APPENDIX C - Wildlife Documents

IPaC Report
TPWD - SGCN List
TPWD Rare Species Listing
WHAP Report

United States Department of the Interior

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http://www.fws.gov/southwest/es/EndangeredSpecies/lists/

In Reply Refer To: February 11, 2020
Consultation Code: 02ETAR00-2018-SLI-0485
Event Code: 02ETAR00-2020-E-02069
Project Name: Lewisville Lake Masterplan Revision

Subject: Updated list of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed, and candidate species, as well as proposed and final designated critical habitat, which may occur within the boundary of your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.).

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under section 7(a)(1) of the Act, Federal agencies are directed to utilize their authorities to carry out programs for the conservation of threatened and endangered species. Under and 7(a)(2) and its implementing regulations (50 CFR 402 et seq.), Federal agencies are required to determine whether their actions may affect threatened and endangered species and/or designated critical habitat. A Federal action is an activity or program authorized, funded, or carried out, in whole or in part, by a Federal agency (50 CFR 402.02).

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For Federal actions other than major construction activities, the Service suggests that a biological evaluation (similar to a Biological Assessment) be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

After evaluating the potential effects of a proposed action on federally listed species, one of the following determinations should be made by the Federal agency:

1. *No effect* - the appropriate determination when a project, as proposed, is anticipated to have no effects to listed species or critical habitat. A "no effect" determination does not require section 7 consultation and no coordination or contact with the Service is necessary. However, the action agency should maintain a complete record of their evaluation, including the steps leading to the determination of affect, the qualified personnel conducting the evaluation, habitat conditions, site photographs, and any other related information.
2. *May affect, but is not likely to adversely affect* - the appropriate determination when a proposed action's anticipated effects are insignificant, discountable, or completely beneficial. Insignificant effects relate to the size of the impact and should never reach the scale where "take" of a listed species occurs. Discountable effects are those extremely unlikely to occur. Based on best judgment, a person would not be able to meaningfully measure, detect, or evaluate insignificant effects, or expect discountable effects to occur. This determination requires written concurrence from the Service. A biological evaluation or other supporting information justifying this determination should be submitted with a request for written concurrence.
3. *May affect, is likely to adversely affect* - the appropriate determination if any adverse effect to listed species or critical habitat may occur as a direct or indirect result of the proposed action, and the effect is not discountable or insignificant. This determination requires formal section 7 consultation.

The Service recommends that candidate species, proposed species, and proposed critical habitat be addressed should consultation be necessary. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at: http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 et seq.), and projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy

guidelines (http://www.fws.gov/windenergy/) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm; http://www.towerkill.com; and http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html.

For additional information concerning migratory birds and eagle conservation plans, please contact the Service's Migratory Bird Office at 505-248-7882.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Arlington Ecological Services Field Office
2005 Ne Green Oaks Blvd
Suite 140
Arlington, TX 76006-6247
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Project Summary

Consultation Code: 02ETAR00-2018-SLI-0485

Event Code: 02ETAR00-2020-E-02069

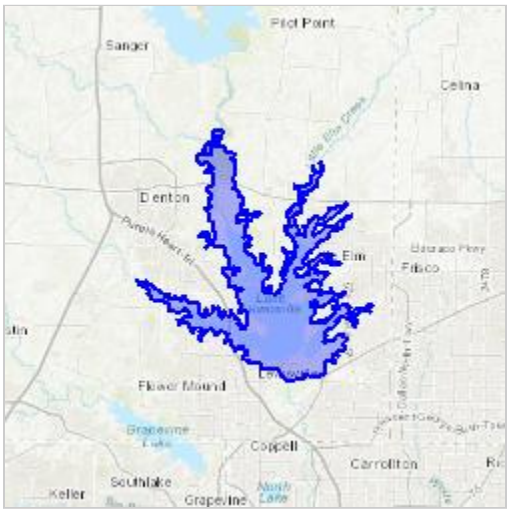
Project Name: Lewisville Lake Masterplan Revision

Project Type: LAND - MANAGEMENT PLANS

Project Description: The Lewisville Master Plan (Denton County, Texas) is the long-term strategic land use management document that guides the comprehensive management and development of all the project's recreational, natural, and cultural resources within the federal fee boundary. Under the guidance of ER-1130-2-550 Change 7, the Plan guides the efficient and cost-effective development, management, and use of project lands. It is a dynamic tool that provides for the responsible stewardship and sustainability of the project's resources for the benefit of present and future generations. The Plan works in tandem with the Operational Management Plan (OMP), which is the implementation tool for the resource objectives and development needs identified in the Master Plan. The Master Plan guides and articulates the USACE responsibilities pursuant to federal laws. Efforts are under way to revise the current Lake Master Plan. The Master Plan revision will update land classifications, plan for the modernization of existing parks, and inform the management of wildlife and other resource lands within USACE managed property at Lewisville Lake for the next 25 years

Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/place/33.16630645600003N97.01489065428797W



Counties: Denton, TX

Endangered Species Act Species

There is a total of 4 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. Note that 2 of these species should be considered only under certain conditions.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

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1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Birds

NAME	STATUS
Least Tern *Sterna antillarum*	Endangered
Piping Plover *Charadrius melodus*	Threatened
Red Knot *Calidris canutus rufa*	Threatened
Whooping Crane *Grus americana*	Endangered

Least Tern *Sterna antillarum*
Population: interior pop.
No critical habitat has been designated for this species.
Species profile: https://ecos.fws.gov/ecp/species/8505

Piping Plover *Charadrius melodus*
Population: [Atlantic Coast and Northern Great Plains populations] - Wherever found, except those areas where listed as endangered.
There is **final** critical habitat for this species. Your location is outside the critical habitat.
This species only needs to be considered under the following conditions:
- Wind Energy Projects

Species profile: https://ecos.fws.gov/ecp/species/6039

Red Knot *Calidris canutus rufa*
No critical habitat has been designated for this species.
This species only needs to be considered under the following conditions:
- Wind Energy Projects

Species profile: https://ecos.fws.gov/ecp/species/1864

Whooping Crane *Grus americana*
Population: Wherever found, except where listed as an experimental population
There is **final** critical habitat for this species. Your location is outside the critical habitat.
Species profile: https://ecos.fws.gov/ecp/species/758

Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

TEXAS BLACKLAND PRAIRIES SPECIES OF GREATEST CONSERVATION NEED

Scientific Name	Common Name	Status		Abundance Ranking		General Habitat Type(s) in Texas These are VERY broad habitat types as a starting place
		Federal	State	Global	State	
MAMMALS						
Blarina hylophaga plumblea	Elliot's short-tailed shrew			G5T1Q	S1	Savanna/Open Woodland
Geomys attwateri	Attwater's pocket gopher			G4	S4	Shrubland
Lutra canadensis	River otter			G5	S4	Riparian
Mustela frenata	Long-tailed weasel			G5	S5	Forest, Woodland, Desert Scrub, Shrubland, Savanna/Open Woodland
Myotis austroriparius	Southeastern myotis			G3G4	S3	Caves/Karst, Forest, Riparian
Myotis velifer	Cave myotis			G5	S4	Caves/Karst,
Puma concolor	Mountain lion			G5	S2	Forest, Woodland, Desert Scrub, Shrubland, Savanna/Open Woodland, Riparian
Spilogale putorius	Eastern spotted skunk			G4T	S4	Savanna/Open Woodland, Grassland
Sylvilagus aquaticus	Swamp rabbit			G5	S5	Riparian, Freshwater Wetland
Tadarida brasiliensis	Brazilian free-tailed bat			G5	S5	Cave/Karst, Artificial Refugia
Taxidea taxus	American badger			G5	S5	Grassland, Desert scrub, Woodland, Savanna/Open Woodland, Forest
Ursus americanus	Black bear	SAT	T	G5	S3	Forest, Woodland, Savanna/Open Woodland, Desert Scrub, Shrubland
BIRDS						
Anas acuta	Northern Pintail			G5	S3B,S5N	Lacustrine, freshwater wetland, saltwater wetland, coastal, marine
Colinus virginianus	Northern Bobwhite			G5	S4B	Grassland, Shrubland, Savanna/Open Woodland
Tympanuchus cupido	Greater Prairie-Chicken (Interior)			G4	S1B	Grassland
Meleagris gallopavo	Wild Turkey			G5	S5B	Shrubland, Savanna/Open Woodland, Forest, Riparian, Agricultural
Ixobrychus exilis	Least Bittern			G5	S4B	Lacustrine, Freshwater Wetland, Saltwater Wetland, Estuary
Egretta thula	Snowy Egret			G5	S5B	Riparian, Riverine, Lacustrine, Freshwater Wetland, Saltwater Wetland, Estuary, Coastal, Cultural Aquatic
Egretta caerulea	Little Blue Heron			G5	S5B	Riparian, Riverine, Lacustrine, Freshwater Wetland, Saltwater Wetland, Estuary, Coastal, Cultural Aquatic
Butorides virescens	Green Heron			G5	S5B	Riparian, Riverine, Lacustrine, Freshwater Wetland, Cultural Aquatic
Mycteria americana	Wood Stork		T	G4	SHB,S2N	Riverine, Freshwater wetland
Ictinia mississippiensis	Mississippi Kite			G5	S4B	Woodland, Forest, Riparian, Developed:Urban/Suburban/Rural
Haliaeetus leucocephalus	Bald Eagle			G5	S3B,S3N	Riparian, Lacustrine, Freshwater Wetland, Saltwater Wetland
Circus cyaneus	Northern Harrier			G5	S2B,S3N	Grassland, Shrubland
Buteo lineatus	Red-shouldered Hawk			G5	S4B	Woodland, Forest, Riparian, Freshwater Wetland
Pluvialis dominica	American Golden-Plover			G5	S3	Grassland, Freshwater Wetland, Agricultural
Charadrius montanus	Mountain Plover	PT		G3	S2	Agricultural, Grassland
Scolopax minor	American Woodcock			G5	S2B,S3N	Woodland, Forest, Riparian
Sternula antillarum	Least Tern	LE*	E*	G4	S3B	Riverine, Lacustrine, Freshwater Wetland, Saltwater Wetland, Estuary, Coastal, Marine, Developed: Industrial
Asio flammeus	Short-eared Owl			G5	S4N	Grassland, Shrubland, Agricultural
Caprimulgus carolinensis	Chuck-will's-widow			G5	S3S4B	Woodland, Forest, Riparian
Melanerpes erythrocephalus	Red-headed Woodpecker			G5	S3B	Savanna/Open Woodland, Woodland, Forest, Riparian, Developed: Urban/Suburban/Rural
Dryocopus pileatus	Pileated Woodpecker			G5	S4B	Savanna/Open Woodland, Woodland, Forest, Riparian, Developed: Urban/Suburban/Rural
Tyrannus forficatus	Scissor-tailed Flycatcher			G5	S3B	Desert Scrub, Grassland, Shrubland, Agricultural, Developed
Lanius ludovicianus	Loggerhead Shrike			G4	S4B	Desert Scrub, Grassland, Shrubland, Savanna/Open Woodland, Agricultural, Developed
Vireo bellii	Bell's Vireo			G5	S3B	Desert scrub, Shrubland, Riparian
Poecile carolinensis	Carolina Chickadee			G5	S5B	Woodland, Forest, Riparian, Developed: Urban/Suburban/Rural

Scientific Name	Common Name	Status		Abundance Ranking		General Habitat Type(s) in Texas These are VERY broad habitat types as a starting place
		Federal	State	Global	State	
Thryomanes bewickii (bewickii)	Bewick's Wren			G5	S5B	Shrubland, Savanna/Open Woodland, Woodland, Developed: Urban/Suburban/Rural
Cistothorus platensis	Sedge Wren			G5	S4	Grassland, Freshwater Wetland
Hylocichla mustelina	Wood Thrush			G5	S4B	Woodland, Forest, Riparian
Anthus spragueii	Sprague's Pipit	C		G4	S3N	Barren/Sparse Vegetation, Grassland, Shrubland, Agricultural
Dendroica dominica	Yellow-throated Warbler			G5	S4B	Woodland, Forest, Riparian
Protonotaria citrea	Prothonotary Warbler			G5	S3B	Woodland, Forest, Riparian, Lacustrine, Freshwater Wetland
Limnothlypis swainsonii	Swainson's Warbler			G4	S3B	Woodland, Forest, Riparian
Seiurus motacilla	Louisiana Waterthrush			G5	S3B	Woodland, Forest, Riparian
Oporornis formosus	Kentucky Warbler			G5	S3B	Woodland, Forest
Spizella pusilla	Field Sparrow			G5	S5B	Grassland, Shrubland, Savanna/Open Woodland
Ammodramus savannarum	Grasshopper Sparrow			G5	S3B	Grassland, Agricultural
Chondestes grammacus	Lark Sparrow			G5	S4B	Grassland, Shrubland, Savanna/Open Woodland
Ammodramus henslowii	Henslow's Sparrow			G4	S2S3N,SXB	Grassland, Savanna/Open Woodland
Ammodramus leconteii	Le Conte's Sparrow					Grassland
Zonotrichia querula	Harris's Sparrow			G5	S4	Shrubland, Agricultural
Calcarius mccownii	McCown's Longspur			G4	S4	Grassland, Agricultural
Calcarius pictus	Smith's Longspur					Grassland, Agricultural
Piranga rubra	Summer Tanager			G5	S5B	Savanna/Open Woodland, Woodland, Forest, Riparian, Developed: Urban/Suburban/Rural
Passerina ciris	Painted Bunting			G5	S4B	Shrubland, Agricultural
Spiza americana	Dickcissel			G5	S4B	Grassland, Agricultural
Sturnella magna	Eastern Meadowlark			G5	S5B	Grassland, Shrubland, Savanna/Open Woodland
Euphagus carolinus	Rusty Blackbird			G4	S3	Woodland, Forest, Riparian, Lacustrine, Freshwater Wetland
Icterus spurius	Orchard Oriole			G5	S4B	Shrubland, Savanna/Open Woodland, Woodland, Riparian
REPTILES AND AMPHIBIANS						
Anaxyrus (Bufo) woodhousii	Woodhouse's toad			G5	SU	woodland, forest, freshwater wetland
Apalone mutica	smooth softshell turtle					riparian, riverine, lacustrine, freshwater wetland
Apalone spinifera	spiny softshell turtle					riparian, riverine, lacustrine, freshwater wetland
Cheylydra serpentina	Common snapping turtle					riparina, riverine
Crotalus atrox	Western diamondback rattlesnake				S4	barren/sparse vegetation, desert scrub, grassland, shrubland, savanna, woodland, caves/karst
Crotalus horridus	Timber (Canebrake) Rattlesnake		T	G4	S4	woodland, forest, riparian
Graptemys caglei	Cagle's map turtle		T	G3	S1	riparian, riverine
Graptemys versa	Texas map turtle			G4	SU	riparian, riverine
Heterodon nasicus	Western hognosed snake					desert scrub, grassland, shrubland
Macrochelys temminckii	alligator snapping turtle		T	G3G4	S3	riparian, riverine, cultural aquatic
Ophisaurus attenuatus	western slender glass lizard					grassland, savanna
Phrynosoma cornutum	Texas horned lizard		T	G4G5	S4	desert scrub, grassland, savanna
Pseudacris streckeri	Strecker's Chorus Frog			G5	S3	grassland, savanna, woodland, riparian, cultural aquatic, freshwater wetland
Sistrurus catenatus	massasauga					grassland, barren/sparse vegetation, shrubland, coastal,
Terrapene carolina	Eastern box turtle			G5	S3	grasslands, savanna, woodland
Terrapene ornata	Ornate box turtle			G5	S3	grassland, barren/sparse vegetation, deset scrub, savanna, woodland
Thamnophis sirtalis annectans	Texas Garter Snake (Eastern/Texas/ New Mexico)			G5	S2	riparian, around lacustrine and cultural aquatic sites
Trachemys scripta	Red-eared slider					riparian, riverine, lacustrine, freshwater wetland, cultural aquatic
FRESHWATER FISHES						
Anguilla rostrata	American eel			G4	S5	streams and reservoirs in drainages connected to marine environments
Atractosteus spatula	alligator gar					channel snag, pool-snag complex, pool-edge, and pool-vegetation habitat

Scientific Name	Common Name	Status		Abundance Ranking		General Habitat Type(s) in Texas These are VERY broad habitat types as a starting place
		Federal	State	Global	State	
Cycleptus elongatus	Blue sucker		T	G3G4	S3	large, deep rivers, and deeper zones of lakes
Etheostoma fonticola	Fountain darter	LE	E	G1	S1	usually in dense beds of *Vallisneria, Elodia, Ludwigia* and other aquatic plants; substrate normally mucky
Macryhbopsis storeriana	Silver chub					over silt or mud, turbid water with very soft sand/silt substrate
Micropterus treculii	Guadalupe bass			G3	S3	small lentic environments; commonly taken in flowing water
Notropis atrocaudalis	Blackspot shiner					backwater and swiftest currents
Notropis bairdi	Red River shiner					streambeds with widely fluctuating flows subject to high summer temperatures, high rates of evaporation, and
Notropis buccula	Small eye shiner	C		G2Q	S2	condition tolerances (turbidity, salinity, oxygen).
Notropis chalybaeus	Ironcolor shiner					Plain streams and rivers of low to moderate gradient; often at the upstream ends of pools, with a moderate to
Notropis oxyrhynchus	Sharpnose shiner	C		G3	S3	Moderate current velocities and depths, sand bottom
Notropis potteri	Chub shiner		T	G4	S3	turbid, flowing water with silt or sand substrate; tolerant of high salinities
Notropis shumardi	Silverband shiner					channel with moderate to swift current velocities and moderate to deep depths; associated with turbid water
Percina apristis	Guadalupe darter					collections from the clearest waters tributary to the Guadalupe, namely spring heads and the main river west
Polyodon spathula	Paddlefish		T	G4	S3	rivers, sluggish pools, backwaters, bayous, and oxbows with abundant zooplankton; large reservoirs if
Satan eurystomus	Widemouth blindcat		T	G1	S1	Karst: Subterranean waters
Trogloglanis pattersoni	Toothless blindcat		T	G1	S1	Karst: Subterranean waters
INVERTEBRATES						
Bombus pensylvanicus	American bumblebee			GU	SU*	Grassland, Savanna/Open Woodland
Chimarra holzenthali	Holzenthal's Philopotamid caddisfly			G1G2	S1	Riparian, Riverine
Cotinis boylei	A scarab beetle			G2*	S2*	Grassland, Shrubland, Woodland
Nicrophorus americanus	American Burying Beetle	LE		G1	S1	Grassland, Savanna/Open Woodland
Potamilus amphichaenus	Texas heelsplitter		T	G1G2	S1	Riverine
Procambarus regalis	Regal burrowing crayfish			G2G3	S2?*	Freshwater Wetland, Grassland
Procambarus steigmani	Parkhill prairie crayfish			G1G2	S1S2*	Freshwater Wetland, Grassland
Pseudocentroptiloides morihari	A mayfly			G2G3	S2?*	Riverine, Riparian
Sphinx eremitoides	Sage sphinx			G1G2	S1?*	Grassland
Susperatus tonkawa	A mayfly			G1	S1*	Riparian, Riverine
PLANTS						
Agalinis densiflora	Osage Plains false foxglove			G3	S2	Savanna/Open Woodland - Outcrops
Astragalus reflexus	Texas milk vetch			G3	S3	Savanna/Open Woodland
Calopogon oklahomensis	Oklahoma grass pink			G3	S1S2	Savanna/Open Woodland; Grassland; Freshwater Wetland
Carex edwardsiana	canyon sedge			G3G4S3S4	S3S4	Woodland (slopes above Riparian)
Carex shinnersii	Shinner's sedge			G3?	S2	Grassland
Crataegus dallasiana	Dallas hawthorn			G3Q	S3	Riparian (creeks in the Blackland Prairie)
Cuscuta exaltata	tree dodder			G3	S3	Woodland
Dalea hallii	Hall's prairie-clover			G3	S3	Savanna/Open Woodland; Grassland
Echinacea atrorubens	Topeka purple-coneflower			G3	S3	Savanna/Open Woodland
Hexalectris nitida	Glass Mountains coral-root			G3	S3	Woodland
Hexalectris warnockii	Warnock's coral-root			G2G3	S2	Woodland
Hymenoxys pygmea	Pygmy prairie dawn			G1	S1	Barren/Sparse Vegetation with Grassland matrix (saline prairie)
Liatris glandulosa	glandular gay-feather			G3	S3	Savanna/Open Woodland
Paronychia setacea	bristle nailwort			G3	S3	Savanna/Open Woodland
Phlox oklahomensis	Oklahoma phlox			G3	SH	Savanna/Open Woodland
Physaria engelmannii	Engelmann's bladderpod			G3	S3	Savanna/Open Woodland
Polygonella parksii	Parks' jointweed			G2	S2	Savanna/Open Woodland (sandhills); Grassland
Prunus texana	Texas peachbush			G3G4	S3S4	Savanna/Open Woodland; Grassland

