w trees & shru	0 0 Avg.Score	3 3 3 4
edge to field) Grade (East) Grade (West) 6b. Riparian Zone Vegetation Protection/	10 10 >90% plan: shrubs, prair riparian zor	human activitie impacted zone 9 9 Optimal t density of ma rie grasses, or	8 8 ture trees or marsh plants, ruption from	7 7 7 CON 75-90% stre young specie trees behir	6 6 NDITION C/Suboptima eambank veges along chann	5 ATEGORY (4 4 4 GRADE or S Ma 50-75%: vegetation of and sparse shrub spe	3 3 SCORE rginal streambank mixed grasses	Less than 5 coverage or grasses, fer density; bank	Poor 0% streambar onsisting most w trees & shru	0 0 Avg.Score	3 3 3 4
edge to field) Grade (East) Grade (West) 6b. Riparian Zone Vegetation Protection/	10 10 >90% plan: shrubs, prair riparian zor	human activitie impacted zone 9 9 9 Optimal t density of ma rie grasses, or ne intact or dis	8 8 ture trees or marsh plants, ruption from	7 7 7 CON 75-90% stre young specie trees behir	6 6 NDITION C/Suboptima earnbank vege es along channing (disruption ocurring at inter	5 ATEGORY (4 4 4 GRADE or S Ma 50-75%: vegetation of and sparse shrub spe frequent wit	3 3 3 CORE rginal streambank mixed grasses young tree or cies; breaks	Less than 5 coverage or grasses, fer density; bank	Poor O% streambar ow trees & shru d deeply scarre	0 0 Avg.Score	3 3 3 1
edge to field) Grade (East) Grade (West) 6b. Riparian Zone Vegetation Protection/	10 10 >90% plan: shrubs, prair riparian zor	human activitie impacted zone 9 9 9 Optimal t density of ma rie grasses, or ne intact or dis	8 8 ture trees or marsh plants, ruption from	7 7 7 CON 75-90% stre young specie trees behir	6 6 NDITION C/Suboptima earnbank vege es along channing (disruption ocurring at inter	5 ATEGORY (4 4 4 GRADE or S Ma 50-75%: vegetation of and sparse shrub spe frequent wit	auman activities. 3 3 3 CCORE rginal streambank mixed grasses young tree or cies; breaks h some gullies	Less than 5 coverage or grasses, fer density; bank	Poor O% streambar ow trees & shru d deeply scarre	0 0 Avg.Score	3 3 3 1
Grade (East) Grade (West) 6b. Riparian Zone Vegetation Protection/	10 10 >90% plan: shrubs, prair riparian zor	human activitie impacted zone 9 9 9 Optimal t density of ma rie grasses, or ne intact or dis	8 8 ture trees or marsh plants, ruption from	7 7 7 CON 75-90% stre young specie trees behir	6 6 NDITION C/Suboptima earnbank vege es along channing (disruption ocurring at inter	5 ATEGORY (4 4 4 GRADE or S Ma 50-75%: vegetation of and sparse shrub spe frequent wit	auman activities. 3 3 3 CCORE rginal streambank mixed grasses young tree or cies; breaks h some gullies	Less than 5 coverage or grasses, fer density; bank	Poor O% streambar ow trees & shru d deeply scarre	0 0 Avg.Score	3 3 3 1
Grade (East) Grade (West) 6b. Riparian Zone Vegetation Protection/ Completeness	10 10 10 >90% plan shrubs, praiir riparian zor graz	human activitie impacted zone 9 9 Optimal t density of ma rie grasses, or ne intact or dis ing/mowing min	ture trees or marsh plants, ruption from nimal.	7 7 7 7 75-90% strr young specie trees behir breaks oo	6 6 NDITION C/Suboptima sambank vege sa along channic curring at intermeters.	5 5 5 SATEGORY (Ill station, mixed rel and mature evident with roals of >50	impacted by h 4 4 GRADE or S Ma 50-75% if the second of the second	auman activities. 3 3 3 COORE rginal streambank mixed grasses young tree or cies; breaks h some gullies rery 50 meters.	Less than 5 coverage or grasses, fe density; banl al	Poor O% streambar ow trees & shru d deeply scarre	0 0 Avg.Score Avg.Score nk vegetation tly of pasture bs; low plant ed with gullies thh.	3 3 3 3 4 6
Grade (East) Grade (West) 6b. Riparian Zone Vegetation Protection/ Completeness Grade (East)	10 10 >90% plam shrubs, prain riparian zor graz	human activitie impacted zone 9 9 Optimal t density of ma rie grasses, or ne intact or dis ing/mowing min	ture trees or marsh plants, ruption from nimal.	7 7 7 75-90% strey young specie trees behit breaks oo	impacted zone 6 6 NDITION C/ Suboptima sambank vege salong chann d; disruption curring at inter meters.	5 5 5 SATEGORY (III tattion, mixed nel and mature evident with ryals of >50	4 4 5RADE or S Ma 50-75% i vegetation of and sparse shrub spe frequent wit and scars ev	auman activities. 3 3 3 CORE rginal streambank mixed grasses young tree or cies; breaks a some gullies very 50 meters.	Less than 5 coverage or grasses, fer density; bank	Poor O% streambar onsisting most w trees & shru c deeply scarre, along its leng	O O Avg.Score Avg.Score Ak vegetation thy of pasture bs; low plant ed with gullies gith.	3 3 3 4 6 6 7 8
Grade (East) Grade (West) 6b. Riparian Zone Vegetation	10 10 10 >90% plan shrubs, praiir riparian zor graz	human activitie impacted zone 9 9 Optimal t density of ma rie grasses, or ne intact or dis ing/mowing min	ture trees or marsh plants, ruption from nimal.	7 7 7 7 75-90% strr young specie trees behir breaks oo	6 6 NDITION C/Suboptima sambank vege sa along channic curring at intermeters.	5 5 5 SATEGORY (Ill station, mixed rel and mature evident with roals of >50	impacted by h 4 4 GRADE or S Ma 50-75% if the second of the second	auman activities. 3 3 3 COORE rginal streambank mixed grasses young tree or cies; breaks h some gullies rery 50 meters.	Less than 5 coverage or grasses, fe density; banl al	Poor Poor Now streambar nosisting most w trees & shru deeply scarr along its leng	0 0 Avg.Score Avg.Score nk vegetation tly of pasture bs; low plant ed with gullies thh.	3 3 3 3 4 6

