# Appendix C1 – Environmental Resources

# River Road Aquatic Ecosystem Restoration Feasibility Study

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US Army Corps of Engineers®
Fort Worth District

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# 1 Introduction

The River Road Aquatic Ecosystem Restoration (ER) Feasibility Study is located in San Antonio, TX (Figure 1). The Environmental Resources Appendix was developed to provide technical and policy support information utilized in the development of the feasibility report. Havard (1885) describes the San Antonio River Valley as containing "masses of luxuriant timber spread over the valley, thick shrubbery of various shades of green covers the uplands, and a sward of thin but nutritious grass carpets the ground…Largest and most conspicuous of trees along the river is the lordly pecan, attaining here an enormous size, and the cottonwood." Havard describes an extremely rich and diverse aquatic ecosystem in the San Antonio streams including yellow pond-lily (*Nuphar lutea*), water pennyworts (*Hydrocotyle prolifera, H. verticillata*), Carolina fanwort (*Cabomba caroliana*), watercress (*Nasturtium officinale*), arrow-heads (*Sagittaria lancifolia, S. latifolia*), brookweeds (*Samolus valerandi, S. ebracteatus*), water hemlock (*Cicuta maculata*), monkey-flowers (*Mimulus glabratus, M. luteus*), and several species of pondweed (*Potomogeton spp*.). Beckham (1887) provides further insight into the historic morphology of the San Antonio River and its tributaries writing "These (San Antonio) springs or fountains unite to form a river, which, after winding through the town in a very tortuous course, is joined some distance below by the San Pedro, a large creek having a source of supply similar to that of the river."

The aquatic and terrestrial organisms that depended on the aquatic and riparian habitats were equally diverse. The presence of numerous springs and streams along the Balcones Escarpment and the convergence of the Edwards Plateau, South Texas Brush, and Blackland Prairies ecological regions have long been recognized as providing valuable habitat for many wildlife species in the San Antonio area, particularly birds (Beckham, 1887; Attwater, 1892; Quinlan and Holleman, 1918; Griscom, 1920). The evolutionary 'development' of the Central Flyway along these resources is probably no accident given the immense historic productivity these habitats must have provided.

The River Road aquatic ecosystem has been affected by the urbanization of Bexar County and the encroachment on the riparian habitats. This ecosystem is heavily utilized by the general public and there are no protections in place to safeguard the aquatic and riparian habitats from vehicular traffic and unauthorized vegetation alterations. This reach of the San Antonio River has also been impacted by three low water crossings (LWC). LWC 1 functions as a dam, altering stream flow and sediment transport of the river. Severe pooling upstream of LWC 1 has also led to a disruption of substrate composition, adversely impacting the aquatic habitats remaining within the area. These impacts deter the formation of essential pool/riffle/run structures for aquatic wildlife, increase water temperatures, and lower dissolved oxygen concentrations. Water conveyance through LWCs 2 and 3 are facilitated by culverts, but erosion has started to degrade the river banks within their immediate vicinity. The upstream and downstream portions of LWCs 2 and 3 have been channelized, causing severe bank drop-offs and increased water velocities. The loss of overstory vegetation that once shaded the river has exacerbated these effects resulting in the severe aquatic conditions existing today.

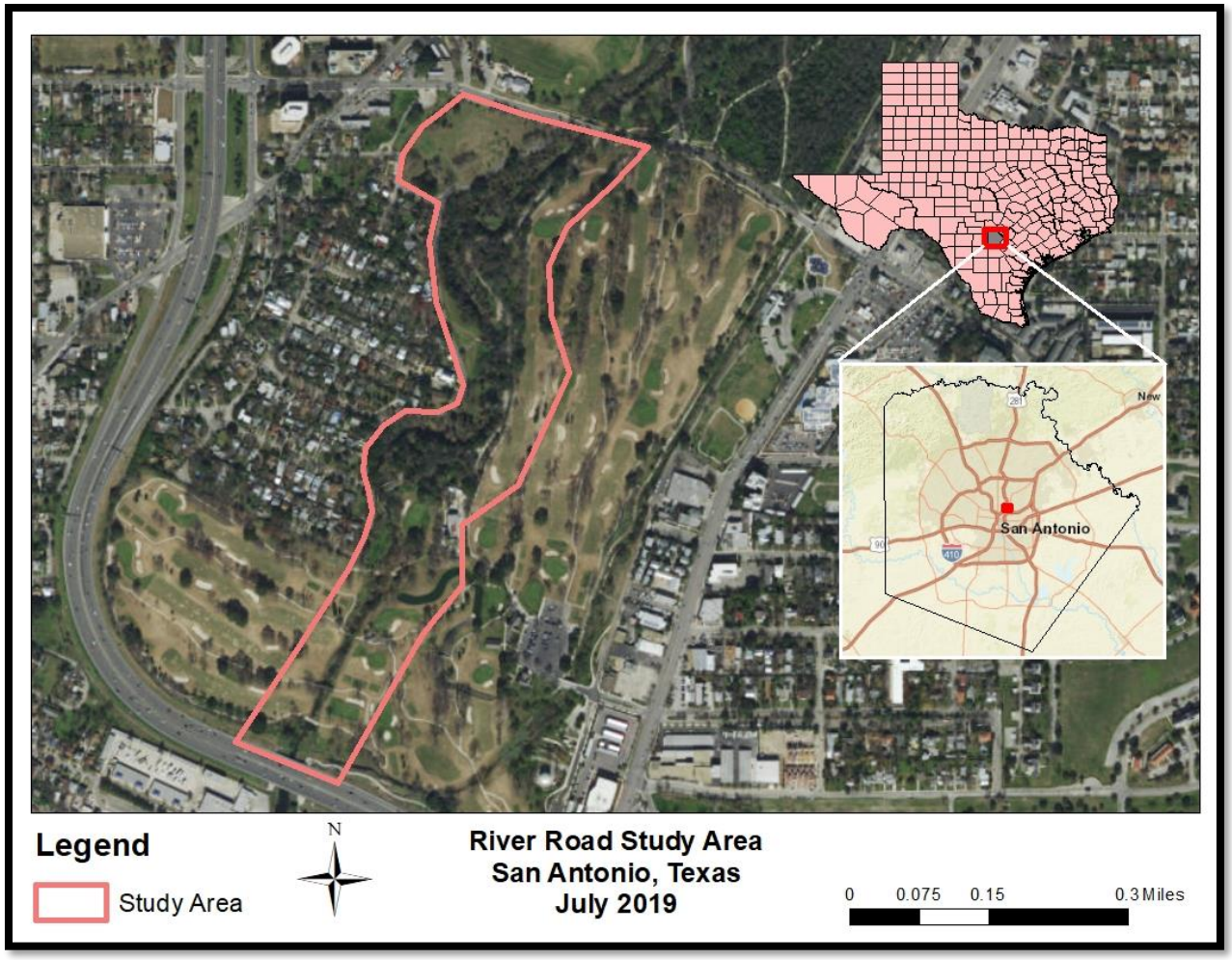


**Figure 1. River Road Aquatic Ecosystem Restoration Feasibility Study Area**

# 2 Resource Significance

In compliance with the Council of Environmental Quality (CEQ) National Environmental Policy Act (NEPA) regulations (40 CFR 1500.1(b), 1501.7(a)(2) and (3), and 1502.2(b)), guidance for USACE ecosystem restoration projects require the identification of significant resources and attributes that are likely to be affected by one or more of the plans (U.S. Water Resources Council, 1983). “Significant” is defined as “likely to have a material bearing on the decision-making process” (Apogee Research, Inc., 1996). Resource significance is determined by the importance and non-monetary value of the resource based on institutional, public, and technical recognition in the study area. The criteria are defined as:

- Institutional Recognition: The importance of the resource or attribute is acknowledged in the laws, adopted plans, and other policy statements of public agencies or private groups.
- Public Recognition: The resource or attribute is considered important by some segment of the general public.
- Technical Recognition: The importance of the resource or attribute is based on scientific or technical knowledge or judgment of critical resource characteristics.

## 2.1 Institutional Recognition

Significance based on institutional recognition means that the importance of the environmental resource is acknowledged in the laws, adopted plans, and other policy statements of public agencies or private groups. The institutional recognition of resource significance for the River Road study area is demonstrated by the following laws, policies, treaties, plans, and cooperative agreements established for the conservation and protection of these environmental resources.

### 2.1.1 Endangered Species Act

The Endangered Species Act of 1973 (ESA), as amended, "provides a means whereby the ecosystems upon which endangered and threatened species depend may be conserved, and to provide a program for the conservation of these species." The Department of the Interior, acting through the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service is responsible for the protection of federally threatened and endangered species in the U.S. The ESA prohibits the take of listed animals and the interstate or international trade in listed plants and animals without a permit. The USFWS also maintains a list of Candidate species where there is information that warrants proposing them for listing under ESA, but listing is precluded due to higher priority species. The Federally listed species that have the possibility of occurring in the study area are listed in Table 1. Candidate species, Texas fatmucket (*Lampsilis bracteata*) and Texas pimpleback (*Quadrula petrina),* have the highest chance to occur in the study area because of the likelihood of their use of the San Antonio River. However, their occurrences may be limited due to the lack of connectivity within this reach of the river. It is anticipated that the ecosystem restoration proposed, such as riparian and riverine habitat restoration and invasive species management within the study area would greatly benefit these species and may possibly provide suitable core habitat over time. At the time of the Draft release of the IFR-EA, least tern were a Federally listed Endangered species. As of January 12, 2021, the least tern was delisted and further mention of this species in regard to Federal listed has been removed from this Appendix.

**Table 1. Federally Listed Threatened and Endangered Species with the Potential to Occur in the Study Area (USFWS 2019a)**

| Name | Scientific Name | Federal Listing | Habitat Present |
|---|---|---|---|
| **Birds** | | | |
| Golden-cheeked Warbler | *Dendroica chrysoparia* | Endangered | M |
| Piping Plover | *Charadrius melodus* | Threatened | M |
| Red Knot | *Calidris canutus rufa* | Threatened | M |
| Whooping Crane | *Grus americana* | Endangered | No |
| **Amphibians** | | | |
| San Marcos Salamander | *Eurycea nana* | Threatened | No |
| Texas Blind Salamander | *Typhlomolge rathbuni* | Endangered | No |
| **Fishes** | | | |

| Name | Scientific Name | Federal Listing | Habitat Present |
|---|---|---|---|
| Fountain Darter | *Etheostoma fonticola* | Endangered | No |
| **Insects** | | | |
| [no Common Name] Beetle | *Rhadine exilis* | Endangered | No |
| [no Common Name] Beetle | *Rhadine infernalis* | Endangered | No |
| Comal Springs Dryopid Beetle | *Stygoparnus comalensis* | Endangered | No |
| Comal Springs Riffle Beetle | *Heterelmis comalensis* | Endangered | No |
| Helotes Mold Beetle | *Batrisodes venyivi* | Endangered | No |
| **Arachnids** | | | |
| Braken Bat Cave Meshweaver | *Cicurina venii* | Endangered | No |
| Cokendolpher Cave Harvestmand | *Texella cokendolpheri* | Endangered | No |
| Government Canyon Bat Cave Meshweaver | *Cicurina vespera* | Endangered | No |
| Government Canyon Bat Cave Spider | *Neoleptoneta microps* | Endangered | No |
| Madla's Cave Meshweaver | *Cicurina madla* | Endangered | No |
| Robber Baron Cave Meshweaver | *Cicurina baronia* | Endangered | No |
| **Crustaceans** | | | |
| Peck's Cave Amphipod | *Stygobromus (=Stygonectes) pecki* | Endangered | No |
| **Flowering Plants** | | | |
| Bracted Twistflower | *Streptanthus bracteatus* | Candidate | No |
| Texas Wild-rice | *Zizania texana* | Endangered | No |

M=migration stopover habitat; N=nesting habitat

### 2.1.2 Texas State Threatened and Endangered Species

In 1973, the Texas legislature authorized the Texas Parks and Wildlife Department (TPWD) to establish a list of fish and wildlife that are endangered or threatened with statewide extinction. In 1988, the Texas legislature added the authority for TPWD to establish a list of threatened and endangered plant species for the state. TPWD regulations prohibit the taking, possession, transportation, or sale of any state endangered or threatened animal species without the issuance of a permit (TPWD Code §68.015). In addition, the commercial sale, possession for commercial sale, or the sale of all or part of an endangered, threatened, or protected plant from public land is prohibited (TPWD Code §88.008).

Table 2 presents the state-listed threatened and endangered species that are known to occur in Bexar County with the potential of these species to utilize habitats within the study area (TPWD, 2019a).

**Table 2. State Listed Threatened and Endangered Species for Bexar County, Texas (TPWD, 2019a)**

| Name | Scientific Name | State Listing | Habitat Present |
|---|---|---|---|
| **Birds** | | | |
| Reddish Egret | *Egretta rufescens* | T | M |
| White-Faced Ibis | *Plegadis chihi* | T | M |
| Wood Stork | *Mycteria americana* | T | M |
| Bald Eagle | *Haliaeetus leucocephalus* | T | No |
| Zone-Tailed Hawk | *Buteo albonotatus* | T | No |
| Whooping Crane | *Grus americana* | E | No |
| Piping Plover | *Charadrius melodus* | T | M |
| Interior Least Tern | *Sternula antillarum athalassos* | E | M |
| Black-Capped Vireo | *Vireo atricapilla* | E | M |
| Tropical Parula | *Setophaga pitiayumi* | T | M,N |
| Golden-Cheeked Warbler | *Setophaga chrysoparia* | E | M |
| **Amphibians** | | | |
| Cascade Caverns Salamander | *Eurycea latitans* | T | No |
| Comal Blind Salamander | *Eurycea tridentifera* | T | No |
| Black-spotted Newt | *Notophthalmus meridionalis* | T | Yes |
| Mexican Treefrog | *Smilisca baudinii* | T | Yes |
| **Fishes** | | | |
| Widemouth Blindcat | *Satan eurystomus* | T | No |
| Toothless Blindcat | *Trogloglanis pattersoni* | T | No |
| **Mollusks** | | | |
| Golden Orb | *Quadrula aurea* | T | Yes |

| Name | Scientific Name | State Listing | Habitat Present |
|---|---|---|---|
| **Mammals** | | | |
| Black Bear | *Ursus americana* | T | No |
| White-nosed Coati | *Nasua narica* | T | No |
| **Reptiles** | | | |
| Cagle's Map Turtle | *Graptemys caglei* | T | Yes |
| Texas Tortoise | *Gopherus berlandieri* | T | Yes |
| Texas Horned Lizard | *Phyrnosoma cornutum* | T | Yes |
| Texas Indigo Snake | *Drymarchon melanurus erebennus* | T | Yes |
| Timber Rattlesnake | *Crotalus horridus* | T | No |

M=migration stopover habitat; N=nesting habitat

### 2.1.3 Fish and Wildlife Coordination Act of 1958

The Fish and Wildlife Coordination Act of 1934 (FWCA), as amended, recognizes the contribution of wildlife resources to the nation. The 1958 amendments added provisions to recognize the vital contribution of wildlife resources to the Nation and to require equal consideration and coordination of wildlife conservation with other water resources development programs. The USFWS and TPWD have committed to dedicate time and resources in developing a set of measures toward the ultimate identification of a preferred plan that meets USACE, USFWS, TPWD, and the sponsor's objectives for restoration of aquatic habitat. The measures identified in the Tentatively Selected Plan (TSP), will be considered by these agencies to have significant environmental outputs for fish and wildlife resources. The habitats that would be restored with implementation of the TSP would meet the intent and provisions of the FWCA by recognizing the vital contribution of wildlife resources to San Antonio, south-central Texas, and the Nation. Institutional significance is demonstrated by the extreme interest, commitment, and recognition given to this study by the USFWS, TPWD, and other outside resource agencies. The FWCA recognizes that incremental losses to natural rivers and their habitats have become cumulatively important to nationally recognized resources and that mitigation of those losses is within the national interest. Similarly, the restoration of the habitats within the River Road study area are shown to be incrementally nationally significant due to the decline of natural riverine and riparian habitat for migratory birds and aquatic species. The FWCA and USFWS concurrence is located in Attachment A.

### 2.1.4 Migratory Bird Treaty Act

The U.S. has recognized the critical importance of this shared resource by ratifying international, bilateral conventions for the conservation of migratory birds. These migratory bird conventions impose substantive obligations on the U.S. for the conservation of migratory birds and their habitats, and through the Migratory Bird Treaty Act (MBTA), the U.S. has implemented these migratory bird conventions with respect to the U.S. The MBTA prohibits taking, possessing, importing/exporting, selling, and transporting of any listed migratory bird, its parts, nest, or eggs.

The San Antonio River is positioned on a natural migratory route and serves as a resting point for hundreds of thousands of birds each year. Despite its degraded conditions and ecological losses, the high quality opportunity of the ecosystem is evident as the area currently remains a

hotspot for birding opportunities. Due to the San Antonio River Channel Improvement Project (SACIP), migratory birds are now able to utilize areas along the San Antonio River within city limits that were previously unsuitable. The addition of the River Road reach of the San Antonio River will add to the success of the other projects constructed on the river; thereby, synergistically improving the ecological output of the project due connectivity between other migratory bird habitats.

### 2.1.5 Water Resources Development Act of 1986

The restored ecosystem functions that would be provided by the eventual recommended plan for the River Road study can be considered significant by the USACE because the restoration of these functions meet with the spirit of the Water Resources Development Act (WRDA) of 1986.

### 2.1.6 Water Resources Development Act of 1990

Section 307(a) of WRDA of 1990 established an interim goal of no overall net loss of wetlands in the U.S. and set a long-term goal to increase the quality wetlands, as defined by acreage and function. The River Road ecosystem restoration would restore the ecological and hydraulic function to the San Antonio River, thereby increasing the quality of this resource.

### 2.1.7 Executive Order 13112

Executive Order (EO) 13112 called upon executive departments and agencies to take steps to prevent the introduction and spread of invasive species, and to support efforts to eradicate and control invasive species that are established. It also created the National Invasive Species Council (NISC) to oversee implementation of the order, encourage proactive planning and action, develop recommendations for international cooperation, and take other steps to improve the Federal response to invasive species. EO 13112 recognizes the significant contribution native species make to the well-being of the Nation's natural environment and directs Federal agencies to take preventive and responsive action to the threat of non-native species invasion and to provide restoration of native species and habitat conditions in ecosystems that have been invaded. Linked to the aquatic ecosystem degradation is the loss of native riverine and riparian vegetation species, which in addition to being vital to the aquatic environment, supports native residential and migratory game and nongame wildlife species within the River Road study area. The TSP addresses non-native invasive species by implementing goals and objectives that will assist in the management and removal of these species.

### 2.1.8 Executive Order 13751

This order amends EO 13112 and directs actions to continue coordinated Federal prevention and control efforts related to invasive species. This order maintains the NISC and the Invasive Species Advisory Committee; expands the membership of the Council; clarifies the operations of the Council; incorporates considerations of human and environmental health, climate change, technological innovation, and other emerging priorities into Federal efforts to address invasive species; and strengthens coordinated, cost-efficient Federal action.

### 2.1.9 Executive Order 13186

EO 13186 directs Federal agencies to promote the conservation of migratory bird populations, including restoring and enhancing habitat (USFWS 2019). Migratory Non-game Birds of Management Concern is a list maintained by the USFWS. The list helps fulfill a primary goal of the USFWS to conserve avian diversity in North America. Additionally, the USFWS' Migratory Bird Plan is a draft strategic plan to strengthen and guide the agency's Migratory Bird Program. The proposed ecosystem restoration would contribute directly to the USFWS Migratory Bird Program goals to protect, conserve, and restore migratory bird habitats to ensure long-term sustainability of all migratory bird populations. Rangewide protection, restoration and

improvement of terrestrial and aquatic habitats and landscapes are crucial to maintain and conserve migratory birds.

Because the River Road study area supports species of concern and their habitats which are addressed in numerous avian joint ventures, conservation organizations, and interagency and international cooperative plans, their institutional significance is recognized from both a regional, national, and international perspective. Restoration or improvement of the degraded habitat within the study area would support the goals of each of these plans and cooperative initiatives as the degraded habitat within the study area would increase the quality of breeding, foraging, wintering, and migration habitats for numerous bird species.

### 2.1.10 Audubon Red-list

In 2007, the Audubon Society and the American Bird Conservancy published the Watchlist 2007 (Butcher et al., 2007) documenting a Red-list of bird species in the U.S. that were rapidly declining in numbers, had very small populations or limited ranges, and/or faced major conservation threats and a Yellow-list of bird species that were either declining or rare. Watchlist 2007 includes 15 Red-listed species and 48 Yellow-listed species that can be found in Bexar County (Coffey et al., 2011).

The Audubon Red-list species in Bexar County are listed below.

- Mottled Duck (*Anas fulvigula*)
- Reddish Egret (*Egretta rufescens*)
- Whooping Crane
- Piping Plover
- Mountain Plover (*Charadrius montanus*)
- Buff-breasted Sandpiper (*Calidris subruficollis*)
- Least Tern
- Green Parakeet (*Aratinga holochroa*)
- Bell's Vireo (*Vireo belli*)
- Black-capped Vireo (*Vireo atricapilla*)
- Golden-winged Warbler (*Vermivora chrysoptera*)
- Golden-cheeked Warbler
- Baird's Sparrow (*Centronyx bairdii*)
- Henslow's Sparrow (*Centronyx henslowii*)

The Audubon Yellow-list species are listed below.

- Scaled Quail (*Callipepla squamata*)
- Swallow-tailed Kite (*Elaoides forficatus*)
- King Rail (*Rallus elegans*)
- American Golden-Plover (*Pluvialis dominica*)
- Snowy Plover (*Charadrius nivosus*)
- Wilson's Plover (*Charadrius semipalmatus*)

- Long-billed Curlew (*Numenius americanus*)
- Marbled Godwit (*Limosa fedoa*)
- Red Knot
- Sanderling (*Calidris alba*)
- Semipalmated Sandpiper (*Calidris pusilla*)
- White-rumped Sandpiper (*Calidris fuscicollis*)
- Bridled Tern (*Onychoprion anaethetus*)
- Gull-billed Tern (*Gelochelidon nilotica*)
- Black Skimmer (*Rynchops niger*)
- Short-eared Owl (*Asio flammeus*)
- Red-headed Woodpecker (*Melanerpes erythrocephalus*)
- Olive-sided Flycatcher (*Contopus cooperi*)
- Willow Flycatcher (*Empidonax traillii*)
- Wood Thrush (*Hylocichla mustelina*)
- Varied Thrush (*Ixoreus naevius*)
- Sprague's Pipit (*Anthus spragueii*)
- Prairie Warbler (*Setophaga discolor*)
- Bay-breasted Warbler (*Setophaga castanea*)
- Cerulean Warbler (*Setophaga cerulean*)
- Prothonotary Warbler (*Protonotaria citrea*)
- Kentucky Warbler (*Geothlypis formosa*)
- Canada Warbler (*Cardellina canadensis*)
- Lark Bunting (*Calamospiza melanocorys*)
- Le Conte's Sparrow (*Ammodramus leconteii*)
- Chestnut-collared Longspur (*Calcarius ornatus*)
- Varied Bunting (*Passerina versicolor*)
- Painted Bunting (*Passerina ciris*)
- Rusty Blackbird (*Euphagus carolinus*)
- Swainson's Hawk (*Buteo swainsoni*)
- Hudsonian Godwit (*Limosa haemastica*)
- Western Sandpiper (*Calidris mauri*)
- Stilt Sandpiper (*Calidris himantopus*)
- Elf Owl (*Micrathene whitneyi*)

- Calliope Hummingbird (*Selasphorus calliopez*)
- Allen's Hummingbird (*Selasphorus sasin*)
- Blue-winged Warbler (*Vermivora cyanoptera*)
- Swainson's Warbler (*Limnothlypis swainsonii*)
- Smith's Longspur (*Calcarius pictus*)
- Audubon's Oriole (*Icterus graduacauda*)

#### 2.1.11 Department of Defense Partners in Flight

The Department of Defense (DoD) Partneers in Flight (PIF) program consists of a cooperative network of natural resources personnel from military installations across the U.S. DoD PIF works collaboratively with other avian conservation initiatives to conserve migratory and resident bird species and their habitat on DoD lands. In addition, DoD PIF works beyond installation boundaries to facilitate cooperative partnerships, determine the current status of bird populations, and prevent the listing of additional birds as threatened or endangered. There are 33 species on the DoD PIF list that occur in Bexar County.