Scientific Name	Common Name	Status		Abundance Ranking		General Habitat Type(s) in Texas These are VERY broad habitat types as a starting place
		Federal	State	Global	State	
Thalictrum texanum	Texas meadow-rue			G2	S2	Savanna/Open Woodland; Riparian (bottomland forest)
Zizania texana	Texas wild rice	LE	E	G1	S1	Riverine (spring-fed, clear, thermally constant, moderate current, sand to gravel substrate)

CROSS TIMBERS SPECIES OF GREATEST CONSERVATION NEED

Scientific Name	Common Name	Status		Abundance Ranking		General Habitat Type(s) in Texas These are VERY broad habitat types as a starting place
		Federal	State	Global	State	
MAMMALS						
Conepatus leuconotus	Hog-nosed skunk			G5	S4	Shrubland, Savanna/Open Woodland, Barren/Sparse Vegetation,
Dipodomys elator	Texas kangaroo rat		T	G1G2	S2	Shrubland, Agricultural
Lutra canadensis	River otter			G5	S4	Riparian
Mustela frenata	Long-tailed weasel			G5	S5	Forest, Woodland, Desert Scrub, Shrubland, Savanna/Open Woodland
Myotis velifer	Cave myotis			G5	S4	Caves/Karst,
Neovison vison	Mink			G5	S4	Riparian, Riverine, Lacustrine, Freshwater Wetland
Puma concolor	Mountain lion			G5	S2	Forest, Woodland, Desert Scrub, Shrubland, Savanna/Open Woodland, Riparian
Spilogale putorius	Eastern spotted skunk			G4T	S4	Savanna/Open Woodland, Grassland
Sylvilagus aquaticus	Swamp rabbit			G5	S5	Riparian, Freshwater Wetland
Tadarida brasiliensis	Brazilian free-tailed bat			G5	S5	Cave/Karst, Artificial Refugia
Taxidea taxus	American badger			G5	S5	Grassland, Desert scrub, Woodland, Savanna/Open Woodland, Forest
BIRDS						
Anas acuta	Northern Pintail			G5	S3B,S5N	Lacustrine, freshwater wetland, saltwater wetland, coastal, marine
Colinus virginianus	Northern Bobwhite			G5	S4B	Grassland, Shrubland, Savanna/Open Woodland
Tympanuchus cupido	Greater Prairie-Chicken (Interior)			G4	S1B	Grassland
Meleagris gallopavo	Wild Turkey			G5	S5B	Shrubland, Savanna/Open Woodland, Forest, Riparian, Agricultural
Egretta thula	Snowy Egret			G5	S5B	Riparian, Riverine, Lacustrine, Freshwater Wetland, Saltwater Wetland, Estuary, Coastal, Cultural Aquatic
Egretta caerulea	Little Blue Heron			G5	S5B	Riparian, Riverine, Lacustrine, Freshwater Wetland, Saltwater Wetland, Estuary, Coastal, Cultural Aquatic
Butorides virescens	Green Heron			G5	S5B	Riparian, Riverine, Lacustrine, Freshwater Wetland, Cultural Aquatic
Ictinia mississippiensis	Mississippi Kite			G5	S4B	Woodland, Forest, Riparian, Developed:Urban/Suburban/Rural
Haliaeetus leucocephalus	Bald Eagle			G5	S3B,S3N	Riparian, Lacustrine, Freshwater Wetland, Saltwater Wetland
Circus cyaneus	Northern Harrier			G5	S2B,S3N	Grassland, Shrubland
Buteo lineatus	Red-shouldered Hawk			G5	S4B	Woodland, Forest, Riparian, Freshwater Wetland
Buteo swainsoni	Swainson's Hawk			G5	S4B	Desert Scrub, Grassland, Shrubland
Pluvialis dominica	American Golden-Plover			G5	S3	Grassland, Freshwater Wetland, Agricultural
Sternula antillarum	Least Tern	LE*	E*	G4	S3B	Riverine, Lacustrine, Freshwater Wetland, Saltwater Wetland, Estuary, Coastal, Marine, Developed: Industrial
Athene cunicularia	Burrowing Owl			G4	S3B	Desert Scrub, Grassland, Shrubland, Agricultural, Developed
Asio flammeus	Short-eared Owl			G5	S4N	Grassland, Shrubland, Agricultural
Caprimulgus carolinensis	Chuck-will's-widow			G5	S3S4B	Woodland, Forest, Riparian
Melanerpes erythrocephalus	Red-headed Woodpecker			G5	S3B	Savanna/Open Woodland, Woodland, Forest, Riparian, Developed: Urban/Suburban/Rural
Tyrannus forficatus	Scissor-tailed Flycatcher			G5	S3B	Desert Scrub, Grassland, Shrubland, Agricultural, Developed
Lanius ludovicianus	Loggerhead Shrike			G4	S4B	Desert Scrub, Grassland, Shrubland, Savanna/Open Woodland, Agricultural, Developed
Vireo bellii	Bell's Vireo			G5	S3B	Desert scrub, Shrubland, Riparian
Vireo atricapilla	Black-capped Vireo	LE	E	G3	S2B	Shrubland
Poecile carolinensis	Carolina Chickadee			G5	S5B	Woodland, Forest, Riparian, Developed: Urban/Suburban/Rural
Anthus spragueii	Sprague's Pipit	C		G4	S3N	Barren/Sparse Vegetation, Grassland, Shrubland, Agricultural
*Dendroica chrysoparia**	Golden-cheeked Warbler	LE	E	G2	S2B	Woodland
Aimophila cassinii	Cassin's Sparrow			G5	S4B	Grassland, Shrubland
Aimophila ruficeps	Rufous-crowned Sparrow			G5	S4B	Grassland
Spizella pusilla	Field Sparrow			G5	S5B	Grassland, Shrubland, Savanna/Open Woodland

Scientific Name	Common Name	Status		Abundance Ranking		General Habitat Type(s) in Texas These are VERY broad habitat types as a starting place
		Federal	State	Global	State	
Ammodramus savannarum	Grasshopper Sparrow			G5	S3B	Grassland, Agricultural
Chondestes grammacus	Lark Sparrow			G5	S4B	Grassland, Shrubland, Savanna/Open Woodland
Ammodramus leconteii	Le Conte's Sparrow					Grassland
Zonotrichia querula	Harris's Sparrow			G5	S4	Shrubland, Agricultural
Calcarius mccownii	McCown's Longspur			G4	S4	Grassland, Agricultural
Piranga rubra	Summer Tanager			G5	S5B	Savanna/Open Woodland, Woodland, Forest, Riparian, Developed: Urban/Suburban/Rural
Passerina ciris	Painted Bunting			G5	S4B	Shrubland, Agricultural
Spiza americana	Dickcissel			G5	S4B	Grassland, Agricultural
Sturnella magna	Eastern Meadowlark			G5	S5B	Grassland, Shrubland, Savanna/Open Woodland
Icterus spurius	Orchard Oriole			G5	S4B	Shrubland, Savanna/Open Woodland, Woodland, Riparian
REPTILES AND AMPHIBIANS						
Anaxyrus (Bufo) woodhousii	Woodhouse's toad			G5	SU	woodland, forest, freshwater wetland
Apalone mutica	smooth softshell turtle					riparian, riverine, lacustrine, freshwater wetland
Cheylydra serpentina	Common snapping turtle					riparina, riverine
Crotalus atrox	Western diamondback rattlesnake				S4	barren/sparse vegetation, desert scrub, grassland, shrubland, savanna, woodland, caves/karst
Crotalus horridus	Timber (Canebrake) Rattlesnake		T	G4	S4	woodland, forest, riparian
Eurycea chisolmensis	Salado Springs salamander	C		G1	S1	freshwater wetland (springs)
Eurycea naufragia	Georgetown Salamander	C		G1	S1	caves and karst, freshwater wetland (springs)
Graptemys versa	Texas map turtle			G4	SU	riparian, riverine
Heterodon nasicus	Western hognosed snake					desert scrub, grassland, shrubland
Macrochelys temminckii	alligator snapping turtle		T	G3G4	S3	riparian, riverine, cultural aquatic
Nerodia harteri	Brazos Water Snake		T		S1	riparian, riverine, cultural aquatic
Phrynosoma cornutum	Texas horned lizard		T	G4G5	S4	desert scrub, grassland, savanna
Pseudacris streckeri	Strecker's Chorus Frog			G5	S3	grassland, savanna, woodland, riparian, cultural aquatic, freshwater wetland
Sistrurus catenatus	massasauga					grassland, barren/sparse vegetation, shrubland, coastal,
Terrapene ornata	Ornate box turtle			G5	S3	grassland, barren/sparse vegetation, deset scrub, savanna, woodland
Thamnophis sirtalis annectans	Texas Garter Snake (Eastern/Texas/ New Mexico)			G5	S2	riparian, around lacustrine and cultural aquatic sites
Trachemys scripta	Red-eared slider					riparian, riverine, lacustrine, freshwater wetland, cultural aquatic
FRESHWATER FISHES						
Anguilla rostrata	American eel			G4	S5	streams and reservoirs in drainages connected to marine environments
Cycleptus elongatus	Blue sucker		T	G3G4	S3	large, deep rivers, and deeper zones of lakes
Hiodon alosoides	Goldeye					large lakes; backwaters
Ictalurus lupus	Headwater catfish			G3	S2	clear streams and rivers with moderate gradients, deep spring runs
Macryhbopsis storeriana	Silver chub					over silt or mud, turbid water with very soft sand/silt substrate
Micropterus treculii	Guadalupe bass			G3	S3	small lentic environments; commonly taken in flowing water
Notropis bairdi	Red River shiner					streambeds with widely fluctuating flows subject to high summer temperatures, high rates of evaporation, and
Notropis oxyrhynchus	Sharpnose shiner	C		G3	S3	Moderate current velocities and depths, sand bottom
Notropis potteri	Chub shiner		T	G4	S3	turbid, flowing water with silt or sand substrate; tolerant of high salinities
Polyodon spathula	Paddlefish		T	G4	S3	rivers, sluggish pools, backwaters, bayous, and oxbows with abundant zooplankton; large reservoirs if
INVERTEBRATES						
Amblycorypha uhleri	A katydid			G2G3*	S2?*	Savanna/Open Woodland
Arethaea ambulator	A katydid			G2G3*	S2?*	Savanna/Open Woodland
Bombus pensylvanicus	American bumblebee			GU	SU*	Grassland, Savanna/Open Woodland
Pleurobema riddellii	Louisiana pigtoe		T	G1G2	S1	Riverine

Scientific Name	Common Name	Status		Abundance Ranking		General Habitat Type(s) in Texas These are VERY broad habitat types as a starting place
		Federal	State	Global	State	
Pogonomyrmex comanche	Comanche harvester ant			G2G3*	S2*	Barren/Sparse Vegetation
Potamilus amphichaenus	Texas heelsplitter		T	G1G2	S1	Riverine
Quadrula aurea	Golden orb		T	G1	S2*	Riverine
Quadrula houstonensis	Smooth pimpleback		T	G2	S1S2*	Riverine
Quadrula mitchelli	False Spike		T	GH	SH	Riverine
Taeniopteryx starki	Texas willowfly			G1	S1	Riparian, Riverine
Truncilla macrodon	Texas fawnsfoot		T	G2Q	S1*	Riverine
PLANTS						
Agalinis auriculata	earleaf false foxglove			G3	SH	Savanna/Open Woodland; Grrassland
Agalinis densiflora	Osage Plains false foxglove			G3	S2	Savanna/Open Woodland - Outcrops
Argythamnia aphoroides	Hill Country wild-mercury			G2G3	S2S3	Savanna/Open Woodland
Carex edwardsiana	canyon sedge			G3G4S3S4	S3S4	Woodland (slopes above Riparian)
Carex shinnersii	Shinner's sedge			G3?	S2	Grassland
Clematis texensis	scarlet leather-flower			G3G4	S3S4	Woodland
Croton alabamensis var. texensis	Texabama croton			G3T2	S2	Woodland
Cuscuta exaltata	tree dodder			G3	S3	Woodland
Dalea reverchonii	Comanche Peak prairie-clover			G2	S2	Savanna/Open Woodland; Grassland
Echinacea atrorubens	Topeka purple-coneflower			G3	S3	Savanna/Open Woodland
Festuca versuta	Texas fescue			G3	S3	Woodland
Gaura triangulata	prairie butterfly-weed			G3G4	S3	Grassland
Hexalectris nitida	Glass Mountains coral-root			G3	S3	Woodland
Ipomoea shumardiana	Shumard's morning glory			G2G3	S1	Savanna/Open Woodland
Liatris glandulosa	glandular gay-feather			G3	S3	Savanna/Open Woodland
Oenothera coryi	Cory's Evening-primrose			G3	S3	Savanna/Open Woodland
Pediomelum cyphocalyx	turnip-root scurfpea			G3G4	S3S4	Grassland
Pediomelum reverchonii	Reverchon's curfpea			G3	S3	Grassland
Physaria engelmannii	Engelmann's bladderpod			G3	S3	Savanna/Open Woodland
Prunus minutiflora	Texas almond			G3G4	S3S4	Savanna/Open Woodland
Schoenoplectus hallii	Hall's baby bulrush			G2G3	S1	Freshwater Wetland (ponds)
Senecio quaylei	Quayle's butterweed			G1Q	S1	Savanna/Open Woodland
Styrax platanifolius subsp. platanifolius	sycamore-leaf snowbell			G3T3	S3	Woodland
Valerianella stenocarpa	bigflower cornsalad			G3	S3	Savanna/Open Woodland
Yucca necopina	Glen Rose yucca			G1G2	S1S2	Savanna/Open Woodland

Last Update: 7/17/2019

DENTON COUNTY

AMPHIBIANS

Strecker's chorus frog *Pseudacris streckeri*

Wooded floodplains and flats, prairies, cultivated fields and marshes. Likes sandy substrates.

Federal Status:	State Status:	SGCN: Y
Endemic: N	Global Rank: G5	State Rank: S3

Woodhouse's toad *Anaxyrus woodhousii*

Extremely catholic up to 5000 feet, does very well (except for traffic) in association with man.

Federal Status:	State Status:	SGCN: Y
Endemic: N	Global Rank: G5	State Rank: SU

BIRDS

bald eagle *Haliaeetus leucocephalus*

Found primarily near rivers and large lakes; nests in tall trees or on cliffs near water; communally roosts, especially in winter; hunts live prey, scavenges, and pirates food from other birds

Federal Status:	State Status: T	SGCN: Y
Endemic: N	Global Rank: G5	State Rank: S3B,S3N

black rail *Laterallus jamaicensis*

Salt, brackish, and freshwater marshes, pond borders, wet meadows, and grassy swamps; nests in or along edge of marsh, sometimes on damp ground, but usually on mat of previous years dead grasses; nest usually hidden in marsh grass or at base of Salicornia

Federal Status: PT	State Status:	SGCN: Y
Endemic: N	Global Rank: G3G4	State Rank: S2

Franklin's gull *Leucophaeus pipixcan*

Habitat description is not available at this time.

Federal Status:	State Status:	SGCN: Y
Endemic: N	Global Rank: G4G5	State Rank: S2N

interior least tern *Sternula antillarum athalassos*

Sand beaches, flats, bays, inlets, lagoons, islands. Subspecies is listed only when inland (more than 50 miles from a coastline); nests along sand and gravel bars within braided streams, rivers; also know to nest on man-made structures (inland beaches, wastewater treatment plants, gravel mines, etc); eats small fish and crustaceans, when breeding forages within a few hundred feet of colony

Federal Status: LE	State Status: E	SGCN: Y
Endemic: N	Global Rank: G4T2Q	State Rank: S1B

DENTON COUNTY

BIRDS

mountain plover *Charadrius montanus*

Breeding: nests on high plains or shortgrass prairie, on ground in shallow depression; nonbreeding: shortgrass plains and bare, dirt (plowed) fields; primarily insectivorous

Federal Status:	State Status:	SGCN: Y
Endemic: N	Global Rank: G3	State Rank: S2

piping plover *Charadrius melodus*

Beaches, sandflats, and dunes along Gulf Coast beaches and adjacent offshore islands. Also spoil islands in the Intracoastal Waterway. Based on the November 30, 1992 Section 6 Job No. 9.1, Piping Plover and Snowy Plover Winter Habitat Status Survey, algal flats appear to be the highest quality habitat. Some of the most important aspects of algal flats are their relative inaccessibility and their continuous availability throughout all tidal conditions. Sand flats often appear to be preferred over algal flats when both are available, but large portions of sand flats along the Texas coast are available only during low-very low tides and are often completely unavailable during extreme high tides or strong north winds. Beaches appear to serve as a secondary habitat to the flats associated with the primary bays, lagoons, and inter-island passes. Beaches are rarely used on the southern Texas coast, where bayside habitat is always available, and are abandoned as bayside habitats become available on the central and northern coast. However, beaches are probably a vital habitat along the central and northern coast (i.e. north of Padre Island) during periods of extreme high tides that cover the flats. Optimal site characteristics appear to be large in area, sparsely vegetated, continuously available or in close proximity to secondary habitat, and with limited human disturbance.

Federal Status: LT	State Status: T	SGCN: Y
Endemic: N	Global Rank: G3	State Rank: S2N

red knot *Calidris canutus rufa*

Red knots migrate long distances in flocks northward through the contiguous United States mainly April-June, southward July-October. A small plump-bodied, short-necked shorebird that in breeding plumage, typically held from May through August, is a distinctive and unique pottery orange color. Its bill is dark, straight and, relative to other shorebirds, short-to-medium in length. After molting in late summer, this species is in a drab gray-and-white non-breeding plumage, typically held from September through April. In the non-breeding plumage, the knot might be confused with the omnipresent Sanderling. During this plumage, look for the knot's prominent pale eyebrow and whitish flanks with dark barring. The Red Knot prefers the shoreline of coast and bays and also uses mudflats during rare inland encounters. Primary prey items include coquina clam (Donax spp.) on beaches and dwarf surf clam (Mulinia lateralis) in bays, at least in the Laguna Madre. Wintering Range includes- Aransas, Brazoria, Calhoun, Cameron, Chambers, Galveston, Jefferson, Kennedy, Kleberg, Matagorda, Nueces, San Patricio, and Willacy. Habitat: Primarily seacoasts on tidal flats and beaches, herbaceous wetland, and Tidal flat/shore.

