



# Texas Parks & Wildlife 2013 MOU

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## Best Management Practices 2017 Revision

This agreement defines the best management practices (BMPs), which for species with BMPs can eliminate the need to coordinate projects with TPWD, that TxDOT and TPWD have agreed will result in avoidance and minimization of potential impacts to natural resources.

BEST MANAGEMENT PRACTICES  
PROGRAMMATIC AGREEMENT

BETWEEN

TEXAS DEPARTMENT OF TRANSPORTATION

AND

TEXAS PARKS AND WILDLIFE DEPARTMENT

UNDER THE 2013 MOU

2017 Revision

This Programmatic Agreement defines Best Management Practices (BMPs) to be implemented by Texas Department of Transportation (TxDOT) per §2.213 (Programmatic Agreements) of the 2013 Memorandum of Understanding (MOU) between TxDOT and Texas Parks and Wildlife Department (TPWD). These BMPs are measures that TxDOT and TPWD agree will result in avoidance and minimization of potential impacts to natural resources and in some cases apply to particular types of TxDOT projects. The Interagency MOU Implementation Team (§2.214) will have a standing agenda item to discuss implementation of this Programmatic Agreement (PA), including BMP revisions, proposed TPWD County List changes, or other implementation experiences.

### **BMP PA Section 1: Species BMPs**

The purpose of this section is to provide BMPs to minimize impacts to species or groups of species listed in Table 1. Implementation of these BMPs by TxDOT eliminates the need for coordination under §2.206(1) of the MOU, except as noted in Table 1. If Table 1 indicates coordination is required for a species, proceed to coordination per the MOU. Implementation of BMPs listed in Section 2 (Standard Recommendations) would help further minimize impacts to SGCN but is not required to avoid the coordination trigger under §2.206(1).

Table 1 presents BMPs for species that are on the TPWD Rare, Threatened, and Endangered Species of Texas by County list (<http://tpwd.texas.gov/gis/rtest/>). Table 1 includes State Threatened Species and species that are identified in the Texas Conservation Action Plan as Species of Greatest Conservation Need (SGCN) and are tracked on the TPWD county lists. General taxa BMPs (e.g. Bird BMPs, Fish BMPs) and Water Quality BMPs identified in the right-hand column and are detailed below Table 1.

**Table 1.** BMPs for Species of Greatest Conservation Need (SGCN). State-listed threatened species are denoted by the letter “T” in the Status column. This table does not currently include any species listed as endangered by the state or the U.S. Fish and Wildlife Service.

Common Name	Status	Scientific Name	BMPs
<b>Amphibians</b>			
Black-spotted Newt	T	<i>Notophthalmus meridionalis</i>	1) Water Quality BMPs 2) Amphibian BMPs
Mexican Treefrog	T	<i>Smilisca baudinii</i>	1) Water Quality BMPs 2) Amphibian BMPs
Sheep Frog	T	<i>Hypopachus variolosus</i>	1) Minimize disturbance to burrows or downed woody debris 2) Water Quality BMPs 3) Amphibian BMPs
South Texas Siren (large form)	T	<i>Siren sp 1</i>	1) Minimize impacts to warm, shallow waters with vegetative cover such as ponds and ditches 2) Water Quality BMPs 3) Amphibian BMPs
Southern Crawfish Frog		<i>Lithobates areolatus areolatus</i>	In Austin, Colorado, Delta, Fannin, Fort Bend, Grayson, Harris, Hopkins, Kaufman, Lamar, Van Zandt, Victoria, and Waller counties, coordinate for all projects that would include new ROW or TxDOT easements. For projects entirely within the existing ROW in those counties and for all projects in other counties in species range: 1) Minimize impacts to wetland habitats including isolated ephemeral pools 2) Water Quality BMPs 3) Amphibian BMPs
White-lipped Frog	T	<i>Leptodactylus fragilis</i>	1) Water Quality BMPs 2) Amphibian BMPs
<b>Birds</b>			
American Peregrine Falcon	T	<i>Falco peregrinus anatum</i>	Bird BMPs
Arctic Peregrine Falcon		<i>Falco peregrinus tundrius</i>	Bird BMPs