1 FLOW REGI			water from			AM rain sho		mittant		Enham!	
TYPE Grade	10	Perennial 9	8	Intermitte 7	ent w/ Pere	ennial Pools 5	Interr 4	nittent 3	2	Ephemeral 0	
2 EPIFAUNAL	SUBSTRATE/A	VAILABLE	COVER								
	Within stream	Optimal		Mithin	Suboptim	al 50% coverage		ginal bed, 10-30%	Loos #b	Poor 10% habitat features	7
	coverage by	stable habita	at features,	by stable h	nabitat featu	res favorable	coverage by	stable habitat	present; la	ck of habitat is obvious	
	favorable for st and/or fish/amp					nization and/or Many habitat		able for stream ization and/or		e unstable or lacking; ned channels. Habita	t
	features non t include snags, s	transient. Fe	atures may	features no		See Excellent	fish/amphibiar	cover; habitat by be less than	features and	I pools buried or lacking bottom may be flat.	
Exposed roots but no	banks, roots, co	bble, rocks,	persistent leaf		component		desirable, sub	ostrate may be	Chamile	bottom may be nat.	
water.	packs, pools a habitat at a sta							sturbed. (See			
		3						mponents.)			
Grade	10	9	8	7	6	5	4	3	2	1 0	-
3 STREAM BO	TTOM SUBSTR	RATE: Pool Optimal	Substrate C	haracterizat	tion Suboptim	al l	Mar	ginal		Poor	
	Mixture of subst	trate materia			f soft sand, i	mud, or clay;	All mud or clay	or sand bottom;		lay or bedrock; no roo	it
	and firm sand submerged	prevalent; ro d vegetation				nt; some root d vegatation		root mat; no I vegetation.	mat or su	ubmerged vegetation.	
					present.			· • · · · · · · · · · · · · · · · · · ·			
Grade	10	9	8	7	6	5	4	3	2	1 0	
4 POOL VARIA	ABILITY										
	Even mix of la	Optimal	lorgo doon	Majority	Suboptim	al e-deep; very		ginal Is much more	Majority of	Poor pools small-shallow o	7
	small-shallow,			iviajority o	few shallo			n deep pools		pools absent	'
0 1	10		1 0			1 -					
Grade 5 SEDIMENT [10 DEPOSITION/SO	9 COURING	8	7	6	5	4	3	2	1 0	
	50/ -/ -b	Optimal		5.000/ -#-	Suboptim	al or deposition;		ginal ted by scour or	M # 500	Poor	
	<5% of channel	deposition.	ed by scour or	Scour at cor	nstrictions an	d wehre grades	deposition. Dep	osits and scour at	flux or chan	% of the bottom in a state ge nearly yearlong. Pool:	
				steepen.	Some depos	ition in pools		onstrictions and filling of pools.		or absent due to heavy or excessive scouring.	
Grade	10	9	8	7	6	5	4	3	2	1 0	+
6 CHANNEL F	LOW STATUS										
		Optimal	f both lower	Water fills	Suboptim >75% of th	al e channel; or	Mar	ginal	Very little w	Poor rater in the channel an	d
	Water reache	s the base o					Water fills 2	5-75% of the			or
	Water reache banks; <5%	of channel s		<25% 0	of channel s		available chan	nel and/or riffle		ent in standing pools;	01
				<25% 0			available chan			ent in standing pools; on stream is dry	oi
		of channel s		<25% 0	of channel s		available chan	nel and/or riffle			
		of channel s		<25% 0	of channel s		available chan	nel and/or riffle			oi e
Grade 7 CHANNEL A	banks; <5%	of channel s		<25% o	of channel s		available chan	nel and/or riffle			
Grade 7 CHANNEL A	banks; <5%	of channel s exposed 9	ubstrate is	7	of channel s exposed	5	available chan substrates are	nel and/or riffle mostly exposed 3 ginal	2	1 0	
	banks; <5%	of channel s exposed 9 Optimal n, alteration,	ubstrate is 8 or dredging	7 Some alte	of channel s exposed	5 aal nannelization	available chan substrates are 4 Mar Alteration or or	nel and/or riffle mostly exposed	2 Banks shore	1 0 Poor ed with gabion, riprap,	or
	10 LTERATION Channelization absent or min stream meano	of channel s exposed 9 Optimal n, alteration, imal; normal der pattern.	8 or dredging I and stable Alteration by	7 Some alte	6 Suboptimeration or chot, usually aures, (such	al annelization djacent to as bridge	available chan substrates are 4 Mar Alteration or may be embankments	nel and/or riffle mostly exposed 3 ginal channelization extensive; (including spoil	2 Banks shore concrete. channe	1 0 Poor ad with gabion, riprap, Concrete or riprap line Is. Instream habitat	or d
	banks; <5% 10 LTERATION Channelization absent or min	of channel s exposed 9 Optimal n, alteration, imal; normal der pattern.	8 or dredging I and stable Alteration by	7 Some alter presen structurents past altera	6 Suboptimeration or cht, usually auures, (such its or culverts, tition, (I.e., ch	al nannelization djacent to as bridge j; evidence of nannelization)	available chan substrates are 4 Mar Alteration or may be embankments piles) or shor present on both	nel and/or riffle mostly exposed 3 ginal channelization extensive; (including spoil ring structures n banks; normal	Banks shore concrete. (channe significantly other inp	1 0 Poor ed with gabion, riprap, Concrete or riprap line is. Instream habitat altered by stormwater uts. Over 80% of the	or d
	10 LTERATION Channelization absent or min stream meano	of channel s exposed 9 Optimal n, alteration, imal; normal der pattern.	8 or dredging I and stable Alteration by	Some alter presen structurents past altera; may be pre	6 Suboptimeration or cht, usually aures, (such sor culverts tition, (I.e., chesent, but seent, but	al nannelization djacent to as bridge ; evidence of	available chan substrates are 4 Mar Alteration or or embankments piles) or shot present on bott stable stream r	nel and/or riffle mostly exposed 3 ginal channelization extensive; (including spoil ing structures	Banks shore concrete. (channe significantly other inp	1 0 Poor ad with gabion, riprap, Concrete or riprap line Is. Instream habitat	or d
	10 LTERATION Channelization absent or min stream meano	of channel s exposed 9 Optimal n, alteration, imal; normal der pattern.	8 or dredging I and stable Alteration by	7 Some alte presen structurents past alterar may be pre and stabiliti alteration	f channel s exposed Suboptim eration or cf nt, usually a ures, (such s or culverts tition, (l.e., cl esent, but s ty have recc n is not pre:	al annelization djacent to as bridge); evidence of annelization) tream pattern vered; recent tent. Minor	available chan substrates are 4 Mar Alteration or may be te embankments piles) or shot present on bot stable stream in has not recove	nel and/or riffle mostly exposed 3 ginal channelization extensive; (including spoil ing structures n banks; normal neander pattern ered. Alteration or inputs may be	Banks shore concrete. (channe significantly other inp	1 0 Poor ed with gabion, riprap, Concrete or riprap line is. Instream habitat altered by stormwater uts. Over 80% of the	or d
	10 LTERATION Channelization absent or min stream meano	of channel s exposed 9 Optimal n, alteration, imal; normal der pattern.	8 or dredging I and stable Alteration by	7 Some alte presen structurents past alterar may be pre and stabiliti alteration	f channel s exposed Suboptim eration or cf nt, usually a ures, (such s or culverts tition, (l.e., cl esent, but s ty have recc n is not pre:	al lannelization djacent to as bridge cyevidence of nannelization) tream pattern wered; recent	4 Mar Alteration or of may be embankments piles) or shot present on bott stable stream in has not recove from stormwate extensive. 40-	nel and/or riffle mostly exposed 3 ginal channelization extensive; (including spoil ing structures in banks; normal neader pattern ared. Alteration	Banks shore concrete. (channe significantly other inp	1 0 Poor ed with gabion, riprap, Concrete or riprap line is. Instream habitat altered by stormwater uts. Over 80% of the	or d
	10 LTERATION Channelization absent or min stream meano	of channel s exposed 9 Optimal n, alteration, imal; normal der pattern.	8 or dredging I and stable Alteration by	7 Some alte presen structurents past alterar may be pre and stabiliti alteration	6 Suboptimeration or chan, usually a ures, (such sor culverts tion, (I.e., cl esent, but s ty have recc in is not preefrom storms.)	al annelization djacent to as bridge); evidence of annelization) tream pattern vered; recent tent. Minor	4 Mar Alteration or or may be embankments piles) or shot present on bott stable stream in has not recove from stormwate extensive. 40-	nel and/or riffle mostly exposed 3 ginal channelization extensive; (including spoil ing structures in banks; normal neander patternered. Alteration er inputs may be 80% of stream	Banks shore concrete. (channe significantly other inp	1 0 Poor ed with gabion, riprap, Concrete or riprap line is. Instream habitat altered by stormwater uts. Over 80% of the	or d
	10 LTERATION Channelization absent or min stream meano	of channel s exposed 9 Optimal n, alteration, imal; normal der pattern.	8 or dredging I and stable Alteration by	7 Some alte presen structurents past alterar may be pre and stabiliti alteration	6 Suboptimeration or chan, usually a ures, (such sor culverts tion, (I.e., cl esent, but s ty have recc in is not preefrom storms.)	al annelization djacent to as bridge); evidence of annelization) tream pattern vered; recent tent. Minor	4 Mar Alteration or or may be embankments piles) or shot present on bott stable stream in has not recove from stormwate extensive. 40-	nel and/or riffle mostly exposed 3 ginal channelization extensive; (including spoil ing structures in banks; normal neander patternered. Alteration er inputs may be 80% of stream	Banks shore concrete. (channe significantly other inp	1 0 Poor ed with gabion, riprap, Concrete or riprap line is. Instream habitat altered by stormwater uts. Over 80% of the	or d
	10 LTERATION Channelization absent or min stream meano	of channel s exposed 9 Optimal n, alteration, imal; normal der pattern.	8 or dredging I and stable Alteration by	7 Some alte presen structurents past alterar may be pre and stabiliti alteration	6 Suboptimeration or chan, usually a ures, (such sor culverts tion, (I.e., cl esent, but s ty have recc in is not preefrom storms.)	al annelization djacent to as bridge); evidence of annelization) tream pattern vered; recent tent. Minor	4 Mar Alteration or or may be embankments piles) or shot present on bott stable stream in has not recove from stormwate extensive. 40-	nel and/or riffle mostly exposed 3 ginal channelization extensive; (including spoil ing structures in banks; normal neander patternered. Alteration er inputs may be 80% of stream	Banks shore concrete. (channe significantly other inp	1 0 Poor ed with gabion, riprap, Concrete or riprap line is. Instream habitat altered by stormwater uts. Over 80% of the	or d
7 CHANNEL A	banks; <5% 10 LTERATION Channelization absent or min stream meand stormwater in	9 Optimal n, alteration, imal; normal step pattern. nputs absent	8 or dredging land stable Alteration by or minimal	7 Some alte presen structurents past alterar may be pre and stabiliti alteration	6 Suboptimeration or cht, usually aures, such so or culverts tion, (I.e., ct seent, but s have recconstructed in some such that substitution, (I.e., ct seent, but s have recconstructed in since the seent, but s have recconstructed in such substitution, (I.e., ct seent, but s have recconstructed in such substitution, (I.e., ct seent, but s have recconstructed in substitution, su	al lannelization glacent to as bridge g, evidence of nannelization) tream pattern vered; recent sent. Minor vater or other	4 Mar Alteration or or may be embankments piles) or shot present on bott stable stream in has not recove the stream extensive. 40-reach in the stream or th	and/or riffle mostly exposed 3 ginal channelization extensive; (including spoil ing structures n banks; normal neander pattern ered. Alteration r inputs may be 80% of stream altered.	Banks shore concrete. I channe significantly other inp strea	1 0 Poor ad with gabion, riprap, Concrete or riprap line is. Instream habitat altered by stormwater uts. Over 80% of the m reach altered.	or d
7 CHANNEL A	banks; <5% 10 LTERATION Channelization absent or min stream meand stormwater in	9 Optimal n, alteration, imal; normal step pattern. nputs absent	8 or dredging land stable Alteration by or minimal	7 Some alte presen structurents past alterar may be pre and stabiliti alteration	6 Suboptimeration or cht, usually aures, such so or culverts tion, (I.e., ct seent, but s have recconstructed in some such that substitution, (I.e., ct seent, but s have recconstructed in since the seent, but s have recconstructed in such substitution, (I.e., ct seent, but s have recconstructed in such substitution, (I.e., ct seent, but s have recconstructed in substitution, su	al annelization jacent to as bridge of the control	available chan substrates are 4 Mar Alteration or a may be a embankments piles) or shot present on both stable stream in has not recove from stormwate extensive. 40-reach	and/or riffle mostly exposed 3 ginal channelization extensive; (including spoil ing structures n banks; normal neander pattern ered. Alteration r inputs may be 80% of stream altered.	Banks shore concrete. I channe significantly other inp strea	1 0 Poor ad with gabion, riprap, Concrete or riprap line is. Instream habitat altered by stormwater uts. Over 80% of the m reach altered.	or d
7 CHANNEL A	banks; <5% 10 LTERATION Channelization absent or min stream meand stormwater in 10 10 INUOSITY The bends in	9 Optimal n, alteration, imat; norma ser pattern. nputs absent	8 or dredging and stable Attention by or minimal	7 Some alte presene struct. abutments past altera may be pre and stabilitial alteration alteration 1	6 Suboptimeration or cht, usually a ures, (such so or culverts titon, (Le., citon, but so the seem, but so the seem, but so the seem, but so the seem, but so the seem, but so the seem, but so the seem, but so the seem, but so the seem, but so the seem, but so the seem, but so the seem, but so the seem, but so the seem, but so the seem seems and the seems see	al annelization jajcent to as bridge ; evidence of nannelization) tream pattern vered; recent. Minor vater or other	available chan substrates are 4 Mar Alteration or or may be embankments piles) or should stable stream in has not recove from stormwate extensive. 40-reach in the stream of the strea	nel and/or riffle mostly exposed 3 ginal channelization extensive; (including spoil ing structures to banks; normal neander pattern ered. Alteration er inputs may be 80% of stream altered. 3 ginal n the stream	2 Banks shore concrete, to channe significantly other input stream stre	Poor ed with gabion, riprap, Concrete or riprap line is. Instream habitat altered by stormwater uts. Over 80% of the m reach altered.	or d d
7 CHANNEL A	banks; <5% 10 LTERATION Channelization absent or min stream meand stormwater in 10 iniuosity The bends in stream length 3 was in a straig	of channel s exposed 9 Optimal n, alteration, important pattern. apputs absent pattern to the stream it to 4 times le pitch in the stream it to 4 times le pitch in services.	B 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	Some alter present structure abutments past alterar may be preand stabiliti alteration alteration of the present stream less than the present stream less stream les stream less stream less stream less stream les stream les stream les stream les stream les stream les stream les stream les stream les stream les stream les stream les stream les stream les	6 Suboptimeration or cht, usually a ures, (such so or culverts titon, (Le., citon, but so the seem, but so the seem, but so the seem, but so the seem, but so the seem, but so the seem, but so the seem, but so the seem, but so the seem, but so the seem, but so the seem, but so the seem, but so the seem, but so the seem, but so the seem seems and the seems see	al al annelization dispersion and spring and	available chan substrates are 4 Mar Alteration or or may be or embankments piles) or short stable stream rhas not recove from stormwate extensive. 40- reach Mar The bends increase the times longer thimse longer tr	nel and/or riffle mostly exposed 3 ginal channelization extensive; (including spoil ing structures to banks; normal neander pattern ered. Alteration er inputs may be 80% of stream altered. 3 ginal n the stream stream 1 to 2 ann if it was in a	2 Banks shore concrete, to channe significantly other input stream stre	1 0 Poor ad with gabion, riprap, Concrete or riprap line Is. Instream habitat attered by stormwater uts. Over 80% of the im reach altered.	or d d
7 CHANNEL A	banks; <5% 10 LTERATION Channelization absent or min stream meanc stormwater in 10 INUOSITY The bends in stream length 3 was in a straig braiding is con- plains and oth-	9 Optimal n, alteration, imal; norma der pattern. pputs absent 9 Optimal the stream it to 4 times to 4 times to 4 times to 3 times to 4 times to 3 times to 4 times	8 or dredging and stable Alteration by or minimal 8 8 8 8 8 8 8 8 8 8 8 8 8	Some alter present structure abutments past alterar may be preand stabiliti alteration alteration of the present stream less than the present stream less stream les stream less stream less stream less stream les stream les stream les stream les stream les stream les stream les stream les stream les stream les stream les stream les stream les stream les	6 Suboptimeration or cit, usually a urres, such so re culverts titon, (I.e., clessent, but s ty have recc in is not preform stormy inputs.	al al annelization dispersion and spring and	available chan substrates are 4 Mar Alteration or or may be or embankments piles) or short stable stream rhas not recove from stormwate extensive. 40- reach Mar The bends increase the times longer thimse longer tr	and/or riffle mostly exposed 3 ginal channelization xxtensive; (including spoil ing structures n banks; normal neander pattern red. Alteration riputs may be 80% of stream altered. 3 ginal n the ntestream stream 1 to 2	2 Banks shore concrete, to channe significantly other input stream stre	Poor ed with gabion, riprap, Concrete or riprap line is. Instream habitat altered by stormwater uts. Over 80% of the m reach altered.	or d d
7 CHANNEL A	banks; <5% 10 LTERATION Channelization absent or min stream meand stormwater in 10 INUOSITY The bends in stream length 3 was in a straig braiding is con-	9 Optimal n, alteration, imal; norma der pattern. pputs absent 9 Optimal the stream it to 4 times to 4 times to 4 times to 3 times to 4 times to 3 times to 4 times	8 or dredging and stable Alteration by or minimal 8 8 8 8 8 8 8 8 8 8 8 8 8	Some alter present structure abutments past alterar may be preand stabiliti alteration alteration of the present stream less than the present stream less stream les stream less stream less stream less stream les stream les stream les stream les stream les stream les stream les stream les stream les stream les stream les stream les stream les stream les	6 Suboptimeration or cit, usually a urres, such so re culverts titon, (I.e., clessent, but s ty have recc in is not preform stormy inputs.	al al annelization dispersion and spring and	available chan substrates are 4 Mar Alteration or or may be or embankments piles) or short stable stream rhas not recove from stormwate extensive. 40- reach Mar The bends increase the times longer thimse longer tr	nel and/or riffle mostly exposed 3 ginal channelization extensive; (including spoil ing structures to banks; normal neander pattern ered. Alteration er inputs may be 80% of stream altered. 3 ginal n the stream stream 1 to 2 ann if it was in a	2 Banks shore concrete, to channe significantly other input stream stre	Poor ed with gabion, riprap, Concrete or riprap line is. Instream habitat altered by stormwater uts. Over 80% of the m reach altered.	or d d