Federal Status: LT	State Status:	SGCN: Y
Endemic: N	Global Rank: G4T2	State Rank: SNRN

western burrowing owl *Athene cunicularia hypugaea*

Open grasslands, especially prairie, plains, and savanna, sometimes in open areas such as vacant lots near human habitation or airports; nests and roosts in abandoned burrows

Federal Status:	State Status:	SGCN: Y
Endemic: N	Global Rank: G4T4	State Rank: S2

white-faced ibis *Plegadis chihi*

Prefers freshwater marshes, sloughs, and irrigated rice fields, but will attend brackish and saltwater habitats; currently confined to near-coastal rookeries in so-called hog-wallow prairies. Nests in marshes, in low trees, on the ground in bulrushes or reeds, or on floating mats.

Federal Status:	State Status: T	SGCN: Y
Endemic: N	Global Rank: G5	State Rank: S4B

DENTON COUNTY

BIRDS

whooping crane *Grus americana*

Small ponds, marshes, and flooded grain fields for both roosting and foraging. Potential migrant via plains throughout most of state to coast; winters in coastal marshes of Aransas, Calhoun, and Refugio counties.

Federal Status: LE	State Status: E	SGCN: Y
Endemic: N	Global Rank: G1	State Rank: S1N

INSECTS

American bumblebee *Bombus pensylvanicus*

Habitat description is not available at this time.

Federal Status:	State Status:	SGCN: Y
Endemic:	Global Rank: G3G4	State Rank: SNR

No accepted common name *Arethaea ambulator*

Habitat description is not available at this time.

Federal Status:	State Status:	SGCN: Y
Endemic:	Global Rank: GNR	State Rank: SNR

MAMMALS

American badger *Taxidea taxus*

Habitat description is not available at this time.

Federal Status:	State Status:	SGCN: Y
Endemic: N	Global Rank: G5	State Rank: S5

big brown bat *Eptesicus fuscus*

Any wooded areas or woodlands except south Texas. Riparian areas in west Texas.

Federal Status:	State Status:	SGCN: Y
Endemic: N	Global Rank: G5	State Rank: S5

big free-tailed bat *Nyctinomops macrotis*

Habitat data sparse but records indicate that species prefers to roost in crevices and cracks in high canyon walls, but will use buildings, as well; reproduction data sparse, gives birth to single offspring late June-early July; females gather in nursery colonies; winter habits undetermined, but may hibernate in the Trans-Pecos; opportunistic insectivore

Federal Status:	State Status:	SGCN: Y
Endemic:	Global Rank: G5	State Rank: S3

black-tailed prairie dog *Cynomys ludovicianus*

Dry, flat, short grasslands with low, relatively sparse vegetation, including areas overgrazed by cattle; live in large family groups

Federal Status:	State Status:	SGCN: Y
Endemic: N	Global Rank: G4	State Rank: S3

DENTON COUNTY

MAMMALS

eastern red bat *Lasiurus borealis*

Found in a variety of habitats in Texas. Usually associated with wooded areas. Found in towns especially during migration.

Federal Status:	State Status:	SGCN: Y
Endemic: N	Global Rank: G3G4	State Rank: S4

eastern spotted skunk *Spilogale putorius*

Catholic; open fields prairies, croplands, fence rows, farmyards, forest edges & woodlands. Prefer wooded, brushy areas & tallgrass prairies. S.p. ssp. interrupta found in wooded areas and tallgrass prairies, preferring rocky canyons and outcrops when such sites are available.

Federal Status:	State Status:	SGCN: Y
Endemic: N	Global Rank: G4	State Rank: S1S3

hoary bat *Lasiurus cinereus*

Known from montane and riparian woodland in Trans-Pecos, forests and woods in east and central Texas.

Federal Status:	State Status:	SGCN: Y
Endemic: N	Global Rank: G3G4	State Rank: S4

long-tailed weasel *Mustela frenata*

Includes brushlands, fence rows, upland woods and bottomland hardwoods, forest edges & rocky desert scrub. Usually live close to water.

Federal Status:	State Status:	SGCN: Y
Endemic: N	Global Rank: G5	State Rank: S5

Mexican free-tailed bat *Tadarida brasiliensis*

Roosts in buildings in east Texas. Largest maternity roosts are in limestone caves on the Edwards Plateau. Found in all habitats, forest to desert.

Federal Status:	State Status:	SGCN: Y
Endemic: N	Global Rank: G5	State Rank: S5

mink *Neovison vison*

Intimately associated with water; coastal swamps & marshes, wooded riparian zones, edges of lakes. Prefer floodplains.

Federal Status:	State Status:	SGCN: Y
Endemic: N	Global Rank: G5	State Rank: S4

mountain lion *Puma concolor*

Rugged mountains & riparian zones.

Federal Status:	State Status:	SGCN: Y
Endemic: N	Global Rank: G5	State Rank: S2S3

DENTON COUNTY

MAMMALS

plains spotted skunk *Spilogale putorius interrupta*

Catholic; open fields, prairies, croplands, fence rows, farmyards, forest edges, and woodlands; prefers wooded, brushy areas and tallgrass prairie

Federal Status:	State Status:	SGCN: N
Endemic: N	Global Rank: G4T4	State Rank: S1S3

southern short-tailed shrew *Blarina carolinensis*

Habitat description is not available at this time.

Federal Status:	State Status:	SGCN: Y
Endemic: N	Global Rank: G5	State Rank: S4

swamp rabbit *Sylvilagus aquaticus*

Habitat description is not available at this time.

Federal Status:	State Status:	SGCN: Y
Endemic: N	Global Rank: G5	State Rank: S5

thirteen-lined ground squirrel *Ictidomys tridecemlineatus*

Habitat description is not available at this time.

Federal Status:	State Status:	SGCN: Y
Endemic: N	Global Rank: G5	State Rank: S5

tricolored bat *Perimyotis subflavus*

Forest, woodland and riparian areas are important. Caves are very important to this species.

Federal Status:	State Status:	SGCN: Y
Endemic: N	Global Rank: G2G3	State Rank: S3S4

western hog-nosed skunk *Conepatus leuconotus*

Habitats include woodlands, grasslands & deserts, to 7200 feet, most common in rugged, rocky canyon country; little is known about the habitat of the ssp. telmalestes

Federal Status:	State Status:	SGCN: Y
Endemic: N	Global Rank: G4	State Rank: S4

woodland vole *Microtus pinetorum*

Include grassy marshes, swamp edges, old-field/pine woodland ecotones, tallgrass fields; generally sandy soils.

Federal Status:	State Status:	SGCN: Y
Endemic: N	Global Rank: G5	State Rank: S3

DENTON COUNTY

MOLLUSKS

Louisiana pigtoe *Pleurobema riddellii*

Streams and moderate-size rivers, usually flowing water on substrates of mud, sand, and gravel; not generally known from impoundments; Sabine, Neches, and Trinity (historic) River basins

Federal Status:	State Status: T	SGCN: Y
Endemic: N	Global Rank: G1G2	State Rank: S1

sandbank pocketbook *Lampsilis satura*

Small to large rivers with moderate flows and swift current on gravel, gravel-sand, and sand bottoms; east Texas, Sulfur south through San Jacinto River basins; Neches River

Federal Status:	State Status: T	SGCN: Y
Endemic:	Global Rank: G2	State Rank: S1

Texas heelsplitter *Potamilus amphichaenus*

Quiet waters in mud or sand and also in reservoirs. Sabine, Neches, and Trinity River basins

Federal Status:	State Status: T	SGCN: Y
Endemic: N	Global Rank: G1G2	State Rank: S1

REPTILES

American alligator *Alligator mississippiensis*

Coastal marshes; inland natural rivers, swamps and marshes; manmade impoundments.

Federal Status:	State Status:	SGCN: N
Endemic: N	Global Rank: G5	State Rank: S4

common garter snake *Thamnophis sirtalis*

Irrigation canals and riparian-corridor farmlands in west; marshy, flooded pastureland, grassy or brushy borders of permanent bodies of water; coastal salt marshes.

Federal Status:	State Status:	SGCN: N
Endemic:	Global Rank: G5	State Rank: S2

eastern box turtle *Terrapene carolina*

Eastern box turtles inhabit forests, fields, forest-brush, and forest-field ecotones. In some areas they move seasonally from fields in spring to forest in summer. They commonly enters pools of shallow water in summer. For shelter, they burrow into loose soil, debris, mud, old stump holes, or under leaf litter. They can successfully hibernate in sites that may experience subfreezing temperatures. In Maryland bottomland forest, some hibernated in pits or depressions in forest floor (usually about 30 cm deep) usually within summer range; individuals tended to hibernate in same area in different years (Stickel 1989). Also attracted to farms, old fields and cut-over woodlands, as well as creek bottoms and dense woodlands. Egg laying sites often are sandy or loamy soils in open areas; females may move from bottomlands to warmer and drier sites to nest. In Maryland, females used the same nesting area in different years (Stickel 1989).

Federal Status:	State Status:	SGCN: Y
Endemic: N	Global Rank: G5	State Rank: S3

DENTON COUNTY

REPTILES

slender glass lizard *Ophisaurus attenuatus*

Prefers relatively dry microhabitats, usually associated with grassy areas. Habitats include open grassland, prairie, woodland edge, open woodland, oak savannas, longleaf pine flatwoods, scrubby areas, fallow fields, and areas near streams and ponds, often in habitats with sandy soil. This species often appears on roads in spring. During inactivity, it occurs in underground burrows. In Kansas, slender glass lizards were scarce in heavily grazed pastures, increased as grass increased with removal of grazing, and declined as brush and trees replaced grass (Fitch 1989). Eggs are laid underground, under cover, or under grass clumps (Ashton and Ashton 1985); in cavities beneath flat rocks or in abandoned tunnels of small mammals (Scalopus, Microtus) (Fitch 1989).

Federal Status:	State Status:	SGCN: Y
Endemic: N	Global Rank: G5	State Rank: S3

smooth softshell *Apalone mutica*

Any permanent body of water.Large rivers and streams; in some areas also found in lakes, impoundments, and shallow bogs (Ernst and Barbour 1972). Usually in water with sandy or mud bottom and few aquatic plants. Often basks on sand bars and mudflats at edge of water. Eggs are laid in nests dug in high open sandbars and banks close to water, usually within 90 m of water (Fitch and Plummer 1975).

Federal Status:	State Status:	SGCN: Y
Endemic: N	Global Rank: G5	State Rank: S3

Texas garter snake *Thamnophis sirtalis annectens*

Irrigation canals and riparian-corridor farmlands in west; marshy, flooded pastureland, grassy or brushy borders of permanent bodies of water; coastal salt marshes. Wet or moist microhabitats are conducive to the species occurrence, but is not necessarily restricted to them; hibernates underground or in or under surface cover; breeds March-August.

Federal Status:	State Status:	SGCN: Y
Endemic: Y	Global Rank: G5T4	State Rank: S1

Texas horned lizard *Phrynosoma cornutum*

Occurs to 6000 feet, but largely limited below the pinyon-juniper zone on mountains in the Big Bend area. Open, arid and semi-arid regions with sparse vegetation, including grass, cactus, scattered brush or scrubby trees; soil may vary in texture from sandy to rocky; burrows into soil, enters rodent burrows, or hides under rock when inactive; breeds March-September.

Federal Status:	State Status: T	SGCN: Y
Endemic: N	Global Rank: G4G5	State Rank: S3

timber (canebrake) rattlesnake *Crotalus horridus*

Swamps, floodplains, upland pine and deciduous woodland, riparian zones, abandoned farmland. Limestone bluffs, sandy soil or black clay. Prefers dense ground cover, i.e. grapevines, palmetto.

Federal Status:	State Status: T	SGCN: Y
Endemic: N	Global Rank: G4	State Rank: S4

DENTON COUNTY

REPTILES

western box turtle *Terrapene ornata*

Ornate or western box trutles inhabit prairie grassland, pasture, fields, sandhills, and open woodland. They are essentially terrestrial but sometimes enter slow, shallow streams and creek pools. For shelter, they burrow into soil (e.g., under plants such as yucca) (Converse et al. 2002) or enter burrows made by other species; winter burrow depth was 0.5-1.8 meters in Wisconsin (Doroff and Keith 1990), 7-120 cm (average depth 54 cm) in Nebraska (Converse et al. 2002). Eggs are laid in nests dug in soft well-drained soil in open area (Legler 1960, Converse et al. 2002). Very partial to sandy soil.

Federal Status:	State Status:	SGCN: Y
Endemic: N	Global Rank: G5	State Rank: S3

western hognose snake *Heterodon nasicus*

Habitat consists of areas with sandy or gravelly soils, including prairies, sandhills, wide valleys, river floodplains, bajadas, semiagricultural areas (but not intensively cultivated land), and margins of irrigation ditches (Degenhardt et al. 1996, Hammerson 1999, Werler and Dixon 2000, Stebbins 2003). Also thornscrub woodlands and chaparral thickets. Seems to prefer sandy and loamy soils, not necessarily flat. Periods of inactivity are spent burrowed in the soil or in existing burrows. Eggs are laid in nests a few inches below the ground surface (Platt 1969).

Federal Status:	State Status:	SGCN: Y
Endemic: N	Global Rank: G5	State Rank: S4

western rattlesnake *Crotalus viridis*

Grassland, both desert and prairie; shrub desert rocky hillsides; edges of arid and semi-arid river breaks.

Federal Status:	State Status:	SGCN: Y
Endemic: N	Global Rank: G5	State Rank: S5

PLANTS

Glen Rose yucca *Yucca necopina*

Grasslands on sandy soils and limestone outcrops; flowering April-June

Federal Status:	State Status:	SGCN: Y
Endemic: Y	Global Rank: G1G2	State Rank: S1S2

Topeka purple-coneflower *Echinacea atrorubens*

Occurring mostly in tallgrass prairie of the southern Great Plains, in blackland prairies but also in a variety of other sites like limestone hillsides; Perennial; Flowering Jan-June; Fruiting Jan-May

Federal Status:	State Status:	SGCN: Y
Endemic: N	Global Rank: G3	State Rank: S3

APPENDIX E

WILDLIFE HABITAT APPRAISAL PROCEDURE (WHAP) SUMMARY REPORT

LEWISVILLE LAKE MASTER PLAN

DENTON COUNTY, TEXAS

US Army Corps of Engineers®
Fort Worth District

January 2018

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Introduction

Habitat assessments were conducted at Lewisville on October 16-20, 2017 using Texas Parks and Wildlife Department's (TPWD) Wildlife Habitat Appraisal Procedure ([WHAP] TPWD 1995). WHAP survey point locations were haphazardly preselected based on aerial imagery from existing Geographical Information Systems (GIS) data. A total of 84 WHAP points were surveyed, 11 others were skipped for various reasons, and all are within U.S. Army Corps of Engineers (USACE) fee boundary (Figures 1A through 1J).

The purpose of this report is to describe wildlife habitat quality within the USACE Lewisville Lake fee-owned property in Denton Counties, Texas. This report is being prepared by the USACE Regional Planning and Environmental Center to provide habitat quality information and inform land classifications as part of the Lewisville Lake Master Plan revision process.

Study Area

USACE fee owned property at Lewisville Lake, approximately 45,944 acres, is located within the Dallas-Fort Worth metroplex in north central Texas. More specifically, the lake sits primarily between the cities of Denton and Frisco, Texas within the Texas Blackland Prairie and Cross Timbers ecoregions. Among numerous small creeks and tributaries, the Elm Fork of the Trinity River is the major contributing stream to Lewisville Lake. Downstream of the Lewisville Lake dam, Elm Fork meanders down to the confluence with the West Fork of the Trinity River.

Methodology

An interagency team of biologists, foresters, and USACE park rangers conducted the habitat surveys on October 16-20, 2017. TPWD's WHAP protocol was used to analyze and describe existing habitats.

The WHAP requires evaluating representative sites of each cover type present within an area of interest. For this project, a search area of 0.1 acre (circle with radius of 37.2 feet) was used at each WHAP site to compile a list of plant species occurring at each site and to complete the Biological Components Field Evaluation Form (https://tpwd.texas.gov/publications/pwdpubs/media/pwd_rp_w7000_0145.pdf). Field data collected on the form at each WHAP site included the following components:

1. Site Potential
2. Temporal Development of Existing Successional Stage
3. Uniqueness and Relative Abundance
4. Vegetation Species Diversity
5. Vertical Vegetation Stratification
6. Additional Structural Diversity
7. Condition of Existing Vegetation

At each site, a 1/10th acre plot was evaluated and points were assigned to all applicable components based on field conditions. A habitat quality score, where values range from 0.0 (low quality) to 1.0 (high quality), was then calculated for each site by adding together all points and multiplying by 0.01. Habitat quality was then determined for all sites within the same habitat type.

Photographs were taken at each site and are included as Attachment B.
The TPWD developed the WHAP to allow a qualitative, holistic evaluation of wildlife habitat for particular tracts of land statewide without imposing significant time requirements in regard to field work and compilation of data (TPWD 1995). The WHAP was not designed to evaluate habitat quality in relation to specific wildlife species.

The WHAP is based on the following assumptions:

1. Vegetation structure including species composition and physiognomy is itself sufficient to define the habitat suitability for wildlife;

2. A positive relationship exists between vegetation diversity and wildlife species diversity;

3. Vegetation composition and primary productivity directly influence population densities of wildlife species.

As designed, the WHAP is intended to be used for the following applications:

1. Evaluating impacts upon wildlife populations from specific development project alternatives.
2. Establishing baseline data prior to anticipated or proposed changes in habitat conditions for specific areas.
3. Comparing tracts of land that are candidates for land acquisition or mitigation.
4. Evaluating general habitat quality and wildlife management potential for tracts of land over large geographical areas, including wildlife planning units.

The WHAP protocol can be used to assess a wide range of habitats, however it was originally developed to assess and develop mitigation requirements for loss of bottomland hardwoods and other aquatic habitats. Scores can screw higher for these habitats based on how the scoring is allotted to each WHAP habitat component. Upland forest and grassland habitat types cannot reach a score indicative of high quality habitat although they may exhibit high quality features. Subsequently, high quality upland habitat may not be identified or can be overlooked.

Grasslands, in particular, fall into this category. Consider the Site Potential component with a maximum score of 0.25 points, it allocates more points based on higher hydrologic connectivity. In order to receive the highest score for this component, the area must exhibit at least one of the following: at least periodically support predominately hydrophytic vegetation, is predominately undrained hydric soil and supports or is capable of supporting hydrophytic vegetation, and/or is saturated with water or covered by shallow water during 1-2 months during the growing season of each year. In a grassland setting, when conditions become conducive to hydrophytic plant growth, a successional shift from a grassland to herbaceous wetlands, swamps, or riparian forest is likely to occur. Therefore, grasslands would almost always be limited to a maximum score of 0.12 points (uplands with thick surface layer).

Similarly, grasslands would be limited to a maximum of 0.12 points for the Temporal Development of Existing Successional Stage component, whereas other forested habitats could receive the full 0.25 points.