The list below shows the species that occur within Bexar County that are listed on the DoD PIF Priority List.

- Northern Bobwhite (*Colinus virginianus*)
- Swallow-tailed Kite (*Elanoides forficatus*)
- Bald Eagle
- Northern Goshawk (*Accipiter gentilis*)
- Golden Eagle (*Aquila chrysaetos*)
- King Rail
- Wilson's Plover
- Mountain Plover
- Upland Sandpiper (*Bartramia longicauda*)
- Long-billed Curlew
- Buff-breasted Sandpiper
- Least Tern
- Gull-billed Tern
- Burrowing Owl (*Athene cunicularia*)
- Common Nighthawk (*Chordeiles minor*)
- Chuck-will's-widow (*Antrostomus carolinensis*)
- Eastern Whip-poor-will (*Antrostomus vociferous*)
- Red-headed Woodpecker
- Prairie Falcon (*Falco mexicanus*)
- Olive-sided Flycatcher

- Loggerhead Shrike (*Lanius ludovicianus*)
- Sage Thrasher (*Oreoscoptes montanus*)
- Blue-winged Warbler
- Swainson's Warbler
- Kentucky Warbler
- Cerulean Warbler
- Prairie Warbler
- Brewer's Sparrow (*Spizella breweri*)
- Grasshopper Sparrow (*Ammodramus savannarum*)
- Baird's Sparrow
- Harris's Sparrow (*Zonotrichia querula*)
- Painted Bunting
- Dickcissel (*Spiza americana*)

2.1.12 Partners in Flight

PIF is a cooperative partnership between federal, state, and local government agencies, philanthropic foundations, professional organizations, conservation groups, industry, academia, and private individuals.

Agency partners include the following:

- Federal Agencies;
    - U.S. Geological Survey (USGS),
    - National Park Service (NPS),
    - Bureau of Land Management (BLM),
    - USFWS,
    - DoD,
    - U.S. Forest Service (USFS),
    - U.S. Environmental Protection Agency (EPA),
    - U.S. Department of Agriculture Natural Resources Conservation Service (NRCS),
    - USACE,
    - U.S. Department of State
- State Wildlife Resource Agencies; and
    - TPWD
- Private Interest Groups/Private Agencies.
    - Audubon Society

The goals of PIF are to create a coordinated network of conservation partners to secure sufficient commitment and resources to implement and support scientifically-based landbird conservation plans at multiple scales. In an effort to prioritize conservation needs, PIF assessed the conservation vulnerability for landbird species and assigned a score to each species based on biological criteria such as population size, breeding distribution, non-breeding distribution, threats to breeding habitats, threats to non-breeding areas, and population trends (K.V. Rosenberg et al., 2016). There are 29 species in Bexar County that are on the PIF Watch List.

- The Red Watch List – species with extremely high vulnerability due to small population and range, high threats, and rangewide declines has three species that correlate to Bexar County.
- The “not declining” Yellow Watch List – species not declining but vulnerable due to small range or population and moderate threats has three species that correlate to Bexar County.
- The “declining” Yellow Watch List – species with population declines and moderate to high threats has 23 species that correlate to Bexar County.

The PIF Watch List species in Bexar County are listed below (R-Recover [Red List]; ND-Prevent Decline [Yellow List]; D-Reverse Decline [Yellow List]).

- Black-capped Vireo[R]
- Golden-winged Warbler[R]
- Golden-cheeked Warbler[R]
- Lucifer Hummingbird[ND] (*Calothorax Lucifer*)
- Henslow's Sparrow[ND]
- Audubon's Oriole[ND]
- Black-billed Cuckoo[D] (*Coccyzus erythropthalmus*)
- Long-eared Owl[D] (*Asio otus*)
- Eastern Whip-poor-will[D]
- Rufous Hummingbird[D] (*Selasphorus rufus*)
- Allen's Hummingbird[D] (*Selasphorus sasin*)
- Red-headed Woodpecker[D]
- Green Parakeet[D]
- Olive-sided Flycatcher[D]
- Wood Thrush[D]
- Sprague's Pipit[D] (*Anthus spragueii*)
- Chestnut-collared Longspur[D] (*Calcarius ornatus*)
- McCown's Longspur[D](*Rhynchophanes mccownii*)
- Prothonotary Warbler[D]
- Connecticut Warbler[D] (*Oporornis agilis*)

- Kentucky Warbler[D]
- Cape May Warbler[D] (*Setophaga tigrina*)
- Cerulean Warbler[D]
- Prairie Warbler[D]
- Canada Warbler[D]
- Baird's Sparrow[D]
- Harris's Sparrow[D]
- Bobolink[D] (*Dolichonyx oryzivorus*)
- Evening Grosbeak[D] (*Coccothraustes vespertinus*)

### 2.1.13 Urban Waters Federal Partnership

The Urban Waters Federal Partnership (UWFP) reconnects urban communities, particularly those that are overburdened or economically distressed, with their waterways by improving coordination among federal agencies and collaborating with community-led revitalization efforts to improve our Nation's water systems and promote their economic, environmental and social benefits (EPA 2017). Specifically, this partnership will:

- Break down federal program silos to promote more efficient and effective use of federal resources through better coordination and targeting of federal investments.
- Recognize and build on local efforts and leadership, by engaging and serving community partners.
- Work with local officials and effective community-based organizations to leverage area resources and stimulate local economies to create local jobs.
- Learn from early and visible victories to fuel long-term action.

The UWFP established seven Urban Waters Pilot locations in June of 2011, with the goal of working closely with local partners to restore urban waterways. Cleaning up and restoring local water resources is essential to protecting Americans' health and improving their overall quality of life.

The San Antonio River Basin within Bexar County was selected as a location for the nation’s UWFP. This partnership will reconnect urban communities, particularly those that are overburdened or economically distressed, with their waterways by improving coordination among federal agencies and collaborating with community-led revitalization efforts. This partnership further serves to improve our nation’s water systems and promote economic, environmental and social benefits.

### 2.1.14 North American Waterfowl Management Plan

Established in 1986, the North American Waterfowl Management Plan (NAWMP) is an international plan to reverse the downward trend in waterfowl populations (NAWMP, 2018). The goal of the plan is to protect, restore, and improve wetland habitat and increase waterfowl population numbers. An update to the plan in 1998 was signed by the United States, Canada, and Mexico and lists wetland, aquatic systems, grassland, forest, and riparian areas as habitats critical to waterfowl. Thirty-six Important Waterfowl Habitat Areas have been identified by the USFWS, three of which are represented within Texas, and include east Texas, the gulf coast, and the playa lakes region. Central Texas, including the San Antonio area, provides a critical

link between the three priority waterfowl habitat areas. The USFWS states that conservation efforts should include national and regional planning for both migratory and endemic waterfowl species. Between 1986 and 2009, $4.5 billion was invested to secure, protect, restore, improve and manage 15.7 million acres of waterfowl priority landscapes in North America. The NAWMP was updated again in 2004 and 2018, and the NAWMP Science Support Team (NSST) prioritized conservation needs for waterfowl species based on socioeconomic importance of the species, the species population trend, and the vulnerability of the population to decline. The TSP for the ecosystem restoration of River Road will directly affect the management of North American waterfowl species. The measures included in the plan would attract waterfowl and benefit those species by increasing the quality of forage found during their migration.

The Bexar County species in the NAWMP are listed below.

- Canada Goose (*Branta canadensis*)
- Cackling Goose (*Branta hutchinsii*)
- Snow Goose (*Chen caerulescens*)
- Ross's Goose (*Chen rossii*)
- Mottled Duck
- Cinnamon Teal (*Anas cyanoptera*)
- Wood Duck (*Aix sponsa*)
- Ring-necked Duck (*Aythya collaris*)
- Ruddy Duck (*Oxyura jamaicensis*)
- Masked Duck (*Nomonyx dominicus*)
- Long-tailed Duck (*Clangula hyemalis*)
- Black Scoter (*Melanitta Americana*)
- Surf Scoter (*Melanitta perspicillata*)
- White-Winged Scoter (*Melanitta fusca*)
- Common Goldeneye (*Bucephala clangula*)
- Bufflehead (*Lophodytes cucullatus*)
- Hooded Merganser
- Red-Breasted Merganser (*Mergus serrator*)
- Common Merganser (*Mergus merganser*)

#### 2.1.15 North American Bird Conservation Initiative

The North American Bird Conservation Initiative (NABCI) is a tri-national declaration of intent between the U.S., Canada, and Mexico to strengthen cooperation on the conservation of North American birds throughout their ranges and habitats. The U.S. NABCI Committee is a coalition of government agencies, private organizations, and bird initiatives in the United States comprised of representatives from the following entities:

- USFWS
- NRCS

- BLM
- DoD
- NPS
- USGS
- USFS
- Farm Service Agency
- Wildlife Management Institute
- Association of Fish and Wildlife Agencies
- National Flyway Council
- PIF
- Association of Joint Venture Management Boards
- National Audubon Society
- The Nature Conservancy
- American Bird Conservancy
- Ducks Unlimited
- Waterbird Conservation for the Americas
- U.S. Shorebird Conservation Plan
- NAWMP
- Migratory Shorebird and Upland Game Bird Working Group
- Resident Game Bird Working Group

The NABCI divided North America into 67 ecologically distinct Bird Conservation Regions (BCRs) based on similar bird communities, habitats, and resource management issues. The River Road study area is located near the intersection of three BCRs: Oaks and Prairies (BCR 21), Edwards Plateau (BCR 20), and Tamaulipan Brushlands (BCR 36). Because of the proximity of the study area to each of these BCRs, the avian community and habitats exhibit characteristics of each region.

OAKS AND PRAIRIES BCR

The Oaks and Prairies BCR encompasses over 45 million acres of Texas and Oklahoma encompassing the Blackland Prairie Ecoregion and the Cross Timbers Ecoregion. These ecoregions represent the southernmost extent of “true” prairies and the westernmost extent of deciduous forest in North America.

EDWARDS PLATEAU BCR

The Edwards Plateau BCR is demarcated by the Balcones Fault on the south and east boundary of the BCR and grades into the Great Plains and Chihuahuan Desert to the west and north. The Edwards Plateau BCR includes the eastern ranges for more arid, desert species as the region trends to more mesic climes provided in the prairie regions.

TAMAULIPAN BRUSHLANDS BCR

The Tamaulipan Brushlands BCR encompasses most of south Texas west of the Gulf Coastal Plains and extends into northeastern Mexico. The BCR provides habitat representing the northernmost extent of several tropical species ranges and the southernmost extent to numerous North American species.

### 2.1.16 North American Waterbird Conservation Plan

The Waterbird Conservation for the Americas (WCA) initiative was established in 1998 to address threats to waterbirds and their habitats (Kushlan et al., 2002). The goal of the WCA is to sustain and restore waterbird populations and breeding, migratory, and nonbreeding habitats in North America, Central America, and the Caribbean. The WCA identified and ranked the conservation concern for waterbird species throughout North America by BCRs. The conservation status of waterbirds known to occur in Bexar County can be found in the table below. Waterbirds will benefit from the measures proposed for the River Road Aquatic ER. Increased quality of riverine and riparian habitats will attract waterbirds and supplement their food and cover resources.

**Table 3. North American Conservation Status of Waterbirds Known to Occur in Bexar County (Coffey et al., 2011).**

| **Waterbird Species** | **Bird Conservation Region (BCR)** | | |
|---|---|---|---|
| | ***Oaks and Prairies*** | ***Edwards Plateau*** | ***Tamaulipan Brushland*** |
| **High Concern** | | | |
| Black Skimmer | | | X |
| Least Tern | X | X | |
| Little Blue Heron (*Egretta caerulea*) | X | X | X |
| Snowy Egret (*Egretta thula*) | X | | X |
| Tricolored Heron (*Egretta tricolor*) | | | X |
| **Moderate Concern** | | | |
| White Pelican (*Pelecanus erythrorhynchos*) | | | X |
| Anhinga (*Anhinga anhinga*) | X | | X |
| Black-crowned Night-heron (*Nycticorax nycticorax*) | X | X | X |
| Bonaparte's Gull (*Chroicocephalus philadelphia*) | X | | X |
| Eared Grebe (*Podiceps nigricollis*) | X | X | X |
| Forster's Tern (*Sterna forsteri*) | X | | X |
| Neotropic Cormorant (*Phalacrocorax brasilianus*) | X | | X |
| Roseate Spoonbill (*Platalea ajaja*) | | | X |

| Waterbird Species | Bird Conservation Region (BCR) | | |
|---|---|---|---|
| | ***Oaks and Prairies*** | ***Edwards Plateau*** | ***Tamaulipan Brushland*** |
| White Ibis (*Eudocimus albus*) | | | X |
| Yellow-crowned Night-heron (*Nyctanassa violacea*) | X | | X |

2.1.17 U.S. Shorebird Conservation Plan

The U.S. Shorebird Conservation Partnership is a collaboration of state and federal agencies and non-governmental conservation organizations. The Shorebird Conservation Plan provides a framework to protect and restore shorebird populations and their migratory, breeding, and nonbreeding habitats (Brown et al., 2001). The plan categorizes the conservation concern and risk for North American shorebirds into five categories: 1) species not at risk, 2) species of low concern, 3) species of moderate concern, 4) species of high concern, and 5) highly imperiled species. Table 8 provides a list of Conservation Category 3, 4, and 5 shorebirds that are known to occur in Bexar County. Riverine habitat is of great importance to shorebird conservation. The improvement of riverine habitat from the TSP will benefit shorebird populations within Bexar County and will have some effects on shorebirds nationwide.

**Table 4. North American Shorebird Conservation Plan Species of Concern (Brown et al. 2001) Known to Occur in Bexar County (Coffey et al. 2011).**

| Species | Bird Conservation Region (BCR) | | |
|---|---|---|---|
| | ***Oaks and Prairies*** | ***Edwards Plateau*** | ***Tamaulipan Brushland*** |
| **Highly Imperiled Species** | | | |
| Long-billed Curlew | | | X |
| Mountain Plover | | | X |
| Piping Plover | | | X |
| Snowy Plover | | | X |
| **Species of High Concern** | | | |
| American Woodcock (*Scolopax minor*) | X | | |
| Marbled Godwit (*Limosa fedoa*) | | | X |
| Red Knot | | | X |
| Ruddy Turnstone (*Arenaria interpres*) | | | X |
| Sanderling | | | X |
| Short-billed Dowitcher (*Limnodromus griseus*) | | | X |
| Solitary Sandpiper (*Tringa solitaria*) | | | X |
| Western Sandpiper (*Calidris mauri*) | X | | |
| Whimbrel (*Numenius phaeopus*) | | | X |

| Species | Bird Conservation Region (BCR) | | |
|---|---|---|---|
| | ***Oaks and Prairies*** | ***Edwards Plateau*** | ***Tamaulipan Brushland*** |
| Wilson's Plover | | | X |
| **Species of Moderate Concern** | | | |
| American Avocet (*Recurvirostra Americana*) | | | X |
| Black-bellied Plover (*Pluvialis squatarola*) | | | X |
| Dunlin (*Calidris alpine*) | X | | X |
| Greater Yellowlegs (*Tringa melanoleuca*) | | | X |
| Killdeer (*Charadrius vociferous*) | X | X | X |
| Least Sandpiper (*Calidris minutilla*) | X | X | X |
| Lesser Yellowlegs (*Tringa flavipes*) | | | X |
| Stilt Sandpiper (*Calidris himantopus*) | | | X |
| Willet (*Tringa semipalmata*) | | | X |

### 2.1.18 USFWS Birds of Conservation Concern

The 1988 amendment to (Public Law 100-653, Title VIII) to the Fish and Wildlife Conservation Act directs the USFWS to "identify species, subspecies, and populations of all migratory nongame birds that, without additional conservation actions, are likely to become candidates for listing under the Endangered Species Act of 1973." In response to this mandate, the USFWS (2019b) compiled a list of Birds of Conservation Concern (BCC) on three scales: the BCRs, USFWS Regions, and a National scale. The USFWS utilized the conservation assessment scores in the PIF North American Landbird Conservation Plan, the United States Shorebird Conservation Plan, and the North American Waterbird Conservation Plan to identify abundance, population trends, distribution, threats, and the importance of an area to a species to identify Birds of Conservation Concern for each BCR. The goal of the BCC is to identify the highest conservation priorities within the populations of migratory and non-migratory bird species. The table below cross references the BCC and birds identified in Bexar County. Any of the species below could occur within the project area due to its location along the San Antonio River. This project will directly benefit BCC species through the implementation of native species plantings and invasive species management along the riparian corridor and within the river itself. By planting native species and managing monocultures, the study area's biodiversity will be improved which will effectively improve foraging and nesting sites for birds.

**Table 5. USFWS Birds of Conservation Concern and Species Known to Occur in Bexar County (Coffey et al., 2011)**

| Species | Bird Conservation Region (BCR) | | |
|---|---|---|---|
| | **Oaks and Prairies** | **Edwards Plateau** | **Tamaulipan Brushland** |
| Little Blue Heron | X | | |
| Swallow-tailed Kite | X | | |

| Species | Bird Conservation Region (BCR) | | |
|---|---|---|---|
| | Oaks and Prairies | Edwards Plateau | Tamaulipan Brushland |
| Bald Eagle | X[b] | X[b] | |
| Harris' Hawk (*Parabuteo unicinctus*) | | | X |
| Swainson's Hawk | | | X |
| Peregrine Falcon (*Falco peregrinus*) | X[b] | X[b] | |
| Snowy Plover | | | X[c] |
| Mountain Plover | | X[nb] | X[nb] |
| Lesser Yellowlegs | | | X[nb] |
| Solitary Sandpiper | | | X[nb] |
| Upland Sandpiper | X | X[nb] | |
| Long-billed Curlew | X[nb] | X[nb] | X[nb] |
| Hudsonian Godwit | X[nb] | | |
| Buff-breasted Sandpiper | X[nb] | | |
| Gull-billed Tern | | | X |
| Green Parakeet | | | X[d] |
| Elf Owl | | | X |
| Burrowing Owl | | | X |
| Buff-bellied Hummingbird (*Amazilia yucatanensis*) | | | X |
| Red-headed Woodpecker | X | | |
| Scissor-tailed Flycatcher (*Tyrannus forficatus*) | X | | |
| Loggerhead Shrike | X | | |
| Bell's Vireo | X[c] | | X[c] |
| Verdin (*Auriparus flaviceps*) | | | X |
| Curve-billed Thrasher (*Toxostoma curvirostre*) | | | X |
| Sprague's Pipit | X[nb] | | X[nb] |
| Tropical Parula (*Setophaga pitiayumi*) | | | X |
| Swainson's Warbler | X | | |
| Summer Tanager (*Piranga rubra*) | | | X |
| White-collared Seedeater (*Sporophila torqueola*) | | | X |
| Cassin's Sparrow (*Peucaea cassinii*) | | | X |
| Rufous-crowned Sparrow (*Aimophila ruficeps*) | | X | |
| Lark Bunting | | | X[nb] |
| Henslow's Sparrow | X[nb] | | |

| Species | Bird Conservation Region (BCR) | | |
|---|---|---|---|
| | Oaks and Prairies | Edwards Plateau | Tamaulipan Brushland |
| Harris' Sparrow | X[nb] | X[nb] | |
| McCown's Longspur (*Rhynchophanes mccownii*) | | X[nb] | |
| Smith's Longspur | X[nb] | | |
| Chestnut-collared Longspur | | X[nb] | X[nb] |
| Varied Bunting | | | X |
| Painted Bunting | | | X |
| Dickcissel | | | X |
| Orchard Oriole (*Icterus spurius*) | X | X | |
| Hooded Oriole (*Icterus cucullatus*) | | | X |
| Altamira Oriole (*Icterus gularis*) | | | X |
| Audubon's Oriole | | | X |

b - *ESA delisted,* c - *non-listed subspecies or population of* threatened or endangered species, d - *MBTA protection uncertain or lacking,* nb - *non-breeding in this B*CR

### 2.1.19 Texas Conservation Action Plan

The Texas Conservation Action Plan (TPWD 2011) identifies Species of Greatest Conservation Need (SGCN) for ecoregions throughout the state, including the Blackland Prairie, Edwards Plateau, and South Texas ecoregions. Included in the list of SGCN for these ecoregions are several species that would benefit from aquatic and riparian ecosystem restoration measures within the River Road study area (Table 10). Aquatic species such as spiny softshell turtle (*Apalone spinifera*), red-eared slider (*Trachemys scripta*), alligator gar (*Atractosteus spatula*), and blue sucker (*Cycleptus elongates*) would benefit from the reconnection of fragmented aquatic habitats. Riparian SGCN such as the swamp rabbit (*Sylvilagus aquaticus*), Strecker's chorus frog (*Pseudacris streckeri*), Bell's Vireo, Louisiana Waterthrush (*Seiurus motacilla*) would also benefit from the restoration of riparian grassland, shrubland, and woodland habitats. In addition, species that rely on riparian corridors for foraging habitat, including bat SGCN such as the Brazilian free-tailed bat (*Tadarida brasiliensis*), would benefit from the improved habitat for forage species.