9	BANK STAB	LITY (SCORE EA	ACH BANK) Optimal			Suboptima	1	Marc	rinal	1	Poor		l
		Banks stable; evid		or bank	Moderatols		quent, small	Moderately unst		Unstable:	no perennial v	venetation at	l
		failure absent or				stable; infre		vegetation to wa			; severe eros		l
		affected), perennia					has areas of	(mainly scoured			ently expose		ı
		no raw or undercu				erosion and		lateral erosion)			tree falls and		I
			ander bends O.K				vegetation to	hard points			t trees comm		ı
		recently exposed i				in most place		outcrops) and			eas; "raw" are		I
		roconny expected i	0010, 110 1000111	u oo iano,		ee roots rare		elsewhere; 30-6			iaht sections		l
								reach has areas		obvious ba	nk sloughing;	60-100% of	ı
								bank undercu			has erosiona		l
								exposed tree roo					l
								hairs common	; high erosion				ı
								potential du	ring floods				ı
													ı
													l
													l
	Grade (East)	10	9	8	7	6	5	4	3	2	1	0	2
	Grade (West	10	9	8	7	6	5	4	3	2	1	0	2
	Ciado (II col										Avg.Score		2
											Avg.Score	'1	
10	VEGETATIV	PROTECTION	(SCORE EAC	H BANIV	1								ı
10	VEGETATIVI		Optimal	HIDAINK	1	Cubontin		NA	rinal	1	Door		I
				ourf	70.000/ /	Suboptima		Marg		Log- #b	Poor F0% of the o	troomb = -1:	I
		More than 90% of and immediate rip					ank surfaces ation, but one	50-70% of the surfaces covered			50% of the s covered by v		I
			parian zones co ition, including tr			native vegeta of plants is n		disruption obvio			covered by v of streamban		I
			hrubs, or nonwo			ed; disruption		bare soil or clo			gh; vegetation		I
		macrophytes; veg				cting full pla		vegetation com			o 5 centimete		I
		grazing or mowin				o any great e		one-half of the			age stubble h		I
		almost all plants a				nalf of the po		stubble heigh		4.01		. 5	ı
				,.		le height rem			9				ı
						3	-	1					ı
								1					I
	L				<u></u>			<u> </u>		<u></u>			
	Grade (East)	10	9	8	7	6	5	4	3	2	1	0	3
	Grade (West	10	9	8	7	6	5	4	3	2	1	0	3
	,				•		•			•	Avg.Score		
													ı
11	RIPARIAN 70	ONE (SCORE EA	(CH BANK)										ı
			Optimal		1	Suboptima	ıl	Marg	ninal	1	Poor		ı
		Width of riparian 2		e: human	Width of rio			Width of ripari		Midth of r	riparian zone	<6 motors:	ı
		activities (I.e., park					pacted zone	meters; human			riparian vege		ı
		cuts, lawns, or cr				only minimall		impacted zone			uman activitie		ı
			zone.	.,		,	,,-		- g				l
								1					ı
								1					ı
	0 1 =						-	<u> </u>					
	Grade (East)	10	9	8	7	6	5	4	3	2	1	0	3
	Grade (West	10	9	8	7	6	5	4	3	2	1	0	3
	ļ										Avg.Score	1	ı 3
													ı
12	RIPARIAN H	ABITAT CONDIT		EACH B	ANK)								ı
			Optimal			Suboptima		Marg	ginal		Poor		l
		Tree stratum (dbl					hes) present,	Tree stratum (ıtum absent; i		ı
		>60% tree canopy					anopy cover.	present, with <3			s, croplands,		ı
			clude: sapling, s			xcellent Cate		cover. (See Exc				, mowed and	ı
			ind leaf litter incl				orest layers.)	for examples of			ned herbaced		I
		mosses/lichens an					Good range	layers.) Score at			surfaces, acti		ı
			f Excellent range			litional forest		Fair range if >2 a		P	asture, and e	etC.	ı
		additional layers a				Score at lov		are present. So					I
		end if ≤1 addition	лы iayers are р	resent.		forest layers over areas wi		≤1 additional lay OR area con		1			ı
					OR CUIC	remaining.	iii siuiiips	maintained an					ı
						romaning.		dense herba					ı
								woody ve					ı
									· · · · · · ·				I
								1					ı
	L				<u></u>			<u> </u>		<u></u>			
		10	9	8	7	6	5	4	3	2	1	0	
	Grade							ndition Scores u				Ensure th	e sums of
		riparian areas aid										%Riparia	
	 Delineate 		for each by me									equa	
	 Delineate Determine 	square footage		poses. e		and width)					oor	Jagau	
	 Delineate Determine 	square footage %Riparian Area (or for field pur	poses, e				Marc	ninal				
	 Delineate Determine 	square footage %Riparian Area (or for field pur Optimal	poses, e		Suboptima		Marg 2				100	
	Delineate Determine Enter the	square footage %Riparian Area (%Riparian Area	or for field pur Optimal	rposes, e		Suboptima 40		2	0	4	40	100	
	 Delineate Determine 	square footage %Riparian Area ((%Riparian Area Score	or for field pur Optimal	poses, e		Suboptima 40 6		2	0	4	40 0	100	
	Delineate Determine Enter the	square footage %Riparian Area (%Riparian Area	or for field pur Optimal	poses, e		Suboptima 40		2	0	4	40	100	
	Delineate Determine Enter the	square footage %Riparian Area (%Riparian Area Score SubCl	or for field pur Optimal	poses, e		Suboptima 40 6 2.4		2 3 0.	0 3 6	4	40 0 0		
	Delineate Determine East Bank	%Riparian Area %Riparian Area %Riparian Area Score SubCl %Riparian Area	or for field pur Optimal	poses, e		40 6 2.4 40		2 3 0.	0 3 6 0		40 0 0 1 40	100	
	Delineate Determine Enter the	square footage %Riparian Area (%Riparian Area Score SubCl %Riparian Area Score	or for field pur Optimal 0	poses, e		40 6 2.4 40 6		2 3 0.	0 3 6 0 3		40 0 0 1 40 0		
	Delineate Determine East Bank	%Riparian Area %Riparian Area %Riparian Area Score SubCl %Riparian Area	or for field pur Optimal	poses, e		40 6 2.4 40		2 3 0.	0 3 6 0 3		40 0 0 1 40 0	100	
	Delineate Determine East Bank	square footage %Riparian Area (%Riparian Area Score SubCl %Riparian Area Score	or for field pur Optimal 0	poses, e		40 6 2.4 40 6		2 3 0.	0 3 6 0 3	SubCl=(%	40 0 0 1 40 0 0 0 RA*Scores	100	
	Delineate Determine East Bank	square footage %Riparian Area (%Riparian Area Score SubCl %Riparian Area Score	or for field pur Optimal 0	poses, e		40 6 2.4 40 6		2 3 0.	0 3 6 [0 3		40 0 0 1 40 0 0 0 RA*Scores	100	CI
	Delineate Determine East Bank	square footage %Riparian Area (%Riparian Area Score SubCl %Riparian Area Score	or for field pur Optimal 0	poses, e		40 6 2.4 40 6		2 3 0.	0 3 6 [0 3	SubCl=(%	40 0 0 1 40 0 0 0 RA*Scores	100	CI
	Delineate Determine East Bank	square footage %Riparian Area (%Riparian Area Score SubCl %Riparian Area Score	or for field pur Optimal 0	rposes, e		40 6 2.4 40 6		2 3 0.	0 3 6 0 3 6	SubCl=(% Rt Bank C LT Bank C	40 0 0 40 0 0 0 0 RA*Scores	*0.01) 3 3	CI 3 0.19