Common Name	Status	Scientific Name	BMPs
Audubon's Oriole		<i>Icterus graduacauda audubonii</i>	Bird BMPs
Bachman's Sparrow	T	<i>Aimophila aestivalis</i>	Bird BMPs
Baird's Sparrow		<i>Ammodramus bairdii</i>	Bird BMPs
Bald Eagle	T	<i>Haliaeetus leucocephalus</i>	Bird BMPs and Bald and Golden Eagle Protection Act compliance
Black Rail		<i>Laterallus jamaicensis</i>	Bird BMPs
Brown Jay		<i>Cyanocorax morio</i>	Bird BMPs
Brown Pelican		<i>Pelecanus occidentalis</i>	Bird BMPs
Brownsville Common Yellowthroat		<i>Geothlypis trichas inperata</i>	Bird BMPs
Cactus Ferruginous Pygmy-owl	T	<i>Glaucidium brasilianum cactorum</i>	Bird BMPs
Cerulean Warbler		<i>Setophaga cerulea</i>	Bird BMPs
Common Black-Hawk	T	<i>Buteogallus anthracinus</i>	Bird BMPs
Ferruginous Hawk		<i>Buteo regalis</i>	Bird BMPs
Gray Hawk	T	<i>Buteo nitidus</i>	Bird BMPs
Henslow's Sparrow		<i>Ammodramus henslowi</i>	Bird BMPs
Hook-billed Kite		<i>Chondrohierax uncinatus</i>	Bird BMPs
Mexican Hooded Oriole		<i>Icterus cucullatus cucullatus</i>	Bird BMPs
Montezuma Quail		<i>Cyrtonyx montezumae</i>	Bird BMPs
Mountain Plover		<i>Charadrius montanus</i>	Bird BMPs
Northern Beardless-tyrannulet	T	<i>Camptostoma imberbe</i>	Bird BMPs
Peregrine Falcon	T	<i>Falco peregrinus</i>	Bird BMPs
Prairie Falcon		<i>Falco mexicanus</i>	Bird BMPs
Reddish Egret	T	<i>Egretta rufescens</i>	Bird BMPs unless project is within 300 meters of a known colonial water bird rookery then coordinate with TPWD
Rose-throated Becard	T	<i>Pachyramphus aglaiae</i>	Bird BMPs
Sennett's Hooded Oriole		<i>Icterus cucullatus sennetti</i>	Bird BMPs
Snowy Plover		<i>Charadrius alexandrinus</i>	Bird BMPs
Sooty Tern	T	<i>Sterna fuscata</i>	Bird BMPs
Swallow-tailed Kite	T	<i>Elanoides forficatus</i>	Bird BMPs
Texas Botteri's Sparrow	T	<i>Aimophila botterii texana</i>	Bird BMPs

Common Name	Status	Scientific Name	BMPs
Tropical Parula	T	<i>Parula pitiayumi</i>	Bird BMPs
Western Burrowing Owl		<i>Athene cunicularia hypugaea</i>	Bird BMPs
White-faced Ibis	T	<i>Plegadis chihi</i>	Bird BMPs unless project is within 300 meters of a known colonial water bird rookery then coordinate with TPWD
White-tailed Hawk	T	<i>Buteo albicaudatus</i>	Bird BMPs
Wood Stork	T	<i>Mycteria americana</i>	Bird BMPs
Zone-tailed Hawk	T	<i>Buteo albonotatus</i>	Bird BMPs
<b>Fishes</b>			
American Eel		<i>Anguilla rostrata</i>	Fish BMPs
Arkansas River Speckled (Peppered) Chub		<i>Macrhybopsis tetranema</i>	Fish BMPs
Blackside Darter	T	<i>Percina maculata</i>	Fish BMPs
Blotched Gambusia (considered extinct in the wild)	T	<i>Gambusia senilis</i>	Fish BMPs
Blue Sucker	T	<i>Cycleptus elongatus</i>	Fish BMPs
Bluehead Shiner	T	<i>Pteronotropis hubbsi</i>	Fish BMPs
Bluntnose Shiner (species extinct)	T	<i>Notropis simus</i>	Fish BMPs
Chihuahua Catfish		<i>Ictalurus sp. 1</i>	Fish BMPs
Chihuahua Shiner	T	<i>Notropis chihuahua</i>	Fish BMPs
Conchos Pupfish	T	<i>Cyprinodon eximius</i>	Fish BMPs
Creek Chubsucker	T	<i>Erimyzon oblongus</i>	Fish BMPs
Edwards Plateau Shiner		<i>Cyprinella lepida</i>	Fish BMPs
Goldeye		<i>Hiodon alosoides</i>	Fish BMPs
Guadalupe Bass		<i>Micropterus treculi</i>	Fish BMPs
Headwater Catfish		<i>Ictalurus lupus</i>	Fish BMPs
Ironcolor Shiner		<i>Notropis chalybaeus</i>	Fish BMPs
Manantial Roundnose Minnow		<i>Dionda diaboli</i>	Fish BMPs
Mexican Goby	T	<i>Ctenogobius claytonii</i>	Fish BMPs
Mexican Redhorse		<i>Moxostoma austrinum</i>	Fish BMPs