These two components alone regularly exclude grassland habitat from receiving 0.26 points on the WHAP scale. In order to identify the maximum score each habitat type can receive, USACE environmental staff scored each criteria given ideal conditions for riparian/bottomland hardwood forest (BHF), upland forest (includes all non-riparian/BHF forests), grassland, swamp, and marsh habitats. The maximum values scores, shown in Table 1, were then used to normalize scores for habitats that are prevented from reaching the maximum WHAP score primarily due to arbitrary low scores in the two WHAP components described above. Normalizing habitat scores will identify high quality habitat that would otherwise not be detected.

Table 1. Maximum Total Score per Habitat Type

Cover Type	Component Number								Maximum Total Score
	1	2	3	4	5	6	7	7B	
Swamp	20	20	20	20	5	5	5	5	1.00
Marsh	25	20	20	20	NA	5	10	NA	1.00
Riparian/BHF	25	20	20	15	5	5	5	5	1.00
Upland Forest	12	20	20	15	5	5	5	5	0.87
Grassland	12	12	20	6	3	5	5	5	0.68

Swamp, marsh, and riparian/BHF habitats can all achieve the maximum score, therefore, no normalization of scores were made for these habitat types. Upland forests and grasslands,

however, can only reach within 0.13 and 0.32 points of the maximum WHAP score, even in ideal conditions.

To evaluate all habitat types on an even scoring basis, upland forest and grassland scores were normalized by dividing their original scores by the maximum possible score for their respective habitat types. For example, if a grassland site received an initial score of 0.42, it would be divided by the maximum total points a grassland site can receive, 0.68. The normalized total score used for further analysis for the grassland site would be 0.61.

This adjustment allows habitat type scores to be analyzed and compared to their corresponding habitat type maximum total score. Rather than, for instance, a grassland being evaluated on a bottomland hardwood scoring scale.

All WHAP scores analyzed and discussed from here forward reflect the normalized total scores. As mentioned above, swamp, marsh, and riparian/BHF habitats were not normalized as they can already achieve maximum scores. Grassland scores were normalized by dividing initial scores by 0.68, while all upland forest scores were normalized by dividing the initial score by 0.87.

Habitat

Using TPWD's Texas Ecological Mapping Systems (https://tpwd.texas.gov/landwater/land/programs/landscape-ecology/ems/), Lewisville Lake lies within the Texas Blackland Prairie and Cross Timbers ecoregions. The most common habitat types include grassland, marsh, riparian/BHF, and upland forest (Elliot, 2014). Table 2 displays all habitats surveyed and the number of points surveyed within each respective habitat type.

Table 2. Survey Points per Habitat Type

Habitat Type	Points Surveyed
Grassland	12
Marsh	3
Riparian/BHF	28
Upland Forest	41
Total Points Surveyed	**84**

Elliot (2014) provided general habitat type descriptions and associated vegetation communities for the Ecological Systems Classification and Mapping Project in support of the Comprehensive Wildlife Conservation Strategy for the Texas Parks and Wildlife Department. These descriptions were meant to be broad and depict typical vegetative assemblages across vast areas as the observable vegetation communities can vary based on local conditions.

Historically, tallgrass prairies consisting of little bluestem, big bluestem, yellow Indiangrass, tall dropseed, eastern gamagrass and many forbs, such as asters, clovers, and black-eyed susan dominated the region. Before nearly all of the prairie was developed, bison and pronghorn, greater prairie chickens, and even ocelot utilized this area. Only an estimated 5,000 widely scattered acres in small tracts remain of the original 12 million acres of the region, or less than one-tenth of one percent of remaining prairie. Riparian hardwoods, primarily bur oak, Shumard oak, sugar hackberry, elm, ash, eastern cottonwood, and pecan, meander this prairie. The headwaters of several east Texas rivers begin in the Blackland Prairie region. In addition, the Trinity, Brazos and Colorado Rivers, and many tributaries of nearly every major system feeding the Gulf of Mexico, originate in or cross the Blackland Prairies (TPWD, 2012).

Early settlers found the Cross Timbers' woodlands thick and impenetrable. Dominated by post and blackjack oak, these woodlands were often cleared for farming. The remaining woodland tracts can contain trees reaching 200-500 years old. Today juniper and yaupon are a more abundant component of the Cross Timbers, pockets of prairie are spread throughout agriculture, oil and gas, and urban use areas (TPWD, 2012). The ecoregion is characterized by moderate but sporadic rainfall. Typical vegetation that can be found in the Cross Timbers include: Post Oak (*Quercus stellate), Blackjack Oak (Quercus marilandica), Black Hickory (Carya texana), Bitternut Hickory (Carya cordiformis), Dwarf Chinkapin Oak (Quercus prinoides), Cedar Elm*

(Ulmus crassifolia), Oak (*Quercus) spp,* Little Bluestem *(Schizachyrium scoparium), Sumac (Rhus) spp,* Eastern Red Cedar (*Juniperus virginiana), Ashe Juniper (Juniperus ashei)* and Honey Mesquite (*Prosopis glandulosa).*

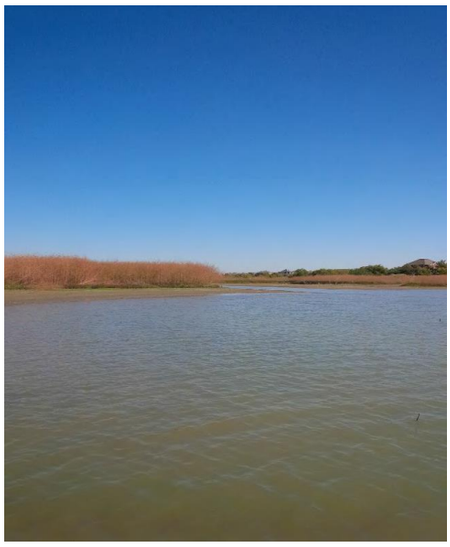


Figure 2 displays the distribution of habitat types within the USACE boundary at Lewisville Lake. For analysis purposes, habitat types were pooled into one of four categories: grassland, marsh, riparian/BHF, and upland forest.

Results and Discussion

The total habitat score for each point surveyed is a representation of multiple habitat attributes including vegetative diversity and structure, site soil potential, successional stage, and uniqueness of that habitat across the landscape. Data analysis highlights are discussed below, while detailed data for each point surveyed can be found in Attachment A: Lewisville WHAP Summary Results of this report.

Upland forest (N = 41) and riparian/BHF (N = 28) were the most abundant habitat types surveyed. Upland forest scores ranged from 0.89 to 0.43 while riparian/BHF scores fell between 0.81 and 0.45 (Table 3). The lower minimum scores, especially for these normally drier upland habitats, may be partly due to long-term flooding that occurred at Lewisville Lake in recent years, thus leading to reduced plant diversity. Flooding at lower elevations in the flood pool of Lewisville Lake almost certainly led to mortality of the typically upland species of herbaceous plant growth. This certainly affected survey metrics within the inundated areas. Long-term flooding of Federal lands is a routine occurrence at typical Corps lakes having a primary mission of flood risk reduction.

The average, maximum, and minimum total score observed for each habitat type surveyed is shown in Table 3.

Table 3. Average, Maximum, and Minimum Total Scores per Habitat Type

Habitat Type	Average Total Score	Maximum Total Score	Minimum Total Score
Grassland	0.66	1.00	0.47
Marsh	0.77	0.98	0.41
Riparian/BHF	0.63	0.81	0.45
Upland Forest	0.61	0.89	0.43

Figures 3A through 3J show the range of total scores for all points surveyed (N = 84) as well as the 11 additional points that were skipped due to inaccessibility or multiple points occurring in the same area. Skipped points show a total score of 0 in figures 3A through 3J but were not included in the analyses. Overall marsh and grassland habitats exhibited the highest average total score (0.70 and 0.66), as these habitats generally exhibited more herbaceous vegetative species and structural diversity. On average, all habitat types, including riparian/BHF and upland forest, displayed at least medium quality habitat.

The grassland site receiving a score of 1.00 is likely to transition to upland forest in the near future. The surrounding forest will continue to encroach into the grassland area as supported by the diversity of young woody species detected within the site.

Also noteworthy, considerable conservation and education efforts are ongoing at Lewisville Lake, especially within Lewisville Lake Environmental Learning Area (LLELA) in addition to environmental research being conducted at the Lewisville Aquatic Ecosystem Research Facility (LAERF). Both of these areas are located on USACE owned property below the lake dam. Habitat scores in this area are expected to climb as native plant diversity increases due to LLELA and LAERF efforts. Native prairie and forest habitat in the region has largely been altered or lost due to different land uses. As development increases around Lewisville Lake these areas are likely to become more unique, and highly valuable for wildlife.

Beyond vegetative diversity, the three major metrics within the WHAP scoring criteria that allocate points are for site potential, successional stage, and uniqueness and relative abundance. Table 4 shows these metrics' average score per habitat type.

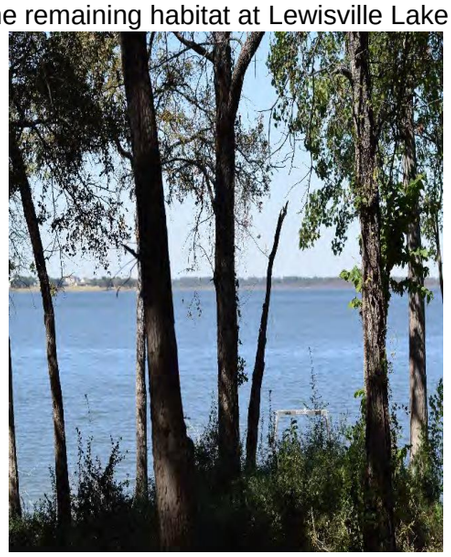
Table 4. Average Site Potential, Successional Stage, and Uniqueness and Relative Abundance Scores per Habitat Type

Habitat Type	x̄ Site Potential	x̄ Successional Stage	x̄ Uniqueness and Relative Abundance
Grassland	14.67	5.92	8.33
Marsh	23.33	NA	15.00
Riparian/BHF	17.11	12.29	12.14
Upland Forest	16.02	10.29	10.24

Site potential allocates more points based on soil substrates characteristics and hydrologic connectivity that can support hydrophytic habitats, such as marshes, swamps, and bottomland hardwood forests that are often considered to be higher quality, more diverse habitat. This allows areas to score higher even though a recent disturbance, such as fire or flood, may have removed most of the vegetation. Areas scoring high in site potential but low in other metrics can be targeted for management efforts as these areas' vegetation community response should be favorable, thus increasing habitat value.

Successional stage refers to the age of the vegetative community. Older, mature forests, as do climax prairies, score higher than younger pole stands or disturbed grasslands as they provide more diverse forage, cover, and niche habitats. These scores are expected to increase across the board except in areas around the lake that may not have the soil types to support hydrophytic vegetation and are flooded frequently enough to limit upland forest or grassland growth and development.

Uniqueness and Relative Abundance takes into consideration the rarity of a habitat or vegetative community and its abundance in the region. Ongoing urban expansion has significantly influenced the region's remaining habitat composition. Few large, contiguous patches of habitat remain within the DFW metroplex Lewisville Lake and the surrounding terrestrial habitat represents one of these remaining patches that have become less abundant across the region. As urban development continues, the remaining habitat at Lewisville Lake will likely increase in overall wildlife value and uniqueness.



Riparian forests are typically found in highly productive soils and consist of vegetation communities that persist and even thrive when exposed to frequent or extended periods of flooding. As such, these areas exhibited the highest average site potential, successional stage, and uniqueness and relative abundance scores among all habitat types surveyed.

As noted earlier, large scale conservation management efforts have been in progress at Lewisville Lake. Several of these sites were surveyed within LLELA and LAERF as part of this effort. Overall, seven riparian/BHF sites (0, 1, 11, 62, 64, 67, 85), ten upland forest sites (3, 24, 26, 49, 50, 52, 65, 66, 79, 92), and two grassland sites (20, 38) received scores over 0.70, exhibiting medium to high quality habitat. Eight of these points are located below the lake dam and largely represent the conservation and restoration efforts completed to date and are likely to increase in habitat value as restoration efforts continue.

Five points (48, 45, 13, 6, and 9) surveyed received scores over 0.80 indicating very high quality habitat. Points 13 (riparian/BHF), 6 (Marsh), and 9 (riparian/BHF), which were below the lake dam, all scored over 0.90 representing near pristine habitat. These areas support marsh, riparian/BHF, upland forest and grassland habitats featuring high tree and grass species diversity as well as a variety of niche habitats. In addition, these five points all received the high scores for site potential, successional stage, and uniqueness and relative abundance criteria. Figure 4 highlights the WHAP points scoring over 0.70 by habitat type.

In summary, high quality habitat appears to occur in patches around Lewisville Lake. Considering the WHAP analysis, expected urban development, and spatial distribution of higher scoring points, four areas were identified as having contiguous high quality habitat in relation to the remaining lands administered by USACE at Lewisville Lake. These areas include the lands

below the lake dam, Hickory Creek branch, Little Elm Fork branch, and the Elm Fork of the Trinity River branch.

Recommendations

Even with planned and unplanned disturbances, there are numerous areas of valuable wildlife habitat remaining on USACE fee property at Lewisville Lake.

Current conservation and restoration management practices at Lewisville Lake include prairie restoration using thinning and prescribed fire, and chemical treatment for the improvement of upland and riparian habitats with an overall goal of increasing native species diversity and maintaining overall health. Overall, habitat management has shown to be effective in maintaining medium- to high-quality wildlife habitat on USACE lands at Lewisville Lake.

Based on the results of the WHAP survey efforts, areas to consider for Wildlife Management or Environmentally Sensitive Areas land classifications include contiguous tracts of land having medium or greater WHAP survey scores. The planning team for the Lewisville Lake Master Plan revision will take into account the WHAP scores when making land classification decisions.

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Lewisville Lake WHAP Summary Result Figures

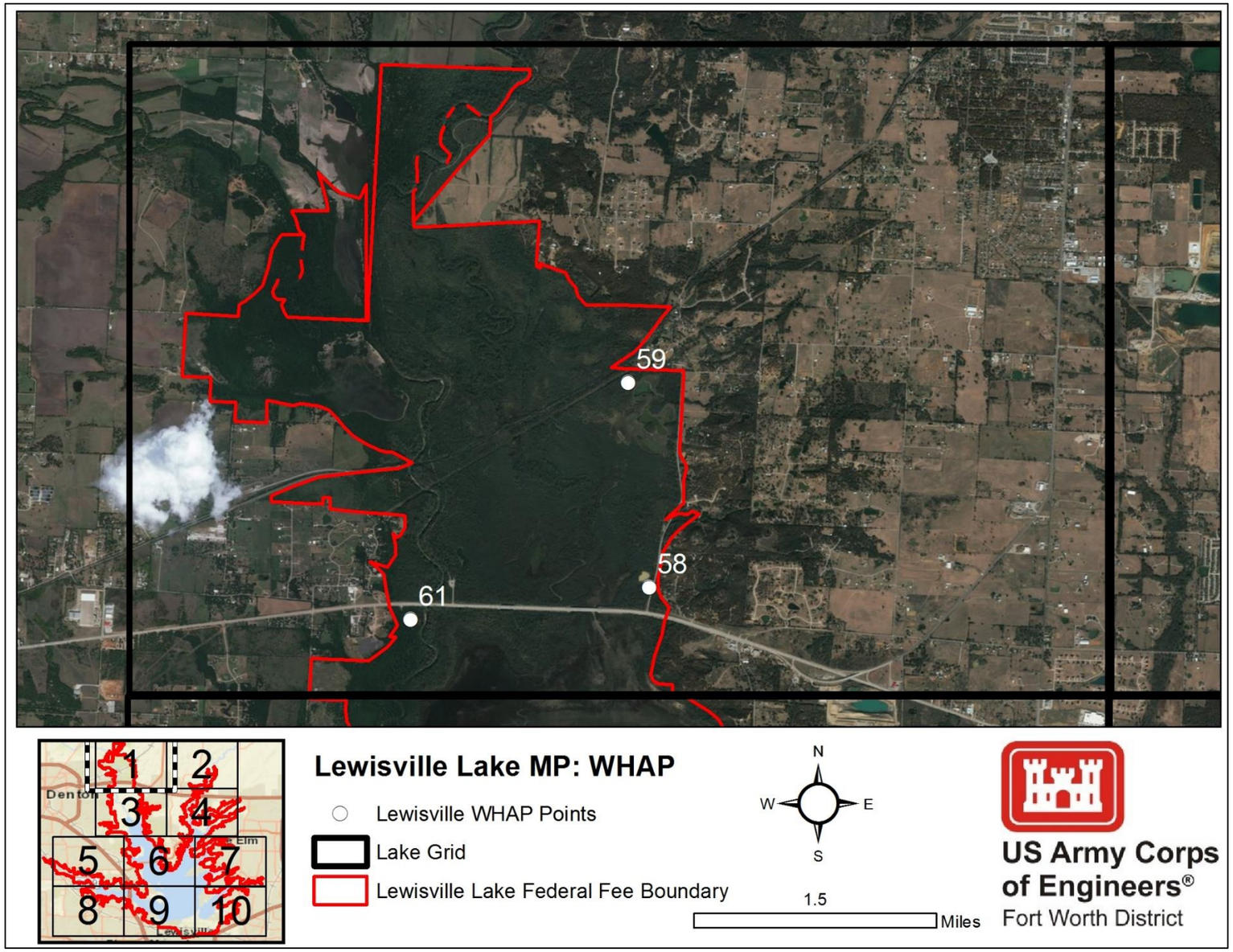

Figure 1A. Distribution of WHAP Points within the fee owned boundary at Lewisville Lake.

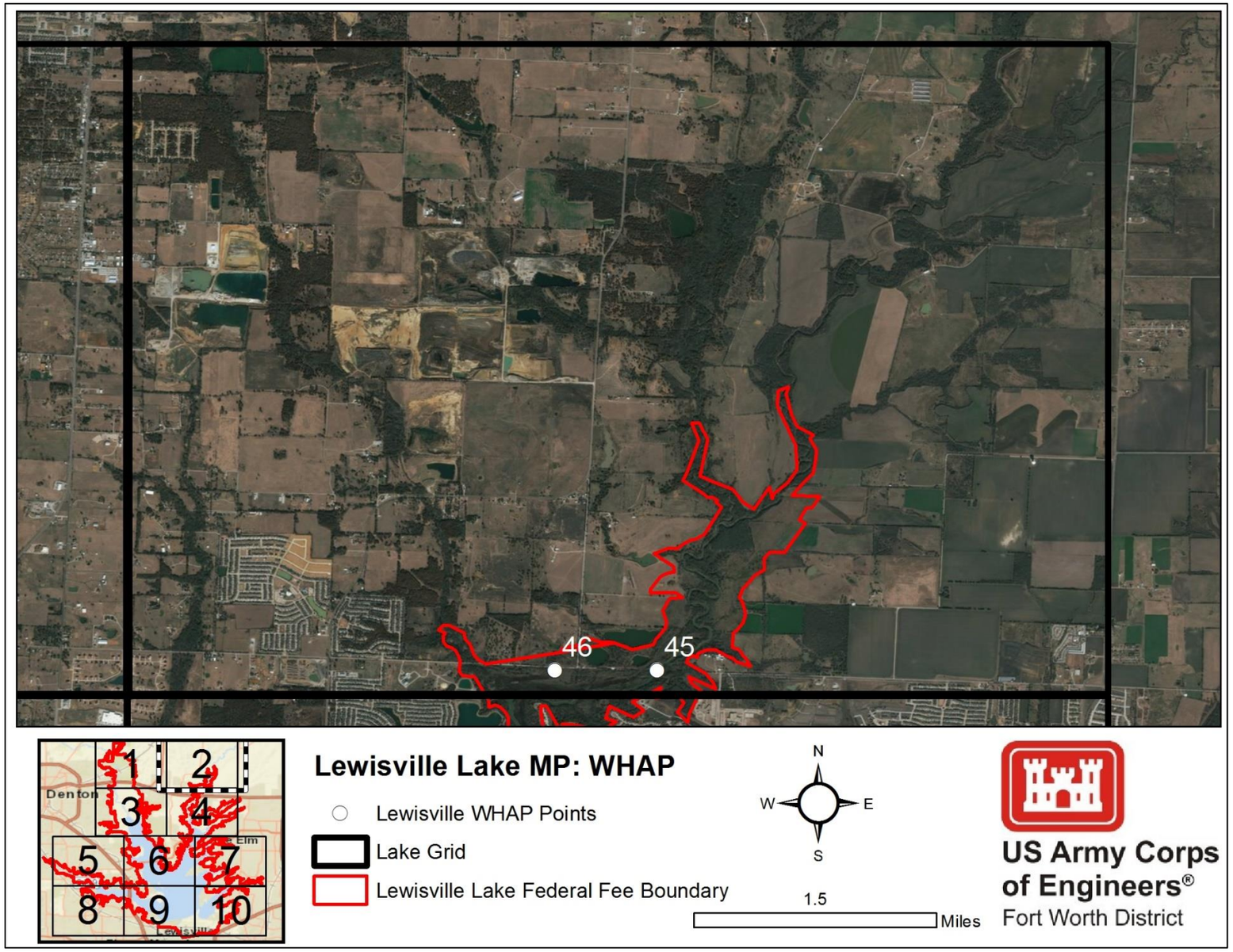

Figure 1B. Distribution of WHAP Points within the fee owned boundary at Lewisville Lake.