Record of Functional Assessment Results

	Stream Function	nal Capacity C	alculation		
	N18 (16 - >25	5')			
Date:	8/26/2009				
Project:	Lake Ralph H	all			
Assessment Area:	WP 30	· ·			
Assessors:	Voight Capps	i			
Project Status:	XPrepro	ject	Postproject		
		Stream	Stream	Multiplication	
Major Function Categories	FCI	Length (LF)*	Characterization	Factor**	FC
Hydrologic	0.12	12,086	E	0.00125	1.81
Water Quality Improvement	0.19	12,086	E	0.00125	2.83
Habitat	0.19	12,086	E	0.00125	2.90
Total	0.50	12,086			7.54
*Stream Length is the length of the * **Multiplication Factors Ephemeral = 0.00125	Stream Assessme	nt Reach (SAF	R)		

Intermittent = 0.0025

Perennial = 0.0038

Standing water from recent rain (8-24-2009 AM rain shower)





SWAMPIM DATASHEETS – SOUTH EPHEMERAL 0.5 TO 2.0	0'
PRE-PROJECT	

• S8-TRIB2

S8 Trib2 (0.5-2')

PARAMET	ER										
				CONI	DITION CAT	TEGORY G	RADE or S	CORE			
		Optimal			Suboptima			ginal		Poor	
Grade	10	9	8	7	6	5	4	3	2	1	0

Right bank- 5-10 meters to pasture, Left bank 5 to 0 meters to pasture. Small park area surrounded by pasture is downstream. No cover WP 12 P 80, 79

VARIABLES FLOW REGIME	F:					S& I rib	2 (0.5-2)				SCORE	Source
TYPE		Perennial		Intermitte	ent w/ Perer	nnial Pools	Interr	nittent		Ephemeral			KDWP 2
Grade	10	9	8	7	6	5	4	3	2	1	0	2	Subjectiv
CHANNEL CO	NDITION:	Measureme	ent or Obser	vation of S	tream Char	nel Condition	ns]
				COV	IDITION C	ATEGORY (RADE or	SCORF					Barbour,
		Optimal			Suboptima	i	Mar	ginal		Poor			EPA RBA
		hannel; no sti tion minimal.			annelization areas) or pas			nannel; 40- he reach		is actively dow >80% of the rea			5-21;
2a.Channel	of downcu	utting or exces	ssive lateral	alteration	on, but with s	ignificant	channe	elized or	channneli	zed. Degradat	ion,dikes or		Newton, USDA/ N
Condition/Alter		 Normal frequical connection 			f channel bed e frequency (d. Excess on; braided	levees	s prevent acces floodplain.	s to the		SVAP pa
ation (natural,		nnel and flood			s onto flood		channel wit	h excessive		oapiuiii.			
altered, or downcutting)	1							of overbank onto the					
٠,	1						floodplain	. Historical					
								es or levees loodplain.					
	ł							•					
0 !	10												
Grade	10	9	8	7	6	5	4	3	2	1	0	С	<u> </u>
		Ontire		CON		ATEGORY (1	D			w/ assista
2b.Channel	Channel Ca	Optimal apacity to Flor	w Frequency	Channel Ca	Suboptima pacity to Flo			ginal Capacity to	Channel C	Poor Capacity to Flow	/ Frequency		and input Dr. Mike
Capacity to Flow	Ratio is suc	ch that bank o	overflow from	Ratio is suc	h that bank o	overflow from	Flow Freque	ency Ratio is	Ratio is su	ich that bank o	erflow from		Harvey a
Frequency		nts occur at a year frequence			ts are more f 5 years or le:	requent than ss frequent		ank overflow events are		nts are more fr f year or less fro			Travant
Ratio (for 2- year peak	ĺ	0.75-1.25		tha	n every 2.5 y <0.75 or >1.2	ears.	more free	quent than		every 10 years <0.24 or >2			
flow)					<υ. ι Ο UΓ > 1.2	.5	frequent th	ar or less nan every 5		<0.24 OF >2			
	1							ars. or >1.5					
Grade	10	9	8	7	6	5	4	3	2	1 1	0	C	1
				I	l .								
		Optimal		CON	IDITION CA Suboptima	ATEGORY (II		ginal		Poor			Newton, USDA/ N
		ole; evidence			stable; infre			y unstable;		no perennial v			SVAP pa
2c.Channel		e absent or m ik affected), p			osion mostly ank in reach	has areas of		egetation to arse (mainly		e; severe erosi ecently exposed			10; Barbo al., 1999
Bank Stability		n to waterline banks (some			erosion and/	or bank vegetation to		stripped by sion), bank		; tree falls and/orees common; r			RBA pag
(score each bank, left or	outside of	meander ben	nds O.K.); no	waterline	in most place	es; recently	held by h	ard points	areas; "r	aw" areas freq	uent along		26; USA Norfolk
right facing	recently e	exposed roots tree falls;	; no recent	exposed tre	ee roots rare	but present.		k outcrops) ded back		ections and ben hing; 60-100%			District, 2
downstream)	ł	ti do idilo,					elsewhere	; 30-60% of		erosional scars			
	ł							ch has areas and bank					
	ł						undercutti	ng; recently					
	1							e roots and					
Grade (Left) Grade (Right)	10 10	9	8	7	6	5 5	4	3	2	1	0	C	
Grade (Right)	10						- 4				Avg.Score	C	
CHANNEL ROI	UGHNESS	FACTORS							-				
O. D. II VI VILL INCO	JOI 114200												
		Optimal		CON	IDITION CA Suboptima	ATEGORY (GCORE ginal	1	Poor			Barbour, EPA RBA
3a.Channel Sinuosity		in the stream			n the stream	increase the	The bends i	n the stream		traight; waterwa			Chapter 5
(bends in low		ngth 2.5 to 4 to was straight.				times longer ne. Channel		the stream o 1.5 times		lized for a long length/valley le			5-25; KD
gradient		alley length at			alley length		longer tha	n if it was a	Juannel	.onga a valley le	gui <u>></u> 1.0		1996
stream)								e. Channel by length 1.0					
								1.2.					
Grade	10	9	8	7	6	5	4	3	2	1	0	2	1
				CON	IDITION CA	ATEGORY (SRADE or S	SCORE					KDWP, 1
	I fast.	Optimal	places '	Co	Suboptima			ginal	Ch	Poor	do or -t-		Kansas
3b. Bottom	resu	no channel en Ilting from sec	diment		el bars of co shed debris	arse stones present, little		ars of rocks, silt common;		ivided into braid elized; substrate			Subjectiv Evaluatio
Substrate		lation; channe			moderately s			ly unstable		clay, or bedroo			Aquatic
Composition	i												Habitats
20	1												
20													
25													