Common Name	Status	Scientific Name	BMPs
Mexican Stoneroller	T	<i>Campostoma ornatum</i>	Fish BMPs
Nueces River Shiner		<i>Cyprinella</i> sp. 2	Fish BMPs
Nueces Roundnose Shiner		<i>Dionda serena</i>	Fish BMPs
Opossum Pipefish	T	<i>Microphis brachyurus</i>	Fish BMPs
Orangebelly Darter		<i>Etheostoma rediosum</i>	Fish BMPs
Paddlefish	T	<i>Polyodon spathula</i>	Fish BMPs
Pecos Pupfish	T	<i>Cyprinodon pecosensis</i>	Fish BMPs
Proserpine Shiner	T	<i>Cyprinella proserpina</i>	Fish BMPs
Rio Grande Chub	T	<i>Gila pandora</i>	Fish BMPs
Rio Grande Darter	T	<i>Etheostoma grahami</i>	Fish BMPs
Rio Grande Shiner		<i>Notropis jemezianus</i>	Fish BMPs
River Goby	T	<i>Awaous banana</i>	Fish BMPs
San Felipe Gambusia	T	<i>Gambusia clarkhubbsi</i>	Fish BMPs
Shovelnose Sturgeon	T	<i>Scaphirhynchus platyrhynchus</i>	Fish BMPs
Taillight Shiner		<i>Notropis maculatus</i>	Fish BMPs
Texas Pipefish		<i>Syngnathus affinis</i>	Fish BMPs
Western Sand Darter		<i>Ammocrypta clara</i>	Fish BMPs
Mammals			
Big Free-tailed Bat		<i>Nyctinomops macrotis</i>	Bat BMPs
Black-tailed Prairie Dog		<i>Cynomys ludovicianus</i>	Fossorial Mammal BMPs
Cave Myotis Bat		<i>Myotis velifer</i>	Bat BMPs
Coues' Rice Rat	T	<i>Oryzomys couesi</i>	1) Minimize impacts to wetland, resaca, oxbow lake, and marsh habitats 2) Water Quality BMPs 3) Contractors will be advised of potential occurrence in the project area, and to avoid harming the species if encountered.
Davis Mountains cottontail		<i>Sylvilagus floridanus robustus</i>	Contractors will be advised of potential occurrence in the project area, and to avoid harming the species if encountered.
Greater Western Mastiff Bat		<i>Eumops perotis californicus</i>	Bat BMPs

Common Name	Status	Scientific Name	BMPs
Guadalupe Southern Pocket Gopher		<i>Thomomys bottae guadalupensis</i>	Fossorial Mammal BMPs
Limpia Creek pocket gopher		<i>Thomomys bottae texensis</i>	Fossorial Mammal BMPs
Limpia Southern Pocket Gopher		<i>Thomomys bottae limpiae</i>	Fossorial Mammal BMPs
Llano Pocket Gopher		<i>Geomys texensis texensis</i>	Fossorial Mammal BMPs
Long-legged Myotis Bat		<i>Myotis volans</i>	Bat BMPs
Mexican Long-tongued Bat		<i>Choeronycteris mexicana</i>	1) Avoid unnecessary impacts to cacti and agave species 2) Bat BMPs
Pale Townsend's Big-eared Bat		<i>Corynorhinus townsendii pallescens</i>	Bat BMPs
Pecos River Muskrat		<i>Ondatra zibethicus ripensis</i>	1) Minimize impacts to water crossings/drainages, marshes, drainage ditches, and irrigation canals 2) Contractors will be advised of potential occurrence in the project area, and to avoid harming the species if encountered 3) Avoid unnecessary impacts to dens and lodges
Plains Spotted Skunk		<i>Spilogale putorius interrupta</i>	Contractors will be advised of potential occurrence in the project area, and to avoid harming the species if encountered, and to avoid unnecessary impacts to dens.
Pocketed Free-tailed Bat		<i>Nyctinomops femorosaccus</i>	Bat BMPs
Rafinesque's Big-eared Bat	T	<i>Corynorhinus rafinesquii</i>	Bat BMPs
Southeastern Myotis Bat		<i>Myotis austroriparius</i>	Bat BMPs
Southern Yellow Bat	T	<i>Lasiurus ega</i>	Bat BMPs
Spotted Bat	T	<i>Euderma maculatum</i>	Bat BMPs
Swift Fox		<i>Vulpes velox</i>	Contractors will be advised of potential occurrence in the project area, and to avoid harming the species if encountered, and to avoid unnecessary impacts to dens.
Western Red Bat		<i>Lasiurus blossevilli</i>	Bat BMPs
Western Small-footed Myotis Bat		<i>Myotis ciliolabrum</i>	Bat BMPs