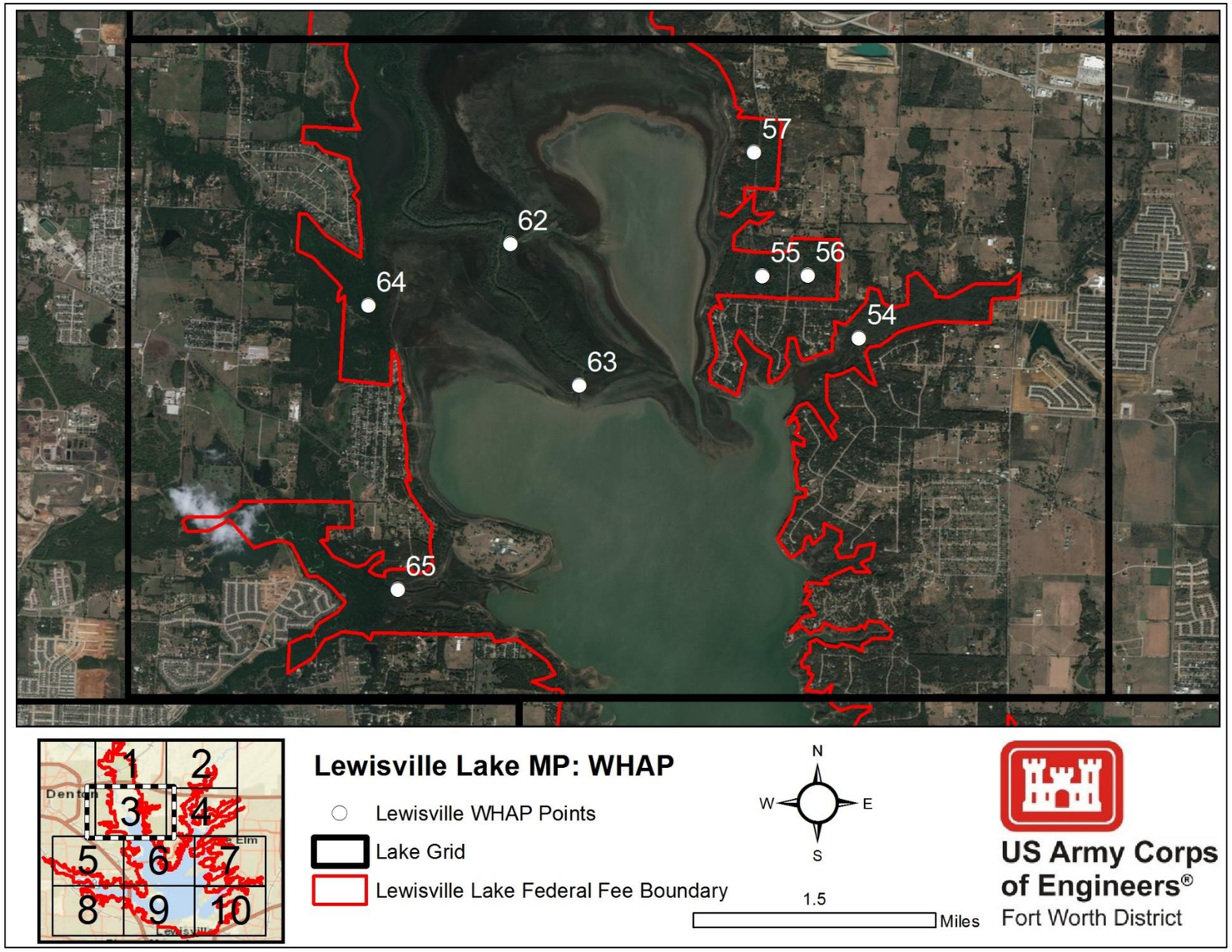

Figure 1C. Distribution of WHAP Points within the fee owned boundary at Lewisville Lake.

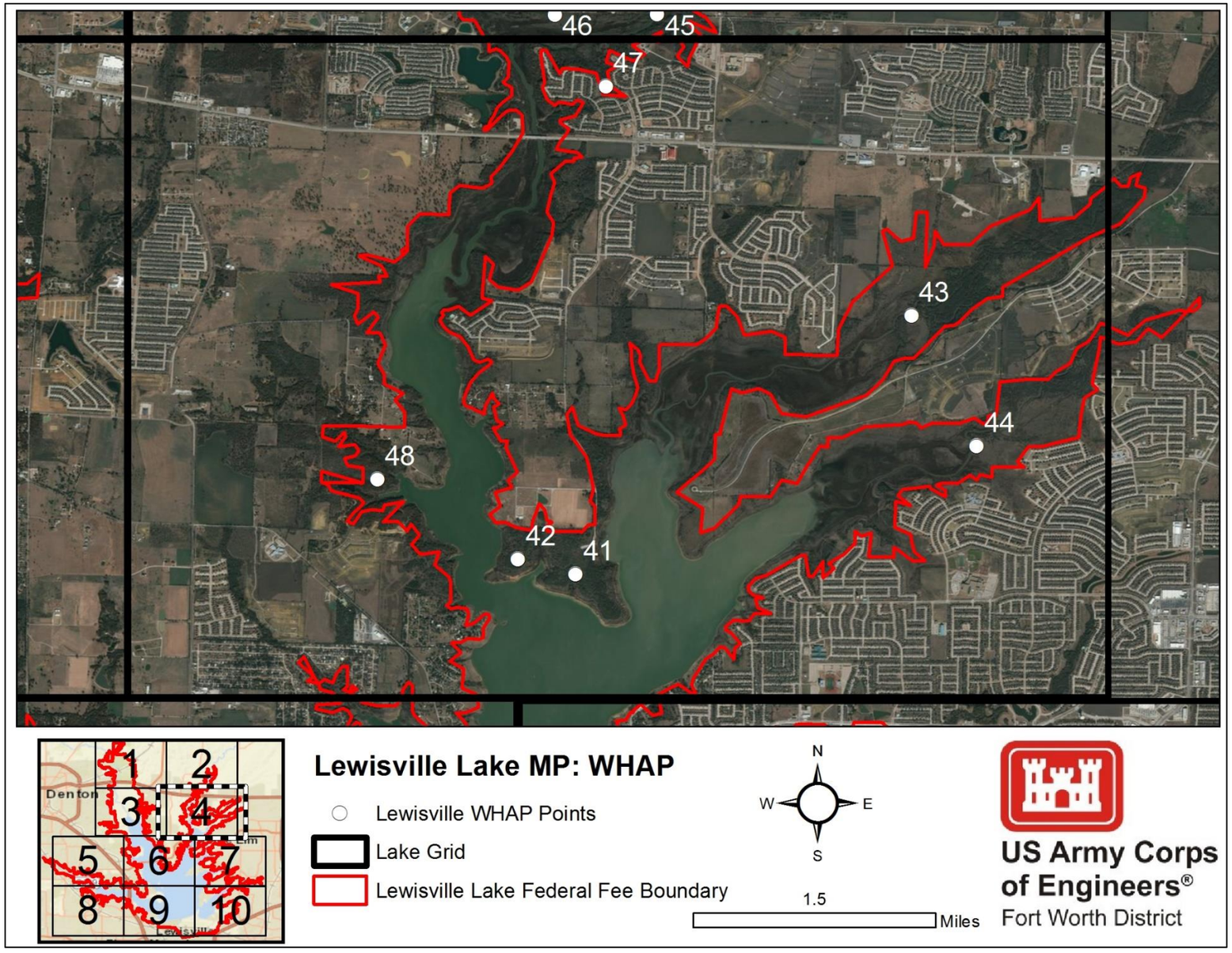

Figure 1D. Distribution of WHAP Points within the fee owned boundary at Lewisville Lake.

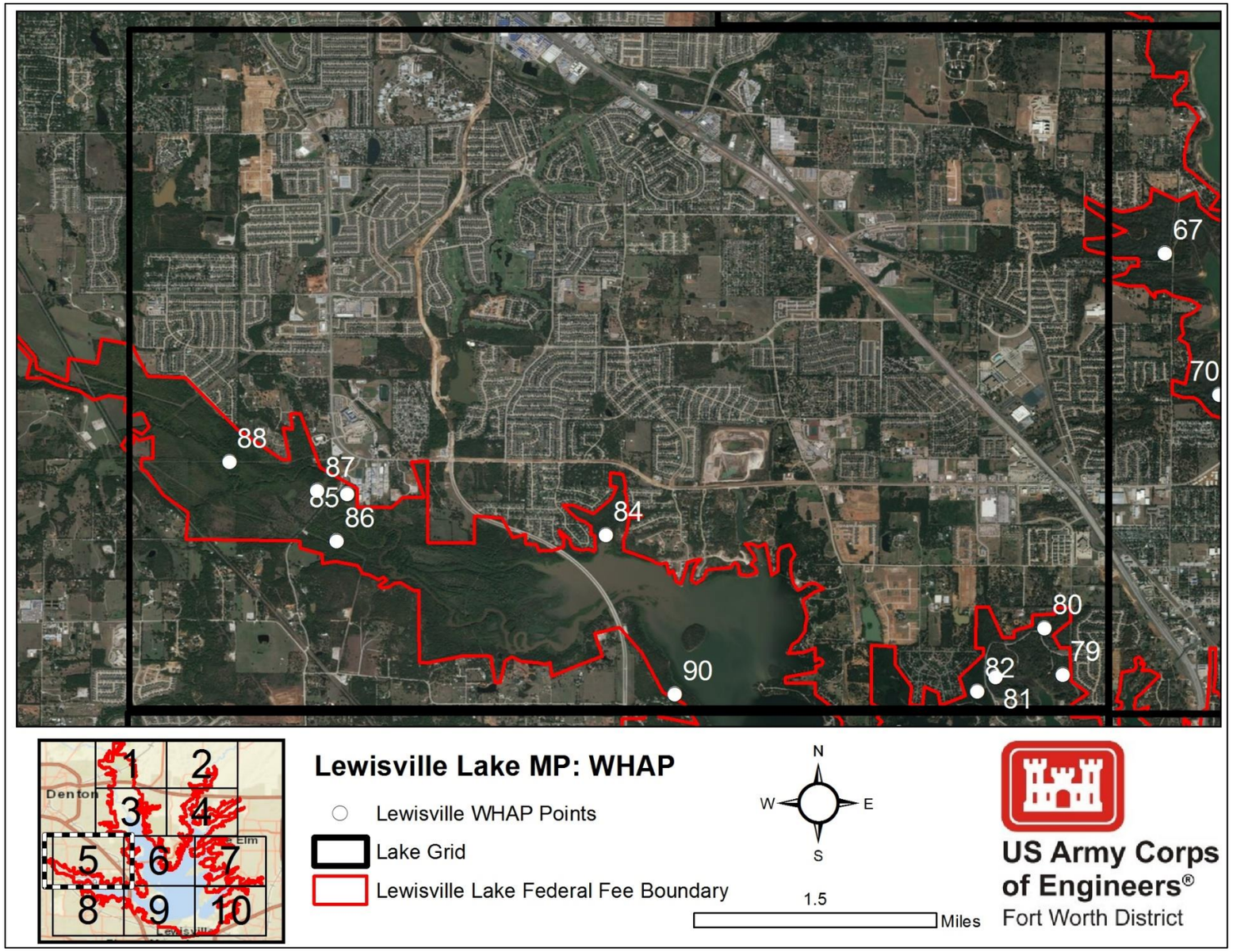

Figure 1E. Distribution of WHAP Points within the fee owned boundary at Lewisville Lake.

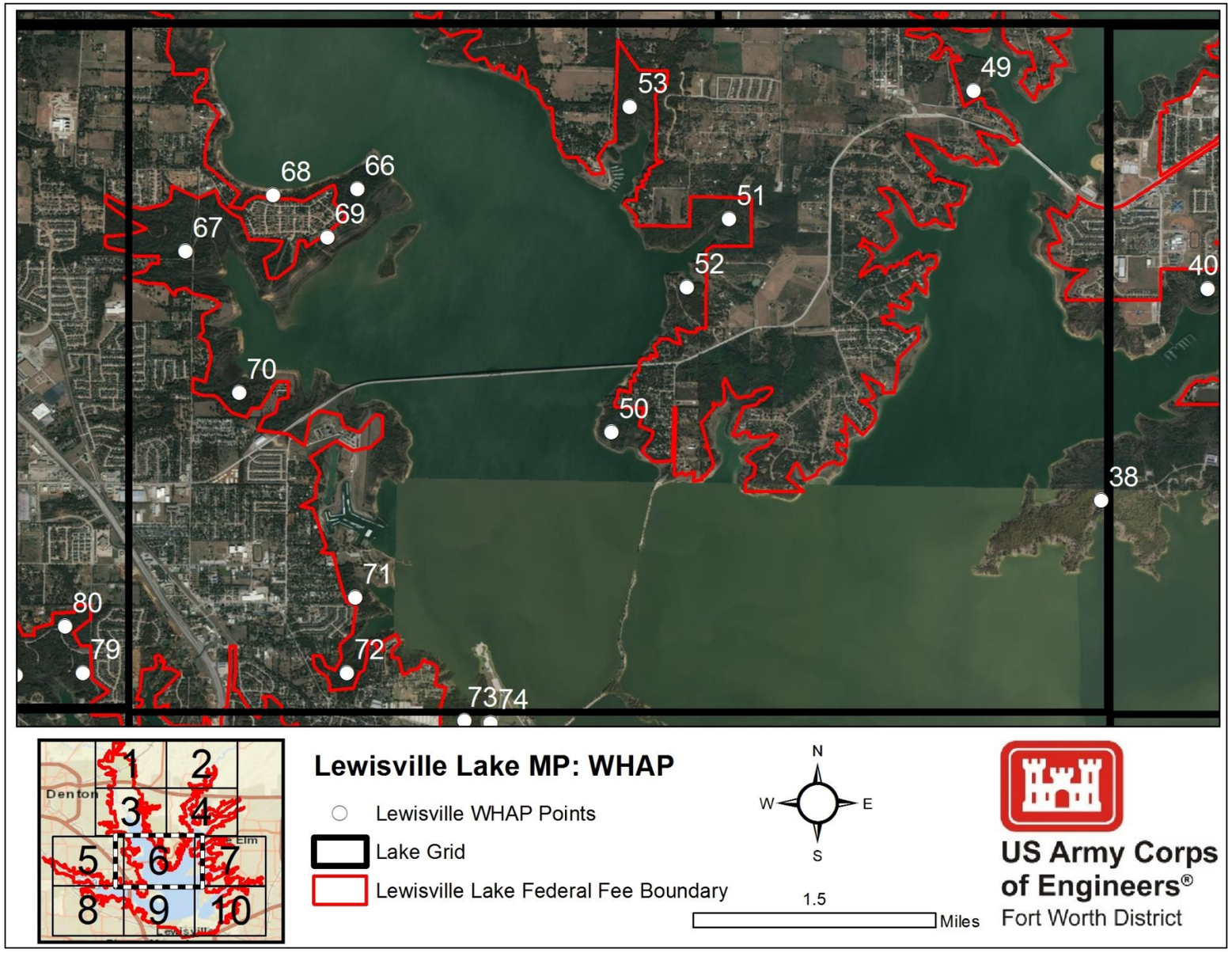

Figure 1F. Distribution of WHAP Points within the fee owned boundary at Lewisville Lake.

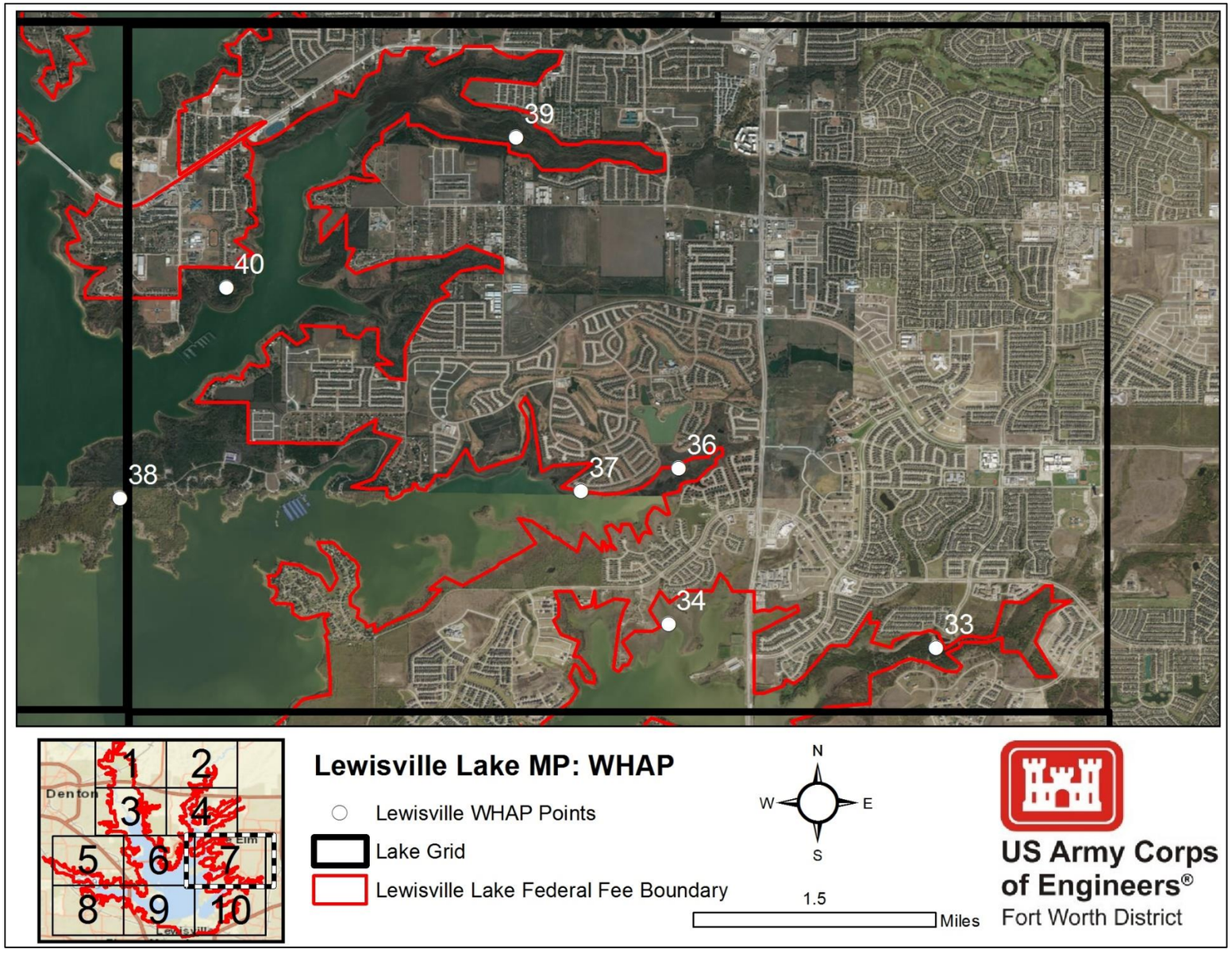

Figure 1G. Distribution of WHAP Points within the fee owned boundary at Lewisville Lake.

