

**ENVIRONMENTAL ASSESSMENT  
FOR  
PROGRAMMATIC SAFE HARBOR AGREEMENT**

**FOR THE**

**HOUSTON TOAD  
IN TEXAS**

**Between  
Texas Parks and Wildlife Department  
and  
U.S. Fish and Wildlife Service**

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## **1.0 PURPOSE AND NEED FOR ACTION**

### **1.1 INTRODUCTION**

On March 2, 2016, Texas Parks and Wildlife Department (TPWD) submitted an application for an Enhancement of Survival Permit and its associated Safe Harbor Agreement under section 10(a)(1)(A) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.). This programmatic Houston Toad Safe Harbor Agreement (programmatic Agreement) seeks to provide a voluntary conservation program for landowners to implement recovery actions for the federally endangered Houston toad (*Bufo houstonensis*) on non-Federal lands in Texas. The proposed programmatic Agreement addresses various conservation activities, including enhancing, restoring, or creating habitat and supplementing or reestablishing populations within the historical range of the Houston toad in Texas. The purpose of this environmental assessment is to assess the short-term and long-term impacts on the quality of the location within the nine counties where the programmatic Agreement will be implemented. The draft programmatic Agreement is available for review on the U.S. Fish and Wildlife Service's (Service) website: [http://www.fws.gov/southwest/es/AustinTexas/..](http://www.fws.gov/southwest/es/AustinTexas/)

### **1.2 PURPOSE**

The Federal action under consideration is the issuance of a section 10(a)(1)(A) Enhancement of Survival permit (permit) under the Safe Harbor Agreement program. The purpose of issuing a permit and approval of the proposed programmatic Agreement is to facilitate recovery activities for the benefit of the Houston toad on non-Federal lands within the historic range of this species. Landowners enrolled under this programmatic Agreement can implement conservation activities to benefit the endangered Houston toad and will in turn receive assurances consistent with the Safe Harbor Agreement Policy, as amended (64 FR 3271 and 69 FR 24084) and related implementing regulations (50 CFR Parts 13 and 17). Many private landowners' concern centers on the applicability of the Act's section 9 "take" prohibitions if listed species occupy their property as a result of their conservation activities. Section 9 of the Act prohibits the "take" of listed fish and wildlife species. Therefore, the purpose to be served with the potential issuance of this permit is to allow private landowners to undertake voluntary conservation measures/activities for the Houston toad on their land without the risk of further restrictions pursuant to section 9 of the Act.

### **1.3 NEED FOR THE PROPOSED ACTION**

Because 98 percent of the land in Texas is privately owned, non-Federal landowners play a critical role in recovering species that are federally listed as threatened or endangered. Safe Harbor Agreements provide an incentive to landowners whereby they engage in conservation activities that benefit threatened and endangered species with the assurances that they will not incur any additional restrictions on their property for doing so. A programmatic Safe Harbor Agreement would provide a much more efficient mechanism for enrolling non-Federal landowners in the Safe Harbor program by allowing several landowners to enroll each year. The Service expects the programmatic Agreement to generate interest and participation in Houston toad conservation throughout the species' range and in a manner that could not be achieved through other means.

Landowners enrolling in the programmatic Agreement will work collaboratively with TPWD to implement conservation activities to restore, create, or improve the quality of Houston toad habitat on their properties. This programmatic approach is an efficient mechanism encouraging multiple non-Federal landowners to enroll in the Safe Harbor program and participate in species conservation and recovery. Given the rapid decline of Houston toad populations during recent years, it is important to engage many private landowners throughout its range in activities that will create, enhance, or restore habitat in the most efficient manner possible.

## **2.0 ALTERNATIVES**

This section presents details of the preferred alternative and other alternatives that have been considered. The National Environmental Policy Act (NEPA) requires that Federal agencies consider a range of alternatives that could reduce the environmental impacts of the particular projects under consideration. The analysis of the environmental consequences of these alternatives is discussed in section 4 of this document.

### **2.1 ALTERNATIVE 1: NO ACTION**

In the No Action Alternative, the Service would not issue a permit under the programmatic Agreement. Therefore, a coordinated effort to recover Houston toads on non-Federal properties using a single permit for the programmatic Agreement would not occur. Houston toad recovery efforts could occur through the actions of individual landowners without the assurances provided by a Safe Harbor Agreement and its associated permit. However, it is likely that many landowners would not feel comfortable participating in conservation activities on their properties to enhance habitat for a federally endangered species without coverage for their activities under the Act or assurances that they could eventually take their properties back to their baseline conditions. Individual landowners could also apply for a permit by developing their own Safe Harbor Agreements. However, it often takes several years to develop one safe harbor agreement; therefore, this would be a much less effective means at engaging landowners who may lose interest in participating in the Safe Harbor program over time.

Under the No Action Alternative, various land management activities, such as agricultural, forestry, and wildlife management practices would continue to occur throughout the Houston toad's range. However, landowners might not undertake beneficial actions for the Houston toad on their properties because they would be fearful of attracting endangered species and increasing their legal liability under the Act. Furthermore, there would be no incentive for the Service or TPWD to monitor the effects of these activities on the species or its habitat or to report any activities that may impact the Houston toad. Recovery efforts for the species would primarily continue to be carried out as they have in the past and occur within the areas already being managed for the Houston toad within Bastrop County, Texas, with minor participation of landowners in other counties.

## 2.2 ALTERNATIVE 2: ISSUANCE OF A SECTION 10 (a)(1)(A) ENHANCEMENT OF SURVIVAL PERMIT AND APPROVAL OF A RANGEWIDE PROGRAMMATIC AGREEMENT (PROPOSED ACTION)

The proposed action is to issue a permit under the programmatic Agreement, which would allow for increased Houston toad populations and habitat that is enhanced, restored, or created through participation in the programmatic Agreement. This alternative is expected to significantly contribute to the recovery of the Houston toad throughout its range.

The Service would issue a permit to TPWD. Under the permit, incidental take coverage would be provided to non-Federal landowners who voluntarily agree to enhance, restore, or create habitat, and/or allow Houston toad populations to be supplemented or established on their enrolled property through headstarting or captive propagation.

In addition, neighboring landowners could seek coverage under the programmatic Agreement against regulatory restrictions should Houston toads move onto their property as a result of their neighboring landowner's conservation activities. Neighboring landowners would have the option to receive regulatory protections and safe harbor assurances under this Agreement by completing a baseline assessment for their property and committing to certain monitoring and notification requirements, as described in the Agreement. Allowing for the inclusion of neighboring landowners under this Agreement is expected to increase the benefits to the Houston toad by encouraging the participation of landowners who might be concerned about the potential effects of their conservation activities on their neighbors' properties.

Before participating landowners can enroll properties under the programmatic Agreement, they will work directly with TPWD to complete a habitat assessment of each property to be enrolled and develop a corresponding Cooperative Agreement. Each Cooperative Agreement will provide (1) the specific details describing and assessing habitat characteristics and existing structures for each enrolled property; (2) a habitat management plan outlining the conservation activities that will take place during the term of the programmatic Agreement and its associated permit; (3) restrictions on returning the property to its baseline conditions; and (4) the number of acres to be enrolled in the programmatic Agreement. The habitat assessment will be used to help determine the baseline characteristics of the properties to be enrolled. Baseline will consist of (1) habitat conditions (for example, vegetation, water features, and soils) as determined by an initial habitat assessment, and (2) estimated Houston toad occupancy on each property prior to the time of enrollment. Habitat characteristics, existing structures, water bodies, and other property features will be documented on a map that will be attached to the corresponding Cooperative Agreement.

A property will be considered enrolled under the programmatic Agreement upon the finalization of a Cooperative Agreement between the landowner and TPWD, with the concurrence of the Service on the baseline determination. TPWD will then issue a certificate of inclusion to the landowner. The certificate of inclusion will document the landowner's participation in the programmatic Agreement and convey incidental take authorization and safe harbor assurances from the permit held by TPWD to the certificate's recipient.

Landowners will work collaboratively with TPWD to implement conservation activities to improve the quality of Houston toad habitat on enrolled properties. The goals of the conservation activities are (1) to create or enhance Houston toad breeding, foraging, migrating, and hibernating habitat and/or (2) allow for the establishment of a sustainable Houston toad population through reintroduction or expansion from adjacent properties. Specific conservation measures may include, but are not necessarily limited to, the following:

- Brush management to create desired understory conditions
- Forest enhancement/restoration to create favorable canopy conditions;
- Prescribed burning;
- Removal of sod-forming grasses and restoration of native ground cover
- Existing breeding pond enhancement;
- Removal of ponds
- Control of red-imported fire ants;
- New breeding pond creation;
- Headstarting and/or reintroduction of captive-bred Houston toads; and
- Release of translocated, wild-caught Houston toads

Expected conservation benefits of the programmatic Agreement include the following:

- Enhancement of Houston toad foraging and hibernating habitat by reducing the density of woody understory species, restoring favorable canopy conditions, and facilitating the establishment and maintenance of native herbaceous vegetation and Houston toad prey base
- Creation and enhancement of Houston toad breeding and toadlet emergence habitat
- Facilitation of Houston toad dispersal through the creation and enhancement of habitat linkages throughout the species' range
- Increase in Houston toad population numbers through headstarting and reintroduction efforts
- Facilitation of viable, self-sustaining Houston toad subpopulations

TPWD will not enter into any Cooperative Agreement that does not allow enough time for conservation benefits to accrue on a given property. Each Cooperative Agreement will stipulate that conservation activities be implemented for a period that is expected to result in the use of restored, enhanced, or newly created habitat by the Houston toad and to maintain suitable Houston toad habitat through the implementation of the conservation activities outlined in the corresponding Cooperative Agreement for at least 10 consecutive years after conservation benefits begin to accrue. An enrolled landowner may then return the property to baseline after conservation benefits have been realized within 5 years of the expiration of the landowner's Certificate of Inclusion and before the end of TPWD's permit through otherwise lawful means. Under no circumstances will a landowner be authorized purposefully take (for example, intentionally kill, injure, capture, or transport) a Houston toad in an effort to return the property to baseline conditions or for any other purpose.