Common Name	Status	Scientific Name	BMPs
Western Yellow Bat		<i>Lasiurus xanthinus</i>	Bat BMPs
White-nosed Coati	T	<i>Nasua narica</i>	Contractors will be advised of potential occurrence in the project area, and to avoid harming the species if encountered.
Yellow-nosed Cotton Rat		<i>Sigmodon ochrognathus</i>	Contractors will be advised of potential occurrence in the project area, and to avoid harming the species if encountered.
Mollusks			
False Spike	T	<i>Quadrula mitchelli</i>	Mussel BMPs
Golden Orb	T	<i>Quadrula aurea</i>	Mussel BMPs
Louisiana Pigtoe	T	<i>Pleurobema riddellii</i>	Mussel BMPs
Mexican Fawnsfoot	T	<i>Truncilla cognata</i>	Mussel BMPs
Salina Mucket	T	<i>Potamilus metnecktayi</i>	Mussel BMPs
Sandbank Pocketbook	T	<i>Lampsilis satura</i>	Mussel BMPs
Smooth Pimpleback	T	<i>Quadrula houstonensis</i>	Mussel BMPs
Southern Hickorynut	T	<i>Obovaria jacksoniana</i>	Mussel BMPs
Texas Fatmucket	T	<i>Lampsilis bracteata</i>	Mussel BMPs
Texas Fawnsfoot	T	<i>Truncilla macrodon</i>	Mussel BMPs
Texas Heelsplitter	T	<i>Potamilus amphichaenus</i>	Mussel BMPs
Texas Hornshell	T	<i>Popenaias popeii</i>	Mussel BMPs
Texas Pigtoe	T	<i>Fusconaia askewi</i>	Mussel BMPs
Texas Pimpleback	T	<i>Quadrula petrina</i>	Mussel BMPs
Triangle Pigtoe	T	<i>Fusconaia lananensis</i>	Mussel BMPs
Reptiles			
Alligator Snapping Turtle	T	<i>Macrochelys temminckii</i>	1) Minimize impacts to wetland and riverine habitats 2) Aquatic Reptile BMPs
Big Bend Slider		<i>Trachemys gaigeae</i>	1) Water Quality BMPs 2) Aquatic Reptile BMPs

Common Name	Status	Scientific Name	BMPs
Brazos Water Snake	T	<i>Nerodia harteri</i>	<ul style="list-style-type: none"> <li>1) Minimize impacts to suitable riverine habitats, particularly rock substrate within waterway and along the shoreline, along the upper Brazos River drainage</li> <li>2) Avoid temporarily or permanently impounding water flow within suitable habitat</li> <li>3) Aquatic Reptile BMPs</li> </ul>
Cagle's Map Turtle	T	<i>Graptemys caglei</i>	<ul style="list-style-type: none"> <li>1) Minimize impacts to riverine habitats in the Guadalupe and San Antonio River drainages</li> <li>2) Minimize impacts to gently sloping sand banks within 30 feet of shoreline</li> <li>3) Aquatic Reptile BMPs</li> </ul>
Chihuahuan Desert Lyre Snake	T	<i>Trimorphodon vilkinsonii</i>	Terrestrial Reptile BMPs
Concho Water Snake		<i>Nerodia paucimaculata</i>	<ul style="list-style-type: none"> <li>1) Aquatic Reptile BMPs</li> <li>2) If project area is within 1,000 feet of a biological monitoring site referenced in the 2011 Concho Water Snake Post-Delisting Monitoring Plan (Pages 11-13), coordination with TPWD required.</li> </ul>
Keeled Earless Lizard		<i>Holbrookia propinqua</i>	Terrestrial Reptile BMPs
Northern Cat-eyed Snake	T	<i>Leptodeira septentrionalis septentrionalis</i>	Terrestrial Reptile BMPs
Northern Scarlet Snake	T	<i>Cemophora coccinea copei</i>	Terrestrial Reptile BMPs
Reticulate Collared Lizard	T	<i>Crotaphytus reticulatus</i>	Terrestrial Reptile BMPs
Spot-tailed Earless Lizard		<i>Holbrookia lacerata</i>	Terrestrial Reptile BMPs
Texas Diamondback Terrapin		<i>Malaclemys terrapin littoralis</i>	<ul style="list-style-type: none"> <li>1) Avoid disturbing basking and nesting sites</li> <li>2) Aquatic Reptile BMPs</li> </ul>
Texas Garter Snake		<i>Thamnophis sirtalis annectens</i>	Terrestrial Reptile BMPs

Common Name	Status	Scientific Name	BMPs
Texas Horned Lizard	T	<i>Phrynosoma cornutum</i>	1) Avoid harvester ant mounds in the selection of Project Specific Locations (PSLs) where feasible. 2) Terrestrial Reptile BMPs
Texas Indigo Snake	T	<i>Drymarchon melanurus erebennus</i>	Terrestrial Reptile BMPs
Texas Scarlet Snake	T	<i>Cemophora coccinea lineri</i>	Terrestrial Reptile BMPs
Texas Tortoise	T	<i>Gopherus berlandieri</i>	1) Contractors will be advised of potential occurrence in the project area, and to avoid harming the species if encountered. 2) Utility trenches should be covered overnight or visually inspected before filling to avoid burial of the species 3) Terrestrial Reptile BMPs
Timber (Canebrake) Rattlesnake	T	<i>Crotalus horridus</i>	Terrestrial Reptile BMPs
Trans-Pecos Black-headed Snake	T	<i>Tantilla cucullata</i>	Terrestrial Reptile BMPs