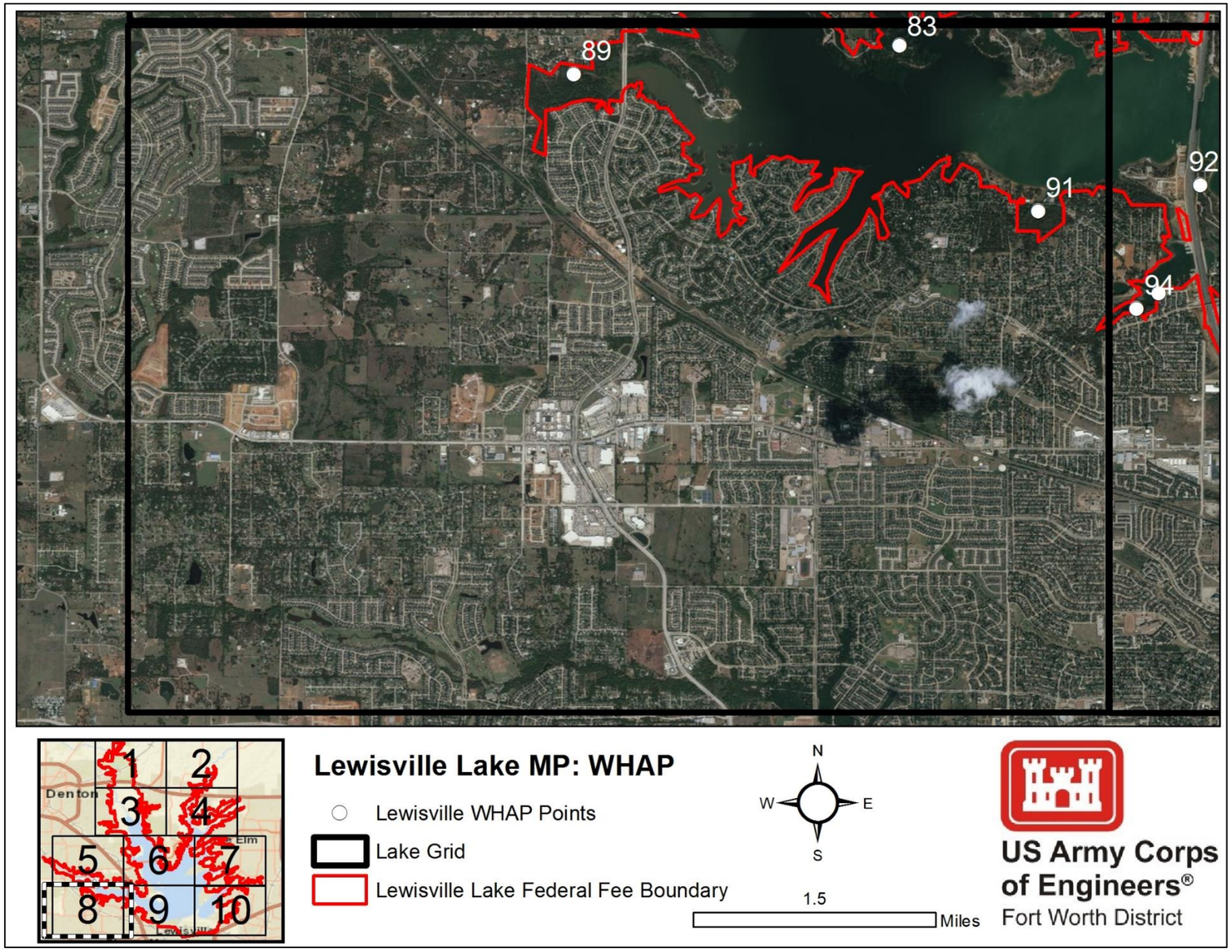

Figure 1H. Distribution of WHAP Points within the fee owned boundary at Lewisville Lake.

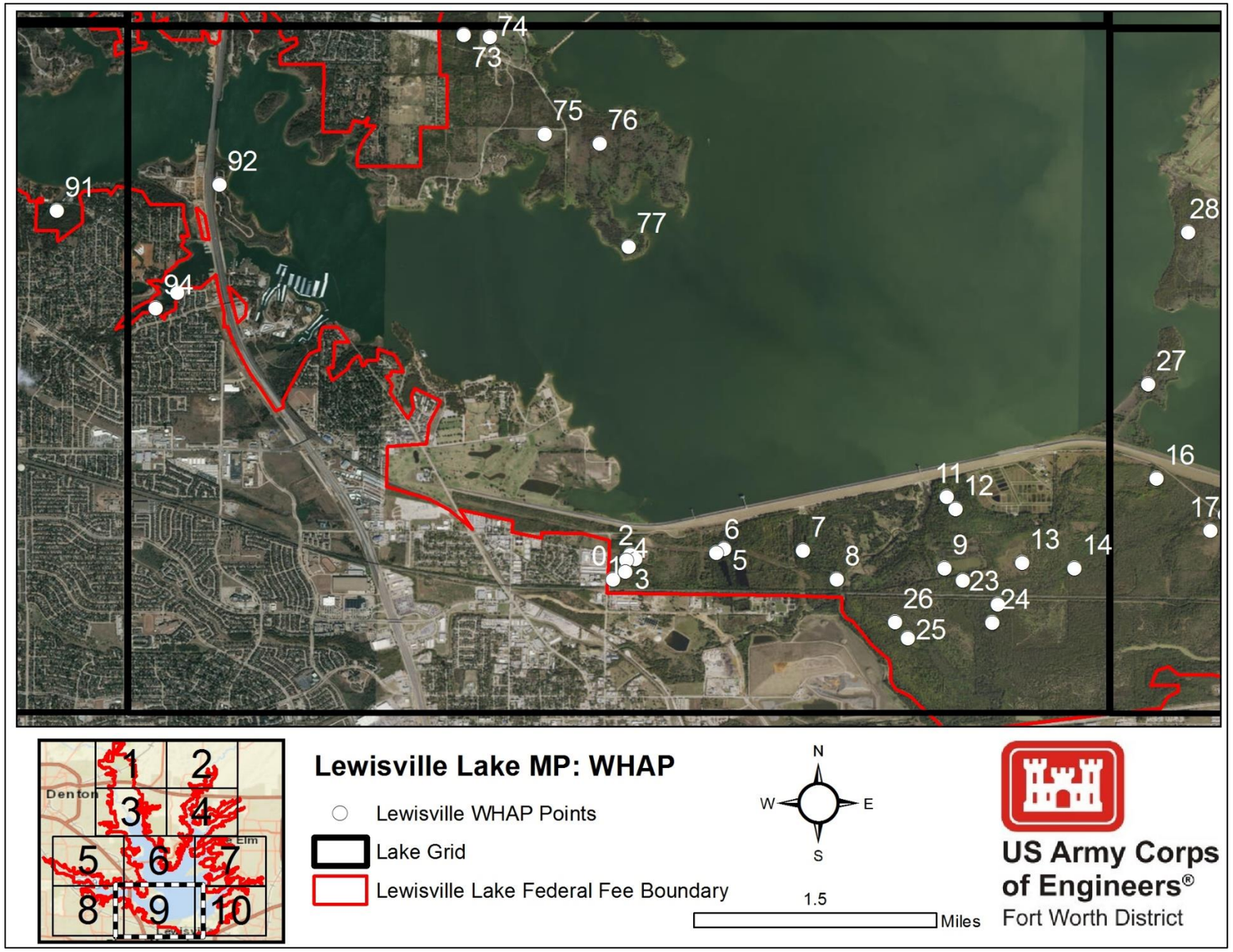

Figure 1I. Distribution of WHAP Points within the fee owned boundary at Lewisville Lake.

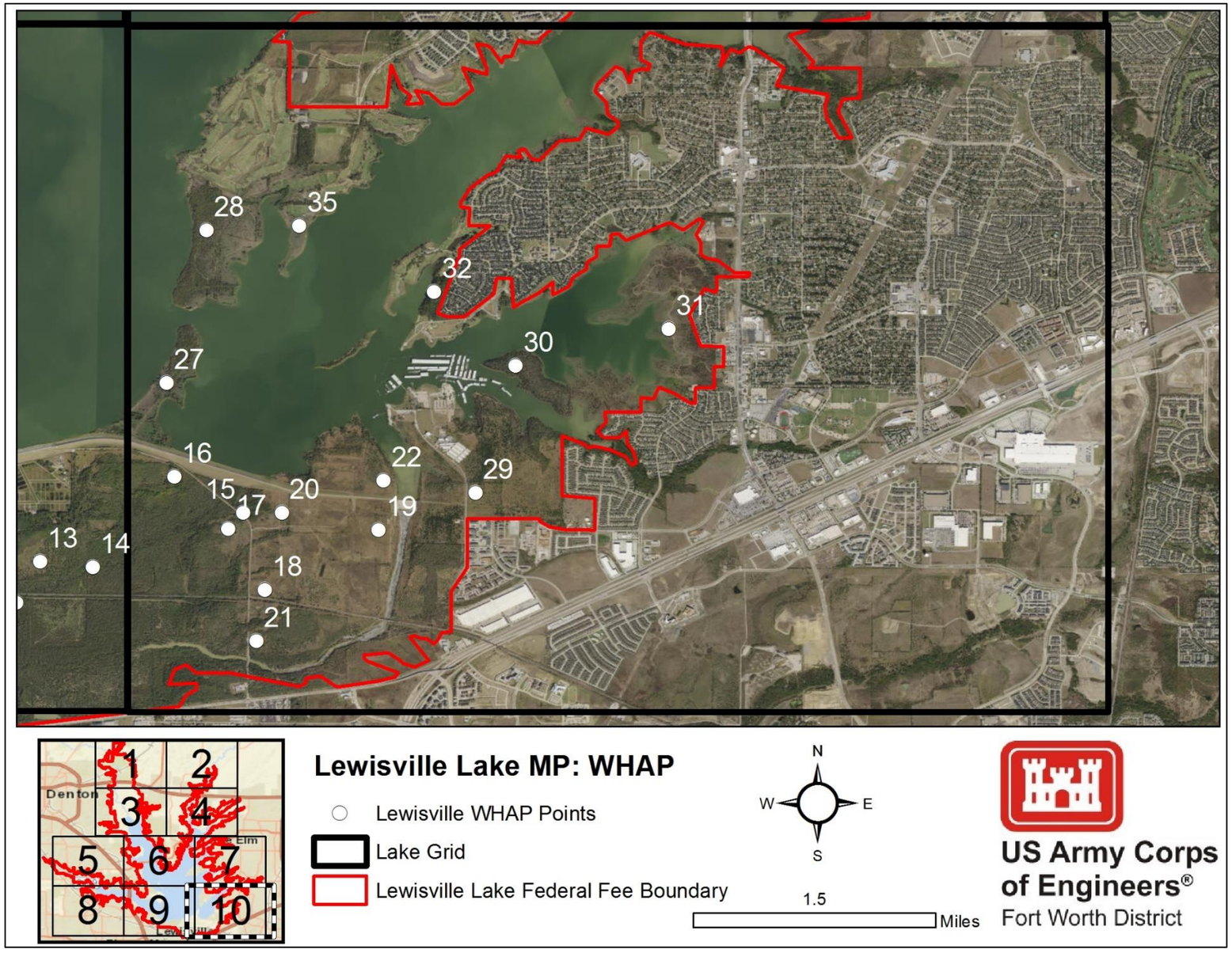

Figure 1J. Distribution of WHAP Points within the fee owned boundary at Lewisville Lake.

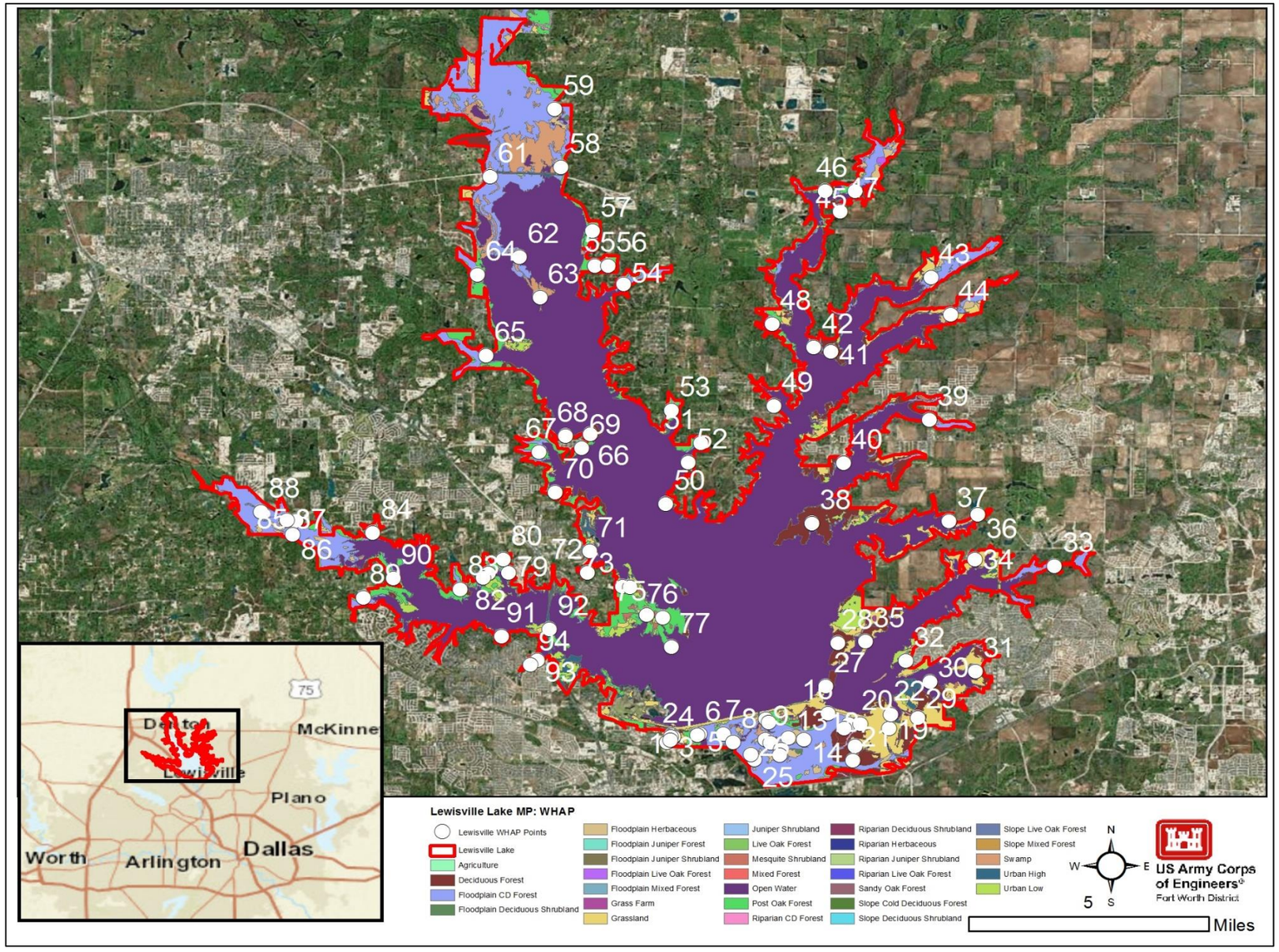

Figure 2. Distribution of Habitat Types within the fee owned boundary at Lewisville Lake.

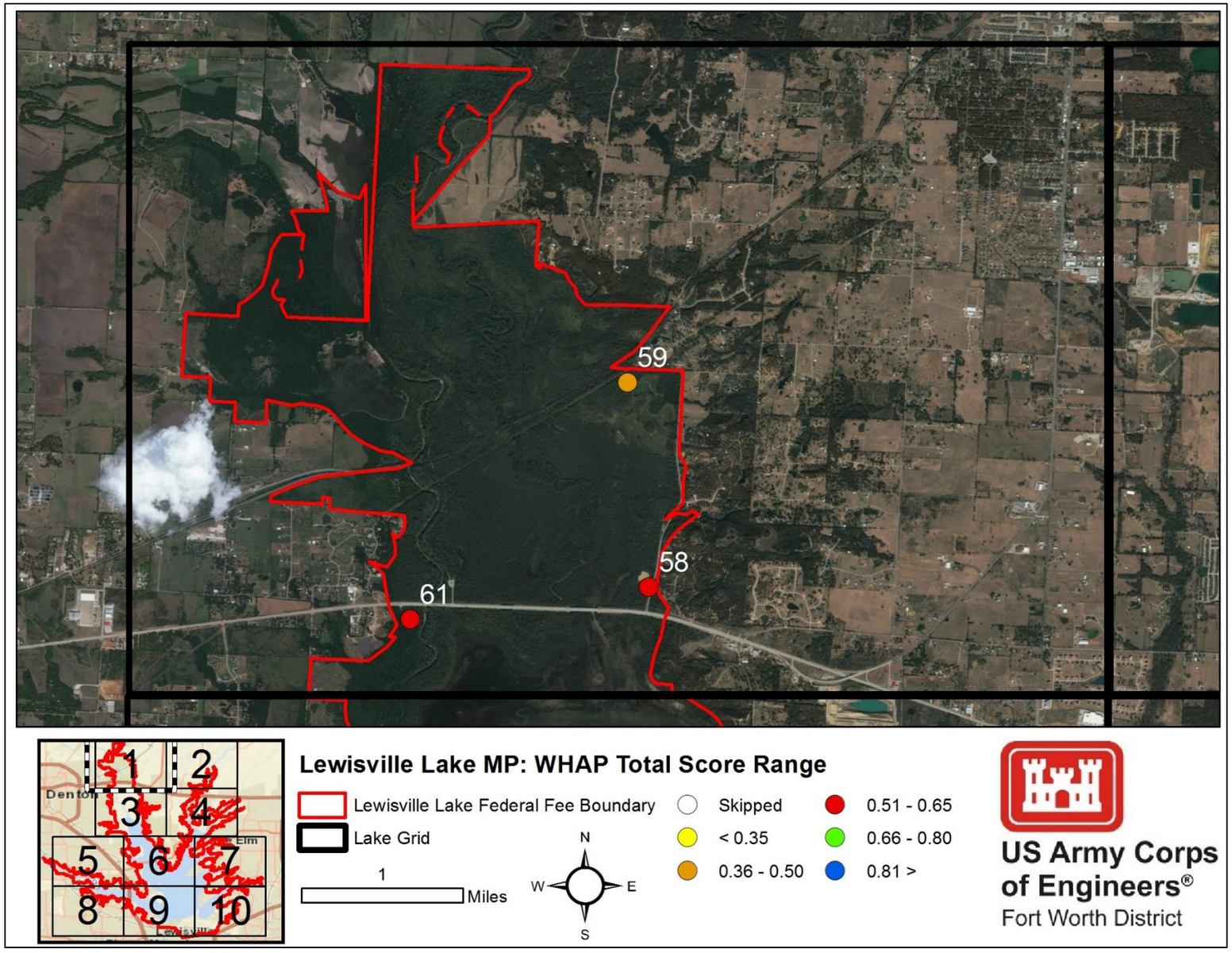

Figure 3A. Total Score Range for All Points Surveyed.