**Table 6. Texas Species of Greatest Conservation Need**

| Scientific Name | Common Name | Abundance Ranking |
|---|---|---|
| **Mammals** | | |
| *Blarina hylophaga plumblea* | Elliot's short-tailed shrew | Critically imperiled |
| *Geomys attwateri* | Attwater's pocket gopher | Apparently Secure |
| *Lutra canadensis* | River otter | Apparently Secure |
| *Mustela frenata* | Long-tailed weasel | Secure |

| Scientific Name | Common Name | Abundance Ranking |
|---|---|---|
| *Myotis austroriparius* | Southeastern myotis | Vulnerable |
| *Myotis velifer* | Cave myotis | Apparently Secure |
| *Puma concolor* | Mountain lion | Imperiled |
| *Spilogale putorius* | Eastern spotted skunk | Apparently Secure |
| *Sylvilagus aquaticus* | Swamp rabbit | Secure |
| *Tadarida brasiliensis* | Brazilian free-tailed bat | Secure |
| *Taxidea taxus* | American badger | Secure |
| *Ursus americanus* | Black bear | Vulnerable |
| **Birds** | | |
| *Anas acuta* | Northern Pintail | Vulnerable for the breeding population, Secure for the nonbreeding population |
| *Colinus virginianus* | Northern Bobwhite | Apparently Secure for the breeding population |
| *Tympanuchus cupido* | Greater Prairie-Chicken (Interior) | Critically imperiled for the breeding population |
| *Meleagris gallopavo* | Wild Turkey | Secure for the breeding population |
| *Ixobrychus exilis* | Least Bittern | Apparently Secure for the breeding population |
| *Egretta thula* | Snowy Egret | Secure for the breeding population |
| *Egretta caerulea* | Little Blue Heron | Secure for the breeding population |
| *Butorides virescens* | Green Heron | Secure for the breeding population |
| *Mycteria americana* | Wood Stork | Possibly Extirpated (historical) for the breeding population, imperiled for the nonbreeding population. |
| *Ictinia mississippiensis* | Mississippi Kite | Apparently Secure for the breeding population |
| *Haliaeetus leucocephalus* | Bald Eagle | Vulnerable for the breeding population, vulnerable for the nonbreeding population |
| *Circus cyaneus* | Northern Harrier | Imperiled for the breeding population, vulnerable for the nonbreeding population |
| *Buteo lineatus* | Red-shouldered Hawk | Apparently Secure for the breeding population |
| *Pluvialis dominica* | American Golden-Plover | Vulnerable |

| Scientific Name | Common Name | Abundance Ranking |
|---|---|---|
| *Charadrius montanus* | Mountain Plover | Imperiled |
| *Scolopax minor* | American Woodcock | Imperiled for the breeding population, Vulnerable for the nonbreeding population |
| *Sternula antillarum* | Least Tern | Vulnerable for the breeding population |
| *Asio flammeus* | Short-eared Owl | Apparently Secure for nonbreeding population |
| *Caprimulgus carolinensis* | Chuck-will's-widow | Vulnerable, apparently Secure for the breeding population |
| *Melanerpes erythrocephalus* | Red-headed Woodpecker | Vulnerable for the breeding population |
| *Dryocopus pileatus* | Pileated Woodpecker | Apparently Secure for the breeding population |
| *Tyrannus forficatus* | Scissor-tailed Flycatcher | Vulnerable for the breeding population |
| *Lanius ludovicianus* | Loggerhead Shrike | Apparently Secure for the breeding population |
| *Vireo bellii* | Bell’s Vireo | Vulnerable for the breeding population |
| *Poecile carolinensis* | Carolina Chickadee | Secure for the breeding population |
| *Thryomanes bewickii (bewickii)* | Bewick's Wren | Secure for the breeding population |
| *Cistothorus platensis* | Sedge Wren | Apparently Secure |
| *Hylocichla mustelina* | Wood Thrush | Apparently Secure for the breeding population |
| *Anthus spragueii* | Sprague's Pipit | Vulnerable for the nonbreeding population |
| *Dendroica dominica* | Yellow-throated Warbler | Apparently Secure for the breeding population |
| *Protonotaria citrea* | Prothonotary Warbler | Vulnerable for the breeding population |
| *Limnothlypis swainsonii* | Swainson's Warbler | Vulnerable for the breeding population |
| *Seiurus motacilla* | Louisiana Waterthrush | Vulnerable for the breeding population |
| *Oporornis formosus* | Kentucky Warbler | Vulnerable for the breeding population |

| Scientific Name | Common Name | Abundance Ranking |
|---|---|---|
| *Spizella pusilla* | Field Sparrow | Secure for the breeding population |
| *Ammodramus savannarum* | Grasshopper Sparrow | Secure for the breeding population |
| *Chondestes grammacus* | Lark Sparrow | Apparently Secure for the breeding population |
| *Ammodramus henslowii* | Henslow's Sparrow | Imperiled, vulnerable for the breeding population, Presumed Extirpated for the breeding population |
| *Ammodramus leconteii* | Le Conte's Sparrow | Unknown |
| *Zonotrichia querula* | Harris's Sparrow | Apparently Secure |
| *Calcarius mccownii* | McCown’s Longspur | Apparently Secure |
| *Calcarius pictus* | Smith's Longspur | Unknown |
| *Piranga rubra* | Summer Tanager | Secure for the breeding population |
| *Passerina ciris* | Painted Bunting | Apparently Secure for the breeding population |
| *Spiza americana* | Dickcissel | Apparently Secure for the breeding population |
| *Sturnella magna* | Eastern Meadowlark | Secure for the breeding population |
| *Euphagus carolinus* | Rusty Blackbird | Vulnerable |
| *Icterus spurius* | Orchard Oriole | Apparently Secure for the breeding population |
| **Reptiles and Amphibians** | | |
| *Anaxyrus (Bufo) woodhousii* | Woodhouse's toad | Unrankable |
| *Apalone mutica* | smooth softshell turtle | Unknown |
| *Apalone spinifera* | spiny softshell turtle | Unknown |
| *Cheylydra serpentina* | Common snapping turtle | Unknown |
| *Crotalus atrox* | Western diamondback rattlesnake | Apparently Secure |
| *Crotalus horridus* | Timber (Canebrake) Rattlesnake | Apparently Secure |
| *Graptemys caglei* | Cagle's map turtle | Critically Imperiled |
| *Graptemys versa* | Texas map turtle | Unrankable |
| *Heterodon nasicus* | Western hognosed snake | Unknown |

| Scientific Name | Common Name | Abundance Ranking |
|---|---|---|
| *Macrochelys temminckii* | alligator snapping turtle | Vulnerable |
| *Ophisaurus attenuatus* | western slender glass lizard | Unknown |
| *Phrynosoma cornutum* | Texas horned lizard | Apparently Secure |
| *Pseudacris streckeri* | Strecker's Chorus Frog | Vulnerable |
| *Sistrurus catenatus* | massasauga | Unknown |
| *Terrapene carolina* | Eastern box turtle | Vulnerable |
| *Terrapene ornata* | Ornate box turtle | Vulnerable |
| *Thamnophis sirtalis annectans* | Texas Garter Snake (Eastern/Texas/ New Mexico) | Imperiled |
| *Trachemys scripta* | Red-eared slider | Unknown |
| **Freshwater Fish** | | |
| *Anguilla rostrata* | American eel | Secure |
| *Atractosteus spatula* | alligator gar | |
| *Cycleptus elongatus* | Blue sucker | Vulnerable |
| *Etheostoma fonticola* | Fountain darter | Critically Imperiled |
| *Macryhbopsis storeriana* | Silver chub | Unknown |
| *Micropterus treculii* | Guadalupe bass | Vulnerable |
| *Notropis atrocaudalis* | Blackspot shiner | Unknown |
| *Notropis bairdi* | Red River shiner | Unknown |
| *Notropis buccula* | Small eye shiner | Imperiled |
| *Notropis chalybaeus* | Ironcolor shiner | Unknown |
| *Notropis oxyrhynchus* | Sharpnose shiner | Vulnerable |
| *Notropis potteri* | Chub shiner | Vulnerable |
| *Notropis shumardi* | Silverband shiner | Unknown |
| *Percina apristis* | Guadalupe darter | Unknown |
| *Polyodon spathula* | Paddlefish | Vulnerable |
| *Satan eurystomus* | Widemouth blindcat | Critically Imperiled |
| *Trogloglanis pattersoni* | Toothless blindcat | Critically Imperiled |

| Scientific Name | Common Name | Abundance Ranking |
|---|---|---|
| **Invertebrates** | | |
| *Bombus pensylvanicus* | American bumblebee | Unrankable |
| *Chimarra holzenthali* | Holzenthal's Philopotamid caddisfly | Critically Imperiled |
| *Cotinis boylei* | A scarab beetle | Imperiled |
| *Nicrophorus americanus* | American Burying Beetle | Critically Imperiled |
| *Potamilus amphichaenus* | Texas heelsplitter | Critically Imperiled |
| *Procambarus regalis* | Regal burrowing crayfish | Imperiled |
| *Procambarus steigmani* | Parkhill prairie crayfish | Critically Imperiled and Imperiled |
| *Pseudocentroptiloides morihari* | A mayfly | Imperiled |
| *Sphinx eremitoides* | Sage sphinx | Critically Imperiled |
| *Susperatus tonkawa* | A mayfly | Critically Imperiled |
| **Plants** | | |
| *Agalinis densiflora* | Osage Plains false foxglove | Imperiled |
| *Astragalus reflexus* | Texas milk vetch | Vulnerable |
| *Calopogon oklahomensis* | Oklahoma grass pink | Critically Imperiled and Imperiled |
| *Carex edwardsiana* | canyon sedge | Vulnerable and Apparently Secure |
| *Carex shinnersii* | Shinner's sedge | Imperiled |
| *Crataegus dallasiana* | Dallas hawthorn | Vulnerable |
| *Cuscuta exaltata* | tree dodder | Vulnerable |
| *Dalea hallii* | Hall's prairie-clover | Vulnerable |
| *Echinacea atrorubens* | Topeka purple-coneflower | Vulnerable |
| *Hexalectris nitida* | Glass Mountains coral-root | Vulnerable |
| *Hexalectris warnockii* | Warnock's coral-root | Imperiled |
| *Hymenoxys pygmea* | Pygmy prairie dawn | Critically Imperiled |
| *Liatris glandulosa* | glandular gay-feather | Vulnerable |
| *Paronychia setacea* | bristle nailwort | Vulnerable |
| *Phlox oklahomensis* | Oklahoma phlox | Possibly Extirpated (historical) |
| *Physaria engelmannii* | Engelmann's bladderpod | Vulnerable |

| Scientific Name | Common Name | Abundance Ranking |
|---|---|---|
| *Polygonella parksii* | Parks' jointweed | Imperiled |
| *Prunus texana* | Texas peachbush | Vulnerable and Apparently Secure |
| *Thalictrum texanum* | Texas meadow-rue | Imperiled |
| *Zizania texana* | Texas wild rice | Critically Imperiled |

## 2.2 Public Recognition

Significance based on public recognition means that some segment of the general public recognizes the importance of an environmental resource. Public recognition is evidenced by people engaged in activities that reflect an interest in or concern for a particular resource. Recognition of public significance for the River Road study area can best be demonstrated by the actions of the San Antonio River Authority (SARA).

The proposed River Road Aquatic ER Feasibility Study makes a significant contribution to a larger migratory bird conservation and restoration effort being implemented by Bexar County, City of San Antonio (CoSA), SARA, and USACE. The above entities have made commitments to improving habitat across the San Antonio River watershed, approximately 1-3 miles from River Road. The following is a brief listing for some of the recent, current, ongoing, and future projects for the San Antonio River watershed and Bexar County.

- Cibolo Creek, Leon Creek, Salado Creek, Olmos Creek, Eagleland, Mission Reach, Westside Creek, and Mitchell Lake Studies: partnerships with USACE to identify ecosystem restoration opportunities within the San Antonio River watershed.
- On-going community input for the restoration of other water bodies in the San Antonio, TX area.
- Three public meetings will have been held in regards to the River Road Aquatic ER Feasibility Study from scoping to Draft document release. Comments from the public have been addressed and were utilized in the development of implementation measures for this project. SARA and USACE will continue to receive public feedback and address any questions, concerns, and recommendations about the project.
- River and Parks Committee of the River Road Neighborhood Association has expressed significant interest in the project and has submitted questions, comments, and concerns that have assisted the team in determining restoration and recreation measures.
- CoSA's Creekways program: $20 million invested in the purchase and preservation the riparian zone of Salado and Leon Creeks.
- CoSA's 2000 Proposition 3: Provides funding to purchase lands located in the Edwards Aquifer recharge zone, including creeks and riparian habitats. Approximately $45 million dollars is available for this effort, and thousands of acres have already been purchased.
- CoSA's 2005 and 2010 Proposition 1: Continues funding to purchase environmentally sensitive properties located above the Edwards Aquifer. Approximately $90 million dollars is available for this effort and thousands of acres have already been purchased.
- CoSA's 2015 Proposition 1: Continues funding to purchase environmentally sensitive properties over the Edwards Aquifer recharge and contributing zones (up to $100

million), $10 million will be used to create new protection zones within urban areas of Bexar County to protect San Antonio's drinking water.

- Bexar County, SARA, and CoSA spend a great deal for river/creek debris clean-up. CoSA maintains two fulltime crews, and SARA is spending millions to develop water quality models throughout the basin to quantify water quality benefits produced by natural creek systems.
- San Antonio River, Mission Reach: $83.6 million (including $27.5 million in lands, easements, rights-of-way, relocations and disposal areas) was invested in the Mission Reach project by SARA and other non-federal entities in addition to the $121.7 million federal share.

Several other public organizations around the country have immense interest in maintaining, restoring, and creating wetlands and assisting waterfowl and shorebird persistence by managing appropriate habitat for essential nesting cover and other needs as of 2020.

- SARA – active river authority in the State of Texas that is committed to clean, safe, enjoyable creeks and rivers.
- San Antonio River Foundation – non-profit organization that aims to preserve, enhance, and transform the San Antonio River Basin as a vibrant cultural, educational, ecological, and recreational experience.
- USFWS - work with others to conserve, protect, and enhance fish, wildlife, plants, and their habitats for the continuing benefit of the American people.
- TPWD – manage and conserve the natural and cultural resources of Texas and to provide hunting, fishing and outdoor recreation opportunities for the use and enjoyment of present and future generations.
- NRCS – deliver conservation solutions so agricultural producers can protect natural resources and feed a growing world.
- Audubon Society of San Antonio – raises the awareness of both members and the general public about the protection, preservation, and propagation of all wildlife, particularly birds, and their habitat.
- Texas Rivers Protection Association - raises awareness for water conservancy and resource use, develops public access to Texas rivers and lakes.
- Delta Waterfowl – a leading conservation group that aims to produce ducks and secure the future of waterfowl hunting.
- Ducks Unlimited – conserves, restores, and manages wetlands and associated habitats for North America's waterfowl.
- National Fish and Wildlife Foundation – works with both public and private sectors to protect and restore the nation's fish, wildlife, plants, and habitats.
- Western Hemisphere Shorebird Reserve Network – conserves shorebirds and their habitats across the Americas through action at a network of key sites.
- Water Keeper Alliance – strengthens and grows a global network of grassroots leaders protecting everyone's right to clean water.

## 2.3 Technical Recognition

Significance based on technical recognition requires identification of critical resource characteristics such as scarcity, representativeness, status and trends, connectivity, limiting habitat, and biodiversity. Therefore, technical recognition of resources varies across geographic areas and spatial scale.

a) Scarcity – Only 3% of Earth's water is fresh with only 1% actually available for use. Water systems are becoming increasingly stressed and polluted. The San Antonio River, running through San Antonio, TX is no exception. This river is not suitable for human consumption because of human induced pollutants and runoff. Rapid development will only increase the degradation of rivers and streams. The San Antonio River is highly significant because of its placement in an urban landscape. There is an opportunity for natural resources education addressed to the public to encourage environmentally friendly habits and a "before and after" of this ecosystem. Suitable riverine habitat has been steadily degraded over the last century through channelization and flood control project. This reach of the San Antonio River is one of the last remaining unchannelized sections. Riparian habitat has also seen a significant decline and was once at least 1% of the western landscape.

b) Representativeness – The study area for River Road has an abundance of non-native invasive species. By improving aquatic and riparian habitat within the project area, USACE and the NFS would be able to mimic the form and function of the historic ecosystem within the San Antonio, TX area.

c) Status and Trends – Over the last 100 years, approximately 95-percent of riparian habitat has been converted by river channelization, water impoundments, agricultural practices, and urbanization (Krueper, 1993). As a result, freshwater animal species are disappearing five times faster than terrestrial animals due, partially, to the widespread physical alteration of rivers (Ricciardi and Rasmussen 1999). Of 860,000 river miles within the United States, approximately 24 percent have been impacted by channelization, impoundment, or navigation. The USFWS estimates 70 percent of the riparian habitats nationwide have been lost or altered, and 50 percent of all listed threatened or endangered species depend on rivers and streams for their continued existence.

   The national and state trend for habitat loss is even more pronounced within Bexar County. An analysis of tree cover within the San Antonio region reveals tree loss trends in three distinct areas. As might be expected, the most dramatic loss of tree cover occurs within the City of San Antonio. The city has had its heavy tree cover (areas with greater than 50-percent canopy) decline by nearly 39 percent from 63,522 acres in 1985 to 38,753 acres in 2001. The greater San Antonio Area, including Bexar County and surrounding suburbs saw its heavy tree cover drop from 26 percent to 20 percent; areas with medium density canopy (20-49 percent) had the most significant percentage change, from 6 percent in 1985 to 3 percent by 2001 – a loss of approximately 43 percent; areas with light tree canopy (less than 20-percent tree cover) expanded from 69 percent in 1985 to 77 percent in 2001 (American Forests, 2002). Further, the introduction of exotic plant and animal species has had a substantial effect on riparian areas, leading to displacement of native species and the subsequent alteration of ecosystem properties (NRC 2002). Problematic non-native woody and herbaceous plant species are found throughout the study area. This trend in the loss of habitat and species is expected to continue unless proactive restoration measures are taken.

d) Connectivity – Desirable habitat for migratory waterfowl and Neotropical migrants is limited in the San Antonio Area. A high percentage of all Neotropical migrant species

require woodlands of various densities and structure. Woodland habitats in San Antonio are primarily limited to only those that occur along waterways. Potential restoration measures would increase riverine habitat (riparian and aquatic) required by many bird species living in or migrating through Bexar County, including many of the bird species of concern noted in the previous tables. The study area is centrally located between two areas where migratory birds, including migratory waterfowl are heavily concentrated, Mitchell Lake and Brackenridge Park. The Mitchell Lake Wildlife Refuge, located approximately 10 miles from the southern end of the study area, has had over 300 species of birds recorded, many of which are migratory waterfowl, and is one of the most heavily birded locations in Bexar County. The other area of heavy use, located just 300 feet from the northern end of the study area, is Brackenridge Park. This area has also recorded a large number of Neotropical migrant species and represents the other heavily birded location in Bexar County. The River Road study area, located to the north of Mitchell Lake and south of Brackenridge Park migratory bird habitats, would increase the amount of highly used, but scarce habitat along a proven migratory bird stop-over corridor.

Potential management actions include the reestablishment of riparian forest and aquatic habitats, in strategic locations throughout the study area. The establishment of native woody and herbaceous riparian vegetation would provide significant benefit to the movement of aquatic species throughout the study area and would play a role in the aquatic species ability to move into newly restored upstream habitats. Because of the low water crossings, fish from the San Antonio River do not have the ability to emigrate up or down the river. During flooding events, fish move along the margins of the river, where velocities are slower, in order to migrate up and downstream between the various aquatic habitats. Currently, because of the trapezoidal shape of the channel in the southern portion of the study area and the lack of proper riparian vegetation structure throughout the reach, velocities along the margins of the river can be too swift for fish movement during floods. Riparian trees serve many purposes when inundated including slowing the flood waters along the margins, which makes fish movement possible and provides a velocity refugia from the higher velocity water. Additionally, the structure added by the trees and the woody and herbaceous understory provides cover from predation during movement up and downstream. It is important that the riparian corridor be continuous from the water's edge to the top of the channel banks in order to maximize the benefits provided with respect to cover and migration along floodwater margins.

e) Limiting Habitat – Aquatic and riparian habitats are dynamic and relatively rare systems in South Texas, most of which are defined by highly variable and intermittent flows. The number of naturally functioning aquatic and riparian habitats is decreasing nationwide, and the loss of these habitats is much more significant in South Texas due to the limited availability of aquatic and riparian habitats in the region. The effect of the loss of aquatic and riparian habitats in South Texas is especially significant for migrating birds utilizing the Central Flyway which are dependent on these habitats. Potentially compounding the loss of riparian habitats in the immediate future, are the number of Conservation Reserve Program lands throughout the Great Plains in the Central Flyway that will be coming out of the program in the immediate future, and will potentially be converted back to croplands. Bird migration is a physical activity that places extreme energy demands on birds. Compounding these energy requirements, the migration bookends the breeding and reproduction season of the birds where the energy demands approach those needed for migration. Energy reserves may be severely depleted for many bird species that have flown non-stop over the Gulf of Mexico. In order to fuel migration

energy demands, productive foraging and resting stopover habitats must be found along the migration corridor. Aquatic and riparian habitats are some of the most productive and diverse ecosystems in North America, especially in the arid southwest, and therefore are heavily utilized by migrating birds. Historically, the aquatic and riparian habitats in the San Antonio area would have been one of the first productive stopover habitats for northbound migratory birds, after leaving the Texas coast along the southeastern side of the arid South Texas plains.

f) Biodiversity – Although riparian habitats comprise a relatively small portion of the overall landscape in arid and semiarid regions, riparian ecosystems substantially influence hydrologic, geomorphic, and ecological processes (Shaw and Cooper, 2008). Because soils in riparian habitats adjacent to intermittent and ephemeral streams have higher moisture content, they support more abundant vegetation than adjacent uplands. This vegetation provides breeding, nesting, and foraging habitat, cover, and wildlife travel corridors that are not available in adjacent upland habitats. Parameters influencing migrant passerine bird use in riparian habitats include habitat preferences of the bird, niche diversity and plant species composition, location and accessibility of habitat, and quality of adjacent habitat (Stevens et al., 1977). Avian species, in particular, are more dependent on riparian habitats in semiarid environments than other organisms (Levick et al., 2008). In fact, riparian bird populations may not be significantly affected by the impacts of urbanization as long as the riparian ecosystem remains in good condition (Oneal and Rotenberry, 2009).

   The species benefiting from the restoration are also significant for a number of reasons. First, the restored aquatic habitat provides the opportunity for native fish populations to return to the San Antonio River within the study area. Riparian habitat has a strong influence upon instream habitat due to roots, debris, and other structures that may enhance habitat within the banks of a stream. These impacts strongly influence fish survival due to available cover and foraging sites. A fish survey conducted for the San Antonio River Mission Reach segment by the U.S. Army Corps of Engineers, Engineering and Research Design Center (ERDC) found 25 percent of the total number identified species were non-native. Sixty-four percent of the native species component of the Mission Reach aquatic community was tolerant of degraded habitat. Therefore, 89 percent of the fishes surveyed within the Mission Reach project area are comprised of introduced species or native species tolerant of degraded conditions. It has been demonstrated that habitat is the limiting factor in the return of native fish to the study area due to the proximity of the Mission Reach project, as well as the existing conditions within the River Road reach of the San Antonio River. As water quality in the river has improved through better wastewater treatment, an increase in the number of pollution-intolerant fish species such as stone rollers (*Campostoma anomalum*)and longear sunfish (*Lepomis megalotis*) in the San Antonio River has been observed.

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# 4 List of Preparers

Justyss Watson – Biologist, Regional Planning and Environmental Center; 5 years USACE experience.