## 2.3 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED ANALYSIS

Initially, the Service developed a Houston toad programmatic Safe Harbor Agreement with Environmental Defense Fund (EDF) with the intention that EDF would hold the permit for this Agreement. The Agreement with EDF included many of the same conservation activities within the same nine-county range (action area). Shortly after the Notice of Availability for this Agreement was published in the Federal Register in 2011 (76 FR 70479-70480), EDF notified the Service that they would no longer be able to serve as the permit holder for the Agreement due to other workload priorities, staffing constraints, and budget considerations. Therefore, the alternative involving EDF as the permit holder was eliminated because EDF was no longer capable to serve in this capacity.

## 3.0 AFFECTED ENVIRONMENT

The affected environment includes the nine-county range of the Houston toad (action area). This range includes Austin, Bastrop, Burleson, Colorado, Lavaca, Lee, Leon, Milam, and Robertson counties, Texas. The regional nature of the programmatic Agreement (it potentially covers many sites over a large area) makes it impossible to characterize each site that may be enrolled. This is especially true as participation is voluntary for landowners, and particular sites that may be enrolled under this programmatic Agreement cannot be predicted. Therefore, the discussion of the affected environment and the environmental consequences will be approached broadly. Areas that may be enrolled under the programmatic Agreement, include any land or water bodies that may be occupied by Houston toads and land or water bodies that may be restored or enhanced to increase the likelihood of being occupied by Houston toads.

Within the permit area, there may be more landowners interested in enrolling in the Agreement than may be feasible from a workload or manpower standpoint at a particular time. In such instances, TPWD will prioritize which properties will be enrolled first and will take the following property characteristics into consideration when determining enrollment priority:

- presence of or proximity to documented populations of Houston toads;
- proximity to other properties engaged in Houston toad conservation practices (properties enrolled in this Agreement and other properties with habitat conservation plans or conservation easement agreements);
- proximity to Houston Toad Recovery Focus Areas<sup>1</sup>;
- habitat suitability index value; and
- presence of water features in proximity to forested areas.

During the permit period, properties that have documented populations of Houston toads, lands managed in part for Houston toad conservation, and Recovery Focus Areas may change with new information, for example, if supported by peer-reviewed literature or permit reports. This new information will also be considered in the determination of priority eligible lands.

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<sup>1</sup> The Houston Toad Recovery Focus Areas are areas within the Houston toad's range developed by the Houston Toad Recovery Team to concentrate on-the-ground recovery actions for the Houston toad. Focus areas are areas that consist of mostly suitable soils and some of the desirable vegetation characteristics found within Houston toad breeding habitat. A map of the Houston toad recovery focus areas can be provided by USFWS and will be made available on the USFWS' Austin Ecological Services website.

The most recent approved habitat suitability model based primarily on soil characteristics and vegetation, such as the habitat suitability model developed by Buzo (2008), will be used as part of the baseline determination and assessment of properties for enrollment. Properties enrolled in this Agreement will potentially benefit from conservation efforts on lands already managed for Houston toads by buffering them from incompatible land uses, enlarging the areas capable of supporting Houston toads, and increasing habitat connectivity and the overall amount of suitable habitat to facilitate dispersal of Houston toads.

The Lost Pines Habitat Conservation Plan (HCP) area is also located within the affected environment. It was finalized in April 2008 and authorizes Bastrop County to issue certificates of inclusion to private landowners seeking incidental take coverage for the Houston toad under the Act for specific activities. These activities are outlined in the Lost Pines HCP and include agricultural, forestry, and wildlife management practices in addition to subdivision development. Many of the conservation activities included under the programmatic Agreement are also included under the agricultural, forestry, and wildlife management guidelines provided in the Lost Pines HCP. These guidelines serve as measures for avoiding or minimizing take of the Houston toad while such activities are conducted. However, the permit area for the Lost Pines HCP only includes approximately 124,000 acres (50,181 hectares) of known and potential Houston toad habitat within Bastrop County.

### 3.1 VEGETATION

Vegetation within Houston toad habitat include loblolly pine (*Pinus taeda*) and a mixed deciduous woodland interspersed with open grassy areas. The loblolly pine and several associated plant and animal species reach their westernmost range extensions within the historical range of the Houston toad. This loblolly pine-post oak savannah ecosystem is an example of a fire-adapted, fire-climax community (Gould 1962).

Dominant overstory species typically found in Houston toad habitat include loblolly pine, post oak (*Quercus stellata*), blackjack oak (*Q. marilandica*), and eastern red cedar (*Juniperus virginiana*). Some sandjack oak (*Q. incana*) can also be found. Pine trees are usually found in drainages, and the oak species are usually found in more upland areas. However, they can be mixed in various locations throughout the range. American elm (*Ulmus americana*), cedar elm (*U. crassifolia*), hackberry (*Celtis laevigata*), cottonwood (*Populus* sp.), and hickory (*Carya* sp.) are also found along drainages.

Understory vegetation typically includes yaupon (*Ilex vomitoria*), possumhaw (*I. decidua*), southern wax myrtle (*Myrica cerifera*), American beauty berry (*Callicarpa americana*), and farkleberry (*Vaccinium arboretum*). Grapevine (*Vitis* sp.), greenbriar (*Smilax* sp.), and poison ivy (*Toxicodendron radicans*) are also common.

Coarse bunchgrasses, such as little bluestem (*Schizachyrium scoparium*), broomsedge bluestem (*Andropogon virginicus*), pineywoods dropseed (*Sporobolus junceus*), hairyawn muhly (*Muhlenbergia capillaris*), Indiangrass (*Sorastrum nutans*), purpletop (*Tridens flavus*), beaked panicum (*Panicum anceps*), switchgrass (*P. virgatum*), and curly threeawn (*Aristida desmantha*) are common ground cover. Other ground cover includes various species of cacti (*Opuntia* sp.),

yucca (*Yucca* sp.), and a variety of forbs, ferns, lichens, and mosses, especially in openings of the woodland canopies.

Many vegetation communities within the historical range of the Houston toad have been impacted in various areas by land-use activities, such as livestock ranching, crop production, timber harvesting, and residential and commercial development. Livestock management is conducted by private ranch operators using a variety of grazing practices. Such practices vary in their impacts to upland, riparian, and aquatic vegetation. Areas involved in crop production usually result from the conversion of forested habitat to pastures.

Large tracts of land within the post oak savannah ecosystem have been cleared for agricultural use and converted to pastures (Telfair 1999). The current range of the Houston toad is a matrix of forested habitat and non-native pasture land. It is not known how Houston toads use non-native grass pastures. However, it is believed that the conversion of forested habitat to sod-forming non-native grasses, such as Bermuda grass (*Cynodon* spp.) and Bahia grass (*Paspalum notatum*) inhibit Houston toad movement and burrowing capabilities (TPWD 2009).

### 3.2 WILDLIFE

Wildlife presence at a potential site within the action area will vary greatly depending on location, proximity to urban development, vegetation community, land use, proximity to wetlands, annual precipitation, and proximity to wildlife dispersal corridors.

Common mammal species that occur within the range of the Houston toad include: the white-tailed deer (*Odocoileus virginianus*), raccoon (*Procyon lotor*), coyote (*Canis latrans*), grey fox (*Urocyon cinereoargenteus*), red fox (*Vulpes vulpes*), bobcat (*Lynx rufus*), opossum (*Didelphis virginiana*), striped skunk (*Mephitis mephitis*), feral pig (*Sus scrofa*), ringtail (*Bassaricus astutus*), eastern cottontail (*Sylvilagus borealis*), nine-banded armadillo (*Dasypus novemcinctus*), eastern red bat (*Lasiurus borealis*), hispid cotton rat (*Sigmodon hispidus*), hispid pocket mouse (*Perognathus hispidus*), white-footed pocket mouse (*Peromyscus leucopus*), eastern woodrat (*Neotoma floridana*), and fox squirrel (*Sciurus niger*).

Many migratory bird species common to the central flyway are also found in the area. These include: the turkey vulture (*Cathartes aura*), black vulture (*Coragyps atratus*), red-shouldered hawk (*Buteo lineatus*), red-tailed hawk (*B. jamaicensis*), wild turkey (*Meleagris gallopavo*), barred owl (*Strix varia*), blue jay (*Cyanocitta cristata*), Carolina chickadee (*Poecile carolinensis*), northern mockingbird (*Mimus polyglottis*), and northern cardinal (*Cardinalis cardinalis*). Other common birds likely to occur on properties within the range of the Houston toad include: the eastern screech owl (*Otus asio*), ruby-throated hummingbird (*Archilochus colubris*), red-bellied woodpecker (*Melanerpes carolinus*), tufted titmouse (*Baeolophus bicolor*), Carolina wren (*Thyrothorus ludovicianus*), white-eyed vireo (*Vireo griseus*), northern parula (*Parula americana*), summer tanager (*Piranga rubra*), indigo bunting (*Passerina cyanea*), painted bunting (*P. ciris*), lark sparrow (*Chondestes grammacus*), and white-throated sparrow (*Zonotrichia albicollis*). The southwestern most range of the pileated woodpecker (*Dryocopus pileatus*) and pine warbler (*Dendroica pinus*), and the western most range of the Kentucky warbler (*Oporornis formosus*), hooded warbler (*Wilsonia citrine*), and Swainson's warbler (*Limothlypis swainsonii*) occur within the range of the Houston toad.