				CON		ATEGORY (KDWP, 1996
		Optimal			Suboptima	al	Ma	rginal		Poo	or			Newton et a
3c. Instream Bottom Topography	>7 of the boulders/ debris, overhan vegetate	e following: de gravel, logs/le , backwaters/ ging vegetati ed shallows, e banks, or sid	arge woody /oxbows, ion, riffles, rootwads,		ottom include ed in Optima	es 5-7 of the al Category	includes <	el bottom 5 of the items n Optimal tegory		bottom ind sted in Op				1998 USDA/NRC SVAP page
Grade	10	pools 9	8	7	6	5	4	3	2	1		0	0	
Or 3c.				CON	IDITION CA	ATEGORY (GRADE or	SCORE						
or		Optimal			Suboptima			rginal		Pod	or			
3c. Manning's n		0.05 to 0.09	9		0.035 to 0.0	5		0.03 or >0.10 0.15	obstruction		r 0.01 nd clea	cessive to 0.02 due an, smooth		
Grade	10	9	8	7	6	5	4	3	2	1		0		
				CON	IDITION CA	ATEGORY (GRADE or	SCORE						USACE,
		Optimal			Suboptima	al	Ma	rginal		Pod	or			Norfolk
3d. Channel Incision (TLB/BFD=BH R; 1/BHR*Adj Factor =CI)	channel si ratio >1.4	itio ≥1.0 <1.2 lope >2%; Er 4; Where cha ntrenchment	ntrenchment annel slope	channel sl ratio >1.4	tio ≥1.2 <1.4 lope >2%, Er 1; Where cha ntrenchment	annel slope	and Whe slope Entrench >1.4; Wh slope	tio $\geq 1.4 < 2.0$ ere channel $\epsilon > 2\%$, hment ratio ere channel $\epsilon \leq 2\%$, eent ratio ≥ 2.0	slope >2% Whe Ent		hment I slope			District, 200 SAAM Form #1 and VT Stream Geomorphic Assessmer Phase 2
TLB =		10		BHR =	1									
BFD =		10												
Grade	10	9	8	7	6	5	4	3	2	1		0	0	
1 DYNAMIC SU	RFACE WA	TER STOR	RAGE											
				CON	IDITION CA	ATEGORY (GRADE or	SCORE						Newton, et
		Optimal			Suboptima	al	Ma	rginal		Pod	r			1998 USDA
4a.Pools (abundant, present or absent)	greater that is obscure	shallow pool in 30% of the due to depth, least 5 feet d	pool bottom , or pools are	from 10-3 obscure d	esent, but not 0% of the poue to depth, at least 3 feet	ol bottom is or the pools	shallow; fr the pool obscure du	resent, but om 5-10% of I bottom is ue to depth, or are less than	discer	sent, or the rnible. No		e bottom is = zero.		NRCS SVA page 14; Barbour, et 1999
								et deep.						
Grade	10	9	8	7	6	5	4	3	2	1		0	0	
4b. Channel				CON	IDITION C	ATEGORY (SRADE or	SCORE						
Flow Status		Optimal			Suboptima			rginal		Poo	or			Barbour, et
(degree to	Water rea	ches base of	f both lower	Water fill	s >75% of th			s 25-75% of	Very little			and mostly		1999 EPA
which channel is filled)		and minimal a I substrate is		channe	el; or <25% of strate is exp	f channel	and /or riff	ble channel, le substrates ly exposed.			pools.	No water =		RBA page 5 /A-9#5; <i>TCL</i> 1999; <i>VANI</i>
Grade	10	9	8	7	6	5	4	3	2	1		0	0	2005
	1				Cal	culation of E	unction Co	pacity Index	- Total Sc	core/Total	I Door	sible Score	0.04	
					Call	cuiation of F	unction Ca	pacity index				CI = #/100	0.04	
									- 20	11111/11/11/2		$O_1 = \#/ 1001$		

ı,	EV/DE												4
	TYPE NOTES												
	SEDIMENT TR	ANSPOR	T/DEPOSIT	ION									7
S	1	7 11 101 011	.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,										†
					COI	NDITION C	ATEGORY (SRADE or S	CORE				
	1a. Bank		Optimal			Suboptima	ıl	Ма	rginal		Poor		
	Stability			of erosion or		stable; infre			unstable; 30-		many eroded		
	(score each bank, left or right facing downstream)			minimal; little lems. <5% of ed.		osion mostly ank in reach erosion.		areas of e erosion po	k in reach has erosion; high tential during ods.	sections a sloughin	requently alor and bends; ol g; 60-100% o erosional sca	bvious bank of bank has	
(Grade (Left)	10	9	8	7	6	5	4	3	2	1	0	(
_	Grade (Right)	10	9	8	7	6	5	4	3	2	1	0	(
Ī												Avg.Score) (
					COI	NDITION C	ATEGORY (GRADE or S	CORE				
	1b. Channel		Optimal			Suboptima			rginal		Poor		
I	Bottom Bank		1/3 of bank is	s generally		1/3 of bank is	generally	Bottom 1/	/3 of bank is		1/3 of bank is		1
	Stability	highly res	sistant plant/s material.	soil matrix or	resistant pl	ant/soil matri	x or material.	material; pla	ighly erodible ant/soil matrix romised.		odible materia severely comp		
	Grade (Left)	10	9	8	7	6	5	4	3	2	1	0	(
(Grade (Right)	10	9	8	7	6	5	4	3	2	1	0	
L												Avg.Score) (
ı	or				COI		ATEGORY (1			
١	1c. Channel	. 500/	Optimal		20 500/	Suboptima			rginal	Cubatast	Poor	-ا- دائماست	4
ı	Sediments or		ravel or large obble boulder			ravel or large substrate ty			ravel or larger e; dominant		is uniform sa bedrock; uns		
	Substrate Composition		e type is grav stable		gravel wit	h some finer loderately sta	sediments;	substrate type	pe is finer than may still be a	OI	bearock, uns	lable	
L	Grade	10	9	8	7	6	5	4	3	2	1	0	(
	NATER APPE			_		U	3	4	3	2	'	U	,
ľ	VAILIVALLE	AIVAIVOL.	Clarity Of V	risibility									†
					COI	NDITION C	ATEGORY (SRADE or S	CORE				
			Optimal			Suboptima	ıl	Ma	rginal		Poor		
				tea-colored;			pecially after		ole cloudiness		or muddy app		
			colored); no	3-6 feet (less		ent, but clea ible at depth			time; objects epth 0.5-1.5 ft;		ojects visible to g water may be		
1	Water Clarity		e;no noticeat			ghtly green c			ns may appear	other obvio	ous water pollut	tants; floating	
			erged objects			n on water s		pea-green; or sumerg	bottom rocks ged objected d with film.		surface scum, s am on surface. zero.		<i>(</i>
(Grade	10	9	8	7	6	5	4	3	2	1	0	(
ß F	PRESENCE OF	F AQUATI	C VEGETA	TION: Prese	ence and Pe	ercent Cove	erage						1
l					001	UDITION	ATECONY		CODE				
I			Ontimal		COI		ATEGORY (1	Door		-
I	ŀ	Clear w	Optimal ater along er	ntire reach:	Fairly clear	Suboptima or slightly gr	eenish water		rginal ter along entire	Pea green	Poor , gray, or brown	n water along	1
l	3a. Nutrient		aquatic plant			re reach; mo		reach; overab	undance of lush		reach; dense s		
l	Enrichment		low quantati			on stream su			hytes; abundant		es clog stream		
			of macrophyte growth prese						th, especially rmer months.	or NO alg	ate thick algal r ae present due trate. No water	to unstable	
	Grade	10	9	8	7	6	5	4	3	2	1	0	1
C					•						•		
C					COI	NDITION C	ATEGORY (SRADE or S	CORE				
C													
C	or		Optimal			Suboptima			rginal		Poor		
3	Or 3b. Aquatic Vegetation		Optimal esent, aquation of moss and algae.			Suboptima ominant in po ants along ed	ols, larger	Algal mats	rginal present, some s, few mosses.	plants dor algae p	ats cover bott minate the ch resent due to	annel or NO unstable	
	3b. Aquatic		esent, aquation of moss and			ominant in po	ols, larger	Algal mats	present, some	plants dor algae p	ats cover bott minate the ch	annel or NO unstable	

				COI	IDITION CA	ATEGORY (SRADE or S	SCORE				1
		Optimal		1	Suboptima			rginal		Poor		ľ
	,	onsisting of le		1	and wood sc ebris without	arce; fine	No leave debris; coa organic i	es or woody arse and fine matter with liment.	color and fo	anic sedimen	erobic) or no	F
Grade	10	9	8	7	6	5	4	3	2	1	0	0
AND USE PA	TTERN: Be	yond Imme	diate Ripari	an Zone								
				COI		ATEGORY (1
		Optimal			Suboptima			rginal		Poor		6
		ed, consisting tive prairie, ar			ent pasture n and swamps			w crops and ome wooded	IV	lainly row cro	ops	·
	,	wetlands.			crops	.,	areas may b	be present but ed patches				ľ
Grade (Left)	10	9	8	7	6	5	4	3	2	1	0	4
Grade (Right)	10	9	8	7	6	5	4	3	2	1	0 Avg.Score	4
6a. Riparian		Optimal		COI	NDITION CA	ATEGORY (SCORE Irginal		Poor		L
Zone Width	Width of rip	parian zone >18	3 meters (1-2	Width of ripa	rian zone 12-1			arian zone 6-12	Width of ripa		meters (natural	1
(from stream edge to field)	grasses), I	ths with trees, s human activitie impacted zone	es have not	grasses), hur	nnel width w/tre nan activities h impacted zone	nave minimally	channel wid	/3-1/2 active 4th vegetated), numan activities.	width), little	ss than 1/3 ac riparian vege numan activitie	tation due to	F F
Grade (left)	10	9	8	7	6	5	4	3	2	1	0	3
Grade (Right)	10	9	8	7	6	5	4	3	2	1	0	3
				001	IDITION C	ATEGORY (2D A D C C	CODE			Avg.Score	3
		Optimal		I	Suboptima			rginal	1	Poor		I e
6b. Riparian Zone Vegetation	shrubs, prair riparian zor	t density of mar rie grasses, or ne intact or dis- ing/mowing mir	marsh plants, ruption from	young specie trees behi	eambank vege es along chann nd; disruption of curring at inter meters.	tation, mixed lel and mature evident with	50-75% s vegetation of and sparse shrub spe frequent wit	f mixed grasses young tree or ecies; breaks th some gullies very 50 meters.	coverage c grasses, fe density; bank	0% streambar onsisting mos w trees & shru	tly of pasture lbs; low plant ed with gullies	F /
Protection/	ı						anu scars ev	very ou meters.				F #
Completeness												
	10 10	9	8 8	7	6	5 5	4	3	2	1	0	0