# Attachment A

# United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
2005 NE Green Oaks Blvd., Suite 140
Arlington, Texas 76006


In Reply Refer To:
02ETAR00-2020-I-2975

February 24, 2021

Arnold (Rob) Newman
Director, Regional Planning and Environmental Center
U.S. Army Corps of Engineers
Room 3A12
819 Taylor Street
Fort Worth, Texas 76102-0300

Dear Mr. Newman:

This letter transmits the U.S. Fish and Wildlife Service's (Service) final report on the U.S. Army Corps of Engineers' (USACE) Feasibility Study for the River Road Aquatic Ecosystem Restoration in Bexar County, Texas, in accordance Section 2(b) of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.). Please see the attached Coordination Act Report.

The River Road Aquatic Ecosystem Restoration Feasibility Study is a Section 206 Continuing Authorities Program. The study is being performed under Section 206 of the Water Resources Development Act (WRDA) of 1996, as amended (335 U.S. Code 2011). Under this authority, USACE is authorized to develop aquatic ecosystem restoration projects that improve the quality of the environment, are in the public interest, and are cost effective. The primary purpose of the study is to investigate and determine modifications that would restore degraded ecological structure and function to aquatic and riparian habitat on the River Road reach of the San Antonio River. The Service assisted USACE in assessing this project by attending team meetings and reviewing baseline habitat assessments.

Project opportunities identified include:

- Provide additional recreational and ecotourism benefits to the community
- Improve water quality in the San Antonio River through ecosystem restoration

Planning objectives used in formulation and evaluation of alternative plans:

- Restore aquatic ecosystem function and structure to the River Road segment of the San Antonio River for a 50-year period of analysis
- Restore riparian habitat quality over the 50-year period of analysis
- Reduce erosive threat to the roads that parallel the river over the 50-year period of analysis

- Maintain pedestrian access in the project area over the 50-year period of analysis
- Provide an economically efficient solution

**Background**

The study area is located in the River Road area of the San Antonio River in San Antonio, Bexar County, Texas. The project site spans approximately 3700 feet of the river between East Mulberry Avenue and U.S. Highway 281 and is bound by Avenue A and River Road to the east and west, respectively. This area is one of the last remaining unchannelized segments of the upper San Antonio River.

The River Road aquatic ecosystem has been affected by increased urbanization and its associated encroachment on riparian habitats throughout the 20th century, the downstream portion of the study area has been depleted of any semblance of its historical descriptions. The San Antonio River, the downstream portion located within the study area, has been completely straightened for approximately 0.2 miles and its banks have been converted from riparian habitats to maintained grass-lined channels. By straightening the once winding watercourses, water velocities increased, disrupting the substrate composition of the aquatic habitats resulting in increased erosion and sedimentation downstream. The homogeneous, shallow channel that replaced the sinuous natural pool-riffle-run habitats severely degraded the quality of the aquatic habitat. The loss of overstory vegetation provided by shrubs and trees, and to a limited extent herbaceous vegetation, has led to increased water temperatures, lower dissolved oxygen concentrations, and limited organic inputs into the aquatic system.

**Summary and Recommendations**

Urbanization and other human impacts have caused significant degradation to the riverine ecosystem functions, resulting in reduced habitat quality and quantity and reductions in wildlife diversity and abundance. Specific planning objectives include (1) maximize and improve fish and wildlife habitat, (2) greater floral and faunal species diversity and richness, and (3) manage and remove invasive species.

After performing an analysis on an array of alternatives and plans, the team recommended the restoration of the riparian corridor on the eastern and western boundary of the study area, as well as the restoration of riverine habitat within the San Antonio River.

The Service supports the proposed action for the River Road Aquatic Ecosystem Restoration. The proposed ecosystem restoration measures would restore, to the extent practicable, the aquatic and riparian functions of the River Road ecosystem. This plan will increase diversity of habitat, increasing the diversity of wildlife including birds, fish, amphibians, reptiles, and mammals. These species will benefit from the results of restoration, which include improved stream connectivity, improved sediment distribution, decreased erosion impacts, and improved water quality. This Plan reasonably maximizes ecosystem restoration benefits compared to costs, consistent with the Federal objective.

The Service has determined that no federally listed species would be expected to occur within the current project area; therefore no adverse effects to listed species are expected to occur with implementation of the proposed action.

Thank you for your coordination and the opportunity to participate in this project to restore, enhance and protect our natural resources. We look forward to assisting your staff in future Fish and Wildlife Coordination Act processes. Please contact Sean Edwards of the Arlington, Texas Ecological Services Field Office at sean_edwards@fws.gov or at 817-277-1100 ext. 22127 if you have any questions or require additional assistance.

Sincerely,

DEBRA BILLS Digitally signed by DEBRA BILLS Date: 2021.02.26 10:40:09 -06'00'

Debra Bills
Field Supervisor

Enclosure

S:\Correspondence\FY 2020\Project Files\2020-I-2975 River Road San Antonio\Final CAR\2020-I-2975 River Road Final CAR concurrence letter.docx

# Fish and Wildlife Coordination Act Report

on

## River Road Aquatic Ecosystem Restoration Feasibility Study

Prepared by:

U.S. Fish & Wildlife Service

Arlington Texas Ecological Services Field Office

February 24, 2021

# Executive Summary

## Study Description

The River Road Aquatic Ecosystem Restoration (ER) Feasibility Study is a Continuing Authorities Program (CAP) Section 206 study. The Integrated Feasibility Report (IFR) document contains information relevant to both a Planning and Design Analysis used as a planning document by the U.S. Army Corps of Engineers (USACE) and an Environmental assessment (EA) to satisfy the National Environmental Policy Act (NEPA).

## Authority

The study is being performed under Section 206 of the Water Resources Development Act (WRDA) of 1996, as amended (335 U.S. Code 2011). Under this authority, USACE is authorized to develop aquatic ecosystem restoration projects that improve the quality of the environment, are in the public interest, and are cost effective.

## Study Purpose

The purpose of this feasibility study is to investigate and determine modifications that would improve the habitat structure and function of the River Road segment of the San Antonio River (River Road). The IFR is prepared in response to a request for Federal assistance from the San Antonio River Authority (SARA) for an aquatic ecosystem restoration project. The IFR documents the feasibility study and serves as the decision document for project design and construction.

## Study Scope

The study is a CAP feasibility study for aquatic ecosystem restoration. CAP feasibility studies focus on water resource related projects of relatively smaller scope, cost, and complexity. A determination of Federal Interest to support a request for initial study was approved on November 30th, 2015.

The study generally includes the River Road segment of the San Antonio River. This section of the river is part of an interconnected system of USACE ecosystem restoration projects in the San Antonio, Texas area. The project will investigate the ecosystem degradation along the river and look for solutions that will restore the area to maximum ecosystem function.

## Location

The study area is located between East Mulberry Avenue and US 281 in San Antonio, Texas (Figure i). The project site spans approximately 3700 feet of the San Antonio River that is bound by Avenue A to the east and River Road to the west and is one of the last unchannelized segments of the river.

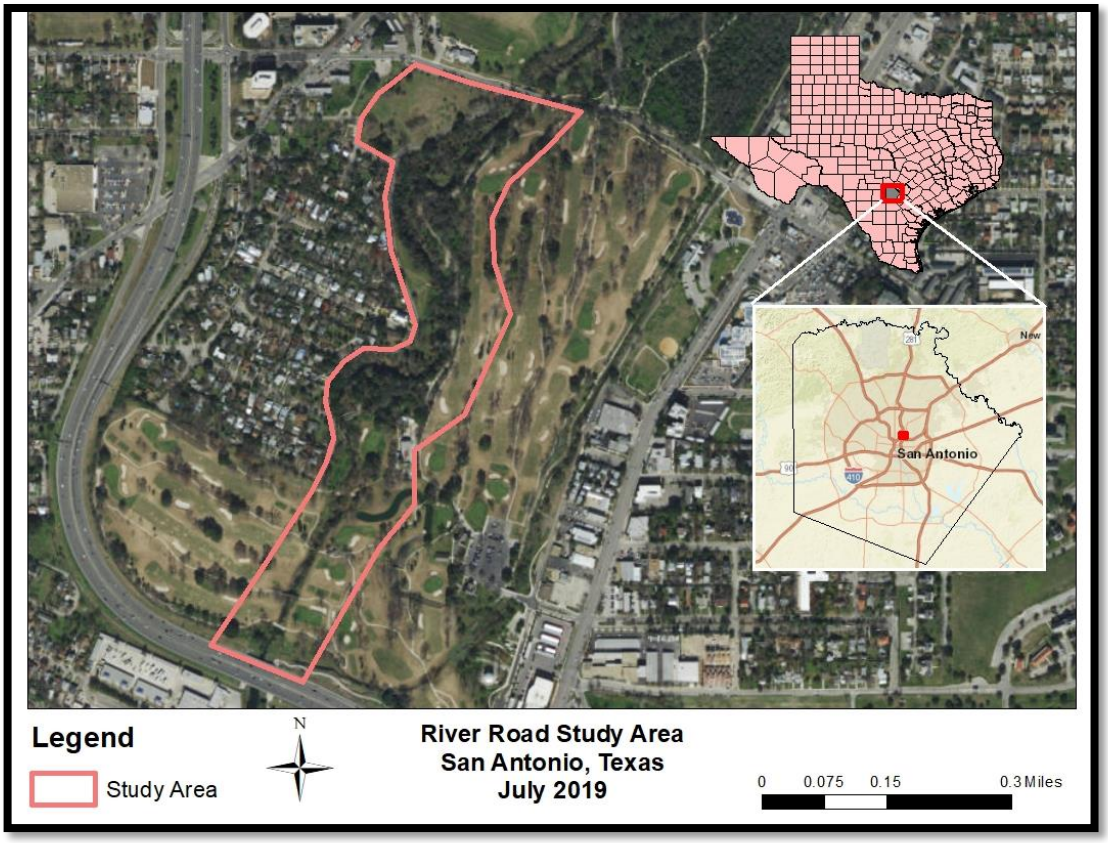


**Figure i.** River Road Aquatic Ecosystem Restoration Feasibility Study Area

## Problems, Opportunities, and Objectives

The aquatic ecosystem along the River Road segment of the San Antonio River is severely degraded from excess erosion resulting in a riparian corridor that has been reduced to a narrow strip adjacent to the river bank. This has reduced the natural bank erosion protection provided by the riparian vegetation along the river.

The opportunities identified include:

- Provide additional recreational and ecotourism benefits to the community
- Improve water quality in the San Antonio River through ecosystem restoration

Planning objectives reflect an expression of public and professional issues or concerns about the use of water and related land resources resulting from the analysis of existing and future conditions in the study area. These planning objectives were used in guiding the development of alternative plans and their evaluation for the period of analysis. The following planning objectives were used in formulation and evaluation of alternative plans:

- Restore aquatic ecosystem function and structure to the River Road segment of the San Antonio River for a 50-year period of analysis
- Restore riparian habitat quality over the 50-year period of analysis
- Reduce erosive threat to the roads that parallel the river over the 50-year period of analysis
- Maintain pedestrian access in the project area over the 50-year period of analysis

- Provide an economically efficient solution

## Alternatives

Measures used to formulate alternatives included both nonstructural and structural measures, as well as a No Action Alternative. Nonstructural measures included native species planting, invasive species removal, and controlled public access. Structural measures included road modifications, nesting structures-platforms, instream structures, channel shaping, bar/island modifications, low water crossing modifications, pulse flows, off channel wetland design, and geolifts. Recreational measures were considered and will be evaluated for the proposed action. Measures were evaluated to determine if they addressed study objectives and remained within the study scope. Those that did not address study objectives were dropped from further evaluation. Remaining measures were grouped together to form discrete alternatives to address specific needs in the study area. Alternatives were screened and scales were added to each alternative to capture differing levels of benefits (Table i). The alternatives were then combined to form alternative plans. Evaluation of the alternatives and alternative plans relied largely on available existing information. Plans were then evaluated based on economic and environmental benefits to determine the proposed action.

Table i. Alternatives

| Alternative | Scale | Description |
|---|---|---|
| **Instream Modification** | 1A | Removal of Low Water Crossings 1, 2, & 3 |
| | 1B | Modification of Low Water Crossing 1 and Removal of Low Water Crossings 2 & 3 |
| | 1C | Removal of Low Water Crossing 1 and Modification of Low Water Crossings 2 & 3 |
| | 1D | Modification of Low Water Crossings 1, 2, & 3 |
| **Avenue A Modification** | 2A | Complete removal of Avenue A |
| | 2B | Partial removal of Avenue A |
| **River Road Modification** | 3A | River Road Relocation and Planting in Davis Park |
| | 3B | River Road As-Is and Planting in Davis Park |

## Proposed action

The Proposed action is a combination of three alternatives: Instream Modification, Avenue A Modification, and the River Road Modification. A description of each alternative and the representative scales selected as the proposed action are presented below.

Instream Modification (Scale 1A)

The River Road reach of the San Antonio River is heavily degraded due in part to severe pooling and sedimentation. The pooling is caused by three low water crossings, known hereafter as Low Water Crossings (LWC) 1, 2, and 3. LWC 1 is especially significant due to its size and lack of effective drainage. It has caused a pool, averaging eight to 14 feet in depth within the immediate vicinity of the structure. LWC 1 inhibits water flow almost 0.5 miles upstream to East Mulberry Avenue. This pooling has decreased the efficiency of natural pool-riffle-run features within the river, negatively impacting aquatic habitat and causing severe erosion on the river banks. LWC 2 and 3 are further downstream, within Brackenridge Park Golf

Course. The low water crossings allow for some minor stream flow, but water continues to pool causing additional erosion on the inflow and outflow of the structures. The proposed action includes the removal of LWC 2 and 3, as well as LWC 1, and replacement of these crossings with pedestrian bridges. The removal of these structures will allow for open flow of the river, improve sediment transport, decrease erosion, and improve overall aquatic connectivity of the San Antonio River.

Pool/riffle run features, such as J-hooks and cross vanes, will be placed throughout the upstream portion of the study area in predetermined locations to restore aquatic habitat for fish and invertebrate species.

A 50-foot riparian zone will be established on both banks of the river with native herbaceous, shrub, and tree species. Riparian species will assist ecosystem restoration in several ways 1) roots of vegetation will hold in the soil and slow down runoff, decreasing the amount of erosion and effectively decreasing the amount of sedimentation buildup within the river, 2) additional vegetation will provide shade within the river, improving the temperature, 3) increase biodiversity of insects and microorganisms near the river effectively improving foraging opportunities for aquatic and terrestrial wildlife, and 4) the natural form of vegetation provides a multiple of cover for aquatic and terrestrial wildlife through their various features, such as roots, limbs, etc.

Avenue A Modification (Scale 2A)

The River Road reach of the San Antonio River is loved by the general public; however, the recreational use of this area has caused severe degradation to the banks of the river. Avenue A encourages the public to park and/or utilize the banks of the river with vehicles and other heavy equipment. This factor, along with unauthorized cutting, trimming, and/or trampling of vegetation has caused severe erosion – leading to increased sediment accumulation in the river. The base of Avenue A will be removed and replaced with appropriate soil. This modification, along with areas adjacent to Avenue A will be planted with native riparian species. This effort will assist in ecosystem restoration by filtering runoff, improving sedimentation through erosion, increasing shade, and providing diverse habitat for migratory birds and other wildlife.

River Road Modification (Scale 3B)

This scale of the River Road Modification entails planting native vegetation and conducting invasive species management within Davis Park. Davis Park is within the northwestern section of the study area, adjacent to River Road and Allison Drive. It was chosen for restoration because of its proximity to the river and setting within the floodplain. Planting native riparian species will expand the riparian zone 600 feet on the western bank of the San Antonio River for 0.15 miles, while also reducing the polluting effects of runoff coming from nearby businesses and U.S. Highway 281.

This proposed action includes the following ecosystem restoration measures when all alternatives are combined:

- Removal of low water crossings
- Installation of pool-riffle-run features
- Removal of Avenue A
- Native species plantings (aquatic and riparian)
- Invasive species management (mechanical and chemical)

- Installation/Creation of habitat structures (snags, debris, nesting boxes, platforms, etc.)

The proposed action will also enact measures developed to protect the features listed above, such as a boulder barrier along the alignment of River Road, a gate at East Mulberry Avenue, trash cans along the original alignment of Avenue A, and signage along the boundary of the project area for environmental education. Recreation features will also be implemented with the proposed action, including fishing piers and an Americans with Disabilities Act (ADA) compliant trail along the eastern boundary of the study area. The constraints placed upon the project through the non-Federal sponsor require that additional measures be considered with project implementation, the constraints are listed below.

- Pedestrian bridges must be placed at the site of removed low water crossings in order to maintain access for the general public and Brackenridge Park Golf Course maintenance staff.
- The removal of Avenue A requires the expansion of the Brackenridge Park Golf Course golf cart path. This path runs parallel to Avenue A and would be expanded to accommodate access to the Brackenridge Park Golf Course maintenance building.
- Native vegetation planted within the boundaries of the Brackenridge Park Golf Course that intersect with green fairways must be diminutive in vertical height to allow for uninterrupted play.

The proposed action adds 8.7 Average Annual Habitat Units over the No Action Alternative over a 50-year period of analysis and will restore 99.2% of the study area. Costs for the plan can be found in the River Road Aquatic Ecosystem Restoration Feasibility Study IFR-EA.

## Major Findings and Conclusions

The Service supports the proposed action for the River Road Aquatic Ecosystem Restoration. The proposed ecosystem restoration measures would restore, to the extent practicable, the aquatic and riparian functions of the River Road ecosystem. This plan will increase diversity of habitat, increasing the diversity of wildlife including birds, fish, amphibians, reptiles, and mammals. These species will benefit from the results of restoration, which include improved stream connectivity, improved sediment distribution, decreased erosion impacts, and improved water quality. This Plan reasonably maximizes ecosystem restoration benefits compared to costs, consistent with the Federal objective.

The Service has determined that there are no federally listed species within the current project area; therefore no adverse effects to listed species are expected to occur with implementation of the proposed action.

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# 1 Introduction

This report has been prepared in accordance with provisions of the Fish and Wildlife Coordination Act (FWCA) (48 Stat. 401, as amended; 16 U.S.C.661 et seq.) and other authorities. The purpose of the FWCA is to provide for equal consideration of fish and wildlife conservation with other features of federally funded or permitted water resource development projects.

This report provides: 1) a description of the public fish and wildlife resources within the proposed project area; 2) a list of observed and potentially present federal or state listed, candidate, proposed, and sensitive flora and fauna within the proposed project area; 3) an analysis of the proposed action and its effects on biological resources of the study area; and 4) our recommendations regarding the proposed action.

The Integrated Feasibility Report (IFR) details the planning process undertaken for the Continuing Authorities Program (CAP) Section 206 River Road Aquatic Ecosystem Restoration (ER) Feasibility Study and documents the Environmental Assessment (EA) to satisfy the National Environmental Policy Act (NEPA). The San Antonio River Authority (SARA) sent a letter of intent to the U.S. Army Corps of Engineers (USACE) Fort Worth's District's (SWF) District Commander on December 1st, 2015. The letter contained SARA's desire to initiate a study partnership under the USACE Section 206 Program for Aquatic ER. A Feasibility Cost Share Agreement (FCSA) was signed between USACE SWF and SARA on September 24th, 2018.

The study is being performed under the standing authority of the USACE CAP Section 206 of the Water Resources Development Act (WRDA) of 1996, as amended (335 U.S Code 2201):

> *"The Secretary may carry out an aquatic ecosystem restoration and protection project if the secretary determines that the project -*
>
> *(1) Will improve the quality of the environment and is in the public interest; and*
>
> *(2) Is cost effective."*

This CAP focuses on water resource related projects of relatively smaller scope, cost and complexity. Unlike traditional USACE civil works projects that are of wider scope and complexity, the CAP is a delegated authority to plan, design, and construct certain types of water resource and environmental restoration projects without specific Congressional authorization.

The primary purpose of the study is to investigate and determine modifications that would restore degraded ecological structure and function to aquatic and riparian habitat on the River Road reach of the San Antonio River. This includes assessing opportunities, evaluating alternatives, and selecting a plan from those alternatives. The proposed action must be technically sound, environmentally acceptable, economically feasible, and supported by the local sponsor, SARA, and the Federal Government. The need is to address current erosion, sedimentation, and altered hydrology in the study area that has caused the degraded ecological structure.

# 2 Description of the Study Area

The study area is located in the River Road area of the San Antonio River in San Antonio, Texas (Figure 2-1). The project site spans approximately 3700 feet of the river between East Mulberry Avenue and U.S. Highway 281 and is bound by Avenue A and River Road to the east and west, respectively. This area is one of the last remaining unchannelized segments of the upper San Antonio River.

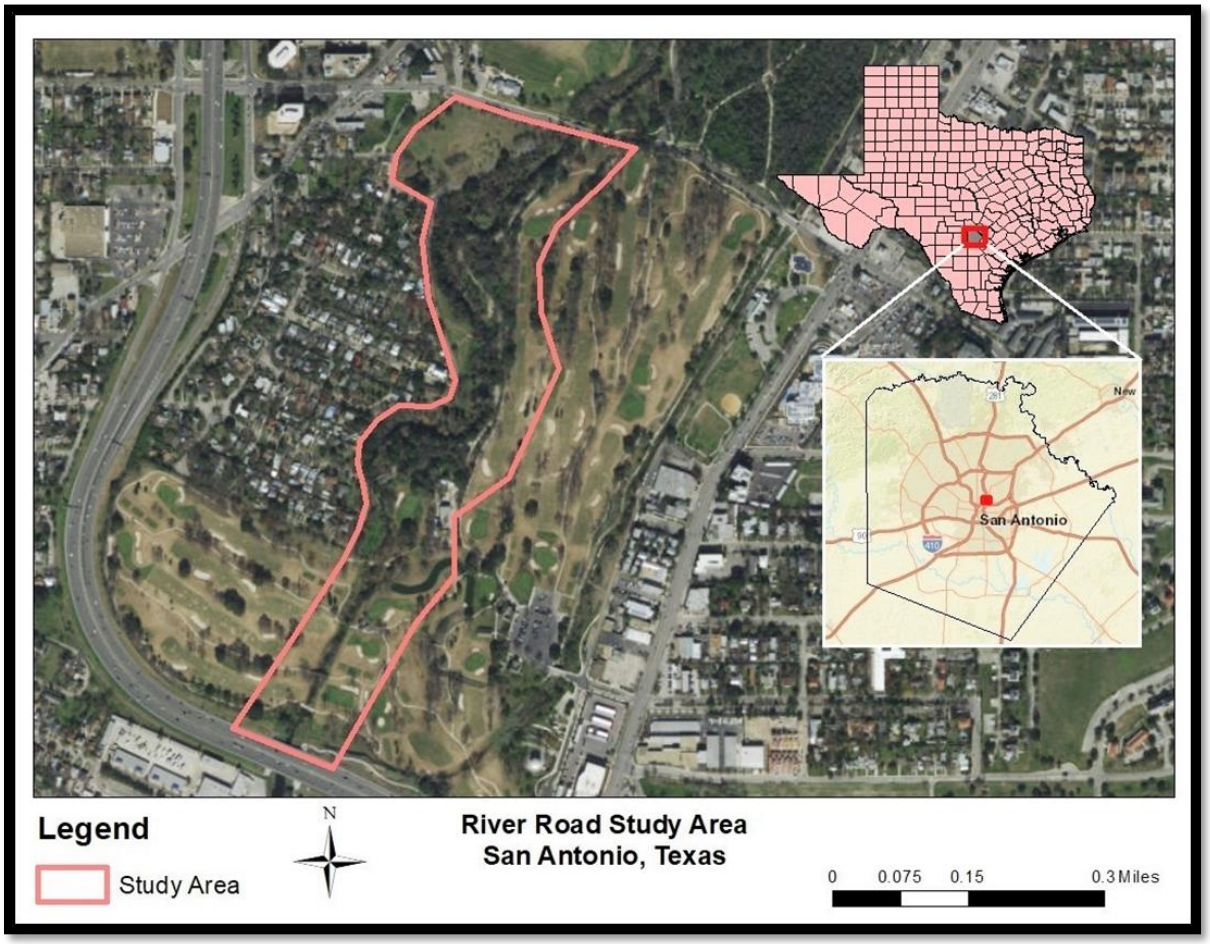


**Figure 2-1. River Road Study Area**

The San Antonio River is the main water body within the River Road study area. This stretch of river is characterized by a thin riparian buffer and non-native invasive grasses as it passes through the Brackenridge Park Golf Course. There are three low water crossings within this reach. The upstream low crossing (Low Water Crossing 1) at Woodlawn Avenue is much larger than the other two crossings, has little to no water flow and essentially acts as a dam creating a significant amount of pooling (Figure 2-2 and Figure 2-3). The other downstream low water crossings (Low Water Crossings 2 and 3) (Figure 2-4 and Figure 2-5) are much smaller in size, but still have a significant impact on river flow. Due to existing infrastructure, the river is constrained to elements imposed upon it by human disturbance.