Reptile and amphibian species that occur within the range of the Houston toad include: the Gulf Coast toad (*Ollotis* [=*Bufo*] *valliceps valliceps*), Woodhouse's toad (*A. woodhouseii woodhouseii*), bullfrog (*Lithobates* [=*Rana*] *catesbeianus*), Southern leopard frog (*L. sphenoccephalus*), gray tree frog (*Hyla versicolor*), green tree frog (*H. cinerea*), Eastern narrowmouth toad (*Gastrophryne carolinensis*), Great plains narrowmouth toad (*G. olivacea*), cliff chirping frog (*Syrrophus marnocki*), spotted chorus frog (*Pseudacris clarki*), Strecker's chorus frog (*Pseudacris streckeri*), Western lesser siren (*Siren intermedia nettingi*), small mouth salamander (*Ambystoma texanum*), central newt (*Notophthalmus viridescens louisianensis*), common snapping turtle (*Chelydra serpentina*), stinkpot (*Sternotherus oderatus*), three-toed box turtle (*Terrapene carolina triunguis*), ornate box turtle (*T. ornata ornata*), red-eared slider (*Trachemys scripta elegans*), American alligator (*Alligator mississippiensis*), green anole (*Anolis carolinensis*), Texas horned lizard (*Phrynosoma cornutum*), Texas spiny lizard (*Sceloporus olivaceus*), crevice spiny lizard (*S. poinsettia poinsettia*), ground skink (*Scincella lateralis*), six-lined race runner (*Aspidoscelis* [=*Cnemidophorus*] *sexlineatus sexlineatus*), eastern yellow-bellied racer (*Coluber constrictor flaviventris*), Texas rat snake (*Elaphe obsoleta lindheimeri*), eastern hog-nosed snake (*Heterodon plirrhinos*), western coachwhip (*Masticophis flagellum testaceus*), blotched water snake (*Nerodia erythrogaster transversa*), diamondback water snake (*N. rhombifer rhombifer*), bull snake (*Pituophis catenifer sayi*), rough green snake (*Opheodrys aestivus*), rough earth snake (*Virginia striatula*), western cottonmouth (*Agkistrodon piscivorus leucostoma*), and western diamondback rattlesnake (*Crotalus atrox*)(Dixon 2000).

### 3.3 LISTED, PROPOSED, AND CANDIDATE SPECIES

The Houston toad is federally listed as endangered. It is endemic to east central Texas (Dixon 2000). Since the 1980s, the known range of the Houston toad included nine Texas counties (Hillis et al. 1984, Yantis 1989, 1990, 1991, 1992). These included Austin, Bastrop, Burleson, Colorado, Lavaca, Lee, Leon, Milam, and Robertson counties.

Habitat loss, fragmentation, and degradation are the most serious threats facing the Houston toad. This includes expanding urbanization, conversion of woodlands to agricultural use, and wetland destruction or alteration. Although Houston toads may migrate across cleared areas (Dixon et al. 1990), they are rarely found far from a forested edge (Forstner 2002). Therefore, extensive clearing of native vegetation can be detrimental to the Houston toad's survival. The Houston toad's habitat has also been negatively impacted by fire suppression throughout its range (Forstner 2006). The lack of fire has increased understory density in woodlands, which has resulted in the decline of native herbaceous vegetation on the forest floor. Dense vegetation likely prohibits Houston toad movement and dispersal. Population viability analyses for the Houston toad indicate that risk of extinction increases with reduced migration and dispersal, survivorship, reproductive success, and sustained reduction of available habitat (Hatfield et al. 2004). Changes in vegetation on the forest floor also negatively affect the abundance and diversity of insect populations, which comprises the Houston toad's prey base. Livestock wading and feral hog use can prevent vegetation from establishing around a Houston toad breeding pond's perimeter and result in high levels of nitrates (from nitrogenous wastes, such as urine and manure), increased turbidity, decreased water quality, and an overall adverse environment for amphibian egg and tadpole development (Forstner 2001; Knutson et al. 2004; Schmutzer et al. 2008; Bull 2009).

Red-imported fire ants (*Solenopsis invicta*) threaten Houston toads by killing young toadlets emerging from ponds (Freed and Neitman 1988, Forstner 2002). They have also been known to drastically reduce the abundance of native insect species that serve as the Houston toad's food source.

The Houston toad's distribution appears to be restricted naturally as the result of specific habitat requirements for breeding and development. Small, sedentary species with restricted distributions, specialized habitat niches, and narrow climatic tolerances are especially sensitive to changes in habitat conditions (Welsh 1990, deMaynadier and Hunter 1998). These natural restrictions make them particularly vulnerable to stochastic events and the negative effects of human-induced changes that result in habitat loss, degradation, and fragmentation (Hillis et al. 1984).

A 2004 population viability analysis (Hatfield et al. 2004) indicated that at least 1,000 adult Houston toad females are needed to prevent extinction within a 10-year timeframe. Houston toad breeding pond survey data from 2005 through 2009 indicate there are likely fewer than 1,000 breeding adults throughout its range (Dr. Michael Forstner, pers. comm. 2009; Forstner and Dixon 2011). Houston toad breeding season monitoring in Bastrop County has indicated a significant decline (as much as 90 percent at some sites) in breeding and juvenile emergence from water sources known to support reproductive activity in previous years (Dr. Michael Forstner, pers. comm. 2009). Outside of Bastrop County, Houston toad breeding choruses are rarely made up of more than 20 individual adult males (Forstner 2008; Dr. Michael Forstner, pers. comm. 2009). Data show that chorusing of Houston toads results in reproduction in less than half of all chorusing ponds. Recruitment (juvenile Houston toads emerging from ponds) occurs in only 1 in 10 chorusing ponds (Swannack and Forstner 2004). The Houston toad juvenile survival rate in the wild has been shown to be approximately 0.03 percent (Forstner 2006). Low occurrence, recruitment, and survivorship of Houston toads significantly affect their ability to rebound from factors that negatively affect their environment (Soulé et al. 1992, Pechman and Wilbur 1994). Such factors may include drought conditions, other stochastic events, fire suppression, habitat fragmentation, and other forms of anthropogenic habitat loss.

Today, the remaining Houston toad populations are all widely scattered, small, and disconnected (Forstner and Dixon 2011). Small population sizes can also act synergistically with other traits of the Houston toad (such as being a habitat specialist and having a limited distribution) to greatly increase risk of extinction (Davies et al. 2004). Stochastic events from either environmental factors (random events such as severe weather and wildfires) or demographic factors (random causes of births and deaths of individuals) are also heightened threats to the Houston toad because of its limited range and small population sizes (Melbourne and Hastings 2008). Thus, recovery efforts should be aimed at increasing the number of toads and their ability to survive in the wild.

Much of central Texas, including Bastrop County and other portions of the Houston toad's range, experienced extreme drought conditions from 2008 to 2009. Beginning again in September 2009, severe to exceptional drought conditions occurred in the central Texas region within the Houston toad's range. In March 2011, during what is typically the peak of the Houston toad's breeding season, central Texas received less than 0.10 inch (0.25 centimeters) of rainfall, making

it the fourth driest March in the region since 1856 (LCRA 2011). Direct effects of drought on this species include desiccation, loss of breeding sites, and loss of eggs or tadpoles resulting from pond evaporation or complete water loss (Service 1994; Forstner and Dixon 2011). As drought severity increases, predators and livestock tend to concentrate at the remaining water bodies (Forstner and Dixon 2011). Houston toads persisted through droughts in prehistoric times; however, habitat loss from anthropogenic impacts has reduced the number of subpopulations and total number of individuals found rangewide (Dr. Michael Forstner, pers. comm. 2009; McHenry and Forstner 2009; Forstner and Dixon 2011). Therefore, the species is less likely to withstand effects of drought conditions within its habitat.

In addition to the Houston toad, there are six other federally listed animals, two animals that are candidates for Federal listing, and two federally listed plants that occur within the action area (Table 1). Although the Service regards it as unlikely for most species, the possibility exists that these listed or candidate species may presently occur or may occur in the future on enrolled properties as a direct result of the conservation activities specified in the programmatic Agreement. The large-fruited sand verbena and the Navasota ladies'-tresses are the two most likely species to occur on enrolled properties, but the Agreement includes provisions to avoid impacts to these species.

Table 1 lists these species as well as an assessment as to whether they might be affected by the activities carried out through this agreement. Section 4.2.3 of this document provides further explanation.