HABITAT FUNCT	ONS						S8 Trib	2 (0.5-2')					SCORE	Source
1	FLOW REGI				1									
	TYPE Grade	10	Perennial 9	8	Intermitte 7	ent w/ Perer 6	nial Pools 5	Intern 4	nittent 3	2	Ephemera 1	al 0	2	KDW 2000
		•							· · ·					
2	EPIFAUNAL	SUBSTRATE/AV	VAILABLE CO Optimal	OVER	ı	Cubantina		Mor	ainal	1	Deer			
		Within stream		than 50%	Within strea	Suboptima am bed, 30-50			ginal bed, 10-30%	Less tha	Poor n 10% habit	at features	_	USA
			stable habitat			nabitat feature			stable habitat			at is obvious;		Norfo
		favorable for st and/or fish/amph				faunal coloniz bian cover. N			able for stream zation and/or		te unstable of lined channe			2004 SAAN
		features non to	ransient. Feat	tures may	features no	ot transient. (S	ee Excellent		cover; habitat	features ar	nd pools buri	ed or lacking,		Form
		include snags, s banks, roots, cot				components.			y be less than estrate may be	channe	el bottom ma	ay be nat.		(page
		packs, pools ar habitat at a sta						frequently dis	sturbed. (See gory for habitat					Barba al. 19
		Habitat at a sta	age to allow co	DIOTIIZALIOIT					mponents.)					EPA
														Parso
														al., 20 AUSF
	0	40			-		-							4
	Grade	10	9	8	7	6	5	4	3	2	1	0	0	2
3 ;	STREAM BC	TTOM SUBSTRA		ubstrate Cha	aracterization									
		Mixture of substr	Optimal rate materials	with grove!	Mixturo -4	Suboptima f soft sand, m		All mud or clay	ginal	Hard no-	Poor	rock; no root	-	D
		and firm sand	prevalent; root	t mats and	mud may	be dominant;	some root		or sand bottom; oot mat; no	mat or s	ciay or bear submerged v	egetation.		Barb al. 19
			vegetation co			d submerged present.		submerged	vegetation.		-			RBA
						present.								page
														Parso
	Grade	10	9	8	7	6	5	4	3	2	1	0	0	
	100011115	ADILITY.												1
4	POOL VARIA		Optimal			Suboptima	ı	Mar	ginal		Poor			1
		Even mix of lar	rge-shallow, la		Majority o	of pools large-	deep; very	Shallow pool	s much more	Majority o		II-shallow or		Barb
		small-shallow, s	small-deep po	ols present		few shallow.		prevalent tha	in deep pools		pools abse	nt		al. 19
														RBA page
														Pars
														al., 2
5	Grade SEDIMENT I	10 DEPOSITION/SC	9 COLIBING	8	7	6	5	4	3	2	1	0	0)
	SEDIMENT		Optimal		1	Suboptima	I	Mar	ginal		Poor			
		<5% of channel I	bottom affected deposition.	by scour or		cted by scour o			ed by scour or osits and scour at		0% of the bott nge nearly yea	om in a state of		Barb
		·	аброзноп.			Some depositi		obstructions, co	onstrictions and	minimal or all	sent due to h	eavy deposition		al. 19 RBA
								bends. Some	filling of pools.	or	excessive sco	uring.		page
														Parso
	Grade	10	9	8	7	6	5	4	3	2	1 1	0	0	al., 2
	Grade	10	9		,	. 0	3	4	3		'			4
6	CHANNEL F	LOW STATUS												TCE
		Water reaches	Optimal s the base of b	ooth lower	Water fills	Suboptima >75% of the			ginal 5-75% of the	Verv little	Poor water in the	channel and	-	1999 Wrks
		banks; <5% of ch				of channel sub		available chan	nel and/or riffle		sent in stand	ding pools; or		Barb
						exposed		substrates are	mostly exposed		stream is d	ry		al. 19
														RBA page
														Pars
	Crade	40			7	1 ^	-		_ ^	_	1 4	1 ^	ļ .	al., 2
7	Grade CHANNEL A	10 LTERATION	<u> 9</u>	8	/	6	5	4	3	2	1 1	0	0	4
,			Optimal			Suboptima			ginal		Poor			1
		Channelization absent or mini				eration or cha		Alteration or cha	annelization may embankments			ion, riprap, or r riprap lined		USA
		stream meand	ler pattern. Al	teration by	structi	ures, (such as	bridge	(including spoil	piles) or shoring	chann	els. Instrear	m habitat		Norfe Distr
		stormwater in	puts absent o	r minimal		s or culverts); ition, (l.e., cha		structures pre banks; normal	esent on both		altered by souts. Over 8	stormwater or 80% of the		2004
					may be pr	esent, but stre	eam pattern	meander pa	ttern has not		am reach al			SAAI
						ty have recoven is not prese		recovered. A	Iteration from nputs may be					Form (Field
						from stormwa		extensive. 40-	80% of stream					page
						inputs.		reach a						Barb
														al. 19 RBA
														Parso
	0 1	10			 _		_			2			<u> </u>	al., 2
	Grade	10	9	8	7	6	5	4	3	2	1	0	0	7