**Figure 2-2. The Low Water Crossings within the Study Area**

**Figure 2-3. Low Water Crossing 1**

**Figure 2-4. Low Water Crossing 2**

**Figure 2-5. Low Water Crossing 3**

## 2.1 Water Resources

The River Road aquatic ecosystem has been affected by increased urbanization and its associated encroachment on riparian habitats throughout the 20th century, the downstream portion of the study area has been depleted of any semblance of the historical streams that Havard and Beckham (1885) described almost 135 years ago. The San Antonio River, the downstream portion located within the study area, has been completely straightened for approximately 0.2 miles and its banks have been converted from riparian habitats to maintained grass-lined channels. By straightening the once winding watercourses, water velocities increased, disrupting the substrate composition of the aquatic habitats resulting in increased erosion and sedimentation downstream. The homogeneous, shallow channel that replaced the sinuous natural pool-riffle-run habitats severely degraded the quality of the aquatic habitat. The

loss of overstory vegetation provided by shrubs and trees, and to a limited extent herbaceous vegetation, has led to increased water temperatures, lower dissolved oxygen concentrations, and limited organic inputs into the aquatic system. There is a significant amount of pooling caused by Low Water Crossing (LWC) 1. It has been reported to be eight to 14 feet in depth throughout, significantly impacting the natural structure and function of riverine habitat. Due to the significant impacts from LWC 1, the water within the river has become murky and deep in the upstream of the low water crossing. This portion of the study area is experiencing increased erosion and sedimentation. Without the removal of the low water crossings, it is expected that natural river flow will continue to be obstructed and all elements of aquatic ecosystem health will continue to deteriorate.

An agreement between the San Antonio Water Systems (SAWS) and SARA, ensures a constant 10 cubic feet per second (cfs) minimum flow in the river, which San Antonio Water System (SAWS) maintains by supplementing the river flows with re-use water. It is assumed that regardless of conditions, including increased temperatures and drought, this constant will remain the same throughout in future conditions.

## 2.2 Recreation

Brackenridge Park was initially designed to facilitate vehicular use; however, park use has shifted to focus on pedestrian-use of park areas and sites (City of San Antonio [CoSA] 2017). It is assumed that this trend will continue with future efforts, while still maintaining the needs for parking and access. Pedestrian access between Brackenridge Park and other San Antonio River Channel Improvement projects will continue to improve as CoSA implements features that will be attractive to both walkers and bikers. Three categories for improvement to Brackenridge Park were identified by CoSA 1) restore natural park features and improve water quality in the San Antonio River, 2) restore, preserve, and articulate park cultural and historical features, and 3) increase visibility and pedestrian access to and within the park. There is a significant amount of interest in restoring and enhancing features within Brackenridge Park for the benefit of the general public. It is expected that modification and improvement to the park by CoSA will increase overall visitation and recreation opportunities in the study area over a 50-year period.

## 2.3 Cultural Resources

The review of the Texas Historical Commission (THC) Atlas database revealed numerous prior terrestrial cultural resource investigations within the study area (Table 2-1). There are four previously recorded terrestrial archeological sites and three historic resources within the study area. The dozens of archeological studies conducted in the vicinity of the project footprint have demonstrated a nearly uninterrupted sequence of occupation beginning with the Late Paleo-Indian Period and extending to the Protohistoric Period. Overall, the east bank of the San Antonio River south of East Mulberry Avenue is dominated by relatively undisturbed archeological deposits that reach from the surface to over two meters below the surface. Nonetheless, most of the archeological deposits in the immediate vicinity of the project area have not been extensively studied.

Paso de Tejas, a historic period crossing, connects the two banks of the river. Brackenridge Park itself is a listed Historic District in the National Register of Historic Places (NRHP), and there are several other Historic Districts surrounding the park. The park is also a State Archeological Antiquities Landmark under the Antiquities Code of Texas. Any impacts to an archeological site, historic structure, or historic resource must be evaluated in the context of the Historic District(s) as a whole.

**Table 2-1. Texas Historical Commission Atlas Data**

| Site Number | National Register of Historic Places Eligibility | Cultural Affiliation |
|---|---|---|
| 41BX13 | Eligible | Prehistoric & Protohistoric |
| 41BX264 | Undetermined | Prehistoric |
| 41BX293 | Undetermined | Prehistoric |
| 41BX1396 | Eligible | Prehistoric |
| Paso de Tejas | Undetermined | Historic |
| Brackenridge Park Historical District | Eligible, NRHP Listed | Multicomponent |
| River Road Local Historic District | Undetermined | Historic |

# 3 Fish and Wildlife Resource Concerns, Problems, Needs, and Planning Objectives

The aquatic ecosystem along the River Road segment of the San Antonio River is severely degraded from excessive erosion and sedimentation resulting in a riparian corridor that has been reduced to a narrow strip along the river banks.

In addition to hydrological impacts associated with urbanization within the watershed, River Road and Avenue A that parallel the River Road segment of the river have constrained the river (Figure 3-1). This has resulted in magnified erosion and sedimentation, leading to a reduced riparian corridor adjacent to the river and reduced natural bank erosion protection of the river. The riparian corridor is further degraded by public disturbance, including parking vehicles in the already reduced riparian area that parallels the river (Figure 3-2 and Figure 3-3).

As stated in Section 2.1, the low water crossings within the river have also significantly impacted the San Antonio River. The severe pooling caused by LWC 1 adds to the increased erosion and adverse sedimentation.

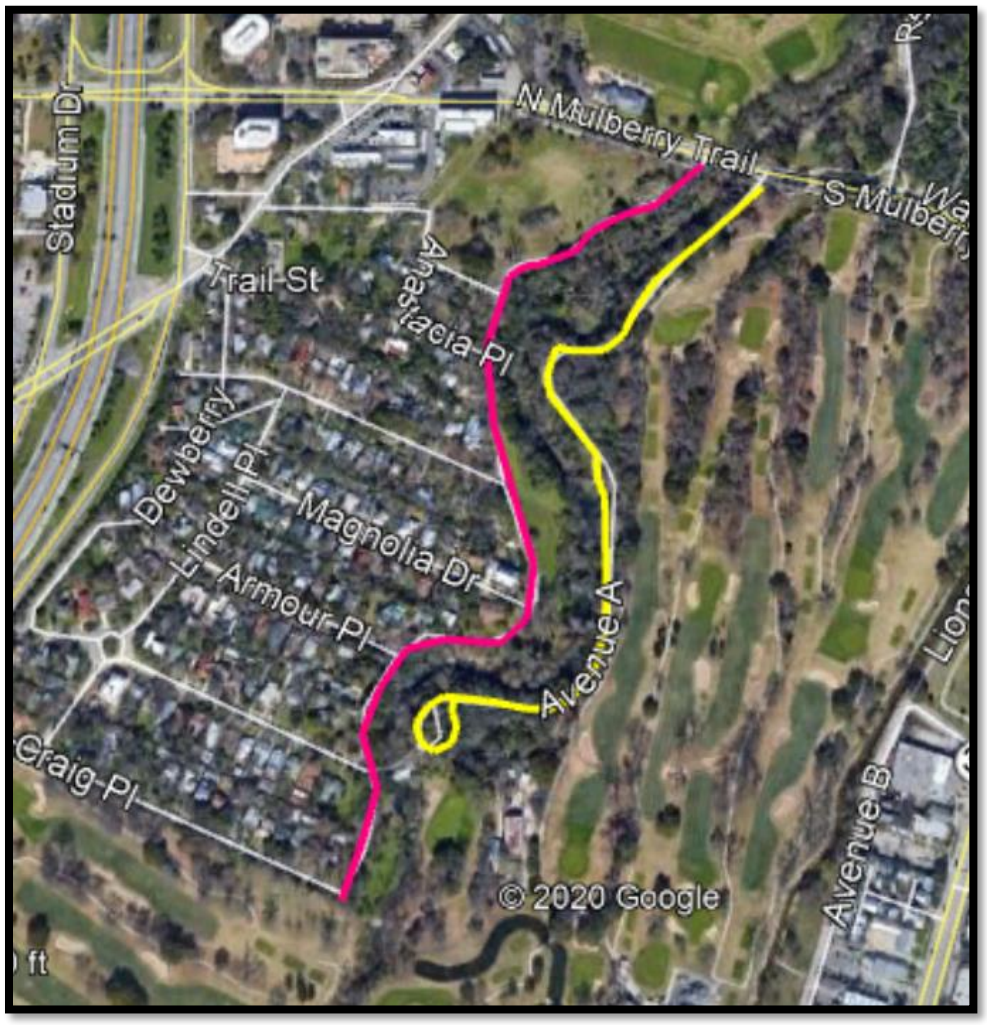


**Figure 3-1. River Road (pink) and Avenue A (yellow)**

**Figure 3-2. Severely Degraded Road/Non-Existent Habitat at the Avenue A Dead-End**

**Figure 3-3. Avenue A Parking Adjacent to the San Antonio River**

Planning Objectives and Opportunities

Planning objectives reflect an expression of public and professional issues or concerns about the use of water and related land resources resulting from the analysis of existing and future conditions in the study area. These planning objectives were used in guiding the development of alternatives and their evaluation for the period of analysis. The following planning objectives were used in formulation and evaluation of alternatives.

- Restore aquatic ecosystem function and structure to the River Road segment of the San Antonio River for a 50-year period of analysis
- Restore riparian habitat quality over the 50-year period of analysis
- Reduce erosive threat to the roads that parallel the river over the 50-year period of analysis
- Maintain pedestrian access in the project area over the 50-year period of analysis
- Provide an economically efficient solution

The opportunities identified include:

- Provide additional recreational and ecotourism benefits to the community
- Improve water quality in the San Antonio River through ecosystem restoration

Constraints

The following are institutional constraints that apply to this study:

- Avoid increasing adverse flooding in the area
- Plans must be consistent with Federal, State, and local laws such as the NEPA, Endangered Species Act (ESA), FWCA, Clean Water Act (CWA), and the National Historic Preservation Act (NHPA)
- Minimize impacts to culturally significant landmarks and areas
- Complete the study within the CAP scope and cost limitations

The following planning constraints apply to this study:

- Pedestrian bridges must be placed at the site of removed low water crossings in order to maintain access for the general public and Brackenridge Park Golf Course maintenance staff.
- The removal of Avenue A requires the expansion of the Brackenridge Park Golf Course golf cart path. This path runs parallel to Avenue A and would be expanded to accommodate access to the Brackenridge Park Golf Course maintenance building.
- Native vegetation planted within the boundaries of the Brackenridge Park Golf Course that intersect with green fairways must be diminutive in vertical height to allow for uninterrupted play.

# 4 Evaluation Methodology

The ER benefits and habitat modeling associated with the River Road Aquatic ER Feasibility Study are described in detail in Appendix C2 – Habitat Modeling of the IFR-EA. The River Road study uses a measure of riparian species and riverine response as the ecological metric (criteria) to compare alternatives against their ability to address the ecosystem restoration objective. Riverine structure and function, from pre-restoration conditions through completed restoration, can be quantified by using an integrated assessment, comparing habitat, water quality, and biological measures to measure the success of the ecosystem restoration objective. Therefore, restoration management measures are largely identified for their ability to restore the physical structures that contribute to food, cover, and nesting sites of the ecosystem.

The Rapid Bioassessment Protocols (RBPs) for Use in Streams and Wadeable Rivers allows for characterization of the existing biotic integrity of the San Antonio River and the Future With-Project (FWP) biotic integrity of the river resulting from the various measures and combinations of measures considered during the study. The Grey Squirrel Habitat Suitability Index (HSI) and Barred Owl HSI were also used to evaluate the conditions of the historically riparian areas on either side of the San Antonio River.

Reference conditions within the RBP guide were used to scale the conditions within the San Antonio River and the acceptable expectation for the level of restoration achievable for the river. Similar studies and projects discussed in Section 1.5 of the IFR-EA were also evaluated and compared to determine whether restoration features would be effective and produce results yielding in high ecosystem restoration benefits. The product of HSIs or RBPs and acres are utilized as a single unit of measure, average annual habitat units (AAHUs), which along with average annual cost (AAC) is used to compare and rank the numerous combinations of management measures.

Comparison and ranking ultimately provides an array of alternatives that, for their cost, provide the best return in ecological benefit. For the purpose of the River Road study, the measured ecological benefit is the ability of the riverine and riparian restoration to provide the life requisites to a diverse community of riparian and aquatic species.

# 5 Description of Fish and Wildlife Resources

This section presents a description of the environmental resources and baseline conditions that could be affected from implementing the proposed action.

## 5.1 Vegetation

The River Road study area is dominated by non-native invasive species resulting in habitats with low plant diversity. Invasive species make up approximately 80% of the total vegetation, including bermudagrass (*Cynodon dactylon*), chinaberry (*Melia azedarach*), bastard cabbage (*Rapistrum* spp.), Chinese privet (*Ligustrum sinense*), elephant ear (*Alocasia* spp.) and giant cane (*Arundo donax*). The grasslands present are artificially maintained by heavy mowing and seeding.

The vegetation within the vicinity of the river include pecan (*Carya illinoiensis*), poison ivy (*Toxicodendron radicans*), Chinese privet, Chinaberry, beggar's lice (*Hackelia virginiana*), greenbriar (*Smilax* spp.), Virginia creeper (*Parthenocissus quinquefolia*), straggler's daisy (*Calyptocarpus vialis*), giant ragweed (*Ambrosia trifida*), and Turk's cap (*Lilium superbum*).

Vegetated areas parallel to Avenue A have species such as poison ivy, giant ragweed, beggar's lice, straggler's daisy, giant cane, Chinese privet, peppervine (*Ampelopsis arborea*), lantana (*Lantana camara*), hackberry (*Celtis occidentalis*), dewberry (*Rubus* spp.), and various oaks. Davis Park is dominated by bermudagrass with intermittent green ash (*Fraxinus pennsylvanica*), straggler's daisy, and false mallow (*Malvastrum* spp.).

It is assumed that a majority of native herbaceous, shrub, and tree species will be eliminated through trampling, mechanical removal, and erosion along the banks of the river. As disturbance continues, invasive species will overtake bare areas with increased light conditions due to the removal of native vegetation. A combination of all of these factors will eventually lead to a severe lack of native plant species.

## 5.2 Wildlife

Wildlife inhabiting the study area include species typical of herbaceous habitats tolerant of human activity and disturbance. These include eastern fox squirrel (*Sciurus niger*), Virginia opossum (*Didelphis virginiana*), striped skunk (*Mephitus mephitus*), Guadalupe spiny softshell turtle (*Apalone spinifera guadalupensis*), water snakes (*Nerodia* spp.), red-eared sliders (*Trachemys scripta*), eastern cottontail rabbits (*Sylvilagus floridanus*), and small rodents.

The San Antonio Audubon Society (2019) lists 452 bird species that occur within Bexar County. Many of these species utilize the riparian corridors in San Antonio for migration, wintering, breeding, and foraging habitats. Bird species associated with the study were dominated by species typical of mowed, maintained, urban habitats including great-tailed grackles (*Quiscalus quiscula*), white-winged doves (*Zenaida asiatica*), rock pigeons (*Columda livia*), house sparrows (*Passer domesticus*), and European starlings (*Starrus vulgaris*). Species often found in aquatic habitats included neotropic cormorants (*Phalacrocorax brasiliensis*), snowy egrets (*Egretta thula*), mallards (*Anas platyrhynchos*), double-crested cormorants (*Phalacrocorax auritus*), great egrets (*Ardea alba*), black-bellied whistling ducks (*Dendrocygna autumnalis*), and yellow-crowned night-herons (*Nyctanassa violacea*). Other species typical of urban greenspaces utilizing the study area include northern mockingbird (*Mimus polyglottos*), northern cardinal (*Cardinalis cardinalis*), house finch (*Carpodacus mexicanus*), cedar waxwing (*Bombycilla cedrorum*), mourning dove (*Zenaida macroura*), and blue jays (*Cyanocitta cristata*).

During sampling conducted by SARA within this reach of the San Antonio River between 2015 and 2019, 21 species of fish were observed which include multiple occurrences of blacktail shiner (*Cyprinella venusta*), longear sunfish (*Lepomis megalotis*), Mexican tetra (*Astyanax mexicanus*), mimic shiner (*Notropis volucellus*), redbreast sunfish (*Lepomis auritus*), and western mosquitofish (*Gambusia affinis*).

The State of Texas identifies “species of greatest conservation need” (SGCN). SGCN are species that are declining or rare and in need of attention to recover or to prevent the need to list under state or federal regulation. Texas Parks and Wildlife Department (TPWD) has identified 127 SGCN; a complete list of these species is located in Appendix C1 – Environmental Resources of the IFR-EA. The Texas Natural Diversity Database (TXNDD) is a GIS-based inventory of known locations of state-listed threatened, endangered, and SGCN species. The TXNDD is limited to elements of occurrence that are located on public lands and private lands where the landowner has given written consent to include in the database. Therefore, the TXNDD data is not a comprehensive representation of the range of the species, but a tool to identify potential listed species in a specific area. A search of the TXNDD for the study area resulted in the identification of six SGCN:

- Texas fescue (*Festuca verseuta*). Its preferred habitat consists of moist limestone based soils that is on steep inclines and or on flat surfaces near streams (NatureServe 2019a).
- Texas shiner (*Notropis amabilis*). Its preferred habitat consists of clear freshwater headwaters of rivers and creeks (NatureServe 2019b).
- Correll’s false dragon-head (*Physostegia correllii*). Its preferred habitat consists of shallow creek like areas with silty clay loam soils (NatureServe 2019c).
- Western spotted skunk (*Spilogale gracilis*). Its preferred habitat are areas that are heavily wooded; as well as areas that are open, or covered in brush (NatureServe 2019d).
- Eastern spotted skunk (*Spilogale putorius*). Its preferred habitat are areas that are heavily wooded, as well as areas that are open, and or covered in brush (NatureServe 2019e).
- Plains spotted skunk (*Spilogale putorius interrupta*). Its preferred habitat consists of pastures, shrublands, farmlands, grasslands, and meadows (Missouri Department of Conservation 2015).

Although the riparian and riverine habitat is degraded, it will continue to act as wildlife habitat within an urban setting.

## 5.3 Migratory Birds

The past several decades have seen a decline in Neotropical migratory bird numbers. Recently, it has been recognized that the loss, fragmentation, and degradation of migratory bird stop-over habitat is potentially the greatest threat to the survival and conservation of Neotropical birds. In arid areas of the U.S., stop-over sites are restricted, and the riparian corridors of south central Texas are the primary stop-over resource for migrating birds. As is the trend throughout the nation, naturally functioning aquatic ecosystems in the southwest are decreasing. Due to the historic rarity of these systems in the southwest the impact of their loss or degradation is more acutely felt. Their loss and/or degradation places extreme pressures on the carrying capacity for the few remaining functional systems and places further stress on the South Texas ecoregion when considered in connection with the life requisites of the migratory birds of the Central Flyway. The dense and overgrown vegetation, severe disturbance in the immediately surrounding area, as well as the overall small size has severely impacted the potential it once had to migratory birds. However, it is still an ecologically unique system that is important to a successful migration and breeding of neotropical migrants utilizing the Central Flyway within the study area (Table 5-1).

**Table 5-1. Migratory Birds that May Utilize the Study Area**

| Name | Scientific Name | Breeding Season |
|---|---|---|
| American Golden-plover | *Pluvialis dominica* | Breeds elsewhere |
| Harris's Sparrow | *Zonotrichia querula* | Breeds elsewhere |
| Lesser Yellowlegs | *Tringa flavipes* | Breeds elsewhere |
| Mountain Plover | *Charadrius montanus* | Breeds elsewhere |
| Semipalmated Sandpiper | *Calidris pusilla* | Breeds elsewhere |
| Sprague's Pipit | *Anthus spragueii* | Breeds elsewhere |
| Swallow-tailed Kite | *Elanoides forficatus* | Breeds Mar 10 to Jun 30 |
| Willet | *Tringa semipalmata* | Breeds elsewhere |

## 5.4 Federally Listed Threatened and Endangered Species

The Federally listed species that have the possibility of occurring in the study area are listed in Table 5-2. Candidate species, Texas fatmucket (*Lampsilis bracteata*) and Texas pimpleback (*Quadrula petrina*), have the highest chance to occur in the study area because of the likelihood of their use of the San Antonio River. However, their occurrences may be limited due to the lack of connectivity within this reach of the river. It is anticipated that the ecosystem restoration proposed, such as riparian and riverine habitat restoration and invasive species management within the study area would greatly benefit these species and may possibly provide suitable core habitat over time. At the time of the Draft release of the IFR-EA, least tern were a Federally listed Endangered species. As of January 12, 2021, the least tern was delisted. Any further mention of this species has been removed from the Final CAR.