**Table 1.** Other Federally Listed, Proposed, or Candidate Species Occurring in the Programmatic Agreement Area.

<b>Species</b>	<b>Listing Status</b>	<b>Potential to be Impacted?</b>
<b>Animals</b>		
American alligator ( <i>Alligator mississippiensis</i> )	T(S/A)	No
Attwater's greater prairie-chicken ( <i>Tympanuchus cupido attwateri</i> )	E	Unlikely
Interior least tern ( <i>Sterna antillarum</i> )	E	No
Whooping crane ( <i>Grus americana</i> )	E	No
Sharptnose shiner ( <i>Notropis oxyrinchus</i> )	C	No
Smalleye shiner ( <i>Notropis buccula</i> )	C	No
Smooth pimpleback ( <i>Quadrula houstonensis</i> )	C	No
Texas fawnsfoot ( <i>Truncilla macrodon</i> )	C	No
<b>Plants</b>		

Species	Listing Status	Potential to be Impacted?
Large-fruited sand verbena ( <i>Abronia macrocarpa</i> )	E	Yes
Navasota ladies'-tresses ( <i>Spiranthes parksii</i> )	E	Yes

### Listing Status

E – Endangered

C – Candidate for Federal listing

T(S/A) – Threatened due to similarity of appearance

- American alligator (*Alligator mississippiensis*) – The American alligator is federally listed as “threatened due to similarity of appearance” (T(S/A); 52 Federal Register 21059 – 21064). Section 4(e) of the Endangered Species Act of 1973, as amended (Act) authorizes the treatment of a species as endangered or threatened species even though it is not otherwise listed as endangered or threatened, if it is found that: (a) the species so closely resembles a federally listed species in appearance that enforcement personnel would have substantial difficulty in differentiating between listed and unlisted species; (b) the effect of this substantial difficulty is an additional threat to the listed species; and (c) such treatment of an unlisted species will substantially facilitate the enforcement. The U.S. Fish and Wildlife Service (Service) formally recognizes the American alligator as secure; however, several species of crocodiles and caimans are still facing extinction. For this reason, the Service continues to regulate the harvest of American alligators and legal trade in the animals, their skins, and products made from them to prevent the illegal take and trafficking of endangered “look-alike” reptiles.
- Attwater’s greater prairie chicken (*Tympanuchus cupido attwateri*) – The Attwater’s greater prairie chicken (prairie chicken) is federally listed as an endangered species (32 Federal Register 4001). Its distribution includes Austin and Colorado counties, Texas. These counties are included in the permit area for the programmatic Agreement. The prairie chicken’s habitat consists of coastal grassland prairies.
- Interior least tern (*Sterna antillarum*) – The interior least tern is federally listed as an endangered species (50 Federal Register 21784-21792). This species is known to occur in Leon and Milam counties, Texas. Both counties are included in the permit area for this Agreement. Interior least terns arrive at Texas breeding areas beginning in early April to early June each year, and spend three to five months on the breeding grounds. Nesting habitat of the interior least tern includes bare or sparsely vegetated sand, shell, and gravel beaches, sandbars, islands, and salt flats associated with rivers and reservoirs.
- Whooping crane (*Grus americana*) – The whooping crane is federally listed as an endangered species (32 Federal Register 4001). Whooping cranes winter on the Aransas National Wildlife Refuge's 22,500 acres (91,054 hectares) of salt flats and marshes on the coast of south Texas. Their winter habitat consists of coastal prairie dotted with swales and ponds. They summer and nest in poorly drained wetlands in Canada's Northwest Territories at Wood Buffalo National Park. Whooping cranes migrate throughout the

central portion of the state from the eastern panhandle to the Dallas/Fort Worth area and south through the central Texas area to the coast during October-November and again in April of each year.

- Sharpnose shiner (*Notropis oxyrhynchus*) – The sharpnose shiner is a candidate for Federal listing as an endangered or threatened species (67 Federal Register 40657). Sharpnose shiners occur in fairly shallow water in broad, sandy channels with moderate current (Moss and Mayes 1993). This species is currently restricted to the Upper Brazos River system, which flows through a portion of the Houston toad’s range, and is noted as occurring in Austin, Burleson, Milam, and Robertson counties.
- Smalleye shiner (*Notropis buccula*) – The smalleye shiner is a candidate for Federal listing as an endangered or threatened species (67 Federal Register 40657). Smalleye shiners occur in fairly shallow water in broad, sandy channels with moderate current (Moss and Mayes 1993). This species is currently restricted to the Upper Brazos River system, which flows through a portion of the Houston toad’s range, and is noted as occurring in Burleson County.
- Smooth pimpleback (*Quadrula houstonensis*) and Texas fawnsfoot (*Truncilla macrodon*) – Smooth pimpleback and Texas fawnsfoot are federally listed as candidate species (76 Federal Register 62166-62212). Extant populations of the smooth pimpleback are known from Yegua Creek in Washington County, the Colorado River in Colorado County, Little River in Milam County, and the Little Brazos River and Brazos River in Robertson County. Texas fawnsfoot populations are known to still persist in the Brazos River in Austin and Robertson counties as well as the Colorado River in Colorado County. These counties are included in the permit area for this Agreement. Both freshwater mussel species appear to prefer the flowing waters of rivers and large streams. Smooth pimpleback is more tolerant of impoundments, having been found in a few reservoirs, than Texas fawnsfoot.
- Large-fruited sand verbena (*Abronia macrocarpa*) – The large-fruited sand verbena is federally listed as endangered (53 Federal Register 37975). Its distribution includes Leon and Robertson counties, Texas. These counties are included in the permit area for the programmatic Agreement. Its habitat consists of open areas of deep sandy soils in post oak woodlands.
- Navasota ladies’-tresses (*Spiranthes parksii*) – Navasota ladies’-tresses is federally listed as an endangered species (47 Federal Register 19539). Its distribution includes Bastrop, Burleson, Leon, Milam, and Robertson counties, Texas. These counties are included in the permit area for the programmatic Agreement.

### 3.4 CULTURAL RESOURCES

Cultural resources, such as historic buildings, archeological sites, and areas that have traditional or cultural significance to Native Americans, may be found throughout Texas. The regional

nature of this programmatic Agreement does not allow predictions as to the specific sites and activities that will be undertaken. The action area is large enough to assume that cultural resources are located within the covered area of the programmatic Agreement.

### 3.5 SOCIOECONOMIC ENVIRONMENT

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-income Populations*, mandates that Federal agencies identify and address, as appropriate, disproportionately high and adverse human health or environmental effects of their programs on minority or low-income individuals.

#### Austin County

Austin County encompasses 652.59 square miles (1,690.20 square kilometers)(U.S. Census Bureau 2009a). The City of Bellville is the county seat of Austin County. Other municipalities include Sealy, Wallis, Industry, Brazos Country, and San Felipe. Manufacturing, trade, service, and local government fuel the County's economic development (Austin County 2008). The median, annual household income is \$50,277. Approximately 10.9 percent of the Austin County population falls below the poverty line (U.S. Census Bureau 2009a). Although most of the County is still considered rural, population projections from the Texas State Data Center (2009) estimate that Austin County will experience a 38.7 percent increase in population from the 2000 census (population 23,590) to 2040 (population estimate of 32,713).

#### Bastrop County

Bastrop County encompasses 888.35 square miles (2,300.81 square kilometers)(U.S. Census Bureau 2009b). The City of Bastrop is Bastrop County's largest town and the county seat. Other municipalities include Elgin and Smithville. Manufacturing, trade, agriculture, local government, oil production, and tourism drive Bastrop County's economic development (Texas State Historical Association 2009a). The median, annual household income is \$51,563. Approximately 12.6 percent of the Bastrop County population falls below the poverty line (U.S. Census Bureau 2009b). Although most of Bastrop County is still considered rural, population projections from the Texas State Data Center (2009) estimate that Bastrop County will experience a 176.7 percent increase in population from the 2000 census (population 57,733) to 2040 (population estimate of 159,776).

#### Burleson County

Burleson County encompasses 585.78 square miles (1,517.16 square kilometers)(U.S. Census Bureau 2009c). The City of Caldwell is Burleson County's largest town and the county seat. Other municipalities include Somerville and Snook. Manufacturing, trade, agriculture, and local government fuel the County's economic development (Texas State Historical Association 2009b). The median, annual household income is \$38,039. Approximately 26.2 percent of the Burleson County population falls below the poverty line (U.S. Census Bureau 2009c). Although most of the County is still considered rural, population projections from the Texas State Data Center (2009) estimate that Burleson County will experience a 49.9 percent increase in population from the 2000 census (population 16,470) to 2040 (population estimate of 24,682).

### Colorado County

Colorado County encompasses 962.95 square miles (2,494.03 square kilometers)(U.S. Census Bureau 2009d). The City of Columbus is the county seat. Other municipalities include Eagle Lake and Weimar. Manufacturing, trade, services, mining, oil production, and agriculture fuel the County's economic development (Texas State Historical Association 2009c). The median, annual household income is \$39,317. Approximately 14.9 percent of the Colorado County population falls below the poverty line (U.S. Census Bureau 2009d). Although most of the County is still considered rural, population projections from the Texas State Data Center (2009) estimate that Colorado County will experience a 21.5 percent increase in population from the 2000 census (population 20,390) to 2040 (population estimate of 24,779).

### Lavaca County

Lavaca County encompasses 969.90 square miles (2,512.03 square kilometers)(U.S. Census Bureau 2009e). The City of Hallettsville is the county seat. Other municipalities include Moulton and Shiner. Between 21 and 30 percent of the land in Lavaca County is considered prime farmland. Natural resources include oil and natural gas. Manufacturing, health care, transportation services, oil production, and agriculture form the basis of Lavaca County's economy (Texas State Historical Association 2009d). The median, annual household income is \$38,025. Approximately 13.2 percent of the Colorado County population falls below the poverty line (U.S. Census Bureau 2009e). Lavaca County is considered mostly rural, with little population growth expected over time (Texas State Data Center 2009).

### Lee County

Lee County encompasses 628.50 square miles (1,627.81 square kilometers)(U.S. Census Bureau 2009f). The City of Giddings is the largest town and the county seat. Lexington is the only other incorporated municipality in Lee County. Trade, health care, and services drive Lee County's economy (U.S. Census Bureau 2002). The median, annual household income is \$44,875. Approximately 12.3 percent of Lee County's population is below the poverty line (U.S. Census Bureau 2009f). Although the County is still considered mostly rural, population projections from the Texas State Data Center (2009) estimate that Lee County will experience a 67.6 percent increase in population from the 2000 census (population 15,657) to 2040 (population estimate of 26,243).