8 CHANNEL SI		ı	Cubantimal	Moreinal	Daa-		
	Optimal The bends in the stream increastream length 3 to 4 times longer was in a straight line. (Note - c	r than if it stream channel than if	Suboptimal in the stream increase the ength 2 to 3 times longer it was in a straight line.	increase the stream 1 to 2 times longer than if it was in a	Poor Channel straight; waterw channelized for a long		Bari al. 1 RBA
	braiding is considered normal in plains and other low-lying area: parameter is not easily rated in areas).	s. This		straight line			Pars al., a AUS
Grade	10 9	8 7	6 5	4 3	2 1	0	2
9 BANK STABI	LITY (SCORE EACH BANK) Ontimal		Subontimal	Marginal	Poor		
	Optimal Banks stable; evidence of erosion failure absent or minimal; (<5% affected), perennial vegetation to no raw or undercut banks (some e outside of meander bends 0.1 recently exposed roots; no recent	of bank areas of e 5-30% of erosion on K.); no undercutt tree falls;	Suboptimal ly stable; infrequent, small rosion mostly healed over- bank in reach has areas of r erosion and/or bank ng; perennial vegetation to e in most places; recently reee roots rare but present.	Marginal Moderately unstable; perennial vegetation to waterline sparse (mainly scoured or stripped by lateral erosion), bank held by hard points (trees, rock outcrope) and eroded back elsewhere; 30-60% of bank in reach has areas of erosion and bank undercutting; recently exposed tree roots and fine root hairs common; high erosion potential during floods	Poor Unstable; no perennial v waterline; severe erosi banks; recently expose; common; tree falls and undercut trees comme eroded areas; 'raw' are along straight sections; obvious bank sloughing; bank has erosional	on of both d tree roots for severely on; many as frequent and bends; 60-100% of	Baril al. 1 RBA Pars al., ; AUS USA Nor Dist 200 #3; and from
Grade Grade	10 9 10 9	8 7 8 7	6 5	4 3 4 3	2 1 2 1	0 0	0 0
					Avg.Score		0
10 VEGETATIVE	E PROTECTION (SCORE EACI Optimal More than 90% of the streambank and immediate riparian zones co native vegetation, including tu understory shrubs, or nonw macrophytes; vegetative disruptio grazing or mowing minimal or no almost all plants allowed to grow	k surfaces 70-90% covered by rees, oody represer not af tevident;	Suboptimal If the streambank surfaces If native vegetation, but one If of plants is not well- Ited, disruption evident but If ecting full plant growth Ito any great extent; more Inalf of the potential plant	Marginal 50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Poor Less than 50% of the s surfaces covered by v disruption of streamban is very high; vegetation removed to 5 centimete average stubble h	egetation; k vegetation has been rs or less in	Bari al. 1 RBA Pars al., 2 AUS
		stub	ble height remaining.				KDV 200
Grade Grade	10 9 10 9	8 7 8 7	6 5 6 5	4 3 4 3	2 1 2 1	0 0	Pete et al
Grade	10 9						Pete et al
Grade	10 9 ONE (SCORE EACH BANK) Optimal	8 7	6 5 Suboptimal	4 3 Marginal	2 1 Avg.Score	0	Pete et al 0
Grade	10 9 ONE (SCORE EACH BANK)	8 7	6 5	4 3 Marginal Width of riparian zone 6-12	2 1 Avg.Score	0 <6 meters; ation due to	Pete et al. O O O O O O O O O O O O O O O O O O O
Grade 11 RIPARIAN ZO Grade	ONE (SCORE EACH BANK) Optimal Width of riparian zone >18 meter activities (I.e., parking lots, roadbe cuts, lawns, or crops) have not ir zone.	8 7 rs; human Width of a human ac mpacted	Suboptimal parian zone 12-18 meters iivities have impacted zone only minimally).	Marginal Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	2 1 Avg.Score Poor Width of riparian zone- little or no riparian veget human activitie	o 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Pete et al 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
Grade 11 RIPARIAN ZO	ONE (SCORE EACH BANK) Optimal Width of riparian zone > 18 meter activities (I.e., parking lots, roadbe cuts, lawns, or crops) have not in zone.	8 7 rs; human Width of human ac mpacted	Suboptimal parian zone 12-18 meters ivities have impacted zone only minimally).	Marginal Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	2 1 Avg.Score Poor Width of riparian zone little or no riparian veget human activitie	0 6 meters; ation due to is.	Pete et al. O O O O O O O O O O O O O O O O O O O
Grade Grade Grade Grade Grade	10 9 ONE (SCORE EACH BANK) Optimal Width of riparian zone >18 meter activities (I.e., parking lots, roadbe cuts, lawns, or crops) have not ir zone. 10 9 10 9	rs; human Width of I buman ac mpacted Width of I buman ac mpacted B 7 8 7	Suboptimal parian zone 12-18 meters iivities have impacted zone only minimally).	Marginal Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	2 1 Avg.Score Poor Width of riparian zone- little or no riparian veget human activitie	o 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Pete et a. 0 0 0 0 0 8ari al., RBF Par. al., 3 3 3
Grade Grade Grade Grade Grade	ONE (SCORE EACH BANK) Optimal Width of riparian zone >18 meter activities (I.e., parking lots, roadbe cuts, lawns, or crops) have not in zone.	rs; human eds, clear-mpacted human acmpacted 8 7 8 7 8 7	Suboptimal parian zone 12-18 meters iivities have impacted zone only minimally).	Marginal Width of riparian zone 6-12 meters; human activities have impacted zone a great deal. 4 3 4 3 Marginal	2 1 Avg.Score Poor Width of riparian zone little or no riparian veget human activitie 2 1 2 1 Avg.Score	of meters; ation due to ss.	Pete of a of a of a of a of a of a of a of
Grade Grade Grade Grade Grade	ONE (SCORE EACH BANK) Optimal Width of riparian zone > 18 meter activities (I.e., parking lots, roadbe cuts, lawns, or crops) have not in zone.	rs; human width of a dds, clear-mpacted human ac mpacted human ac mpacted human ac mpacted search with 30% sent, with onal forest shrub, sluding examples examples additional foresent.	Suboptimal parian zone 12-18 meters ivities have impacted zone only minimally).	Marginal Width of riparian zone 6-12 meters; human activities have impacted zone a great deal. 4 3 4 3 Marginal Tree stratum (dbh-3 inches) present, with <30% tree canopy cover. (See Excellent Category for examples of additional forest	2 1 Avg.Score Poor Width of riparian zone- little or no riparian veget human activitie 2 1 2 1 Avg.Score Poor Tree stratum absent, it	-6 meters; ation due to ss. 0 0 0 mpervious a spoil lands, wed and us areas, rely grazed	Pete et al of of the et al of
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Grade Grade Grade Grade Grade 12 RIPARIAN H Grade 1. Delineate 2. Determine	ONE (SCORE EACH BANK) Optimal Width of riparian zone >18 meter activities (I.e., parking lots, roadbe cuts, lawns, or crops) have not ir zone. 10 9 10 9 10 9 ABITAT CONDITION (SCORE I Optimal Tree stratum (dbh>3 inches) pret >60% tree canopy cover. (Additic layers may include: sapling, s herbaceous, and leaf litter in mosses/lichers and woody debris the high end of Excellent rang additional layers are present. Sce end if ≤1 additional layers are p	rs; human acd with of a sex process. With one of the sex process with a sex present. With 30% core at low present. 8 7 EACH BANK) Sent, with onal forest with 30% (See samples ore at low present. of 2 additional of the sex present of the s	Suboptimal parian zone 12-18 meters iivities have impacted zone only minimally). 6 5 6 5 6 5 Suboptimal um (dbh-3 inches) present to 60% tree canopy cover. Excellent Category for of additional forest layers. he high end of Good range didional forest layers are present. Soore at low end if <1 forest layers are present. tover areas with stumps remaining.	Marginal Width of riparian zone 6-12 meters; human activities have impacted zone a great deal. 4 3 4 3 4 3 Marginal Tree stratum (dbh>3 inches) present, with <30% tree canopy cover. (See Excellent Category for examples of additional layers layers.) Score at the high end of Fair range if ≥2 additional layers are present. Score at low end if 21 additional layers are present. Score at low end if wood with the comparishment of the control	2 1 Avg.Score Poor Width of riparian zone- little or no riparian veget human activitie 2 1 2 1 Avg.Score Poor Tree stratum absent; is surfaces, croplands, min- culverted streams, m- maintained herbaceo denuded surfaces, active pasture, and e	O c6 meters; ation due to ss. O O O O O O O O O O O O O O O O O O O	Pete et a. O O O O O O O O O O O O O O O O O O O
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Grade Grade Grade Grade 12 RIPARIAN H. Grade 1. Delineate 2. Determine 3. Enter the S	10 9 ONE (SCORE EACH BANK) Optimal Width of riparian zone >18 meter activities (I.e., parking lots, roadbe cuts, lawns, or crops) have not in zone. 10 9 10 9 10 9 10 9 ABITAT CONDITION (SCORE Optimal Tree stratum (dbh>3 inches) pres>60% tree canopy cover. (Addition layers may include: sapling, sherbaceous, and leaf litter inconsess/lichens and woody debris the high end of Excellent rang additional layers are present. Sor end if ≤1 additional layers are present. Sor end if ≤1 additional layers are present sort of the	rs; human acd with of a sex process. With one of the sex process with a sex present. With 30% core at low present. 8 7 EACH BANK) Sent, with onal forest with 30% (See samples ore at low present. of 2 additional of the sex present of the s	Suboptimal parian zone 12-18 meters ivities have impacted zone only minimally). 6 5 5 6 5 Suboptimal mr (dbh-3 inches) present to 60% tree canopy cover Excellent Category for of additional forest layers, he high end of Good range dittional forest layers are . Score at low end if _1 forest layers are tower areas with stumps remaining.	Marginal Width of riparian zone 6-12 meters; human activities have impacted zone a great deal. 4 3 4 3 4 3 Warginal Tree stratum (dbh-3 inches) present, with ∠30% tree canopy cover. (See Excellent Category for examples of additional forest layers.) Score at the high end of Fair range if ≥2 additional alyers are present. Score at low end if ∠3 additional alyers are present. Score at low end if ∠3 additional alyers are present. Score at low end if ∠3 additional and naturalized dense herbaceous and/or woody vegetation. 4 3 ittion Scores using the above d d Use GIS maps may be used r each riparian category in the Marginal 100	2 1 Avg.Score Poor Width of riparian zone- little or no riparian veget human activitie 2 1 2 1 Avg.Score Poor Tree stratum absent; is surfaces, croplands, min- culverted streams, m maintained herbaceo denuded surfaces, activ pasture, and e	O c6 meters; ation due to ss. O O O O O O O O O O O O O O O O O O O	Pete et a. O O O O O O O O O O O O O O O O O O O
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Grade Grade Grade Grade 12 RIPARIAN H. Grade 1. Delineate 2. Determine 3. Enter the S	ONE (SCORE EACH BANK) Optimal Width of riparian zone >18 meter activities (I.e., parking lots, roadbe cuts, lawns, or crops) have not ir zone. 10 9 10 9 10 9 ABITAT CONDITION (SCORE I Optimal Tree stratum (dbh>3 inches) pres >60% tree canopy cover. (Additic layers may include: sapling, s herbaceous, and leaf litter inc mosses/lichers and woody debris the high end of Excellent rang additional layers are present. Sce end if ≤1 additional layers are p	rs; human acd with of a sex process. With one of the sex process with a sex present. With 30% core at low present. 8 7 EACH BANK) Sent, with onal forest with 30% (See samples ore at low present. of 2 additional of the sex present of the s	Suboptimal parian zone 12-18 meters ivities have impacted zone only minimally). 6 5 5 6 5 Suboptimal mr (dbh-3 inches) present to 60% tree canopy cover Excellent Category for of additional forest layers, he high end of Good range dittional forest layers are . Score at low end if _1 forest layers are tower areas with stumps remaining.	Marginal Width of riparian zone 6-12 meters; human activities have impacted zone a great deal. 4 3 4 3 4 3 Marginal Tree stratum (dbh-3 inches) present, with ∠30% tree canopy cover. (See Excellent Category for examples of additional forest layers.) Score at the high end of Fair range if ∠2 additional layers are present. Sore at low end if ∠3 additional layers are present. Sore at low end if ∠3 additional layers are present. Sore at low end if with √30% tree canopy for examples of additional layers are present. OR area consists of normaintained and naturalized dense herbaceous and/or woody vegetation. 4 3 itition Scores using the above d d Use GIS maps may be used reach riparian category in the Marginal 100 4	2 1 Avg.Score Poor Width of riparian zone- little or no riparian veget human activitie 2 1 2 1 Avg.Score Poor Tree stratum absent; is surfaces, croplands, min- culverted streams, m maintained herbaceo denuded surfaces, activ pasture, and e	o c6 meters; ation due to ss. O O O O O O O O O O O O O O O O O O O	Pete et a. O O O O O O O O O O O O O O O O O O O
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Grade Grade Grade Grade 12 RIPARIAN H. Grade 1. Delineate 2. Determine 3. Enter the S	ONE (SCORE EACH BANK) Optimal Width of riparian zone >18 meter activities (I.e., parking lots, roadbe cuts, lawns, or crops) have not ir zone. 10 9 10 9 10 9 ABITAT CONDITION (SCORE I Optimal Tree stratum (dbh>3 inches) pres >60% tree canopy cover. (Additic layers may include: sapling, s herbaceous, and leaf litter inc mosses/lichers and woody debris the high end of Excellent rang additional layers are present. Sce end if ≤1 additional layers are p	rs; human acd with of a sex process. With one of the sex process with a sex present. With 30% core at low present. 8 7 EACH BANK) Sent, with onal forest with 30% (See samples ore at low present. of 2 additional of the sex present of the s	Suboptimal parian zone 12-18 meters ivities have impacted zone only minimally). 6 5 5 6 5 Suboptimal mr (dbh-3 inches) present to 60% tree canopy cover Excellent Category for of additional forest layers, he high end of Good range ditional forest havers, he high end of Good range ditional forest havers are subover areas with stumps remaining.	Marginal Width of riparian zone 6-12 meters; human activities have impacted zone a great deal. 4 3 4 3 4 3 Marginal Tree stratum (dbh-3 inches) present, with ∠30% tree canopy cover. (See Excellent Category for examples of additional forest layers.) Score at the high end of Fair range if ∠2 additional layers are present. Sore at low end if ∠3 additional layers are present. Sore at low end if ∠3 additional layers are present. Sore at low end if with √30% tree canopy for examples of additional layers are present. OR area consists of normaintained and naturalized dense herbaceous and/or woody vegetation. 4 3 itition Scores using the above d d Use GIS maps may be used reach riparian category in the Marginal 100 4	2 1 Avg.Score Poor Width of riparian zone- little or no riparian veget human activitie 2 1 2 1 Avg.Score Poor Tree stratum absent; is surfaces, croplands, min- culverted streams, m maintained herbaceo denuded surfaces, activ pasture, and e	o c6 meters; ation due to ss. O O O O O O O O O O O O O O O O O O O	Pete et a. O O O O O O O O O O O O O O O O O O O
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Grade Grade Grade Grade 12 RIPARIAN H Grade 1. Delineate 2. Determine 3. Enter the 9 Right Bank	ONE (SCORE EACH BANK) Optimal Width of riparian zone >18 meter activities (I.e., parking lots, roadbe cuts, lawns, or crops) have not in zone. 10 9 10 9 10 9 10 9 10 9 10 9 10 9 10	rs; human acd with of a sex process. With one of the sex process with a sex present. With 30% core at low present. 8 7 EACH BANK) Sent, with onal forest with 30% (See samples ore at low present. of 2 additional of the sex present of the s	Suboptimal parian zone 12-18 meters iivities have impacted zone only minimally). 6 5 6 5 6 5 5 Suboptimal mr (dbh-3 inches) present to 60% tree canopy cover. Excellent Category for of additional forest layers are being he and of Good range diditional forest layers are 1. Score at low end if <1 forest layers are present. tover areas with stumps remaining. 6 5 5 on Categories and Conong length and width. Lar and width) and Score for Suboptimal	Marginal Width of riparian zone 6-12 meters; human activities have impacted zone a great deal. 4 3 4 3 4 3 Tree stratum (dbh-3 inches) present, with <30% tree canopy cover. (See Excellent Category for examples of additional loyers layers.) Score at the high end of Fair range if ≥2 additional layers are present. Score at low end if ≤1 additional alyers are present. Score at low end if of a range if ≥2 additional layers are present. OR area consists of non-maintained and naturalized dense herbaceous and/or woody vegetation. 4 3 Ittion Scores using the above d Use GIS maps may be used each riparian category in the Marginal layers are category in the Marginal layers are part of the deal of t	2 1 Avg.Score Poor Width of riparian zone- little or no riparian veget human activitie 2 1 2 1 Avg.Score Poor Tree stratum absent; is surfaces, croplands, mino culverted streams, m maintained herbaceo denuded surfaces, active pasture, and e 2 1 escriptors for this. blocks below. Poor	o c6 meters; ation due to ss. O O O O O O O O O O O O O O O O O O O	Pete et a. O O O O O O O O O O O O O O O O O O O