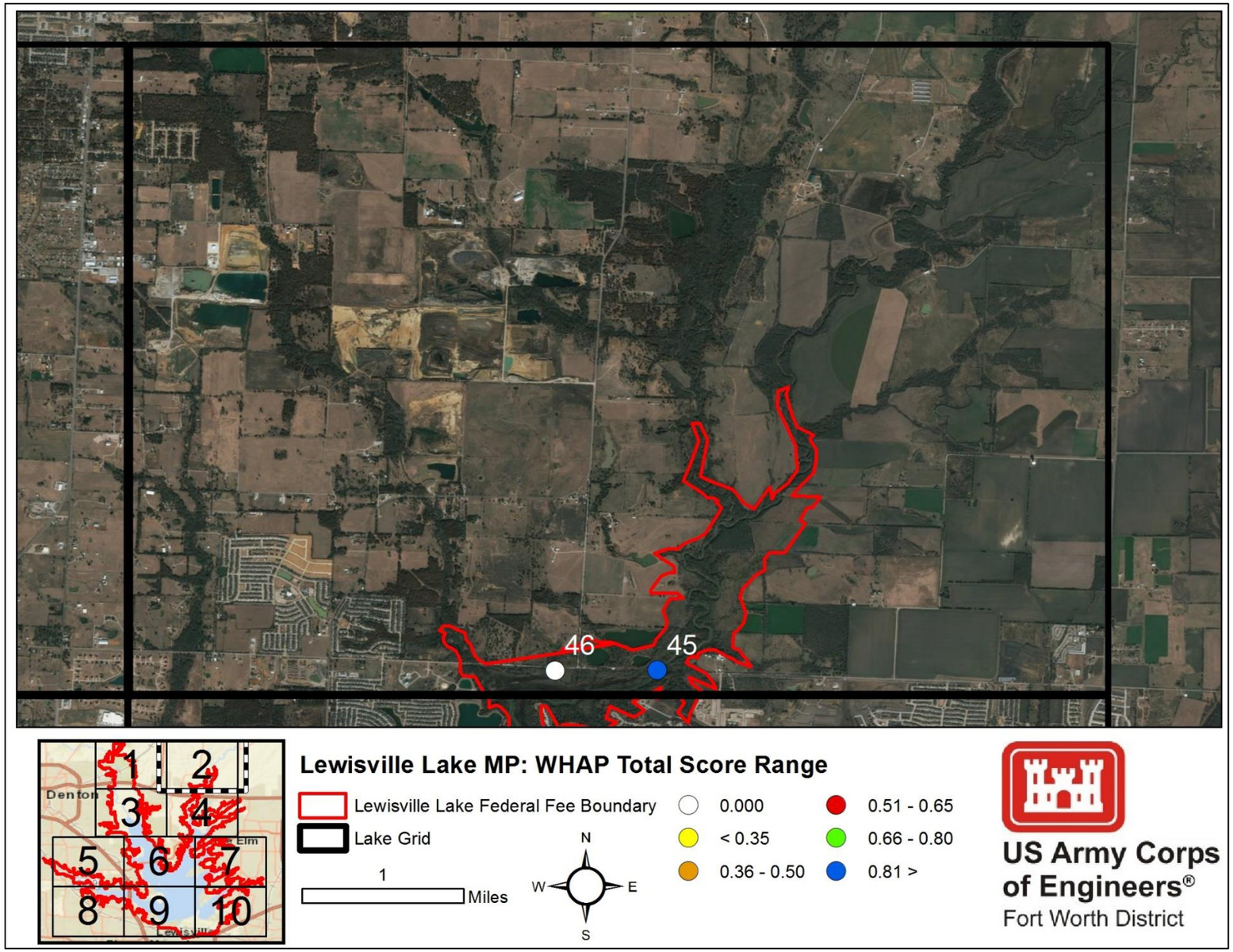

Figure 3B. Total Score Range for All Points Surveyed.

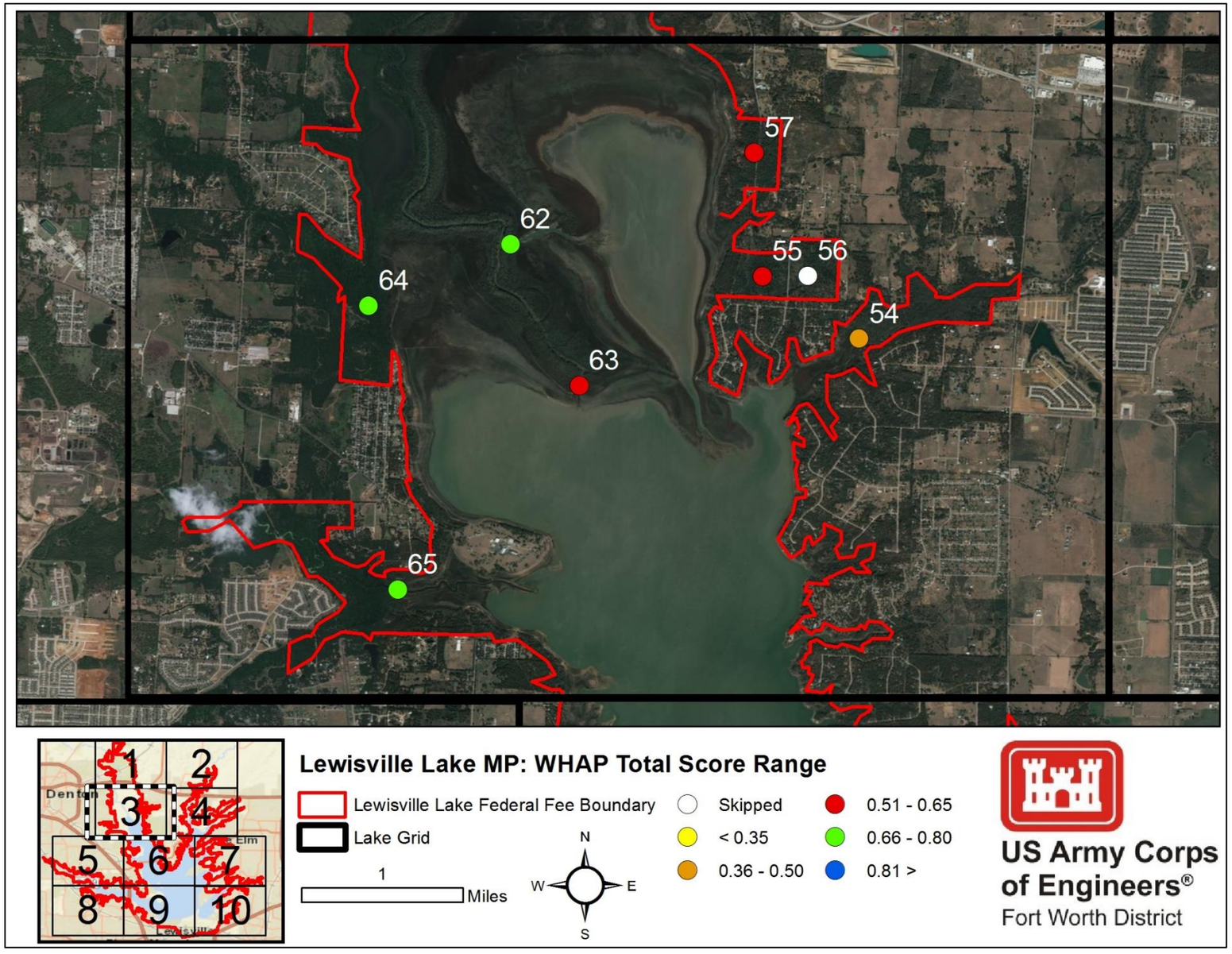

Figure 3C. Total Score Range for All Points Surveyed.

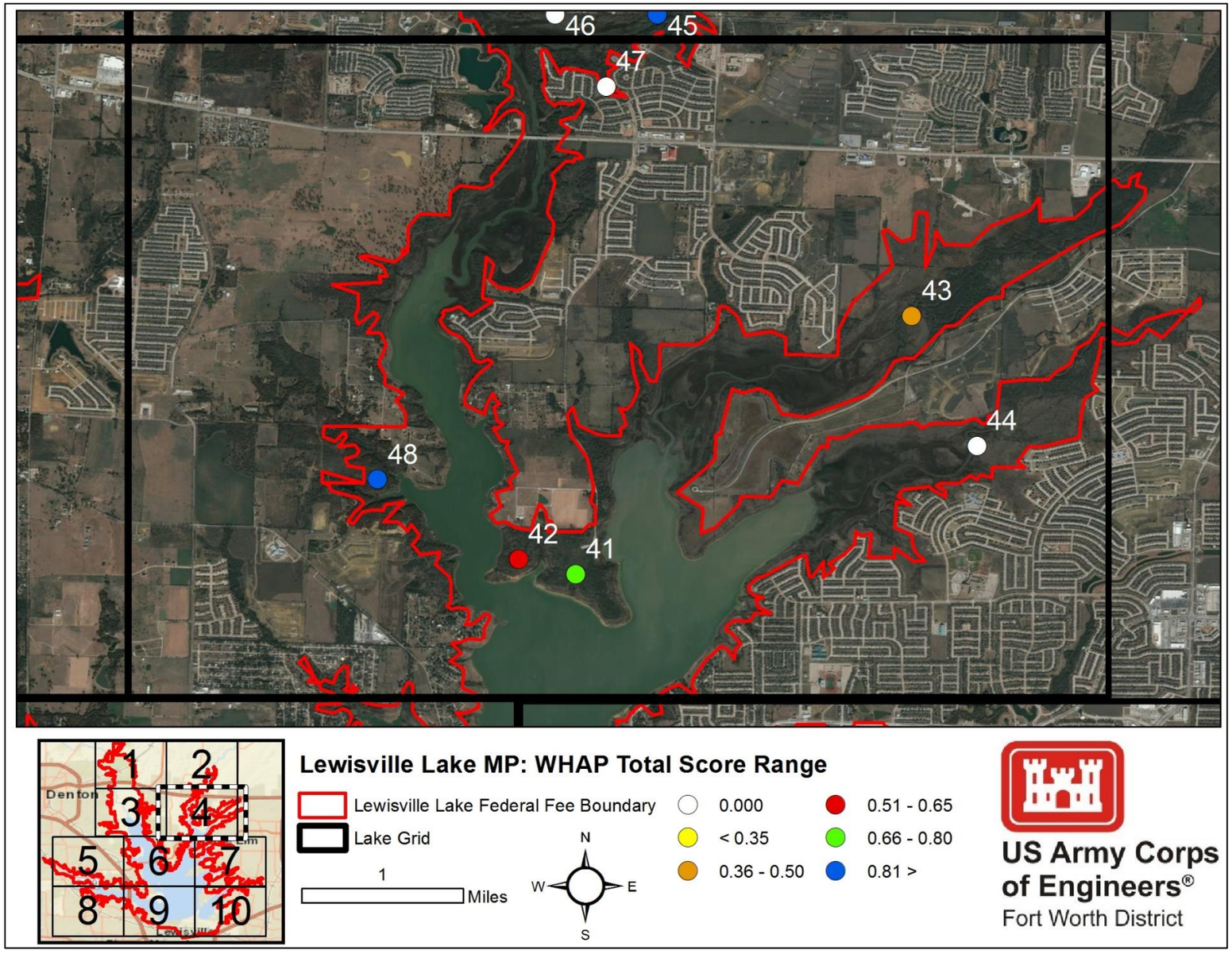

Figure 3D. Total Score Range for All Points Surveyed.

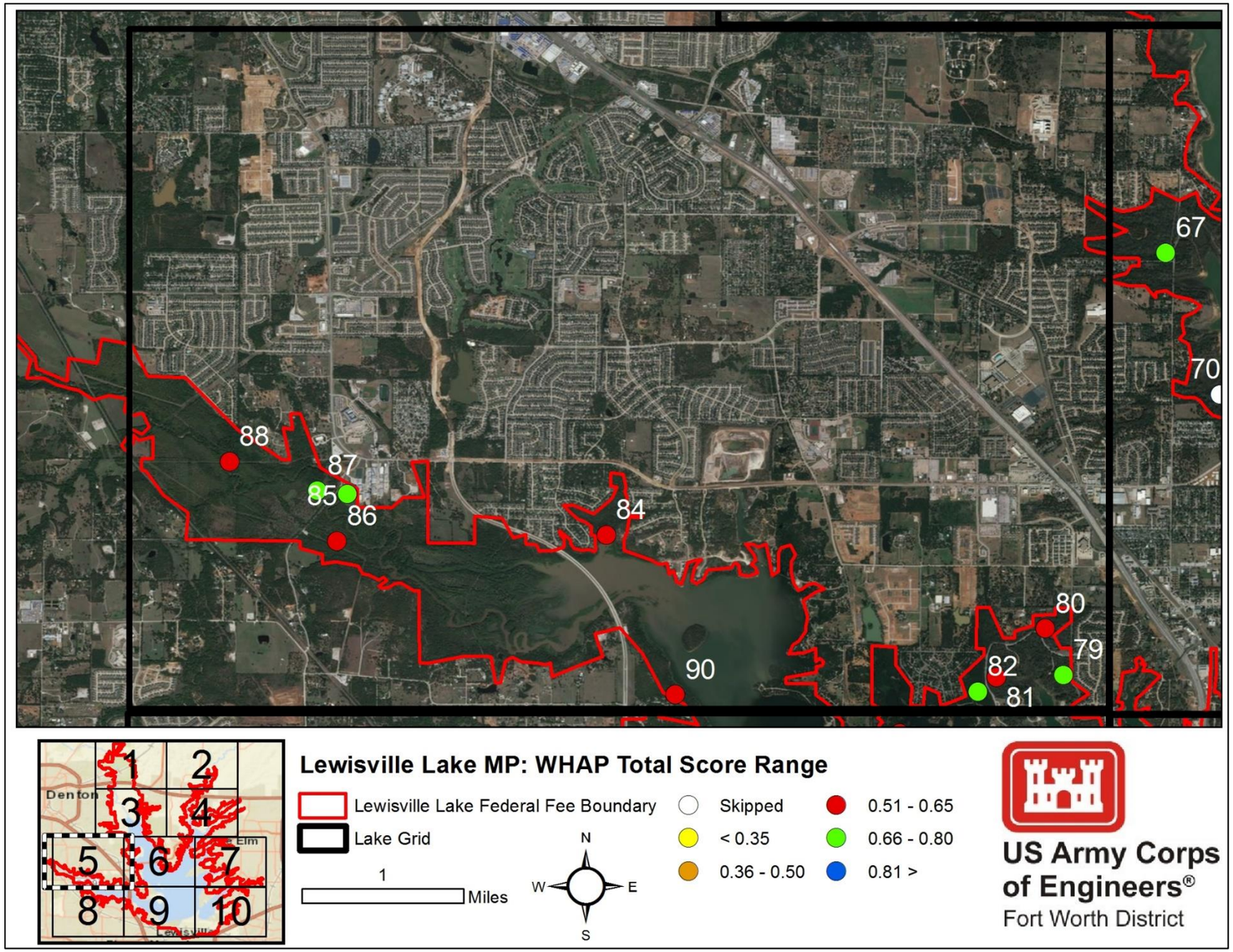

Figure 3E. Total Score Range for All Points Surveyed.

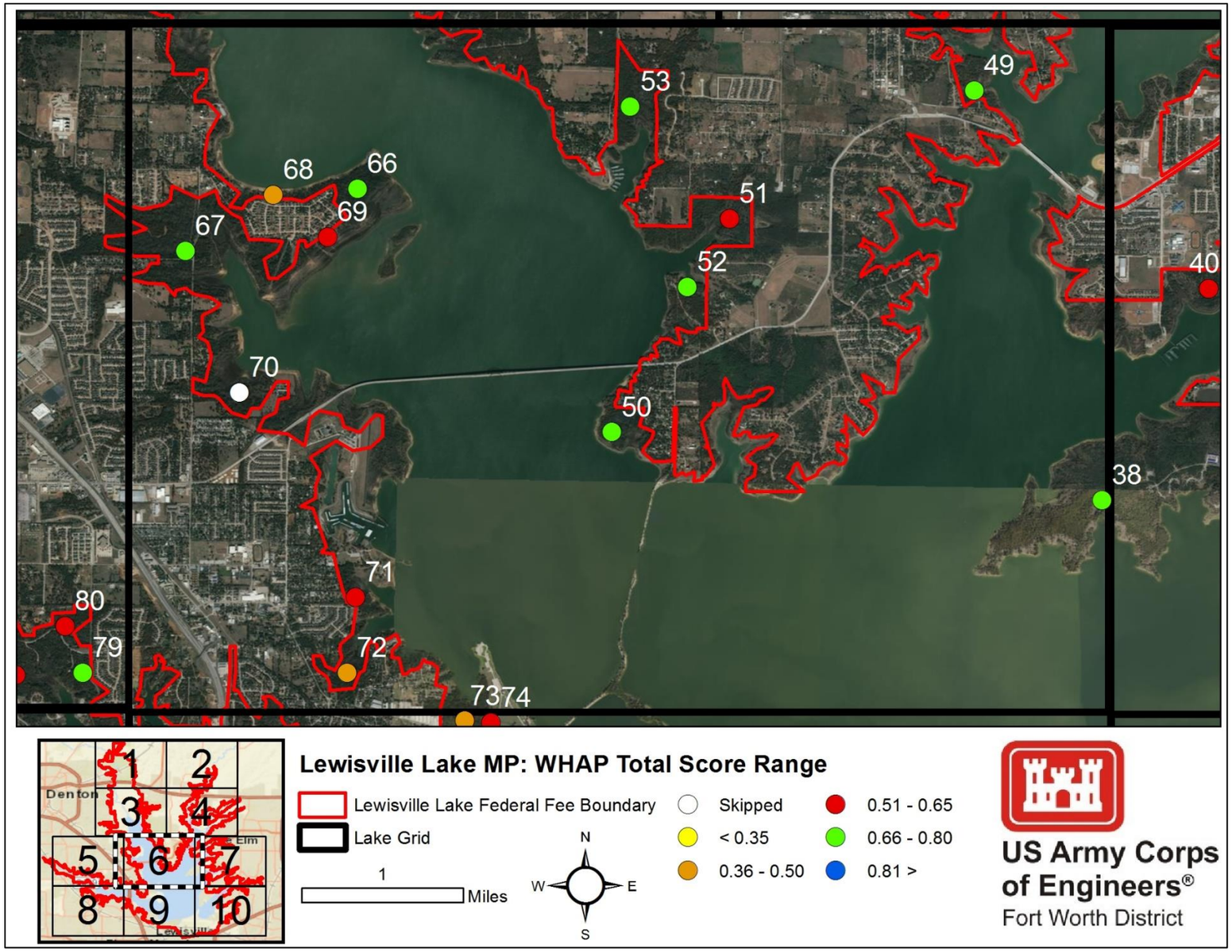

Figure 3F. Total Score Range for All Points Surveyed.