### Leon County

Leon County encompasses 1,072.04 square miles (2,776.52 square kilometers)(U.S. Census Bureau 2009g). The City of Centerville is the county seat. Other municipalities include Buffalo (the largest town), Jewett, Leona, Marquez, Normangee, and Oakwood. The oil and gas industries, mining, and agriculture drive Leon County's economy (Texas State Historical Association 2009e). The median, annual household income is \$38,742. Approximately 15.4 percent of Leon County's population is below the poverty line (U.S. Census Bureau 2009g). Although the County is still considered mostly rural, population projections from the Texas State Data Center (2009) estimate that Leon County will experience a 23.4 percent increase in population from the 2000 census (population 15,335) to 2040 (population estimate of 18,916).

### Milam

Milam County encompasses 1,016.71 square miles (2,633.27 square kilometers)(U.S. Census Bureau 2009h). The City of Cameron is the county seat. Other municipalities include Buckholts, Milano, Rockdale, and Thorndale. Agriculture, mining, manufacturing, trade, and the oil and gas industries drive Milam County's economy (Texas State Historical Association 2009f). The median, annual household income is \$39,427. Approximately 17.3 percent of Milam County's population is below the poverty line (U.S. Census Bureau 2009h). Although most of the County is still considered mostly rural, population projections from the Texas State Data Center (2009) estimate that Milam County will experience a 25.2 percent increase in population from the 2000 census (population 24,238) to 2040 (population estimate of 30,334).

### Robertson

Robertson County encompasses 854.56 square miles (2,213.30 square kilometers)(U.S. Census Bureau 2009i). The City of Franklin is the county seat. Other municipalities include Calvert and Hearne. Agriculture, mining, and the oil and gas industries drive the local economy (Texas State Historical Association 2009g). The median, annual household income is \$35,543. Approximately 19.7 percent of Robertson County's population is below the poverty line (U.S. Census Bureau 2009i). Although most of Robertson County is still considered rural, population projections from the Texas State Data Center (2009) estimate that Robertson County will experience a 39.1 percent increase in population from the 2000 census (population 16,000) to 2040 (population estimate of 22,262).

## 3.6 WETLANDS

The Army Corps of Engineers has regulatory authority over jurisdictional wetlands and waters of the United States pursuant to section 404 of the Clean Water Act. A wetland delineation of the entire range of the Houston toad is not feasible due to the regional nature of the programmatic Agreement. However, National Wetland Inventory maps indicated that typical water bodies within the Houston toad's range include small lakes, impoundments, emergent wetlands, forested wetlands, small rivers, creeks, and tributaries. These features can be ephemeral, intermittent, or perennial. Ephemeral waters or wetlands hold water during and for a short duration after precipitation events in a typical year. Intermittent areas tend to be fed by groundwater or runoff. Perennial water features are characterized as holding water year-round.

Generally, wetlands and other water bodies serve to provide the following functions and values: ground water storage, ground water discharge, flood storage and velocity reduction, shoreline anchoring, sediment trapping, nutrient retention, food chain support, fish and wildlife habitat, aquatic habitat diversity, and recreation. Wetlands occurring within the Houston toad's range can be characterized by just one or several of the functions or values listed above.

## 3.7 LAND USE

The existing land uses within the action area vary considerably with each specific location. The gradient of potential land uses could include lands used for grazing livestock, oil and gas exploration and/or production, mining operations, recreation, ecological preservation, and residential and commercial development. As the increased demand for rural residential housing continues, particularly in Bastrop County, there is an ongoing conversion from agricultural to

residential land usage. Some non-Federal lands within the covered area, particularly within Lee, Milam, and Robertson counties, are used for commercial mining of coal and metal ores. The locations where mining occurs within the covered area are not likely to change, although new mining operations within the covered area could be initiated within the 30-year term of the programmatic Agreement. Recreational land use occurs primarily in Bastrop County with the presence of Bastrop and Buescher State Parks, several public parks and natural areas owned and operated by the Lower Colorado River Authority, and two outdoor wilderness areas owned and operated by the Boy Scouts of America/Capital Area Council.

### **3.8 WATER RESOURCES**

Water resources existing within the action area are likely to vary with each specific tract to be enrolled. The regional nature of this programmatic Agreement does not allow predictions as to the specific sites and activities. Water resources in the area to be covered by the programmatic Agreement come largely from groundwater sources. Other water resources within the covered area include a number of intermittent and perennial creeks and two major rivers. The Colorado River runs through Bastrop and Colorado counties.

The Brazos River runs along the western borders of Austin, Burleson, and Milam counties and along the eastern border of Robertson County within the Houston toad's range.

The principal water-bearing resource within the action area is the Carrizo-Wilcox Aquifer. The Carrizo-Wilcox Aquifer supplies water to 60 Texas counties, including Bastrop, Burleson, Lee, Leon, Milam, and Robertson (Ashworth and Hopkins 1995) within the Houston toad's range. Groundwater pumped from the Carrizo-Wilcox Aquifer is used primarily for municipal public water supply, rural domestic use, and industrial use (Thorkildsen and Price 1991). Approximately 83 percent of the total groundwater removed from the aquifer is for municipal water supply (Thorkildsen and Price 1991).

The Gulf Coast Aquifer also underlies a portion of the Houston toad's range. This aquifer provides water to all or parts of 54 counties in Texas, including Austin, Colorado, and Lavaca. Municipal usage and irrigation account for 90 percent of the total pumpage from this aquifer (Ashworth and Hopkins 1995).

## **4.0 ENVIRONMENTAL CONSEQUENCES**

### **4.1 ALTERNATIVE 1: NO ACTION**

Under the No Action Alternative, the Service would not issue a permit to cover incidental take under the programmatic Agreement. The Lost Pines Habitat Conservation Plan (HCP) would continue to provide incidental take coverage for landowners in Bastrop County choosing to engage in forest, agricultural, and wildlife management activities as long as they follow the appropriate guidelines outlined within the Lost Pines HCP. However, this incidental take coverage would not be extended to landowners outside of Bastrop County, thus possibly limiting the number of landowners willing to manage their properties in a manner that is compatible with Houston toad recovery. For this reason, recovery efforts for the species would primarily occur within the areas already being managed for the Houston toad within Bastrop County. Various land management activities, such as livestock, forestry, and agricultural practices, would

continue to occur in other counties within the Houston toad's range. However, landowners might not undertake beneficial actions for the Houston toad on their properties because they would be fearful of attracting endangered species and increasing their legal liability under the Act. Furthermore, there would be no incentive for the Service or TPWD to monitor the effects of these activities on the habitat or on the species or for land managers to report any activities that may impact the Houston toad. The No Action Alternative provides the baseline for comparison of environmental consequences of the proposed action.

#### 4.1.1 Vegetation

No change to vegetation communities described in section 3.1 above is expected under this alternative. Houston toad conservation on non-Federal lands would not necessarily be part of the considerations in any management of existing vegetation within the action area. Protection of vegetation that is habitat for the Houston toad would be incidental to existing land uses or the actions of individual landowners.

#### 4.1.2 Wildlife

No change to wildlife species described in section 3.2 above is expected under this alternative. Houston toad conservation on non-Federal lands would not necessarily be part of the considerations in any wildlife management actions within the action area.

#### 4.1.3 Listed, Proposed, and Candidate Species

Since the implementation of the Agreement has the potential to affect 2 federally listed plant species as part of the action alternative, then this alternative would eliminate the potential for these effects. No other changes to listed, proposed, or candidate species described in section 3.3 above is expected under this alternative. Houston toad conservation on non-Federal lands would not necessarily be part of the considerations in any management of listed, proposed, or candidate species within the action area. Houston toad conservation would continue on Federal lands consistent with section 7 consultations and recovery activities.

#### 4.1.4 Cultural Resources

No change to cultural resources as described in section 3.4 is expected under this alternative.

#### 4.1.5 Socioeconomic Environment

No change to the socioeconomic environment as described in section 3.5 above is expected under this alternative. This alternative will not provide the assurances to non-Federal landowners through a Safe Harbor Agreement to address Houston toads that may disperse onto their properties.

#### 4.1.6 Wetlands

No change to wetlands as described in section 3.6 above is expected under this alternative. The no action alternative may result in a disincentive for non-Federal landowners to create, restore, or enhance ephemeral wetlands and other potential Houston toad breeding sites on their properties for fear that wetlands may provide habitat that could result in more regulatory restrictions. There would likewise be no incentive for non-Federal landowners to create, restore, or maintain the wetland communities associated with Houston toad breeding sites.

#### 4.1.7 Land Use

No change to land use as described in section 3.7 above is expected under this alternative. Houston toad conservation on non-Federal lands would not necessarily be part of the considerations in any existing land use operations. Protection of Houston toad habitat would be incidental to existing land uses or the actions of individual landowners.

#### 4.1.8 Water Resources

No change to water resources as described in section 3.8 above is expected under this alternative. Houston toad conservation on non-Federal lands would not necessarily be a part of the considerations in any existing water resource management. Protection of Houston toad habitat would be incidental to existing water resource uses or the actions of individual landowners.

### 4.2 ALTERNATIVE 2: ISSUANCE OF A SECTION 10(a)(1)(A) ENHANCEMENT OF SURVIVAL PERMIT ANF APPROVAL OF A RANGEWIDE PROGRAMMATIC AGREEMENT (PROPOSED ACTION)

Under the proposed action alternative, the Service would issue a section 10(a)(1)(A) Enhancement of Survival permit to TPWD and approve the programmatic Agreement. Sites that would be considered for enrollment under the programmatic Agreement are any non-Federal lands within the nine-county range of the Houston toad (Figure 1). Within the action area, TPWD will prioritize which properties will be enrolled first and will take the following property characteristics into consideration when determining enrollment priority:

- presence of or proximity to documented populations of Houston toads;
- proximity to other properties engaged in Houston toad conservation practices (properties enrolled in this Agreement and other properties with habitat conservation plans or conservation easement agreements);
- proximity to Houston Toad Recovery Focus Areas<sup>2</sup>;
- habitat suitability index value; and

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<sup>2</sup> The Houston Toad Recovery Focus Areas are areas within the Houston toad's range developed by the Houston Toad Recovery Team to concentrate on-the-ground recovery actions for the Houston toad. Focus areas are areas that consist of mostly suitable soils and some of the desirable vegetation characteristics found within Houston toad breeding habitat. A map of the Houston toad recovery focus areas can be provided by USFWS and will be made available on the USFWS' Austin Ecological Services website.