### Taxa and Water Quality BMP Descriptions

#### Fossorial Mammal BMPs

- If black-tailed prairie dog (BTPD) burrows or pocket gopher mounds are to be excavated/directly impacted coordinate with TPWD WHAB.
- When a construction zone is adjacent to active BTPD burrows or pocket gopher mounds, erect barriers to discourage individuals moving through or into the construction area.
- When seeding or revegetation is planned in an area adjacent to BTPD burrows or pocket gopher mounds, a vegetative barrier should be considered in the planting to discourage dispersal into the ROW.

#### Amphibian and Aquatic Reptile BMPs

Unless absence of the species can be demonstrated, assume presence in suitable habitat and implement the following BMPs. Absence can only be demonstrated using TPWD-approved survey efforts (contact TPWD for minimum survey protocols for species and project site conditions).

1. For projects within one mile of a known occupied location or observation of the species recorded from 1980 until the current year and suitable habitat is present, coordinate with TPWD.
2. For new location roadway projects, coordinate with TPWD.

3. For projects within existing right-of-way (ROW) when work is in water or will permanently impact a water feature and potential habitat exists for the target species complete the following:
  - a) Contractors will be advised of potential occurrence in the project area, and to avoid harming the species if encountered.
  - b) Minimize impacts to wetland, temporary and permanent open water features, including depressions, and riverine habitats.
  - c) Maintain hydrologic regime and connections between wetlands and other aquatic features.
  - d) Use barrier fencing to direct animal movements away from construction activities and areas of potential wildlife-vehicle collisions in construction areas directly adjacent, or that may directly impact, potential habitat for the target species.
  - e) Apply hydromulching and/or hydroseeding in areas for soil stabilization and/or revegetation of disturbed areas where feasible. If hydromulching and/or hydroseeding are not feasible due to site conditions, using erosion control blankets or mats that contain no netting, or only contain loosely woven natural fiber netting is preferred. Plastic netting should be avoided to the extent practicable.
  - f) Project specific locations (PSLs) proposed within state-owned ROW should be located in uplands away from aquatic features.
  - g) When work is directly adjacent to the water, minimize impacts to shoreline basking sites (e.g., downed trees, sand bars, exposed bedrock) and overwinter sites (e.g., brush and debris piles, crayfish burrows) where feasible.
  - h) Avoid or minimize disturbing or removing downed trees, rotting stumps, and leaf litter, which may be refugia for terrestrial amphibians, where feasible.
  - i) If gutters and curbs are part of the roadway design, where feasible install gutters that do not include the side box inlet and include sloped (i.e. mountable) curbs to allow small animals to leave roadway. If this modification to the entire curb system is not possible, install sections of sloped curb on either side of the storm water drain for several feet to allow small animals to leave the roadway. Priority areas for these design recommendations are those with nearby wetlands or other aquatic features.
4. For projects that require acquisition of additional ROW and work within that new ROW is in water or will permanently impact a water feature, implement a – i above plus j – l below, where applicable:
  - j) For sections of roadway adjacent to wetlands or other aquatic features, install wildlife barriers that prevent climbing. Barriers should terminate at culvert openings in order to funnel animals under the road. The barriers should be of the same length as the adjacent feature or 80 feet long in each direction, or whichever is the lesser of the two.
  - k) For culvert extensions and culvert replacement/installation, incorporate measures to funnel animals toward culverts such as concrete wingwalls and barrier walls with overhangs.
  - l) When riprap or other bank stabilization devices are necessary, their placement should not impede the movement of terrestrial or aquatic wildlife through the water feature. Where feasible, biotechnical streambank stabilization methods using live native vegetation or a combination of vegetative and structural materials should be used.

#### Terrestrial Reptile BMPs

- Apply hydromulching and/or hydroseeding in areas for soil stabilization and/or revegetation of disturbed areas where feasible. If hydromulching and/or hydroseeding are not feasible due to site conditions, utilize erosion control blankets or mats that contain no netting or contain loosely woven, natural fiber netting is preferred. Plastic netting should be avoided to the extent practicable.
- For open trenches and excavated pits, install escape ramps at an angle of less than 45 degrees (1:1) in areas left uncovered. Visually inspect excavation areas for trapped wildlife prior to backfilling.

- Inform contractors that if reptiles are found on project site allow species to safely leave the project area.
- Avoid or minimize disturbing or removing downed trees, rotting stumps, and leaf litter where feasible.
- Contractors will be advised of potential occurrence in the project area, and to avoid harming the species if encountered.