Record of Functional Assessment Results

Ephemeral = 0.00125 Intermittent = 0.0025 Perennial = 0.0038

Stream Functional Capacity Calculation											
	S8 Trib2 ((0.5-2')									
Date:	8/18/2006	` ,									
Project:	Lake Ralph H	lall									
Assessment Area:	WP 12										
Assessors:	Holmes Voigh	nt Capps									
Project Status:	XPrepro	ject									
		Stream	Stream	Multiplication							
Major Function Categories	FCI	Length (LF)*	Characterization	Factor**	FC						
Hydrologic	0.04	602	E	0.00125	0.03						
Water Quality Improvement	0.09	602	E	0.00125	0.07						
Habitat	0.09	602	E	0.00125	0.07						
Total	0.22	602			0.16						
*Stream Length is the length of the	Stream Assessme	nt Reach (SAF	R)								
**Multiplication Factors											





SWAMPIM DATASHEETS – SOUTH EPHEMERAL 0.5 TO	2.0
PRE-PROJECT	

• S10-TRIB2

S10 Trib2 (0.5-2')

PARAMET	ER											Ī
	CONDITION CATEGORY GRADE or SCORE Optimal Suboptimal Marginal Poor											
		Оригнаг		Suboptimal Marginal Poor								
Grade	10	9	8	7	6	5	4	3	2	1	0	

Right bank- 15 meters to pasture, Left bank 15 meters to pasture. Small park area surrounded by pasture. Left bank has more trees.

WP 11 P 83, 82

20% canopy cover

VARIABLES FLOW REGIME	<u>=</u> .	I. HYDROI	LOGIC FUN	CTIONS		S10 Tri	b2 (0.5-	2')				SCORE	Source
TYPE	-	Perennial		Intermitte	ent w/ Pere	nnial Pools	Inter	mittent		Ephemera	ı	-	KDWP 2
Grade	10	9	8	7	6	5	4	3	2	1	0	0	Subjectiv
CHANNEL CO	NDITION:	Measureme	nt or Obser	vation of St	ream Chani	nel Condition	IS					-	
				CON		ATEGORY (Barbour,
	Natural d	Optimal hannel; no st	ructures or	Suboptimal Some channelization (usually in				rginal	Channe	Poor I is actively dov	vncutting or	-	EPA RB/ 5-21; N
		elization mini		bridge areas) or past channel			Altered channel; 40- 80% of the reach		widening.	>80% of the re	ach riprap or		1998 U
2a.Channel		nce of downcu e lateral cuttir		alteration, but with significant recovery of channel bed and banks.			channelized or disrupted. Excess			ized. Degrada s prevent acce			NRCS S
Condition/Alter ation (natural,	frequency of	of hydrologica	al connection	Acceptabl	e frequency	of overbank	aggradation; braided		10,000	floodplain.		page 7	
altered, or	between	channel and	floodplain.	flov	vs onto flood	plain.		ith excessive of overbank					
downcutting)							flows	onto the					
								n. Historical ces or levees					
							restrict t	floodplain.					
Grade	10	9	8	7	6	5	4	3	2	1	0	8	
		0-111		CON		ATEGORY (Б		1	w/ assist
2b.Channel	Channel Ca	Optimal apacity to Flo	w Freguency	Channel Ca	Suboptima apacity to Flo	al w Frequency		rginal Capacity to	Channel (Poor Capacity to Flo	w Frequency	1	and input Dr. Mike
Capacity to Flow	Ratio is suc	h that bank o	overflow from	Ratio is suc	h that bank	overflow from	Flow Frequ	ency Ratio is	Ratio is si	uch that bank o	overflow from		Harvey a
Frequency		nts occur at a year frequenc		every 1.2	5 years or le			ank overflow n events are		ents are more f f year or less fi	requent than		Travant
Ratio (for 2- year peak		0.75-1.25			n every 2.5 y <0.75 or >1.2			quent than ear or less		every 10 year <0.24 or >2			
flow)					X0.70 01 2 1.2		frequent t	han every 5		VO.E4 01 22			
								ears. or >1.5					
Grade	10	9	8	7	6	5	4	3	2	1	0	5	
				CON	NDITION C	ATEGORY (SRADE or S	SCORE					Newton,
		Optimal		Suboptimal			Marginal		Poor			USDA/ N	
		le; evidence absent or m					Moderately unstable; perennial vegetation to		Unstable; no perennial vegetation at waterline; severe erosion of both				SVAP p 10; Barb
2c.Channel Bank Stability		k affected), p n to waterline		5-30% of bank in reach has areas of minor erosion and/or bank undercutting; perennial vegetation to					common; tree falls and/or severely undercut trees common; many eroded				al., 1999
(score each	undercut	banks (some	erosion on										RBA pag 26; USA
bank, left or right facing		meander ben exposed roots			in most place ee roots rare	es; recently but present.		nard points ck outcrops)		raw" areas frec ections and be			Norfolk Di
downstream)		tree falls;				·		oded back	bank sloug	ghing; 60-100% erosional sca			2004
								elsewhere; 30-60% of bank in reach has areas					
								n and bank ing; recently					
							exposed tr	ee roots and					
Grade (Left)	10	9	8	7	6	5	4	airs common:	2	1	0	5	
Grade (Right)	10	9	8	7	6	5	4	3	2	1	0 Avg.Score	5 5	
CHANNEL CO.	IOLINITOS	FACTORS									7.17g.00016		
CHANNEL ROI	JGHNESS	FACTORS										1	
		Optimal		CON	NDITION CA Suboptima	ATEGORY (SCORE rginal		Poor		-	Barbour, EPA RB
3a.Channel Sinuosity		s in the strea			s in the strea	ım increase	The bends	in the stream		straight; waterw		1	Chapter
(bends in low		m length 2.5 than if it was			n length 1.5			the stream to 1.5 times		elized for a long I length/valley I			5-25; KD 1996
gradient stream)		ngth/valley le			ength/valley l		longer tha	an if it was a					1990
Sileaiii)		>1.5.			1.5			ne. Channel ey length 1.0					
							to	1.2.					
Grade	10	9	8	7	6	5	4	3	2	1	0	4	
		O-time?		CON		ATEGORY (Poor			KDWP, 1
	Little or n	Optimal to channel en	largement	Suboptimal Some gravel bars of coarse stones			Marginal Sediment bars of rocks,		, Channel divided into braids or stream				Kansas Subjective
3b. Bottom Substrate	resu	Iting from sec ation; channe	diment	and well-washed debris present, little silt; moderately stable			sands, and	silt common;					Evaluation
Composition	accumu	adon, onanili	or io otable	Sill,	moderately s	Jane	moderate	ory unstable	Janu, Sill	, Jay, OI Deulu	on, unstable		Aquatic Habitats
Grade	10	9	8	7	6	5	4	3	2	1 1	0	1	
		. 9		. /									