- presence of water features in proximity to forested areas.

Under the permit and its programmatic Agreement, landowners will work collaboratively with TPWD and the Service to implement conservation activities to improve the quality of Houston toad habitat on enrolled properties. These conservation activities are expected to create, restore, or maintain Houston toad habitat. Houston toad management activities not pertaining to the programmatic Agreement are already underway on properties in Bastrop County. Expansion and linkage of Houston toad habitat areas between Bastrop State Park and the BSA/CAC's Griffith League Ranch, and also in the areas immediately surrounding these two properties, may be important to the future viability of the Houston toad. The participation of non-Federal landowners in the programmatic Agreement is expected to lead to the expansion of known Houston toad populations and, potentially, the founding of new populations.

Conservation activities on enrolled lands implemented under the permit and its programmatic Agreement are expected to create or restore Houston toad suitable habitat and/or subpopulations, which may result in Houston toads expanding onto other neighboring properties. If a neighboring landowner can demonstrate that his/her property will likely experience an increase in Houston toad occupancy due to his/her neighbor's participation in the Agreement, the landowner may have the option of enrolling as a Non-Participating Neighboring Landowner. Eligibility criteria for a landowner enrolling in a Non-Participating Neighboring Landowner Agreement consist of the following: (1) his/her property must be contiguous with another landowner enrolled as a Cooperator in this Agreement and (2) the Parties agree that there is a reasonable expectation that Houston toads would move onto their property from the bordering enrolled property (including through or along easements and drainages).

If the Parties determine that a neighboring landowner meets eligibility criteria, the neighboring landowner will have the option to work with either TPWD or USFWS to receive incidental take authorization under the Non-Participating Neighboring Landowner Agreement by allowing access to their property to complete a baseline assessment and for monitoring purposes. By entering in to a Non-Participating Neighboring Landowner Agreement, the landowner will be required to maintain the documented baseline conditions of his/her property to receive incidental take authorization under the associated incidental take permit.

Restoration and enhancement of Houston toad habitat as well as increased Houston toad population numbers through headstarting and reintroduction within portions of its range outside of Bastrop County are considered vital to the overall viability and recovery of the species. Few, if any, Houston toad conservation activities are currently being implemented to achieve these goals outside of Bastrop County. The combined effects of these efforts are expected to result in enhanced habitat conditions and increased population numbers for the Houston toad on a rangewide level.

#### 4.2.1 Vegetation

No negative long-term impacts to vegetation are expected to result from the issuance of a permit and approval of the programmatic Agreement. However, issuance of the permit and implementing the programmatic Agreement is likely to result in both short-term and long-term

beneficial effects on native vegetation that make up Houston toad habitat within action area. Each property under consideration for enrollment will differ with regard to vegetation conditions. The amount and locations of sites that will be affected by conservation activities conducted under the programmatic Agreement cannot be estimated at this time. Therefore, the effects of specific conservation activities on native and non-native plant species or their ecosystems as a whole are uncertain at this time. As new information on management practices becomes available, the conservation activities within the programmatic Agreement may be modified to enhance beneficial effects to native plant species within the covered area and the Houston toad.

Brush management will be conducted to create desired understory conditions and facilitate native ground cover. The suppression of wildfires has led to a dramatic increase in the understory density within the range of the Houston toad. Forest thinning is the practice of removing undesirable vegetation (this may include select trees or understory vegetation) from a forested area. Thinning is expected to increase light availability and penetration, which may increase the herbaceous vegetation diversity on the forest floor. This technique may also provide conditions that will facilitate the survival of native herbaceous plants and prevent the extensive growth of Bermuda grass and other heavy, rhizomatous mat-forming grasses that inhibit Houston toad movement.

Some landowners may choose to conduct forest enhancement and/or restoration on their enrolled properties to restore canopy conditions that are favorable to the Houston toad. Pine and oak species that are native to the area may be transplanted in open areas to establish a forest canopy amongst the restored, native herbaceous plant community.

Prescribed burning will also be conducted under the programmatic Agreement. Prescribed burning is a technique used to restore, create, and maintain desired understory and ground cover conditions. Habitat may be subjected to multiple, low-intensity “management” burns following initial understory restoration work (thinning). The purpose of low-intensity burns is to maintain the open understory and enhance the quality and cover of the native herbaceous vegetation.

Studies have shown that increased light on the forest floor can provide an opportunity for increased herbaceous plant diversity (Halls and Schuster 1965, Thomas et al. 1999). Because of this, it is predicted that maintaining light availability through prescribed burning will increase the diversity of plant species and, subsequently, the diversity of the arthropod community (Siemann et al. 1998). Increased light penetration to the forest floor and regrowth of native herbaceous vegetation are expected to increase in a stepwise fashion following each subsequent thinning and fire treatment in Houston toad habitat.

Fire suppressed forests can become too dense and shaded and accumulate dangerous levels of burnable duff and debris. Therefore, thinning and prescribed burning as forest management tools can reduce the threat of stand-replacing, catastrophic wildfires by reducing wildfire intensity (Pollet and Omi 2002, Hurteau and North 2009, Mitchell et al. 2009). Catastrophic wildfires could have devastating effects to Houston toad habitat. Because wildfires also produce large direct carbon dioxide emissions (Wiedinmyer and Neff 2007), fire suppressed, fuel-loaded forests are also susceptible to large carbon emissions if they burn in a catastrophic wildfire (Hurteau et al. 2008, Hurteau and North 2009). Although effects of fuel treatments on forest carbon are still being investigated, some researchers suggest that fuel-reducing prescribed

burning can promote carbon storage by decreasing the risk of carbon loss through stand-replacing, catastrophic wildfires (Hurteau et al. 2008).

Activities related to construction of new breeding ponds or enhancement of existing breeding ponds would likely result in short-term disturbance of vegetation. The disturbance associated with these projects would be relatively small, usually less than one acre for each site, and would not result in a significant change in vegetative structure or distribution.

We expect our proposed action and the implementation of the proposed programmatic Agreement will have an overall beneficial impact on native vegetation communities. These impacts are expected to be insignificant due to the anticipated sizes of the enrolled properties compared within the action area.

#### 4.2.2 Wildlife

Implementing the programmatic Agreement is likely to result in both short-term and long-term effects to species within the covered area. The number of species that will be affected as a result of conservation activities conducted under the programmatic Agreement cannot be fully estimated at this time. Beneficial effects of implementing the proposed action could include increased forage, water, and cover resources and increased overall community diversity. Control of the red-imported fire ant is expected to reduce mortality of various wildlife species and the arthropod community that serves as the food base for many amphibian and reptile species. Prescribed burning and other forest enhancement activities will likely affect each wildlife species differently depending on the frequency, duration, intensity, and severity of the prescribed burns conducted at any given site enrolled in the Agreement. With most species, young animals are more vulnerable to injury and mortality than mature individuals (Lyon et al. 2008). However, it is generally accepted that any fire-induced mortality that does occur is outweighed by maintaining preferred or required habitat features within an ecosystem (Russell et al. 1999; Lyon and Telfer 2008). Other listed, proposed, and candidate species are known to occur within Houston toad habitat. In these instances, TPWD and private landowners will take necessary steps to avoid impacts to these species.

#### 4.2.3 Listed, Proposed, and Candidate Species

The Agreement is expected to have a net conservation benefit to the federally endangered Houston toad, as explained below. No direct impacts to any other listed, proposed, or candidate species are anticipated from the proposed action and approval of the programmatic Agreement. Indirect impacts to listed, proposed, or candidate species could occur during the implementation of this programmatic Agreement. The number of species that will be affected as a result of conservation activities conducted under this programmatic Agreement cannot be fully estimated at this time. Beneficial effects of implementing the proposed action could include increased forage, water, and cover resources.

## Houston toad

The conservation activities outlined in the programmatic Agreement are designed to expand, create, and restore habitat for the Houston toad throughout its range, thereby increasing its population numbers. It is reasonable to expect some short-term negative effects to Houston toads may occur during the implementation of the programmatic Agreement. Houston toads are expected to move onto the enrolled properties after conservation activities have been initiated as a result of an increase in the availability of higher quality habitat. Houston toads may also be reintroduced onto enrolled properties. There may be an increased risk of death or injury to Houston toads on enrolled properties during understory thinning, prescribed burning, or pond construction activities.

There also may be a risk of injury or death to Houston toads when and if landowners enrolled in the programmatic Agreement take actions to return their properties to their baseline conditions. For example, landowners may choose to fill in wetlands or other jurisdictional waters of the United States or cut down forests that had been previously created during implementation of the programmatic Agreement. A number of restrictions have been incorporated into the programmatic Agreement on returning properties to baseline conditions to minimize incidental take. The Service expects these restrictions to minimize the amount of injury or death to Houston toads. They include the following:

- Under no circumstances will a landowner be authorized to purposefully take (for example, intentionally kill, injure, capture, or transport) a Houston toad in an effort to return the property to baseline conditions or for any other purpose.
- Landowners will notify TPWD and the Service prior to the breeding season before he or she plans to return the property to its baseline conditions. Landowners will also allow TPWD and the Service access to enrolled properties to capture Houston toads and move them off the property, if necessary.
- To the extent possible, activities designed to return a property to its baseline conditions will take place between July 1 and December 31 (outside of the Houston toad breeding season and emergence period), when Houston toads are less active.