#### Bird BMPs

In addition to complying with the Migratory Bird Treaty Act (MBTA) perform the following BMPs:

- Prior to construction, perform daytime surveys for nests including under bridges and in culverts to determine if they are active before removal. Nests that are active should not be disturbed.
- Do not disturb, destroy, or remove active nests, including ground nesting birds, during the nesting season;
- Avoid the removal of unoccupied, inactive nests, as practicable;
- Prevent the establishment of active nests during the nesting season on TxDOT owned and operated facilities and structures proposed for replacement or repair;
- Do not collect, capture, relocate, or transport birds, eggs, young, or active nests without a permit.

#### Freshwater Mussel BMPs

- When work is in the water; survey project footprints for state listed species where appropriate habitat exists.
- When work is in the water and mussels are discovered during surveys; relocate state listed and SGCN mussels under TPWD authorization and implement Water Quality BMPs.
- When work is adjacent to the water; Water Quality BMPs implemented as part of the SWPPP for a construction general permit or any conditions of the 401 water quality certification for the project will be implemented. (Note, SWPPP and 401 BMPS are not listed in this PA). No TPWD Coordination required.

#### Fish BMPs

- For projects within the range of a SGCN or State-Listed fish and work is adjacent to water: Water Quality BMPs. No TPWD Coordination required.
- For projects within the range of a SGCN or State-Listed fish, and work is in the water: TPWD coordination required.

#### Water Quality BMPs

In addition to BMPs required for a TCEQ Storm Water Pollution Prevention Plan and/or 401 water quality permit:

- Minimize the use of equipment in streams and riparian areas during construction. When possible, equipment access should be from banks, bridge decks, or barges.
- When temporary stream crossings are unavoidable, remove stream crossings once they are no longer needed and stabilize banks and soils around the crossing.

#### Bat BMPs

To determine the appropriate best management practice to avoid or minimize impacts to bats, review the habitat description for the species of interest on the TPWD Rare, Threatened, and Endangered Species of Texas by County List or other trusted resources. All bat surveys and other activities that include direct contact with bats shall comply with TPWD-recommended white-nose syndrome protocols located on the TPWD Wildlife Habitat Assessment Program website under "Project Design and Construction".

The following survey and exclusion protocols should be followed prior to commencement of construction activities. For the purposes of this document, structures are defined as bridges, culverts (concrete or metal), wells, and buildings.

- For activities that have the potential to impact structures, cliffs or caves, or trees; a qualified biologist will perform a habitat assessment and occupancy survey of the feature(s) with roost potential as early in the planning process as possible or within one year before project letting.
- For roosts where occupancy is strongly suspected but unconfirmed during the initial survey, revisit feature(s) at most four weeks prior to scheduled disturbance to confirm absence of bats.
- If bats are present or recent signs of occupation (i.e., piles of guano, distinct musky odor, or staining and rub marks at potential entry points) are observed, take appropriate measures to ensure that bats are not harmed, such as implementing non-lethal exclusion activities or timing or phasing of construction.
- Exclusion devices can be installed by a qualified individual between September 1 and March 31. Exclusion devices should be used for a minimum of seven days when minimum nighttime temperatures are above 50°F AND minimum daytime temperatures are above 70°F. Prior to exclusion, ensure that alternate roosting habitat is available in the immediate area. If no suitable roosting habitat is available, installation of alternate roosts is recommended to replace the loss of an occupied roost. If alternate roost sites are not provided, bats may seek shelter in other inappropriate sites, such as buildings, in the surrounding area. See **Section 2: Standard Recommendations** for recommended acceptable methods for excluding bats from structures.
- If feature(s) used by bats are removed as a result of construction, replacement structures should incorporate bat-friendly design or artificial roosts should be constructed to replace these features, as practicable.
- Conversion of property containing cave or cliff features to transportation purposes should be avoided where feasible.
- Avoid unnecessary removal of dead fronds on native and ornamental palm trees in south Texas (Cameron, Hidalgo, Willacy, Kenedy, Brooks, Kleberg, Nueces, and San Patricio counties) from April 1 through October 31. If removal of dead fronds is necessary at other times of the year, limit frond removal to extended warm periods (nighttime temperatures  $\geq 55^{\circ}\text{F}$  for at least two consecutive nights), so bats can move away from the disturbance and find new roosts.
- Large hollow trees, snags (dead standing trees), and trees with shaggy bark should be surveyed for colonies and, if found, should not be disturbed until the bats are no longer occupying these features. Post-occupancy surveys should be conducted by a qualified biologist prior to tree removal from the landscape.
- Retain mature, large diameter hardwood forest species and native/ornamental palm trees where feasible.
- In all instances, avoid harm or death to bats. Bats should only be handled as a last resort and after communication with TPWD.