**Table 5-2. Federally Listed Threatened and Endangered Species with the Potential to Occur in the Study Area (USFWS 2020)**

| Name | Scientific Name | Federal Listing | Habitat Present |
|---|---|---|---|
| **Birds** | | | |
| Golden-cheeked Warbler | *Dendroica chrysoparia* | Endangered | M |
| Piping Plover | *Charadrius melodus* | Threatened | M |
| Red Knot | *Calidris canutus rufa* | Threatened | M |
| Whooping Crane | *Grus americana* | Endangered | No |
| **Amphibians** | | | |
| San Marcos Salamander | *Eurycea nana* | Threatened | No |
| Texas Blind Salamander | *Typhlomolge rathbuni* | Endangered | No |
| **Fishes** | | | |
| Fountain Darter | *Etheostoma fonticola* | Endangered | No |
| **Insects** | | | |
| [no Common Name] Beetle | *Rhadine exilis* | Endangered | No |
| [no Common Name] Beetle | *Rhadine infernalis* | Endangered | No |
| Comal Springs Dryopid Beetle | *Stygoparnus comalensis* | Endangered | No |
| Comal Springs Riffle Beetle | *Heterelmis comalensis* | Endangered | No |
| Helotes Mold Beetle | *Batrisodes venyivi* | Endangered | No |
| **Arachnids** | | | |
| Braken Bat Cave Meshweaver | *Cicurina venii* | Endangered | No |
| Cokendolpher Cave Harvestmand | *Texella cokendolpheri* | Endangered | No |

| Name | Scientific Name | Federal Listing | Habitat Present |
|---|---|---|---|
| Government Canyon Bat Cave Meshweaver | *Cicurina vespera* | Endangered | No |
| Government Canyon Bat Cave Spider | *Neoleptoneta microps* | Endangered | No |
| Madla's Cave Meshweaver | *Cicurina madla* | Endangered | No |
| Robber Baron Cave Meshweaver | *Cicurina baronia* | Endangered | No |
| **Crustaceans** | | | |
| Peck's Cave Amphipod | *Stygobromus (=Stygonectes) pecki* | Endangered | No |
| **Flowering Plants** | | | |
| Bracted Twistflower | *Streptanthus bracteatus* | Candidate | No |
| Texas Wild-rice | *Zizania texana* | Endangered | No |

M=migration stopover habitat

**Golden-Cheeked Warbler**

Golden-cheeked warbler habitat consists of old-growth and mature growth Ashe juniper-oak woodlands in rocky terrain (NatureServe 2019f). Within the U.S, the species can only be found with the Edwards Plateau Ecoregion during breeding season. It is a migratory species that spends its winters in Honduras and Guatemala. Adequate nesting habitat for golden-cheeked warbler does not occur within the project area. They are not expected to utilize the area, except perhaps as a temporary stop-over location during migration.

**San Marcos Salamander**

The San Marcos salamander occurs in Spring Lake and in rocky areas up to 500 feet downstream of the dam at Spring Lake (USFWS 1996). Moss and algae provide hiding places for the salamanders and habitat for small animals that serve as their food source. Clean, clear, flowing water of constant temperature is required for suitable habitat. The San Marcos salamander eats tiny aquatic crustaceans, aquatic insects, and snails. The total population size was estimated to be 53,200 individuals, with at least 5,200 individuals occurring within the spring systems of Comal County and San Marcos (USFWS 1996).

Habitat consists of algal mats (Tupa and Davis 1976), where rocks are associated with spring openings (Nelson 1993). Sandy substrates devoid of vegetation and muddy silt or detritus laden substrates with or without vegetation are apparently unsuitable habitats for this species. Specimens are occasionally collected from beneath stones in predominantly sand and gravel areas. In view of the abundance of predators (primarily larger fish, but also crayfish, turtles, and aquatic birds) in the immediate vicinity of spring orifices, protective cover such as that afforded

by algal mats and rocks is essential to the survival of the salamander. The flowing spring waters in the principal habitat are near neutral (pH 6.7 to 7.2), range from 69.8 to 73.4 degrees Fahrenheit (°F), and are clear with low Dissolved Oxygen (DO) levels (Tupa and Davis 1976; Najvar 2001, Guyton and Associates 1979; Groeger et al. 1997).

Prey items for the San Marcos salamander include amphipods, tendipedid (midge fly) larvae and pupae, other small insect pupae and naiads (an aquatic life stage of mayflies, dragonflies, damselflies, and stone flies), and small aquatic snails (USFWS 1996).

Reduced flow of water from the springs is the greatest threat to the survival of the San Marcos salamander. The growth of cities has led to higher water use by people and increased problems with water pollution and silt accumulation. Introduction of exotic species is also a threat because they may destroy aquatic vegetation, prey on endangered animals, or compete with them for food. San Marcos salamander are not expected to occur within the project area due to the lack of suitable habitat mentioned above.

**Texas Blind Salamander**

Texas blind salamanders are small and blind, white and translucent, with red external gills. They lives in dark caves, with clear cool waters within the Edwards Aquifer near San Marcos, Texas. The external gills helps the species gather air from water and its diet consists of small crustaceans and invertebrates (TPWD 2019A). Texas blind salamander are not expected to occur within the project area due to the lack of appropriate habitat as mentioned above.

**Fountain Darter**

Fountain darters are a small brown and white fish that can only be found within the San Marcos and Comal River headwaters. Within these areas they can be found in and around dense vegetation, preferably that of algal mats in slow moving waters. Their diet consists of small aquatic invertebrates (TPWD 2019B). Fountain darter are not expected to occur within the project area due to its preference to the San Marcos and Comal River headwaters.

**Texas Fatmucket**

Texas fatmucket is a small, ovate, brown, freshwater mussel. It occurs in the Colorado and Guadalupe-San Antonio drainage basins and with a possibility of occurring in the Central Brazos river basins. Its habitat consists of shallow (<1m) flowing creeks, rivers, and streams that flow over sand and gravel beds with bedrock underneath. This species is intolerant of impounded waters (NatureServe 2019g). Texas fatmucket may occur within the project area; however, they are likely to be impacted by the pooling caused by the low water crossings.

**Texas Pimpleback**

The Texas pimpleback is a large freshwater mussel with a moderately thick and inflated shell that generally reaches 2.4 to 3.5 inches in length. With the exception of growth lines, the shell of the Texas pimpleback is generally smooth. The Texas pimpleback typically occurs in moderately sized rivers, usually in mud, sand, gravel, and cobble, and occasionally in gravel-filled cracks in bedrock slab bottoms (Horne and McIntosh 1979; Howells 2002). The species has not been found in water depths greater than 6.6 feet. Texas pimplebacks have not been found in reservoirs, which indicates that this species is intolerant of deep, low-velocity waters created by artificial impoundments (Howells 2002). Texas pimplebacks appear to tolerate faster water more than many other mussel species (Horne and McIntosh 1979). The Texas Pimpleback may occur within the project area; however, they are likely to be impacted by the pooling caused by the low water crossings.

**Karst-Dwelling Species**

These species are threatened by the rapid urbanization of the San Antonio area due to the impacts of urban expansion on their habitat. Development can destroy caves and karst features through outright digging or filling or through indirect effects such as storm water run-off and pollutant leaks or spills (USFWS 2008). Due to the lack of cave and karst features within the River Road study area, they are not likely to occur within the study area.

- *Rhadine exilis* - small, essentially eyeless ground beetle with a slender body, approximately 7.4 mm in length.
- *Rhadine infernalis* – small, essentially eyeless reddish-brown ground beetle with a narrow neck and a body approximately 8 to 8.6 mm in length.
- Helotes Mold Beetle – tiny, reddish-brown beetle up to 2.4 mm in length.
- Cokendolpher Cave Harvestman – small, eyeless daddy long-leg with a pale orange body.
- Robber Baron Cave Spider – small, essentially eyeless spider that can be found in the Robber Baron Cave in Alamo Heights.
- Braken Bat Cave Meshweaver – small, essentially eyeless spider in Bexar County.
- Madla Cave Meshweaver – small, essentially eyeless spider with reduced pigment that can be found in eight caves in or near Government Canyon, Helotes, and the University of Texas at San Antonio.
- Government Canyon Bat Cave Meshweaver - small, essentially eyeless spider that can be found around the Government Canyon State Natural Area.
- Government Canyon Bat Cave Spider – small, essentially eyeless spider that can be found in approximately two caves in the Government Canyon State Natural Area.

**Comal Springs Dryopid Beetle**

Small brown aquatic beetle that does not swim. It lives in sub terrestrial habitat within two springs in Central Texas and relies on a steady, natural spring flow for all of its life (USFWS 2008). The comal springs dryopid beetle is not likely to occur within the project area because of its location.

**Comal Springs Riffle Beetle**

A small aquatic beetle growing to a maximum length of approximately 0.2 cm. The entire life cycle of the Comal Springs Riffle Beetle is dependent on the headwaters of the Comal and San Marcos Rivers (USFWS 2008). The comal springs riffle beetle is not likely to occur within the project area because it is not in the Comal or San Marcos Rivers.

**Peck's Cave Amphipod**

Peck's cave amphipod is a small yellowish semi-translucent eyeless amphipod. Its habitat is located in the subterranean springs of the Comal, Fern Bank and Hueco Springs. The critical habitat designation for this species has high water quality, relatively consistent water flow, a carbonate based water chemistry, and water temperatures ranging from 68ºF to 75ºF (NatureServe 2019h). The Peck's cave amphipod is not likely to occur within the project area because it is not located within the Comal, Fern Bank, or Hueco Springs.

**Bracted Twistflower**

Bracted twistflower is 3-6 ft tall annual herb that produces a purple flower. It can be found on slopes and canyon valleys with low density oak-juniper forests on shallow, well drained, gravelly

clays and clay loams over limestone bedrock (NatureServe 2019i). Bracted twistflower is not expected to occur in the project areas as it is very limited in abundance and distribution.

**Texas Wild-rice**

An aquatic perennial grass with a few leaves and flowering stalk that rises above the water's surface up to a height of one meter. It is known to inhabit relatively shallow, clear, flowing waters of spring origin with a constant temperature of 69.8-77 ºF. Texas wild-rice is a critically imperiled flowering plant with only one known site of occurrence. It can inhabit a few kilometers of the San Marcos River, where it was abundant until the 1950s. The small population rarely flowers or seeds in the wild. This plant has been heavily impacted by human modification in regards to water levels and quality. It is regularly trampled and removed by recreationalists in the area and is also impacted by the non-native nutria (*Myocastor coypus*) (NatureServe 2019j). Texas wild-rice is not expected to occur because of the project area's location within San Antonio, TX.

**Red Knot**

The red knot is a medium to large shorebird with a weight of 5 ounces, a body length of 9 to 10 inches, and a wingspan of 20 to 22 inches. During the breeding season, it has a rust-colored face, chest, and underside, and dark brown wings. In winter, it has a gray head, chest, and upperparts and a white belly. It has long greenish legs and a pointed black bill. Males and females look similar, and juveniles resemble nonbreeding adults. The red knot was listed as threatened on December 11, 2014 (79 FR 73706). The greatest threat to the red knot population is habitat loss in the U.S., followed by reduction of preferred prey items in nesting areas and along migration routes (USFWS 2014). The red knot breeds in tundra habitat of the central Canadian arctic, between May and mid-July, and winters along the U.S. coastline from North Carolina to Texas and south to Tierra del Fuego in South America between July and May; however, non-breeding red knots are known to remain in Texas year-round. Wintering habitat includes tidal flats, beaches, and oyster reefs, where they primarily feed on small invertebrates, particularly clams (Newstead 2012, Newstead et al. 2013, USFWS 2011). Long-term systematic population surveys are lacking for this species, but current estimates suggest Texas wintering populations may range between 50 and 2,000, with numbers increasing from survey counts in the early 1990s to recent counts in 2012. The increase in numbers does not necessarily reflect an increase in the population, but may be due to an increase or variation in survey effort. Although rigorous population estimates are lacking, preliminary trends indicate prolonged decline followed by stabilization of small populations (USFWS 2014). They are not expected to utilize the area, except perhaps as a temporary stop-over location during migration.

**Piping Plover**

The piping plover is a migratory shorebird listed as endangered in the watershed of the Great Lakes and threatened in the remainder of its range (the Northern Great Plains, Atlantic coast, Gulf coast, the Bahamas, and the West Indies) (USFWS 1985). The Northern Great Plains population of piping plover spends up to 10 months a year on its wintering ground along the Gulf coast and arrives on prairie breeding grounds in early May. During migration periods, they use large rivers, reservoir beaches, mudflats, and alkali flats (Haig 1986). Piping plover feed on aquatic and terrestrial invertebrates. The migration and wintering period may last as long as 10 months (mid-July through mid-May). Migration to breeding grounds may occur from mid-February through mid-May, with peak migrations in March. Wintering piping plovers forage on invertebrates located on top of the sand or just below the surface along wrack lines (organic material including seaweed, seashells, driftwood, and other materials deposited on beaches by tidal action). Specific prey items may include polychaete marine worms, crustaceans, fly larvae, beetles, and bivalve mollusks (USFWS 2012). Piping plover are not expected to occur within the

project area due to the lack of appropriate habitat; however, they may utilize the area as a stop-over location during migration.

**Whooping Crane**

Whooping cranes are white, tall, have black legs and a reddish black head. Their habitat consists of marshes, shallow lakes, lagoons, salt flats, grain and stubble fields, and barrier islands (AOU 1983, Matthews and Moseley 1990) and (NatureServe 2019k). Autumn migration normally begins in mid-September flying from Wood Buffalo National Park in central Canada, with most birds arriving on the wintering grounds at Aransas National Wildlife Refuge between late October and mid-November. Spring migration occurs during March and April. It has a diverse diet consisting of crabs, snails, fish, frogs, lizards, worms, insects, berries, grains, and acorns. Lakes, ponds, and other open water bodies in Central Texas may be briefly used as stopover habitat by whooping crane. Whooping crane are not expected to occur within the project area due to the lack appropriate habitat.

## 5.5 Invasive Species

Habitats in the study area are significantly impacted by exotic plants and animals including: bermudagrass, Chinaberry, bastard cabbage, Chinese privet, giant cane, hygrophila (*Hygrophila polysperma), vitex (Vitex rotundifolia),* feral cats (*Felis catus*), and fire ants (*Solenopsis invicta*). The neighboring Brackenridge Park has an active Trap-Neuter-Release program for feral cats. While this program does help to reduce feral cat reproduction in the area, it does not stop the natural tendencies of the released feral cats to kill various native birds and mammals.

Figure 5-1. Elephant Ear in the Study Area

Figure 5-2. Vitex in the the Study Area

Figure 5-3. Hygrophilia in the Study Area

Figure 5-4. Hygrophilia in the Study Area

# 6 Summary of Plan Selection Process and Identification of Evaluated Alternatives

The final array of management measures listed below were combined into individual alternatives. Scales of alternatives were developed to achieve differing levels of captured and uncaptured benefits. Each of these alternatives could be a standalone plan, or combined with other alternatives to form a suite of alternative plans to establish connectivity of habitats, achieve a landscape/watershed scale of restoration, and to maximize the ecological benefits associated with the eventual proposed action.

Direct Environmental Restoration Measures

- Low Water Crossing Modification – This would include removing existing concrete rip-rap and fill material. One 5'W x 4' H box culvert would be placed in the center of the low water crossing. Suitable fill material would be placed, compacted, and shaped accordingly and 6" of concrete rip-rap would be positioned for appropriate slope. This measure would help restore the aquatic ecosystem function and structure by allowing for a more natural river system and water flow in the channel. However, this measure is not as effective as a complete removal of a low water crossing, as it only allows channel flow in a constrained conveyance.
- Low Water Crossing Removal – Existing low water crossings would be demolished and the materials removed. LWC 1 at East Woodlawn Avenue currently serves as a heavily utilized structure for public access to both sides of the river. Removal would require mitigation with a bridge (included as a separate measure). This measure would help restore the aquatic ecosystem function and structure by allowing for a more natural river system and water flow in the channel.
- Instream Structures – Placement of instream structures such as j-hooks, pool-riffle-run, and rock vane features within the San Antonio River. This measure would improve aquatic habitat while also reducing the amount of sheer stress on the banks of the river. The features will provide quality auditory benefits for the general public. and restore the aquatic ecosystem function and structure by allowing for a more natural river system and water flow in the channel.
- Geolifts - This measure will complement the instream structures. They would be used to stabilize the stream bank along the outside of stream meanders and would be placed within an appropriate proximity of the instream structures. Geolifts are basically a series of overlapping soils constructed of erosion control matting and native soils and assist in erosion control.
- Rerouting River Road – Partial removal of River Road beginning at East Mulberry Avenue and ending at Allison Road. A Texas Department of Transportation approved road would be built within the boundary of the past alignment of Allison Road to the northwest (Reestablishment of Allison Drive). This measure would help restore the reduced riparian habitat by allowing for a larger space adjacent to the channel for native species plantings.
- Avenue A Partial Removal – This measure would include the removal of 621 cubic yards of road material of Avenue A and its replacement with native soil. This measure would help restore the reduced riparian habitat by allowing for a larger space adjacent to the channel for native species plantings.
- Avenue A Full Removal – This would include the complete removal of Avenue A, 1,921 cubic yards of road material and replacing it with native soil. This measure would help restore the reduced riparian habitat by allowing for a larger space adjacent to the channel for native species plantings.
- Habitat Structures – This measure would include the installation of structural habitat features such as bat boxes, bird boxes, and platforms.
- Native Species Plantings – Native aquatic and riparian vegetation would be planted within the specified project area. This measure would help restore the reduced riparian habitat by establishing native species in the area adjacent to the channel.

- Invasive Species Management – Invasive species would be removed and an invasive species management plan would be implemented within designated sites. This measure would help restore the reduced riparian habitat by removing invasive species that compete with native species adjacent to the channel.

Several recreation and access control measures were developed for the feasibility study, but do not have direct impacts on the benefits of the alternatives evaluated, therefore, they will not be listed or described in this report. For further information regarding recreation and access control measures, please see the River Road Aquatic Ecosystem Restoration Feasibility Study IFR-EA.

The alternatives evaluated for this feasibility study include:

- Alternative 1 Instream Modification: Scales 1A, 1B, 1C, and 1D
- Alternative 2 Avenue A Modification: Scales 2A and 2B
- Alternative 3 River Road Modification: Scales 3A and 3B

## 6.1 Alternative 1 – Instream Modification: Scales 1A, 1B, 1C, and 1D

The Instream Modification alternative focuses on modifications to LWC 1, 2, and 3. Four scales were evaluated for this alternative, with each scale including native species plantings, invasive species management, instream structures, geolifts, and either modification or removal of LWC 1, 2, or 3. Combinations of low water crossing modification and removal yielded different benefits based on the low water crossing that was evaluated (LWC 1 vs. LWCs 2 and 3).

The Instream Modification alternative was broken into an upstream and downstream evaluation. Due to the higher existing habitat quality of the upstream, section, it was necessary to have separate analyses of the existing conditions in order to accurately assess Future-Without Project (FWOP) and FWP conditions. The upstream segment of the study area is located north of LWC 1 and up to East Mulberry Avenue. The aquatic habitat for this segment is adversely influenced by significant pooling, erosion, and sedimentation. The downstream segment of the study area is mostly within the boundaries of the Brackenridge Golf Course with little to no riparian habitat and complete channelization.

FWP benefits vary between the scales of the Instream Modification Alternative. All scales involve native species plantings, invasive species management, instream structures, and geolifts (Figure 6-1 and Figure 6-2); however each scale will require either modification or removal to LWCs 1, 2, or 3. The scales, listed below, are not combinable with one another.

- Scale 1A: Removal of LWCs 1, 2, and 3
- Scale 1B: Modification of LWC 1 and removal of LWCs 2 and 3
- Scale 1C: Removal of LWC 1 and modification of LWCs 2 and 3
- Scale 1D: Modification of LWCs 1, 2, and 3

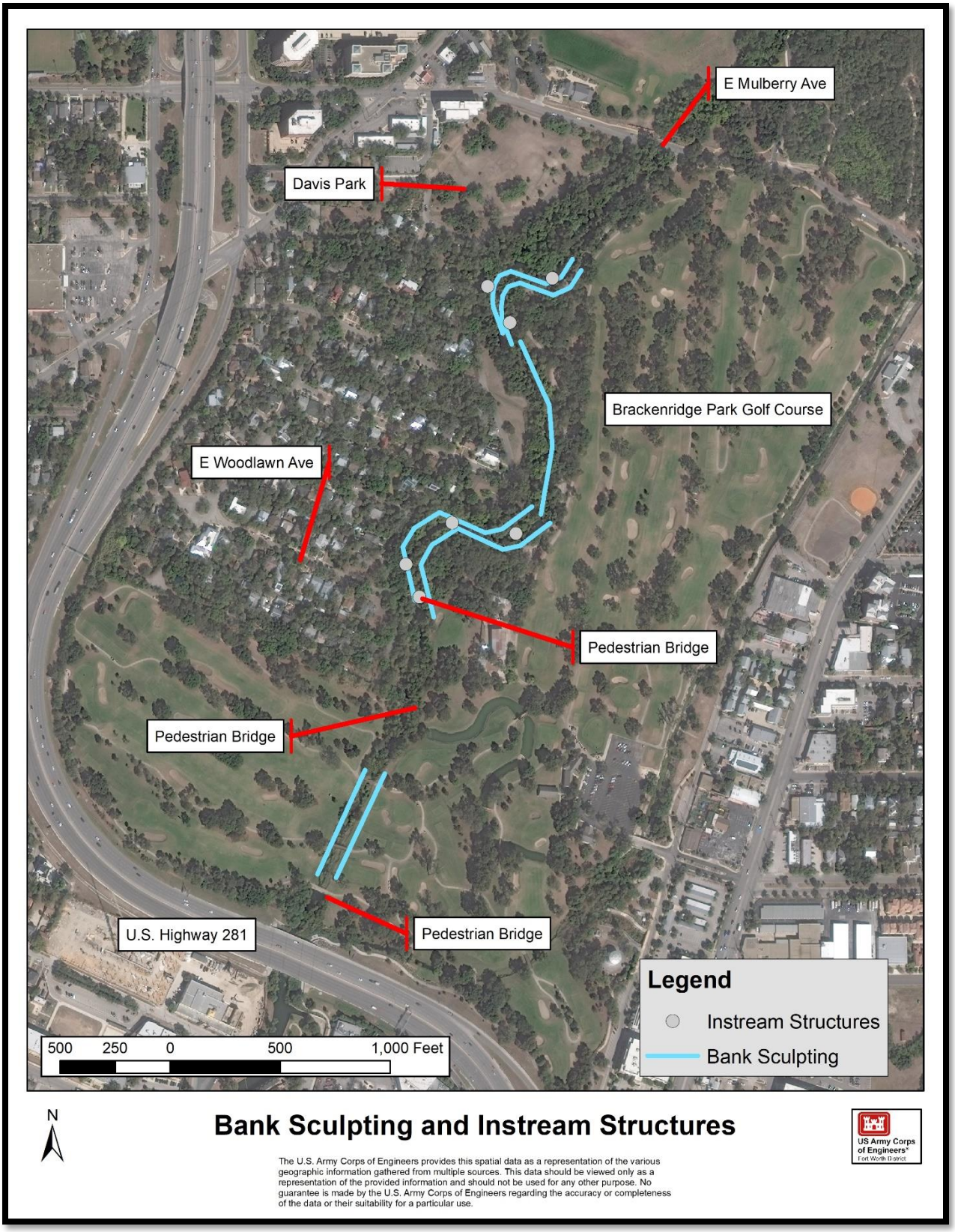


**Figure 6-1. Conceptual Placement of Instream Structures within the San Antonio River**


**Figure 6-2. Native Species Plantings and Invasive Species Management Locations for Instream Modification**

## 6.2 Alternative 2 – Avenue A Modification

Avenue A currently provides public access to the study area on the eastern side of the San Antonio River. Avenue A runs from East Mulberry Avenue and ends in a loop that connects to LWC 1. The road is relatively degraded and does not include public access control features, such as curbs, or physical boundaries separating the edge of the road and the riparian corridor of the San Antonio River. There is constant public disturbance along Avenue A resulting in soil compaction and a lack of vegetation.