The conservation activities described in the programmatic Agreement are likely to result in habitat improvement and the expansion and/or reintroduction of Houston toads onto various enrolled properties. Eligibility to return to baseline will be effective after the conservation activities have been fully implemented and the net conservation benefits have had time to accrue. Each Cooperative Agreement will indicate when the participating landowner will be eligible to return his/her property to baseline conditions and by what means this will occur.

The programmatic Agreement includes a provision to allow some non-participating neighboring landowners to enroll their properties upon meeting eligibility requirements. Such landowners will receive incidental take authorization for any incidental take that may occur as a result of Houston toads moving onto or increasing in number on their properties from the conservation activities from neighboring lands enrolled as Cooperators under the Agreement. The incidental take would only authorize the ongoing, routine operations on these neighboring properties.

Although there are no expected benefits to Houston toads from allowing the enrollment of non-participating neighboring landowners, it is reasonable to expect some short-term negative effects to Houston toads to occur. We expect these short-term negative effects to be outweighed by the net conservation benefit achieved for this species as part of the programmatic Agreement.

The proposed action would likely result in substantial long-term benefits to the Houston toad even with the property owners properties eventually returning to the baseline conditions. The Houston toad depends on healthy and mature forest ecosystems with mixed species composition, moderate canopy cover (Forstner 2002a, Forstner 2003), and open understory layer with an herbaceous component and shaded breeding ponds (Kennedy 1962, Brown 1971, Forstner 2003). Unmanaged forests, fire suppressed forests, and forests that sustain other types of land uses, such as agricultural activities, can become less suitable Houston toad habitat over time if not properly managed. These and other changes may reduce the ability of the forest ecosystem to provide quality Houston toad habitat by altering the Houston toad's food base, increasing the risk for catastrophic fires that could destroy large blocks of habitat, and reducing Houston toad reproductive success. Thinning increases native insect prey abundance and diversity and improving conditions for Houston toad movement. The positive correlation between insect and plant community diversity on the forest floor is commonly recognized, as explained and demonstrated by Siemann et al. (1998). Thus, a reduction in vegetation community diversity on the forest floor may account for a decline in insect diversity and abundance, which is the food source for the Houston toad.

Tree planting that occurs within relatively open areas is expected to produce benefits for the Houston toad within 10 to 20 years of initial planting. These benefits include the creation of shade and micro-climates that will not only support a diverse assemblage of native grasses and forbs, but also provide a more favorable temperature regime for the Houston toad. These conditions are expected to facilitate and enhance Houston toad movement and foraging.

Active management of existing forests and minimizing negative impacts from various types of land uses within and adjacent to forested areas is essential to the long-term sustainability of Houston toad habitat within the action area. A programmatic Agreement is expected to provide an incentive to private landowners to actively participate in Houston toad recovery on a rangewide scale.

Implementation of the programmatic Agreement is expected to result in the following benefits to the Houston toad:

- Enhancement of Houston toad foraging and hibernating habitat by reducing the density of woody understory species, restoring favorable canopy conditions, and facilitating the establishment and maintenance of native herbaceous vegetation and Houston toad prey base
- Creation and enhancement of Houston toad breeding and toadlet emergence habitat
- Facilitation of Houston toad dispersal through the creation and enhancement of habitat linkages throughout the species' range
- Increase in Houston toad population numbers through headstarting and reintroduction
- Facilitation of viable, self-sustaining Houston toad subpopulations

## Other Listed, Proposed, and Candidate Species

- American alligator (*Alligator mississippiensis*) – Although the American alligator’s range includes the nine Texas counties included in the programmatic Agreement, the T(S/A) designation of this species has no effect on land management activities by private landowners.
- Attwater’s greater prairie chicken (*Tympanuchus cupido attwateri*) – Houston toads are not known to occur in this species’ habitat. Therefore, the proposed action and implementation of the programmatic Agreement will not affect this species.

To avoid potential effects to the prairie chicken, landowners within Austin and Colorado counties should determine if any of their enrolled properties are potential prairie chicken habitat. This assessment should be conducted by a qualified individual that has experience in assessing habitat conditions for the prairie chicken. It should also be done prior to the commencement of any conservation activities that may impact this species, such as forest restoration activities. No coastal grassland prairie habitat that could serve as potential habitat for the prairie chicken will be converted to forested habitat for the Houston toad.

- Interior least tern (*Sterna antillarum*) – Houston toads are not known to occur in this species’ habitat, and none of the Houston toad conservation activities are expected to take place in interior least tern habitat. Therefore, the proposed action and implementation of the programmatic Agreement will not affect this species.
- Whooping crane (*Grus americana*) – Because they migrate through the Houston toad’s range, the whooping crane is listed as occurring in each of the counties within the permit area of this Agreement. However, the proposed action and implementation of the programmatic Agreement will not affect this species.
- Sharpnose shiner (*Notropis oxyrhynchus*) – Houston toads are not known to occur in this species’ habitat. Therefore, the proposed action and implementation of the programmatic Agreement will not affect this species.
- Smalleye shiner (*Notropis buccula*) – Houston toads are not known to occur in this species’ habitat. Therefore, the proposed action and implementation of the programmatic Agreement will not affect this species.
- Smooth pimpleback (*Quadrula houstonensis*) and Texas fawnsfoot (*Truncilla macrodon*) These two freshwater mussels are mostly sedentary, riverine species and are not found in the same habitat as Houston toads. Therefore, the proposed action and implementation of the programmatic Agreement will not affect this species.
- Large-fruited sand verbena (*Abronia macrocarpa*) – The large-fruited sand verbena may be sympatric with the Houston toad within the two counties that both species occur. Therefore, the conservation activities outlined as part of the programmatic Agreement

and designed to benefit the Houston toad may potentially affect the large-fruited sand verbena.

To avoid potential effects to the large-fruited sand verbena, landowners within Leon and Robertson counties should determine if any of their enrolled properties are potential large-fruited sand verbena habitat. This assessment should be conducted by a qualified individual that has experience in assessing habitat conditions for the large-fruited sand verbena. It should also be done prior to the commencement of any conservation activities that may impact the large-fruited sand verbena, such as prescribed burning and new pond construction.

Should a landowner choose not to conduct this habitat assessment or if such an assessment fails to exclude the possibility that the large-fruited sand verbena occurs on his or her enrolled property, the landowner will work closely with TPWD and the Service to ensure that conservation activities will be carried out in such a way that will avoid effects to the large-fruited sand verbena. This can be achieved by such means as constructing ponds in areas distant from known large-fruited sand verbena habitat or scheduling prescribed burning activities so as not to disrupt the flowering, seed dispersal, or rosette-producing stages of this species. These precautions will be outlined in the landowner's Cooperative Agreement with TPWD. Because these life cycle stages (flowering period and rosette-producing stages) of the large-fruited sand verbena can begin at different time from season to season, the Service will seek information regarding these life cycle stages on lands known to be occupied by the large-fruited sand verbena by species experts each year to adequately advise TPWD and enrolled landowners on the commencement of burning activities.

- Navasota ladies'-tresses (*Spiranthes parksii*) – Navasota ladies'-tresses habitat consists of lightly wooded stream banks within post oak savannahs of east-central Texas. Navasota ladies'-tresses may be sympatric with the Houston toad within the five counties that both species occur. Therefore, the conservation activities outlined as part of the programmatic Agreement and designed to benefit the Houston toad may potentially affect Navasota ladies'-tresses.

To avoid potential effects to Navasota ladies'-tresses, landowners within Bastrop, Burleson, Leon, Milam, and Robertson counties should determine if any of their enrolled properties are potential Navasota ladies'-tresses habitat. This assessment should be conducted by a qualified individual with experience in assessing habitat conditions for Navasota ladies'-tresses. It should also be done prior to the commencement of any conservation activities that may impact Navasota ladies'-tresses, such as prescribed burning and new pond construction.

Should a landowner choose not to conduct this habitat assessment or if such an assessment fails to exclude the possibility that Navasota ladies'-tresses occur on his or her enrolled property, the landowner will work closely with TPWD and the Service to ensure that conservation activities will be carried out in such a way that will avoid effects to Navasota ladies'-tresses. This can be achieved by such means as constructing ponds in areas distant from known Navasota ladies'-tresses habitat or scheduling prescribed

burning activities so as not to disrupt the flowering, seed dispersal, or rosette-producing stages of this species. These precautions will be outlined in the landowner's Cooperative Agreement with TPWD. Because these life cycle stages of the Navasota ladies'-tresses can differ slightly from season to season, the Service will seek information regarding these life cycle stages on lands known to be occupied by Navasota ladies'-tresses by species experts each year to adequately advise TPWD and enrolled landowners on the commencement of burning activities.

#### 4.2.4 Cultural Resources

Many of the conservation activities that will be conducted as part of the proposed action and the approval and implementation of the programmatic Agreement, such as brush management, breeding pond enhancement, control of red-imported fire ants, and Houston toad head-starting or reintroduction activities, do not typically result in ground disturbance. Therefore, these activities are not expected to impact cultural resources.

Minor to moderate ground disturbance could occur from fence installation, forest enhancement and restoration, prescribed burning activities, or construction of new breeding ponds for the Houston toad. Prior to enrolling a property in the programmatic Agreement, TPWD will use the National Register of Historic Places National Register Information System to determine if the property is listed in or eligible for listing in the National Register of Historic Places. If a property is listed in or eligible for listing in the National Register of Historic Places, TPWD will confer with the appropriate landowner, the Service, and the Texas Historical Commission to determine whether the proposed conservation activities are compatible with the historic integrity of the property. Activities deemed incompatible with the historic integrity of the property will not be conducted. Thus, no direct or indirect impacts to cultural resources are anticipated from the proposed action and approval of the programmatic Agreement.