## **BMP PA Section 2: Standard Recommendations**

The purpose of this section is to provide BMPs that should be implemented when feasible during design, construction, and maintenance activities. By designing a project with wildlife in mind and incorporating wildlife friendly design, direct, indirect and cumulative impacts to wildlife can be reduced over the life of the project. Recommendations in Section 2 are intended to minimize impacts to all wildlife, including SGCN and state-listed species. Implementation of these recommendations is encouraged to promote conservation of state fish and wildlife resources, but is not required under the MOU.

**Due diligence should be used to avoid killing or harming any wildlife species in the implementation of TxDOT projects.**

### **Vegetation BMPs**

- Minimize the amount of vegetation cleared. Removal of native vegetation, particularly mature native trees and shrubs should be avoided to the greatest extent practicable. Wherever practicable, impacted vegetation should be replaced with in-kind on-site replacement/restoration of native vegetation.
- To minimize adverse effects, activities should be planned to preserve mature trees, particularly acorn, nut or berry producing varieties. These types of vegetation have high value to wildlife as food and cover.
- It is strongly recommended that trees greater than 12 inches in dbh that are removed be replaced. TPWD's experience indicates that for ecologically effective replacement, a ratio of three trees for every one (3:1) lost should be provided to the extent practicable either on-site or off-site. Trees less than 12 inches dbh should be replaced at a 1:1 ratio.
- Replacement trees should be of equal or better wildlife quality than those removed and be regionally adapted native species.
- When trees are planted, a maintenance plan that ensures at least an 85 percent survival rate after three years should be developed for the replacement trees.
- The use of any non-native vegetation in landscaping and revegetation is discouraged. Locally adapted native species should be used.
- The use of seed mix that contains seeds from only locally adapted native species is recommended.
- Avoid vegetation clearing activities during the general bird nesting season, March through August, to minimize adverse impacts to birds.

### **Additional Water Quality BMPs**

- Wet-Bottomed detention ponds are recommended to benefit wildlife and downstream water quality. Consider potential wildlife-vehicle interactions when siting detention ponds.
- Rubbish found near bridges on TxDOT ROW should be removed and disposed of properly to minimize the risk of pollution. Rubbish does not include brush piles or snags.

### **Aquatic Mitigation**

- In-kind compensatory mitigation should be considered for all unavoidable impacts to aquatic resources including, but not limited to streams, wetlands, oysters, seagrass and mudflats, regardless of their jurisdictional status.
- Compensatory mitigation plans should be developed in consultation with TPWD Transportation Conservation Coordinator.

### Invasive Species BMPs

- For all work in waters listed in the distribution of Zebra mussels on <http://texasinvasives.org/> as well as those waters specified in 31 TAC §57.972 and any TPWD emergency orders regarding prevention of the spread of Zebra mussels all machinery, equipment, or vehicles coming in contact with such waters should follow clean/drain/dry protocols to prevent the potential spread of invasive Zebra mussels.
- Care should be taken to avoid the spread of aquatic invasive plants (such as Giant Salvinia, Hydrilla, Hyacinth, Watermilfoil, Water Lettuce, and Alligatorweed) from infested water bodies into areas not currently infested. All machinery/equipment/vehicles coming in contact with waters containing aquatic invasive plant species should follow clean/drain/dry protocols to prevent the potential spread of invasive plants
- Colonization by invasive plants should be actively prevented on disturbed sites in terrestrial habitats. Vegetation management should include removing invasive species as soon as practical while allowing the existing native plants to revegetate the disturbed areas. If using hay bales for sediment control, use locally grown weed-free hay to prevent the spread of invasive species. Leave the hay bales in place and allow them to break down, as this acts as mulch assisting in revegetation.

### Additional Reptile BMPs

- Due to increased activity (mating) of reptiles during the spring, construction activities like clearing or grading should attempt to be scheduled outside of the spring (April-May) season. Also, timing ground disturbing activities before October when reptiles become less active and may be using burrows in the project area is also encouraged.
- When designing roads with curbs, consider using Type I or Type III curbs to provide a gentle slope to enable turtles and small animals to get out of roadways.
- If Texas Tortoises are present in a project area they should be removed from the area. After removal of the tortoises, the area that will be disturbed during active construction and project specific locations should be fenced off to exclude tortoises and other reptiles. The exclusion fence should be constructed and maintained as follows:
  - a. The exclusion fence should be constructed with metal flashing or drift fence material.
  - b. Rolled erosion control mesh material should not be used.
  - c. The exclusion fence should be buried at least 6 inches deep and be at least 24 inches high.
  - d. The exclusion fence should be maintained for the life of the project and only removed after the construction is completed and the disturbed site has been revegetated.