Two scales were evaluated for this alternative, both include the removal of road base material, placement of topsoil, native species plantings, invasive species management, and habitat features.

- Scale 2A: Removal of Avenue A from the entrance at East Mulberry Avenue to the loop near LWC 1 (Figure 6-3).


**Figure 6-3. Avenue A Modification Scale 2A Restoration Features**

- Scale 2B: Removal of the lower portion of Avenue A while leaving the rest of Avenue A in place for the maintenance staff to access the maintenance building (Figure 6-4).


**Figure 6-4. Avenue A Modification Scale 2B Restoration Features**

## 6.3 Alternative 3 – River Road Modification

River Road and Davis Park are in the northwestern portion of the study area. River Road serves as the buffer between the riparian corridor of the San Antonio River and the adjacent River Road Neighborhood. Davis Park is heavily maintained with mowing and other landscape controls that do not allow for appropriate filtration of stormwater runoff into the river. The River Road alternative incorporates native species plantings which would restore the riparian buffer between the river and urban elements. The River Road Modification alternative will include native plantings in Davis Park, with focus on wildflowers, native grasses, and riparian shrub and tree species.

River Road and Davis Park are in the northwestern portion of the study area. Because it is still within the floodplain of the San Antonio River, Davis Park has a moderate risk of flooding (Figure 6-5). It is heavily maintained parkland and is utilized by the public throughout the year. Davis Park lacks suitable vegetation to appropriately filter and slow down stormwater runoff flowing into the river. Davis Park is dominated by bermudagrass (*Cynodon dactylon*), isolated green ash (*Fraxinus pennsylvanica*), straggler's daisy, and false mallow (*Malvastrum* spp.) (Figure 6-6).

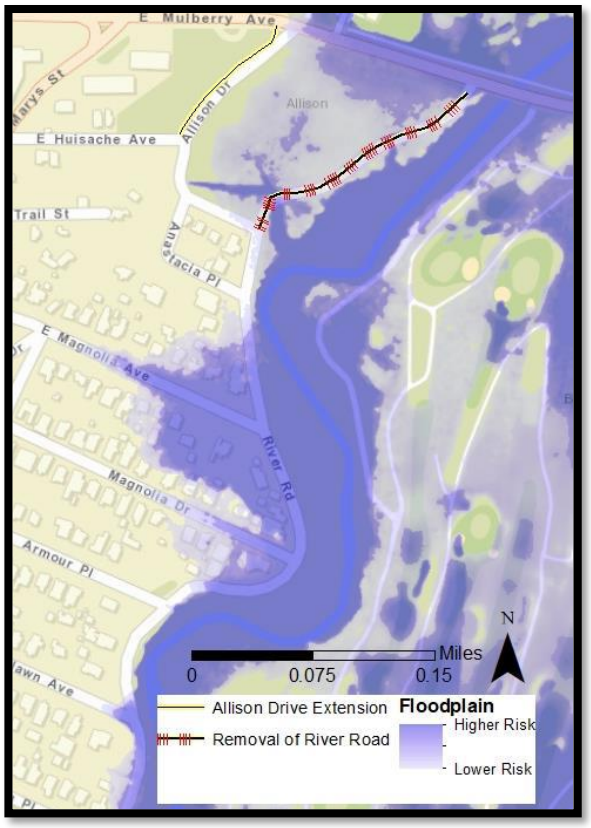


**Figure 6-5. Davis Park and River Road within the Floodplain**

**Figure 6-6. Davis Park**

- Scale 3A of the River Road Modification Alternative includes the removal of the northern portion of River Road and establishment of Allison Drive to the west of Davis Park, to maintain vehicular access for the adjacent neighborhood (Figure 6-7). The removed section of River Road would be replaced with native soil. Native vegetation would be planted in the removed road section and Davis Park to expand the riparian zone (Figure 6-8). This area would also incorporate active invasive species management and the placement of habitat structures for wildlife.

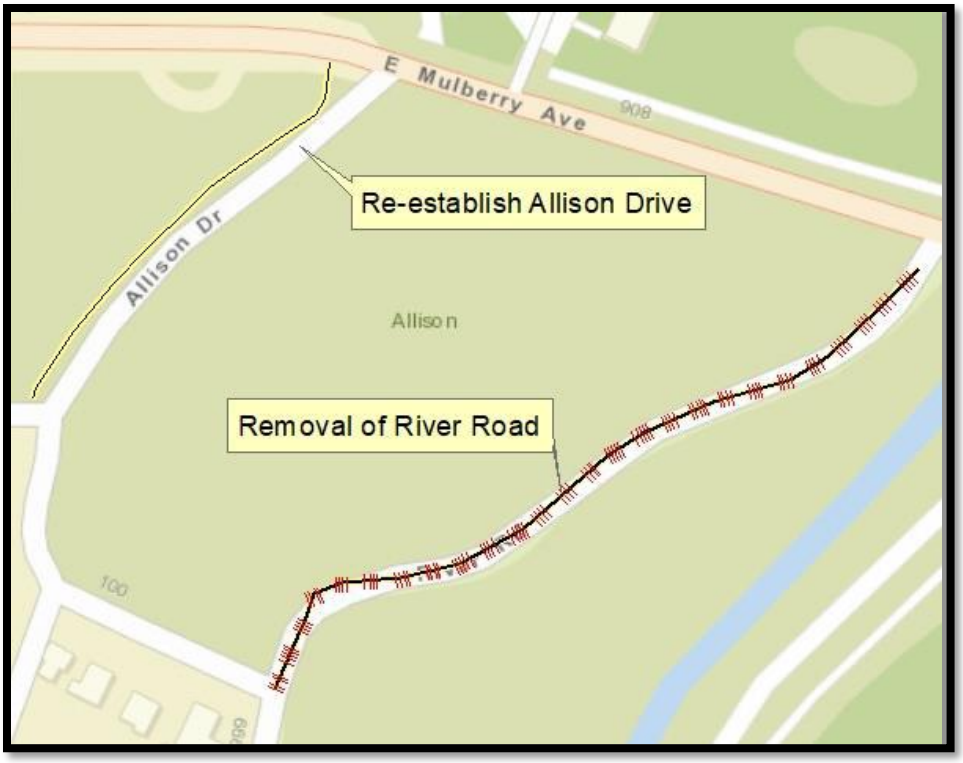


**Figure 6-7. Re-establishment of Allison Drive for Scale 3A**


**Figure 6-8. River Road and Davis Park Scale 3A Restoration Features**

- Scale 3B includes native species plantings, invasive species management, and the placement of habitat structures in Davis Park. The relocation of River Road is not included in this alternative and all plantings would be limited to the existing open park area (Figure 6-9).


**Figure 6-9. River Road and Davis Park Scale 3B Restoration Features**

# 7 Description of Proposed Action and Evaluated Alternatives

Eight scales of four alternatives were explored by the Corps for this project, including a No Action Alternative. The River Road Aquatic Ecosystem Restoration Feasibility Study screened restoration alternatives that were considered in the plan formulation process. Screening criteria included the preliminary identification of adverse impacts related to air quality, water quality, noise, habitat, and biological resources.

Comparing benefits and costs for ecosystem restoration provides a challenge to planners and decision makers because benefits and costs are not measured in the same units. Environmental restoration benefits can be measured in habitat units or some other physical unit, while costs are measured in dollars. Therefore benefits and costs cannot be directly compared. Two analyses are conducted to help planners and decision makers identify plans for implementation, though the analyses themselves do not identify a single ideal plan. These two techniques are cost effectiveness (CE) and incremental cost analysis (ICA). Use of these techniques are described in the Economic and Environmental Principles and Guidelines for Water and Related Land Resource Implementation Studies.

Cost effectiveness compares the annual costs and benefits of plans under consideration to identify the least cost plan alternative for each possible level of environmental output, and for any level of investment, the maximum level of output is identified.

Incremental cost analysis of the cost effective plans is conducted to reveal changes in costs as output levels are increased. Results from both analyses are presented graphically to help planners and decision makers select plans. For each of the best buy plans identified through incremental cost analysis, an “Is It Worth It?” analysis is conducted for each incremental plan to justify the incremental cost per unit of output to arrive at a recommended plan (see Appendix B – CE/ICA of the IFR-EA). Of the 45 plans, 16 were identified as cost effective plans (including No Action) and nine were identified as “best buy” plans. The best buy plans are:

- Plan 1: No Action
- Plan 2: River Road Scale 3B
- Plan 3: River Road Scale 3B + Avenue A Scale 2B
- Plan 4: River Road Scale 3B + Avenue A Scale 2B + Instream Modification Scale 1C
- Plan 5: River Road Scale 3B + Instream Modification Scale 1C + Avenue A Scale 2A
- Plan 6: River Road Scale 3B + Avenue A Scale 2A + Instream Modification Scale 1A
- Plan 7: Avenue A Scale 2A + Instream Modification Scale 1A + River Road Scale 3A

Please refer to the River Road Aquatic Ecosystem Restoration IFR-EA for a more thorough description of the proposed action and evaluated alternative plans. The preferred plan, resulting from an evaluation of combinable alternatives is described below.

The proposed action incorporates River Road Modification Scale 3B, Avenue A Modification Scale 2A, and Instream Modification Scale 1A. This plan provides:

- Two distinct habitat types (riparian and riverine) out of the two targeted habitat types
- Resilient habitat for migratory birds
- The creation of a complex of pool-riffle-run features that can be managed to improve water quality as an ancillary benefit
- The restoration of the San Antonio River through improved channel flow, sedimentation, and erosion
- The restoration of 99.2% of the proposed restoration areas

# 8 Evaluation and Comparison of the Proposed Action and Evaluated Alternatives

As part of Federal guidelines for water resources projects, there are general feasibility criteria that must be met. According to the USACE ER 1105-2-100 for planning, any the USACE project must be analyzed with regard to the following four criteria:

Completeness: Extent to which the plan provides and accounts for all necessary investments or actions to ensure realization of the planning objective.

- The alternatives fully analyzed will not completely restore the novel ecosystem; however, all of the alternatives included in the proposed action would achieve the benefits described below without other projects being completed. For all alternatives, this included determining the likelihood of natural resources that could benefit as part of a project’s implementation.

Effectiveness: Extent to which the plan contributes to achieving the planning objective.

- River Road Scale 3B + Avenue A Scale 2A + Instream Modification Scale 1A contributes to the achievement of the planning objectives and avoids all constraints.

Efficiency: Extent to which the plan is the most cost-effective means of addressing the specified problems and realizing the specified opportunities, consistent with protecting the nation's environment.

- River Road Scale 3B + Avenue A Scale 2A + Instream Modification Scale 1A is the most cost effective means of achieving the objectives of all of this study's alternatives, plans, and scales of plans.

Acceptability: Workability and viability of the alternative plan with respect to acceptance by Federal and non-Federal entities and the public, and compatibility with existing laws, regulations, and public policies.

- River Road Scale 3B + Avenue A Scale 2A + Instream Modification Scale 1A is acceptable in terms of all known applicable laws, regulations, and public policies by the USACE and SARA.

An in-depth analysis of AAHUs of the FWOP and FWP of each alternative can be found in Appendix C2 – Habitat Modeling of the River Road Aquatic ER Feasibility Study IFR-EA. Overall, Scale 1A of the Instream Modification Alternative has the highest rate of AAHUs. All AAHUs have a dependency upon Index scores and acreage, which can result in only minor changes of AAHUS between the FWOP and FWP with certain alternatives. The Instream Modification alternative yielded an increase between 26% and 70% from the FWOP and FWP condition. Avenue A Modification increases 100% to 113% from the FWOP and FWP condition, while the River Road Modification approximately increases by 2,500-2,600% due to project implementation.

**Table 8-1. Average Annual Benefits of the Alternatives Evaluated for the River Road Aquatic Ecosystem Restoration Feasibility Study**

| Alternative | Scale | FWOP AAHU | FWP AAHU | AAHU Benefits | Acres |
|---|---|---|---|---|---|
| **Instream Modification** | 1A: Removal of Low Water Crossings 1, 2, & 3 | 7.6 | 12.9 | 5.3 | 16 |
| | 1B: Modification of Low Water Crossing 1 and Removal of Low Water Crossings 2 and 3 | 7.6 | 10.8 | 3.2 | 16 |
| | 1C: Removal of Low Water Crossing 1 and Modification of Low Water Crossings 2 & 3 | 7.6 | 11.7 | 4.1 | 16 |
| | 1D: Modification of Low Water Crossings 1, 2, & 3 | 7.6 | 9.6 | 2.0 | 16 |
| **Avenue A Modification** | 2A: Complete removal of Avenue A | 0.8 | 1.7 | 0.9 | 4.6 |
| | 2B: Partial removal of Avenue A | 0.4 | 0.8 | 0.4 | 2 |

| Alternative | Scale | FWOP AAHU | FWP AAHU | AAHU Benefits | Acres |
|---|---|---|---|---|---|
| River Road | 3A: River Road Relocation and Planting in Davis Park | 0.0 | 2.6 | 2.6 | 5.1 |
| | 3B: River Road As-Is and Planting in Davis Park | 0.0 | 2.5 | 2.5 | 4.9 |

# 9 Recommendations

The Service provides a list of Nationwide Standard Conservation Measures that are utilized with the goal of reducing impacts to birds and their habitat; however, this list can be applied to this project's conservation measures (USFWS 2017). A partial list of effective measures are listed below. See Appendix A for a full list.

- Educate all employees, contractors, and/or site visitors of relevant rules and regulations that protect wildlife
- Report any incidental take of a migratory bird, to the local Service Office of Law Enforcement.
- Maximize use of disturbed land for all project activities (i.e., siting, lay-down areas, and construction).
- Implement standard soil erosion and dust control measures.
- Schedule all vegetation removal, trimming, and grading of vegetated areas outside of the peak bird breeding season (March 1 to August 31), to avoid impacts to breeding migratory birds unless the area has been investigated and no nesting birds are found present.
- Prepare a vegetation maintenance plan that outlines vegetation maintenance activities and schedules so that direct bird impacts do not occur.
- Prevent the introduction of invasive plants.
- For temporary and permanent habitat restoration/enhancement, use only native and local (when possible) seed and plant stock.
- Prevent increase in lighting of native habitats during the bird breeding season.
- Avoid contaminating natural aquatic and wetland systems with runoff by limiting all equipment maintenance, staging laydown, and dispensing of fuel, oil, etc., to designated upland areas.

# 10 Summary and FWS Position

Urbanization and other human impacts have caused significant degradation to the riverine ecosystem functions, resulting in reduced habitat quality and quantity and reductions in wildlife diversity and abundance. Specific planning objectives include (1) maximize and improve fish and wildlife habitat, (2) greater floral and faunal species diversity and richness, and (3) manage and remove invasive species.

After performing an analysis on an array of alternatives and plans, the team recommended the restoration of the riparian corridor on the eastern and western boundary of the study area, as well as the restoration of riverine habitat within the San Antonio River. The restoration measures would improve the plant diversity and expand suitable riverine and riparian habitat.

The Service supports the proposed action for the River Road Aquatic Ecosystem Restoration. The proposed ecosystem restoration measures would restore, to the extent practicable, the aquatic and riparian functions of the River Road ecosystem. River Road is located on the Central Flyway bird migration route and is used as a stop-over site for migratory birds. The proposed action would provide benefits to a resources of national and international significance as functional riverine and riparian corridors are critical for migratory birds, especially in arid and semiarid climates such as San Antonio, in central Texas.

The Service has determined that there are no federally listed species within the current project area; therefore no adverse effects to listed species are expected to occur with implementation of the proposed action.

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## Appendix A

NATIONWIDE STANDARD CONSERVATION MEASURES

Listed below are effective measures that should be employed at all project development sites nationwide with the goal of reducing impacts to birds and their habitats. These measures are grouped into three categories: General, Habitat Protection, and Stressor Management. These measures may be updated through time. We recommend checking the Conservation Measures website regularly for the most up-to-date list.

1. **General Measures**

a. Educate all employees, contractors, and/or site visitors of relevant rules and regulations that protect wildlife. See the Service webpage on Regulations and Policies for more information on regulations that protect migratory birds.

b. Prior to removal of an inactive nest, ensure that the nest is not protected under the Endangered Species Act (ESA) or the Bald and Golden Eagle Protection Act (BGEPA). Nests protected under ESA or BGEPA cannot be removed without a valid permit. i. See the Service Nest Destruction Policy

c. Do not collect birds (live or dead) or their parts (e.g., feathers) or nests without a valid permit. Please visit the Service permits page for more information on permits and permit applications.

d. Provide enclosed solid waste receptacles at all project areas. Non-hazardous solid waste (trash) would be collected and deposited in the on-site receptacles. Solid waste would be collected and disposed of by a local waste disposal contractor. For more information about solid waste and how to properly dispose of it, see the EPA Non-Hazardous Waste website.

e. Report any incidental take of a migratory bird, to the local Service Office of Law Enforcement.

f. Consult and follow applicable Service industry guidance.

2. **Habitat Protection**

a. Minimize project creep by clearly delineating and maintaining project boundaries (including staging areas).

b. Consult all local, State, and Federal regulations for the development of an appropriate buffer distance between development site and any wetland or waterway. For more information on wetland protection regulations see the Clean Water Act sections 401 and 404.

c. Maximize use of disturbed land for all project activities (i.e., siting, lay-down areas, and construction).

d. Implement standard soil erosion and dust control measures. For example: i. Establish vegetation cover to stabilize soil ii. Use erosion blankets to prevent soil loss iii. Water bare soil to prevent wind erosion and dust issues

3. Stressor Management

Stressor: Vegetation Removal

**Conservation Goal:** Avoid direct take of adults, chicks, or eggs.

**Conservation Measure 1:** Schedule all vegetation removal, trimming, and grading of vegetated areas outside of the peak bird breeding season to the maximum extent practicable. Use available resources, such as internet-based tools (e.g., the FWS's Information, Planning and Conservation system and Avian Knowledge Network) to identify peak breeding months for local

bird species; or, contact local Service Migratory Bird Program Office for breeding bird information.

**Conservation Measure 2:** When project activities cannot occur outside the bird nesting season, conduct surveys prior to scheduled activity to determine if active nests are present within the area of impact and buffer any nesting locations found during surveys.

1) Generally, the surveys should be conducted no more than five days prior to scheduled activity.

2) Timing and dimensions of the area to be surveyed vary and will depend on the nature of the project, location, and expected level of vegetation disturbance.

3) If active nests or breeding behavior (e.g., courtship, nest building, territorial defense, etc.) are detected during these surveys, no vegetation removal activities should be conducted until nestlings have fledged or the nest fails or breeding behaviors are no longer observed. If the activity must occur, establish a buffer zone around the nest and no activities will occur within that zone until nestlings have fledged and left the nest area. The dimension of the buffer zone will depend on the proposed activity, habitat type, and species present and should be coordinated with the local or regional Service office.

4) When establishing a buffer zone, construct a barrier (e.g., plastic fencing) to protect the area. If the fence is knocked down or destroyed, work will suspend wholly, or in part, until the fence is satisfactorily repaired.

5) When establishing a buffer zone, a qualified biologist will be present onsite to serve as a biological monitor during vegetation clearing and grading activities to ensure no take of migratory birds occurs. Prior to vegetation clearing, the monitor will ensure that the limits of construction have been properly staked and are readily identifiable. Any associated project activities that are inconsistent with the applicable conservation measures, and activities that may result in the take of migratory birds will be immediately halted and reported to the appropriate Service office within 24 hours.

6) If establishing a buffer zone is not feasible, contact the Service for guidance to minimize impacts to migratory birds associated with the proposed project or removal of an active nest. Active nests may only be removed if you receive a permit from your local Migratory Bird Permit Office. A permit may authorize active nest removal by a qualified biologist with bird handling experience or by a permitted bird rehabilitator.

**Conservation Measure 3:** Prepare a vegetation maintenance plan that outlines vegetation maintenance activities and schedules so that direct bird impacts do not occur.

Stressor: Invasive Species Introduction

**Conservation Goal:** Prevent the introduction of invasive plants.

**Conservation Measure 1:** Prepare a weed abatement plan that outlines the areas where weed abatement is required and the schedule and method of activities to ensure bird impacts are avoided.

**Conservation Measure 2:** For temporary and permanent habitat restoration/enhancement, use only native and local (when possible) seed and plant stock.

**Conservation Measure 3:** Consider creating vehicle wash stations prior to entering sensitive habitat areas to prevent accidental introduction of non-native plants.

**Conservation Measure 4:** Remove invasive/exotic species that pose an attractive nuisance to migratory birds.

## Stressor: Artificial Lighting

**Conservation Goal**: Prevent increase in lighting of native habitats during the bird breeding season.

**Conservation Measure 1:** To the maximum extent practicable, limit construction activities to the time between dawn and dusk to avoid the illumination of adjacent habitat areas.

**Conservation Measure 2:** If construction activity time restrictions are not possible, use down shielding or directional lighting to avoid light trespass into bird habitat (i.e., use a 'Cobra' style light rather than an omnidirectional light system to direct light down to the roadbed). To the maximum extent practicable, while allowing for public safety, low intensity energy saving lighting (e.g. low pressure sodium lamps) will be used.

**Conservation Measure 3:** Minimize illumination of lighting on associated construction or operation structures by using motion sensors or heat sensors.

**Conservation Measure 4**: Bright white light, such as metal halide, halogen, fluorescent, mercury vapor and incandescent lamps should not be used.

## Stressor: Human Disturbance

**Conservation Goal:** Minimize prolonged human presence near nesting birds during construction and maintenance actions.

**Conservation Measure 1:** Restrict unauthorized access to natural areas adjacent to the project site by erecting a barrier and/or avoidance buffers (e.g., gate, fence, wall) to minimize foot traffic and off-road vehicle uses.

## Stressor: Collision

**Conservation Goal:** Minimize collision risk with project infrastructure and vehicles.

**Conservation Measure 1:** Minimize collision risk with project infrastructure (e.g., temporary and permanent) by increasing visibility through appropriate marking and design features (e.g., lighting, wire marking, etc.).

**Conservation Measure 2:** On bridge crossing areas with adjacent riparian, beach, estuary, or other bird habitat, use fencing or metal bridge poles (Sebastian Poles) that extend to the height of the tallest vehicles that will use the structure.

**Conservation Measure 3:** Install wildlife friendly culverts so rodents and small mammals can travel under any new roadways instead of over them. This may help reduce raptor deaths associated with being struck while tracking prey or scavenging road kill on the roadway.

**Conservation Measure 4:** Remove road-kill carcasses regularly to prevent scavenging and bird congregations along roadways.