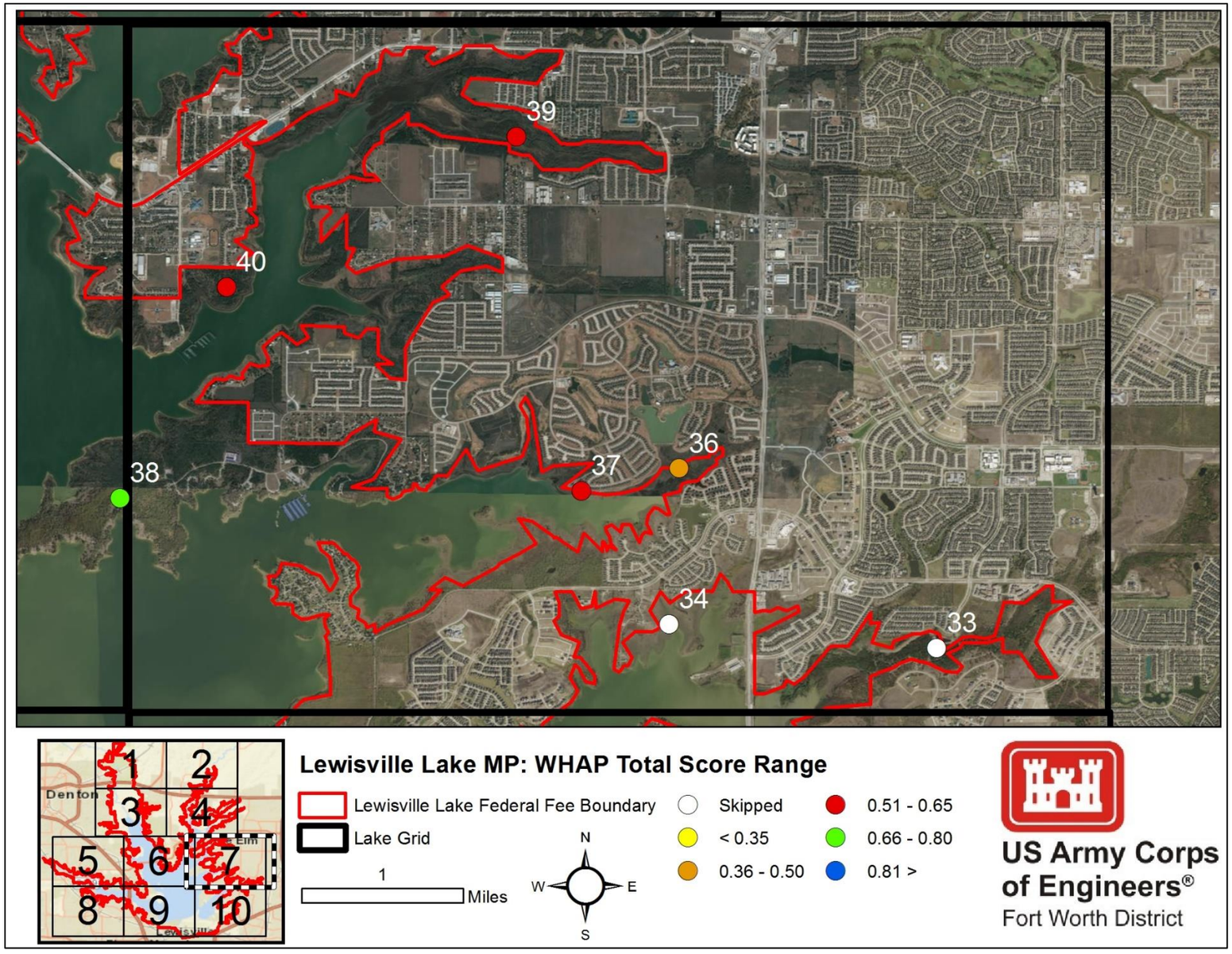

Figure 3G. Total Score Range for All Points Surveyed.

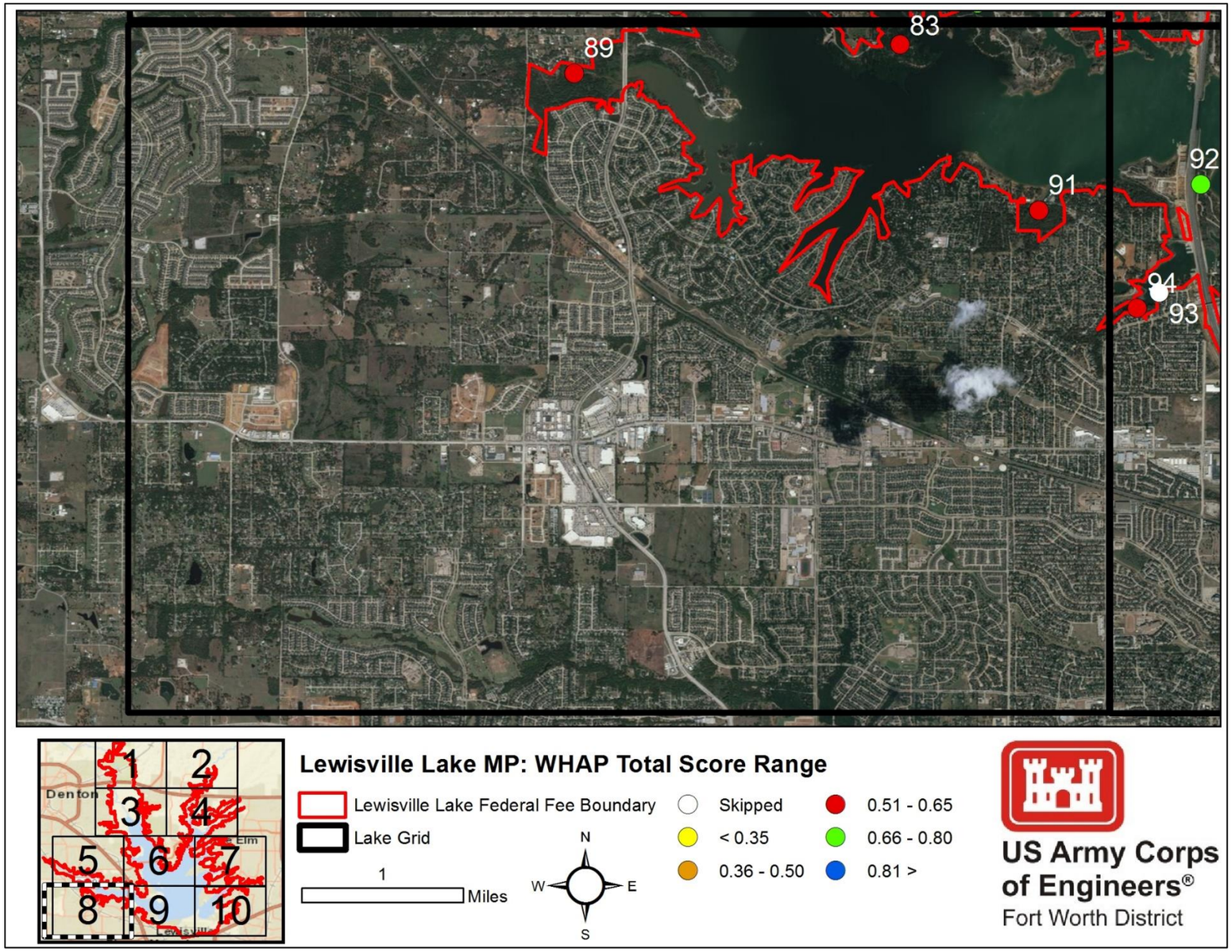

Figure 3H. Total Score Range for All Points Surveyed.

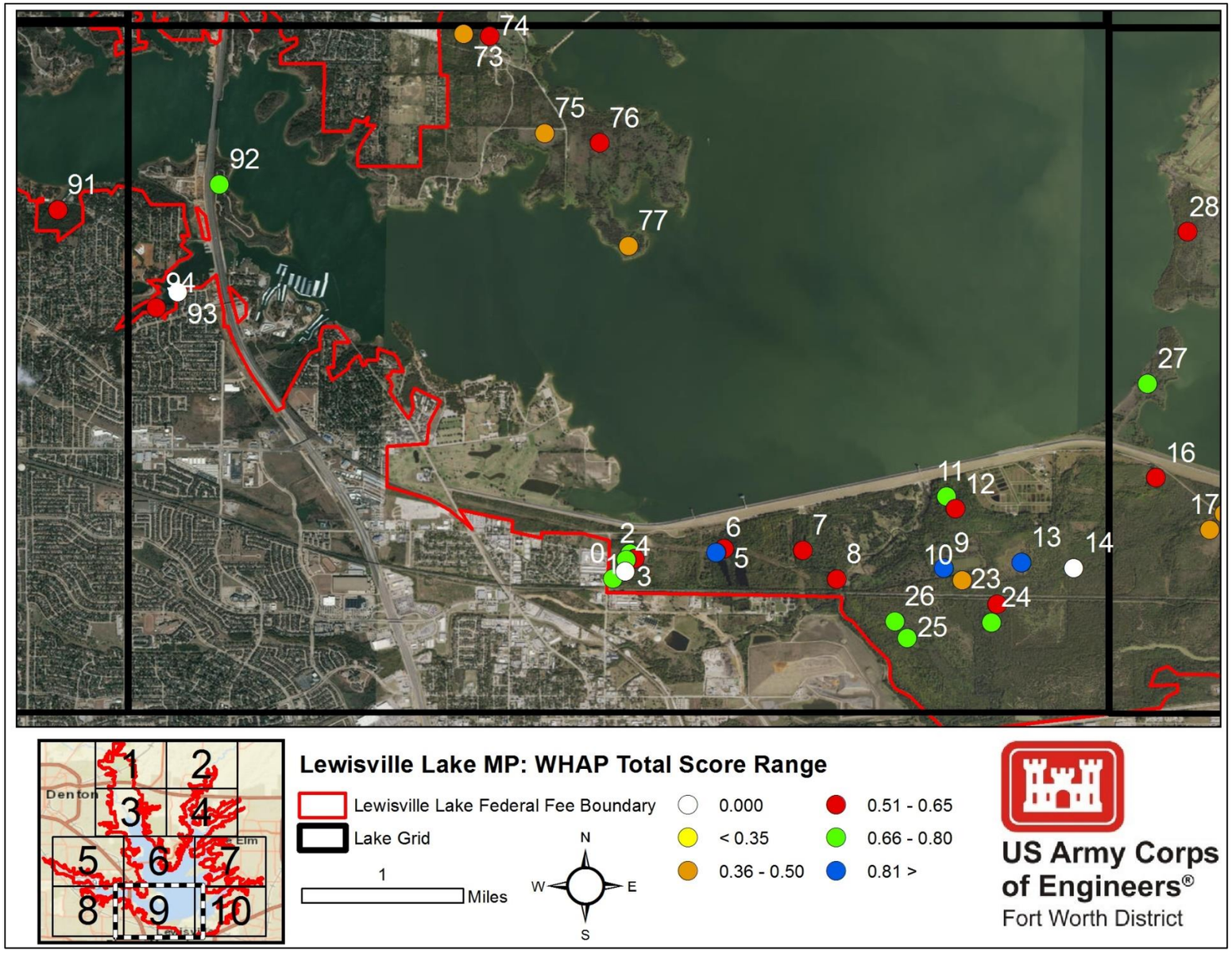

Figure 3I. Total Score Range for All Points Surveyed.

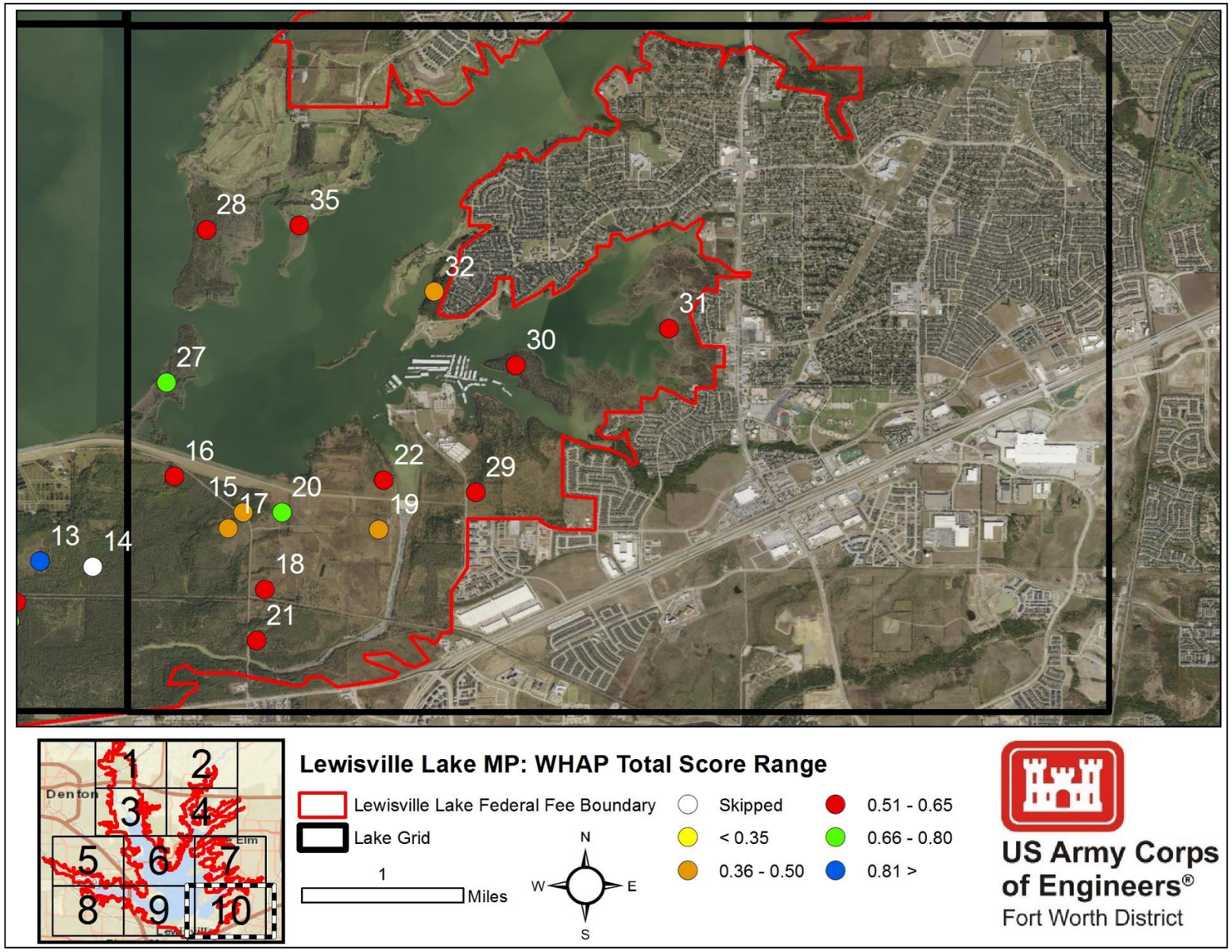

Figure 3J. Total Score Range for All Points Surveyed.

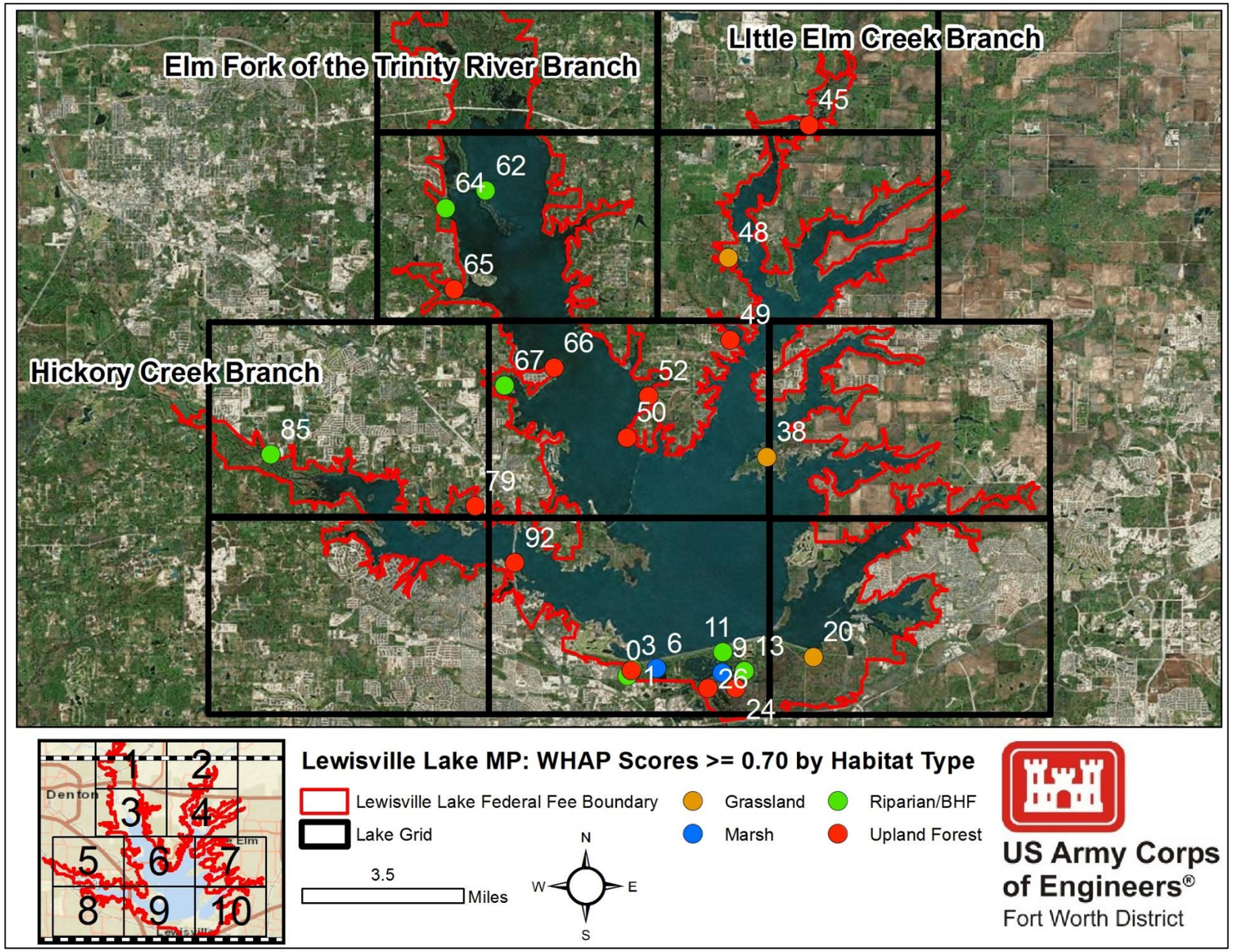

Figure 4. Distribution of WHAP Scores > 0.70 by Habitat Type.

Attachment A: Lewisville Lake WHAP Results Summary

Attachment B: Lewisville Lake WHAP Point Photographs