### Rookeries

In general, nesting dates for herons and egrets range from early February to late August in Texas, depending on the species. Great Blue Herons (GBHE) are usually the first to nest. When GBHE get disrupted from the nest and abandon nesting, then the other species of herons and egrets may not attempt to nest at the colony that year. Breeding dates for rookery species are approximately as follows:

<b>Species</b>	<b>Dates</b>
Cattle Egret	Early April to late October
Little Blue Heron	Late March to late July
Snowy Egret	Late March to early August

Great Egret	Early March to early August
Black-crowned Night Heron	Early February to late July
Great Blue Heron	February to late August

- Vegetation clearing in a primary buffer area of 300 meters (984 feet) from a heronry periphery should be avoided. Utilizing areas that have already been cleared within this buffer area may be acceptable depending on site-specific characteristics. Additionally, human foot-traffic or machinery use should not occur within this buffer area during the nesting season.
- Clearing activities or construction using heavy machinery in a secondary buffer area of 1000 meters (3281 feet) from the heronry periphery should be avoided during the breeding season (courting and nesting).

#### Additional Bat BMPs

- Bat surveys of structures should include visual inspections of structural fissures (cracked or spalled concrete, damaged or split beams, split or damaged timber railings), crevices (expansion joints, space between parallel beams, spaces above supports piers), and alternative structures (drainage pipes, bolt cavities, open sections between support beams, swallow nests) for the presence of bats.
- Before excluding bats from any occupied structure, bat species, weather, temperature, season, and geographic location must be incorporated into any exclusion plans to avoid unnecessary harm or death to bats. Winter exclusion must entail a survey to confirm either, 1) bats are absent or 2) present but active (i.e. continuously active – not intermittently active due to arousals from hibernation).
- Avoid using materials that degrade quickly, like paper, steel wool or rags, to close holes.
- Avoid using products or making structural modifications that may block natural ventilation, like hanging plastic sheeting over an active roost entrance, thereby altering roost microclimate.
- Avoid using chemical and ultrasonic repellents
- Avoid use of silicone, polyurethane or similar non-water-based caulk products.
- Avoid use of expandable foam products at occupied sites
- Avoid the use of flexible netting attached with duct tape.
- In order to avoid entombing bats, exclusion activities should be only implemented by a qualified individual. A qualified individual or company should possess at least the following minimum qualifications:
  - Experience in bat exclusion (the individual, not just the company).
  - Proof of rabies pre-exposure vaccinations.
  - Demonstrated knowledge of the relevant bat species, including maternity season date range and habitat requirements.
  - Demonstrated knowledge of rabies and histoplasmosis in relation to bat roosts.
- Contact TPWD for additional resources and information to assist in executing successful bat exclusions that will avoid unnecessary harm or death in bats.

The following BMPs are intended to reduce impacts to fish and wildlife that encounter roadways.

#### Stream Crossings

- Use spanning bridges rather than culverts when feasible.
- If using a culvert, staggered culverts that concentrate low flows but provide conveyance of higher flows through staggered culverts placed at higher elevations is recommended.

- Bottomless culverts are recommended to allow for fish and other aquatic wildlife passage in the low flow channel. If bottomless culverts are not feasible, making a low flow channel for fish passage is recommended.
- Avoid placing riprap across stream channels and instead use alternative stabilization such as biotechnical stream bank stabilization methods including live native vegetation or a combination of vegetative and structural materials. When riprap or other bank stabilization devices are necessary, their placement should not impede the movement of aquatic and terrestrial wildlife underneath the bridge. In some instances, rip rap may be buried, back-filled with topsoil and planted with native vegetation.
- Incorporate bat-friendly design into bridges and culverts.
- Design bridges for adequate vertical and horizontal clearances under the roadway to allow for terrestrial wildlife to safely pass under the road.
- A span wide enough to cross the stream and allow for dry ground and a natural surface path under the roadway is encouraged. For culverts, incorporation of an artificial ledge inside the culvert on one or both sides for use by terrestrial wildlife is recommended.
- Riparian buffer zones should remain undisturbed where possible.

Wildlife Crossings

- Design roadways on new location to incorporate wildlife crossings, particularly in areas that bisect wildlife travel corridors or seasonal movement routes.
- Consider using cable median barrier instead of concrete traffic barrier when feasible to increase permeability for animals encountering barriers.

Revisions

As stated in §2.213(c), programmatic agreements may be changed at any time by the written concurrence of the Executive Directors of TxDOT and TPWD. This PA will allow for adaptive refinement as the two agencies progress in the implementation of the 2013 MOU. Therefore, this PA must be amended or re-approved by the Executive Director of each agency no later than one year after the effective date.

SIGNATURES

  
 Executive Director, Texas Department of Transportation
 
  
 Date

  
 Executive Director, Texas Parks and Wildlife Department
 
  
 Date