**Conservation Measure 5:** Avoid planting “desirable” fruited or preferred nesting vegetation in medians or Rights of Way.

**Conservation Measure 6:** Eliminate use of steady burning lights on tall structures (e.g., >200 ft).

## Stressor: Entrapment

**Conservation Goal:** Prevent birds from becoming trapped in project structures or perching and nesting in project areas that may endanger them.

**Conservation Measure 1:** Minimize entrapment and entanglement hazards through project design measures that may include:

1. Installing anti-perching devices on facilities/equipment where birds may commonly nest or perch

2. Covering or enclosing all potential nesting surfaces on the structure with mesh netting, chicken wire fencing, or other suitable exclusion material prior to the nesting season to prevent birds from establishing new nests. The netting, fencing, or other material must have no opening or mesh size greater than 19 mm and must be maintained until the structure is removed.

3. Cap pipes and cover/seal all small dark spaces where birds may enter and become trapped.

**Conservation Measure 2:** Use the appropriate deterrents to prevent birds from nesting on structures where they cause conflicts, may endanger themselves, or create a human health and safety hazard.

1. During the time that the birds are trying to build or occupy their nests (generally , between April and August, depending on the geographic location), potential nesting 5 surfaces should be monitored at least once every three days for any nesting activity, especially where bird use of structures is likely to cause take. It is permissible to remove non-active nests (without birds or eggs), partially completed nests, or new nests as they are built (prior to occupation). If birds have started to build any nests, the nests shall be removed before they are completed. Water shall not be used to remove the nests if nests are located within 50 feet of any surface waters.

2. If an active nest becomes established (i.e., there are eggs or young in the nest), all work that could result in abandonment or destruction of the nest shall be avoided until the young have fledged or the nest is unoccupied. Construction activities that may displace birds after they have laid their eggs and before the young have fledged should not be permitted. If the project continues into the following spring, this cycle shall be repeated. When work on the structure is complete, all netting shall be removed and properly disposed of.

Stressor: Noise

**Conservation Goal:** Prevent the increase in noise above ambient levels during the nesting bird breeding season.

**Conservation Measure 1:** Minimize an increase in noise above ambient levels during project construction by installing temporary structural barriers such as sand bags

**Conservation Measure 2:** Avoid permanent additions to ambient noise levels from the proposed project by using baffle boxes or sound walls.

Stressor: Chemical Contamination

**Conservation Goal:** Prevent the introduction of chemicals contaminants into the environment.

**Conservation Measure 1:** Avoid chemical contamination of the project area by implementing a Hazardous Materials Plan. For more information on hazardous waste and how to properly manage hazardous waste, see the EPA Hazardous Waste website.

**Conservation Measure 2:** Avoid soil contamination by using drip pans underneath equipment and containment zones at construction sites and when refueling vehicles or equipment.

**Conservation Measure 3:** Avoid contaminating natural aquatic and wetland systems with runoff by limiting all equipment maintenance, staging laydown, and dispensing of fuel, oil, etc., to designated upland areas.

**Conservation Measure 4:** Any use of pesticides or rodenticides shall comply with the applicable Federal and State laws.

1. Choose non-chemical alternatives when appropriate

2. Pesticides shall be used only in accordance with their registered uses and in accordance with the manufacturer's instructions to limit access to non-target species.

3. For general measures to reducing wildlife exposure to pesticides, see EPA's Pesticides: Environmental Effects website.

Stressor: Fire

**Conservation Goal:** Minimize fire potential from project-related activities.

**Conservation Measure 1:** Reduce fire hazards from vehicles and human activities (e.g., use spark arrestors on power equipment, avoid driving vehicles off road).

**Conservation Measure 2**: Consider fire potential when developing vegetation management plans by planting temporary impact areas with a palate of low-growing, sparse, fire resistant native species that meet with the approval of the County Fire Department and local FWS Office.

# Attachment B

# United States Department of the Interior

FISH AND WILDLIFE SERVICE
Austin Ecological Services Field Office
10711 Burnet Road, Suite 200
Austin, TX 78758-4460
Phone: (512) 490-0057 Fax: (512) 490-0974
http://www.fws.gov/southwest/es/AustinTexas/
http://www.fws.gov/southwest/es/EndangeredSpecies/lists/

In Reply Refer To: March 01, 2021
Consultation Code: 02ETAU00-2020-SLI-0112
Event Code: 02ETAU00-2021-E-01766
Project Name: River Road Feasibility Study

Subject: Updated list of threatened and endangered species that may occur in your proposed project location 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, that *may* occur within the county of your proposed project and/or may be affected by 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.).

Please note that new information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. 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. Also 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.

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 sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of federally listed as threatened or endangered species and to determine whether projects may affect these species and/or designated critical habitat.

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 projects 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.

While a Federal agency may designate a non-Federal representative to conduct informal consultation or prepare a biological assessment, the Federal Agency must notify the Service in writing of any such designation. The Federal agency shall also independently review and evaluate the scope and content of a biological assessment prepared by their designated non-Federal representative before that document is submitted to the Service.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by a federally funded, permitted or authorized activity, the agency is required to consult with the Service pursuant to 50 CFR 402. The following definitions are provided to assist you in reaching a determination:

- *No effect* - the proposed action will not affect federally 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, if the project changes or additional information on the distribution of listed or proposed species becomes available, the project should be reanalyzed for effects not previously considered.
- *May affect, but is not likely to adversely affect* - the project may affect listed species and/or critical habitat; however, the effects are expected to be discountable, insignificant, or completely beneficial. Certain avoidance and minimization measures may need to be implemented in order to reach this level of effect. The Federal agency or the designated non-Federal representative should consult with the Service to seek written concurrence that adverse effects are not likely. Be sure to include all of the information and documentation used to reach your decision with your request for concurrence. The Service must have this documentation before issuing a concurrence.
- *Is likely to adversely affect* - adverse effects to listed species may occur as a direct or indirect result of the proposed action. For this determination, the effect of the action is neither discountable nor insignificant. If the overall effect of the proposed action is beneficial to the listed species but the action is also likely to cause some adverse effects to individuals of that species, then the proposed action “is likely to adversely affect” the listed species. The analysis should consider all interrelated and interdependent actions. An “is likely to adversely affect” determination requires the Federal action agency to initiate formal section 7 consultation with our office.

Regardless of the determination, the Service recommends that the Federal agency maintain a complete record of the evaluation, including steps leading to the determination of effect, the qualified personnel conducting the evaluation, habitat conditions, site photographs, and any other related information. 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.

Migratory Birds

For projects that may affect migratory birds, the Migratory Bird Treaty Act (MBTA) implements various treaties and conventions for the protection of these species. Under the MBTA, taking, killing, or possessing migratory birds is unlawful. Migratory birds may nest in trees, brushy areas, or other areas of suitable habitat. The Service recommends activities requiring vegetation removal or disturbance avoid the peak nesting period of March through August to avoid destruction of individuals, nests, or eggs. If project activities must be conducted during this time, we recommend surveying for nests prior to conducting work. If a nest is found, and if possible, the Service recommends a buffer of vegetation remain around the nest until the young have fledged or the nest is abandoned.

For additional information concerning the MBTA and recommendations to reduce impacts to migratory birds please contact the U.S. Fish and Wildlife Service Migratory Birds Office, 500 Gold Ave. SW, Albuquerque, NM 87102. A list of migratory birds may be viewed at https://www.fws.gov/birds/management/managed-species/migratory-bird-treaty-act-protected-species.php. Guidance for minimizing impacts to migratory birds for projects including communications towers can be found at: https://www.fws.gov/birds/management/project-assessment-tools-and-guidance/guidance-documents/communication-towers.php. Additionally, wind energy projects should follow the wind energy guidelines

https://www.fws.gov/birds/management/project-assessment-tools-and-guidance/guidance-documents/wind-energy.php ) for minimizing impacts to migratory birds and bats.

Finally, 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 https://www.fws.gov/birds/management/project-assessment-tools-and-guidance/guidance-documents/eagles.php.

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:

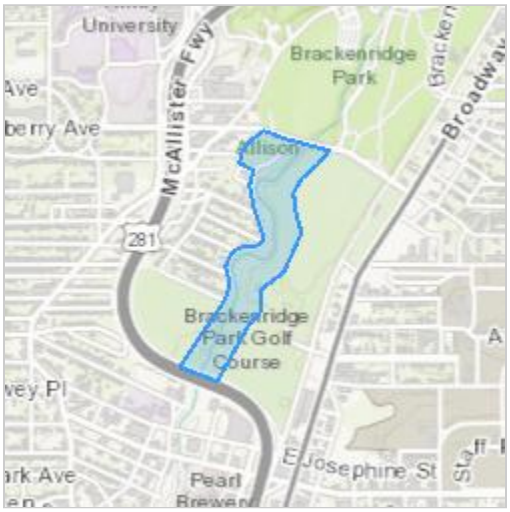
**Austin Ecological Services Field Office**
10711 Burnet Road, Suite 200
Austin, TX 78758-4460
(512) 490-0057

# Project Summary

Consultation Code: 02ETAU00-2020-SLI-0112
Event Code: 02ETAU00-2021-E-01766
Project Name: River Road Feasibility Study
Project Type: ** OTHER **
Project Description: The purpose of the study is to identify and implement aquatic ecosystem restoration measures to restore the riverine ecosystem within the River Road segment of the San Antonio River that has become severely degraded due to erosion and sedimentation.

Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@29.452006572118233,-98.47797682936759,14z




Counties: Bexar County, Texas

# Endangered Species Act Species

There is a total of 21 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 |
|---|---|
| Golden-cheeked Warbler (=wood) *Dendroica chrysoparia*<br>No critical habitat has been designated for this species.<br>Species profile: https://ecos.fws.gov/ecp/species/33 | Endangered |
| Piping Plover *Charadrius melodus*<br>Population: [Atlantic Coast and Northern Great Plains populations] - Wherever found, except those areas where listed as endangered.<br>There is **final** critical habitat for this species. The location of the critical habitat is not available.<br>This species only needs to be considered under the following conditions:<br>▪ Wind Energy Projects<br>Species profile: https://ecos.fws.gov/ecp/species/6039 | Threatened |
| Red Knot *Calidris canutus rufa*<br>No critical habitat has been designated for this species.<br>This species only needs to be considered under the following conditions:<br>▪ Wind Energy Projects<br>Species profile: https://ecos.fws.gov/ecp/species/1864 | Threatened |
| Whooping Crane *Grus americana*<br>Population: Wherever found, except where listed as an experimental population<br>There is **final** critical habitat for this species. The location of the critical habitat is not available.<br>Species profile: https://ecos.fws.gov/ecp/species/758 | Endangered |

## Amphibians

| NAME | STATUS |
|---|---|
| San Marcos Salamander *Eurycea nana*<br>There is **final** critical habitat for this species. The location of the critical habitat is not available.<br>Species profile: https://ecos.fws.gov/ecp/species/6374 | Threatened |
| Texas Blind Salamander *Typhlomolge rathbuni*<br>No critical habitat has been designated for this species.<br>Species profile: https://ecos.fws.gov/ecp/species/5130 | Endangered |

## Fishes

| NAME | STATUS |
|---|---|
| Fountain Darter *Etheostoma fonticola*<br>There is **final** critical habitat for this species. The location of the critical habitat is not available.<br>Species profile: https://ecos.fws.gov/ecp/species/5858 | Endangered |

## Insects

| NAME | STATUS |
|---|---|
| [no Common Name] Beetle *Rhadine exilis*<br>There is **final** critical habitat for this species. The location of the critical habitat is not available.<br>Species profile: https://ecos.fws.gov/ecp/species/6942 | Endangered |
| [no Common Name] Beetle *Rhadine infernalis*<br>There is **final** critical habitat for this species. The location of the critical habitat is not available.<br>Species profile: https://ecos.fws.gov/ecp/species/3804 | Endangered |
| Comal Springs Dryopid Beetle *Stygoparnus comalensis*<br>There is **final** critical habitat for this species. The location of the critical habitat is not available.<br>Species profile: https://ecos.fws.gov/ecp/species/7175 | Endangered |
| Comal Springs Riffle Beetle *Heterelmis comalensis*<br>There is **final** critical habitat for this species. The location of the critical habitat is not available.<br>Species profile: https://ecos.fws.gov/ecp/species/3403 | Endangered |
| Helotes Mold Beetle *Batrisodes venyivi*<br>There is **final** critical habitat for this species. The location of the critical habitat is not available.<br>Species profile: https://ecos.fws.gov/ecp/species/1149 | Endangered |

## Arachnids

| NAME | STATUS |
|---|---|
| Braken Bat Cave Meshweaver *Cicurina venii*<br>There is **final** critical habitat for this species. The location of the critical habitat is not available.<br>Species profile: https://ecos.fws.gov/ecp/species/7900 | Endangered |
| Cokendolpher Cave Harvestman *Texella cokendolpheri*<br>There is **final** critical habitat for this species. The location of the critical habitat is not available.<br>Species profile: https://ecos.fws.gov/ecp/species/676 | Endangered |
| Government Canyon Bat Cave Meshweaver *Cicurina vespera*<br>There is **final** critical habitat for this species. The location of the critical habitat is not available.<br>Species profile: https://ecos.fws.gov/ecp/species/7037 | Endangered |
| Government Canyon Bat Cave Spider *Neoleptoneta microps*<br>There is **final** critical habitat for this species. The location of the critical habitat is not available.<br>Species profile: https://ecos.fws.gov/ecp/species/553 | Endangered |
| Madla Cave Meshweaver *Cicurina madla*<br>There is **final** critical habitat for this species. The location of the critical habitat is not available.<br>Species profile: https://ecos.fws.gov/ecp/species/2467 | Endangered |
| Robber Baron Cave Meshweaver *Cicurina baronia*<br>There is **final** critical habitat for this species. The location of the critical habitat is not available.<br>Species profile: https://ecos.fws.gov/ecp/species/2361 | Endangered |

## Crustaceans

| NAME | STATUS |
|---|---|
| Peck's Cave Amphipod *Stygobromus (=Stygonectes) pecki*<br>There is **final** critical habitat for this species. The location of the critical habitat is not available.<br>Species profile: https://ecos.fws.gov/ecp/species/8575 | Endangered |

## Flowering Plants

| NAME | STATUS |
|---|---|
| Bracted Twistflower *Streptanthus bracteatus*<br>No critical habitat has been designated for this species.<br>Species profile: https://ecos.fws.gov/ecp/species/2856 | Candidate |
| Texas Wild-rice *Zizania texana*<br>There is **final** critical habitat for this species. The location of the critical habitat is not available.<br>Species profile: https://ecos.fws.gov/ecp/species/805 | Endangered |

## Critical habitats

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

# Attachment C

# IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.



## Project information

NAME

River Road Feasibility Study

LOCATION

Bexar County, Texas

DESCRIPTION

Some(The purpose of the study is to identify and implement aquatic ecosystem restoration measures to restore the riverine ecosystem within the River Road segment of the San Antonio River that has become severely degraded due to erosion and sedimentation.)

## Local office

Austin Ecological Services Field Office

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

# Endangered species

**This resource list is for informational purposes only and does not constitute an analysis of project level impacts.**

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Log in to IPaC.
2. Go to your My Projects list.
3. Click PROJECT HOME for this project.
4. Click REQUEST SPECIES LIST.

Listed species[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.



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1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information. IPaC only shows species that are regulated by USFWS (see FAQ).
2. 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.

The following species are potentially affected by activities in this location:

## Birds

| NAME | STATUS |
|---|---|

Golden-cheeked Warbler (=wood) Dendroica chrysoparia — Endangered

Wherever found

No critical habitat has been designated for this species.
https://ecos.fws.gov/ecp/species/33

Piping Plover Charadrius melodus — Threatened

This species only needs to be considered if the following condition applies:

- Wind Energy Projects

There is **final** critical habitat for this species. The location of the critical habitat is not available.
https://ecos.fws.gov/ecp/species/6039

Red Knot Calidris canutus rufa — Threatened

Wherever found

This species only needs to be considered if the following condition applies:

- Wind Energy Projects

No critical habitat has been designated for this species.
https://ecos.fws.gov/ecp/species/1864

Whooping Crane Grus americana — Endangered

There is **final** critical habitat for this species. The location of the critical habitat is not available.
https://ecos.fws.gov/ecp/species/758

# Amphibians

| NAME | STATUS |
|---|---|

San Marcos Salamander Eurycea nana — Threatened

Wherever found

There is **final** critical habitat for this species. The location of the critical habitat is not available.
https://ecos.fws.gov/ecp/species/6374

Texas Blind Salamander Typhlomolge rathbuni — Endangered

Wherever found

No critical habitat has been designated for this species.
https://ecos.fws.gov/ecp/species/5130

# Fishes

| NAME | STATUS |
|---|---|

Fountain Darter Etheostoma fonticola — Endangered
Wherever found
There is **final** critical habitat for this species. The location of the critical habitat is not available.
https://ecos.fws.gov/ecp/species/5858

# Insects

| NAME | STATUS |
|---|---|

[no Common Name] Beetle Rhadine exilis — Endangered
Wherever found
There is **final** critical habitat for this species. The location of the critical habitat is not available.
https://ecos.fws.gov/ecp/species/6942

[no Common Name] Beetle Rhadine infernalis — Endangered
Wherever found
There is **final** critical habitat for this species. The location of the critical habitat is not available.
https://ecos.fws.gov/ecp/species/3804

Comal Springs Dryopid Beetle Stygoparnus comalensis — Endangered
Wherever found
There is **final** critical habitat for this species. The location of the critical habitat is not available.
https://ecos.fws.gov/ecp/species/7175

Comal Springs Riffle Beetle Heterelmis comalensis — Endangered
Wherever found
There is **final** critical habitat for this species. The location of the critical habitat is not available.
https://ecos.fws.gov/ecp/species/3403

Helotes Mold Beetle Batrisodes venyivi — Endangered
Wherever found
There is **final** critical habitat for this species. The location of the critical habitat is not available.
https://ecos.fws.gov/ecp/species/1149

# Arachnids

| NAME | STATUS |
|---|---|

Braken Bat Cave Meshweaver Cicurina venii — Endangered
Wherever found
There is **final** critical habitat for this species. The location of the critical habitat is not available.
https://ecos.fws.gov/ecp/species/7900

Cokendolpher Cave Harvestman Texella cokendolpheri — Endangered
Wherever found
There is **final** critical habitat for this species. The location of the critical habitat is not available.
https://ecos.fws.gov/ecp/species/676

Government Canyon Bat Cave Meshweaver Cicurina vespera — Endangered
Wherever found
There is **final** critical habitat for this species. The location of the critical habitat is not available.
https://ecos.fws.gov/ecp/species/7037

Government Canyon Bat Cave Spider Neoleptoneta microps — Endangered
Wherever found
There is **final** critical habitat for this species. The location of the critical habitat is not available.
https://ecos.fws.gov/ecp/species/553

Madla Cave Meshweaver Cicurina madla — Endangered
Wherever found
There is **final** critical habitat for this species. The location of the critical habitat is not available.
https://ecos.fws.gov/ecp/species/2467

Robber Baron Cave Meshweaver Cicurina baronia — Endangered
Wherever found
There is **final** critical habitat for this species. The location of the critical habitat is not available.
https://ecos.fws.gov/ecp/species/2361

# Crustaceans

| NAME | STATUS |
|---|---|
| Peck's Cave Amphipod Stygobromus (=Stygonectes) pecki | Endangered |

Wherever found
There is **final** critical habitat for this species. The location of the critical habitat is not available.
https://ecos.fws.gov/ecp/species/8575

# Flowering Plants

| NAME | STATUS |
|---|---|
| Bracted Twistflower Streptanthus bracteatus | Candidate |

Wherever found
No critical habitat has been designated for this species.
https://ecos.fws.gov/ecp/species/2856

Texas Wild-rice Zizania texana — Endangered

Wherever found

There is **final** critical habitat for this species. The location of the critical habitat is not available.
https://ecos.fws.gov/ecp/species/805

# Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

THERE ARE NO CRITICAL HABITATS AT THIS LOCATION.

# Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Birds of Conservation Concern http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php
- Measures for avoiding and minimizing impacts to birds http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php
- Nationwide conservation measures for birds http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and

abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

| NAME | BREEDING SEASON (IF A BREEDING SEASON IS INDICATED FOR A BIRD ON YOUR LIST, THE BIRD MAY BREED IN YOUR PROJECT AREA SOMETIME WITHIN THE TIMEFRAME SPECIFIED, WHICH IS A VERY LIBERAL ESTIMATE OF THE DATES INSIDE WHICH THE BIRD BREEDS ACROSS ITS ENTIRE RANGE. "BREEDS ELSEWHERE" INDICATES THAT THE BIRD DOES NOT LIKELY BREED IN YOUR PROJECT AREA.) |
|---|---|
| American Golden-plover Pluvialis dominica<br>This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. | Breeds elsewhere |
| Harris's Sparrow Zonotrichia querula<br>This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. | Breeds elsewhere |
| Lesser Yellowlegs Tringa flavipes<br>This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.<br>https://ecos.fws.gov/ecp/species/9679 | Breeds elsewhere |
| Mountain Plover Charadrius montanus<br>This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.<br>https://ecos.fws.gov/ecp/species/3638 | Breeds elsewhere |
| Semipalmated Sandpiper Calidris pusilla<br>This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. | Breeds elsewhere |

| | |
|---|---|
| Sprague's Pipit Anthus spragueii<br>This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.<br>https://ecos.fws.gov/ecp/species/8964 | Breeds elsewhere |
| Swallow-tailed Kite Elanoides forficatus<br>This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.<br>https://ecos.fws.gov/ecp/species/8938 | Breeds Mar 10 to Jun 30 |
| Willet Tringa semipalmata<br>This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. | Breeds elsewhere |

# Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

**Probability of Presence (■)**

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

**Breeding Season (■)**

Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

**Survey Effort** (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

To see a bar's survey effort range, simply hover your mouse cursor over the bar.

**No Data** (–)
A week is marked as having no data if there were no survey events for that week.

**Survey Timeframe**
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.

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**Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.**

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

**What does IPaC use to generate the migratory birds potentially occurring in my specified location?**

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the AKN Phenology Tool.

**What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?**

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets .

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

**How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?**

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: The Cornell Lab of Ornithology All About Birds Bird Guide, or (if you are unsuccessful in locating the bird of interest there), the Cornell Lab of Ornithology Neotropical Birds guide. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

**What are the levels of concern for migratory birds?**

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

**Details about birds that are potentially affected by offshore projects**

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

**What if I have eagles on my list?**

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

**Proper Interpretation and Use of Your Migratory Bird Report**

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided,

please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

# Facilities

## National Wildlife Refuge lands

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS AT THIS LOCATION.

## Fish hatcheries

THERE ARE NO FISH HATCHERIES AT THIS LOCATION.

# Wetlands in the National Wetlands Inventory

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

This location overlaps the following wetlands:

FRESHWATER POND

- PUBHh
- PUBK

RIVERINE

R2UBH

R4SBC

A full description for each wetland code can be found at the National Wetlands Inventory website

**Data limitations**

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

**Data exclusions**

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

**Data precautions**

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.