#### 4.2.5 Socioeconomic Environment

No direct impacts to the socioeconomic environment are anticipated from the proposed action and approval of the programmatic Agreement. There may be several individual landowners enrolled in the Agreement that receive funding through grants or other State or Federal cost-share programs to assist with the costs of conducting habitat management activities, but this is a small socioeconomic benefit that will likely not affect the socioeconomic environment at the county level. Because participation in the programmatic Agreement is voluntary, no significant effects are expected to the socioeconomic environment within the covered area.

If any participating landowners' voluntary conservation activities are reasonably expected to result in the Houston toad occupying other properties, the Service will address incidental take coverage on those neighboring properties under the programmatic Agreement and the associated permit. The implications to such landowners and the potential need to actively address these implications will be determined on a case-by-case basis. Neighboring landowners will have the option to receive regulatory protections and safe harbor assurances under the programmatic Agreement by completing a baseline assessment for their property and committing to monitoring and notification requirements, as described in the Agreement. In such cases, neighboring landowners will enter into a "Non-Participating Neighboring Landowner Cooperative

Agreement” (see Attachment E of the Agreement) with TPWD and receive a Certificate of Inclusion to enroll their property in this Agreement. Alternatively, neighboring landowners may enroll in this agreement as a participant or they can prepare an individual Safe Harbor Agreement that addresses covered species, baseline environmental conditions, and habitat on their property. No socioeconomic impacts to non-participating neighboring landowners are expected since they will not be conducting any conservation activities or receiving grants and cost-share programs as part of this Agreement.

#### 4.2.6 Wetlands

No direct impacts to wetlands are anticipated from the proposed action and approval of the programmatic Agreement. Indirect impacts to wetlands could occur during the implementation of the programmatic Agreement. Under this alternative, creeks, springs, seeps, and most other wetland areas would largely remain undisturbed and unaffected by the conservation activities proposed in the programmatic Agreement. However, this alternative is expected to provide an incentive for non-Federal landowners to create, restore, or enhance ephemeral wetlands and other potential Houston toad breeding sites on their properties. Such activities may include fence construction to restrict livestock, bank stabilization, canopy restoration adjacent to ponds, methods to reduce eutrophication, and re-vegetation at pond edges to provide cover for emerging toadlets. Therefore, existing stock tanks and other wetlands would be improved by the conservation activities included under the programmatic Agreement. Restoration of heavily-impacted or disturbed ponds and limitation of livestock access is expected to improve their wetland characteristics and functional values over time.

Ephemeral ponds may be created on select properties in different size and shape configurations to provide new breeding habitat for Houston toads during the implementation of the programmatic Agreement. Pond construction would only take place under the following circumstances: (1) through the recommendation of Houston toad experts and with thoughtful consideration of the best available science that would support the need for new ponds at sites that would not reduce the reproductive success of other known Houston toad chorus ponds in the area and (2) when the surrounding upland habitat conditions are of sufficient quality and extent to support the full life cycle of Houston toads emerging from those ponds.

Under the programmatic Agreement, a landowner may return his or her property to baseline conditions upon the expiration of a Cooperative Agreement and before the expiration of the associated programmatic permit. Ponds that are created through the implementation of the programmatic Agreement could be filled or otherwise eliminated if landowners choose to return their properties to their baseline conditions. Likewise, landowners may choose to remove fencing or discontinue management and restoration activities that were initiated to enhance or restore Houston toad breeding habitat. In such cases, these wetlands would be returned to the conditions they were in before the programmatic Agreement was implemented.

Depending on site conditions and location, construction techniques, proximity to jurisdictional waters of the United States, and other factors, activities involving the creation, alteration, or elimination of potential Houston toad breeding sites may require a permit from U.S. Army Corps of Engineers. Although this is not expected to be a common occurrence during the implementation of the programmatic Agreement, TPWD and all participating landowners will

coordinate with Federal, State, and local government offices and comply with all applicable laws and regulations when working in or near wetlands or other jurisdictional waters of the United States.

#### 4.2.7. Land Use

No direct impacts to land use are anticipated from the proposed action and approval of the programmatic Agreement. No significant effects are expected to the land uses that occur within the covered area. Enrollment in the programmatic Agreement is voluntary and will be limited to properties that can be maintained, restored, or enhanced to serve as Houston toad habitat. Therefore, no direct or indirect effects to these land uses as a result of the implementation of the programmatic Agreement are expected to occur.

It is expected that the majority of the sites enrolled in the programmatic Agreement will be open rangelands with existing grazing operations. Other undeveloped areas, such as forested lands may also be enrolled. In fact, enrollment priority will be given to non-Federal landowners with land adjacent to or near other properties currently being managed for Houston toad conservation. These undeveloped areas are likely also used for a variety of recreational activities, such as hunting, fishing, hiking, and bird-watching. The conservation activities included in the programmatic Agreement were designed to be consistent with these land uses. However, landowners enrolling in the programmatic Agreement may find they need to slightly modify their current land use practices to be consistent with the terms and conditions of the permit. For example, excluding livestock (either entirely or partially) or directing recreational activities away from potential Houston toad breeding sites may be necessary to achieve the desired conservation benefits for the Houston toad. Such modifications would not constitute a significant impact to land use.

#### 4.2.8. Water Resources

No direct impacts to water resources within the covered area are anticipated from the proposed action or approval of the programmatic Agreement. Indirect impacts of implementation of the programmatic Agreement may result in improvements to local water quality and quantity at specific sites, depending on a particular landowner's conservation commitments for wetland restoration. However, such activities are not expected to significantly affect groundwater supplies.

### 4.3 Cumulative Impacts

The Council for Environmental Quality regulations defines cumulative impacts as “the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time” (40 CFR 1508.7). Reasonably foreseeable future actions, while not part of the proposed action, refer to future projections or estimates of what is likely to take place when a proposed action is implemented. The timeframe for the cumulative effects analysis is based on the lifespan of the permit, which is 30 years. Specific identification or quantification of reasonably foreseeable

future actions outside of the Service's purview are difficult to anticipate due to the 30-year timeframe for the proposed action.

Three individual Enhancement of Survival permits have been issued and their accompanying Safe Harbor Agreements have been completed for the Houston toad in Bastrop County, Texas. The Long Family Safe Harbor Agreement was effective from 2004 to 2013 and covered incidental take resulting from conservation activities on a 540-acre (218 hectares) ranch known to be occupied by Houston toads. The Small Family Safe Harbor Agreement was finalized in 2007 and covers incidental take resulting from conservation activities on an 836-acre (338 hectares) ranch known to be occupied by Houston toads. Despite the completion of conservation activities and the detection of Houston toads on the Long property around 2005, Houston toads have not been detected on this site in recent years. In contrast, Houston toads have been detected on the Small property since 2011 and are believed to continue to occupy the site. The Boy Scouts of America/Capital Area Council also enrolled their 541-acre (218 hectares) Lost Pines Scout Reservation in a Safe Harbor Agreement that was finalized in 2007. The Lost Pines Scout Reservation is not known to be occupied by Houston toads, but it is expected that the conservation activities undertaken as part of their Safe Harbor Agreement will create and enhance habitat for the species. This may entice Houston toads to move onto the property from surrounding areas.

Since 2004, Houston toad habitat has been successfully created, restored, enhanced, and maintained through the issuance of the individual permits and implementation of their accompanying Safe Harbor Agreements. Additionally, they have provided opportunities for researchers and land managers to collect much needed information on the effectiveness of various management activities on the Houston toad and its habitat.

The Lost Pines HCP was finalized in April 2008 and authorizes Bastrop County to issue certificates of inclusion to private landowners seeking incidental take coverage for the Houston toad under the Act for specific activities. These activities are outlined in the Lost Pines HCP and include agricultural, forestry, and wildlife management practices in addition to subdivision development. Many of the conservation activities included under the programmatic Agreement are also included under the agricultural, forestry, and wildlife management guidelines provided in the Lost Pines HCP. These guidelines serve as measures for avoiding or minimizing take of the Houston toad while such activities are conducted. The permit area for the Lost Pines HCP includes approximately 124,000 acres (50,181 hectares) of known and potential Houston toad habitat within Bastrop County.

Other major HCPs that are currently being implemented within the Houston toad's range include the Bastrop Utilities HCP and the Griffith League Ranch (GLR) HCP. No additional HCPs are being processed within the Houston toad's range; however, more HCPs that include incidental take coverage for the Houston toad may be developed in the future.

The Bastrop Utilities HCP was finalized in 2005 and has a 30-year permit term. It covers the incidental take of Houston toads resulting from the routine installation, maintenance and repair of both linear and fixed-foundation facilities from four utility providers (Aqua Water Supply Corporation, Lower Colorado River Authority, Bluebonnet Electric Cooperative, Inc., and

Austin Energy) for 142,526 acres (57,678 hectares) in portions of Bastrop and Lee Counties, Texas.

The 4,848-acre (1,962-hectare) GLR HCP is located about 8 miles northeast of the City of Bastrop. This HCP covers incidental take of the Houston toad resulting from the otherwise lawful activities associated with the development of the GLR as a high adventure boy scout camp as well as its management and ongoing operations. At the time the GLR HCP was finalized in 2003, it was occupied by one of the two largest remaining Houston toad populations throughout this species' range. Population declines that have been recently documented on the property are likely the result of both ongoing drought conditions and a 2011 wildfire that impacted approximately half of the property.

Federal projects within the action area in the past have included cell tower installation, Federal highway construction and repair projects, petroleum pipeline installations, and wildfire restoration and recovery efforts. Most recently, the Service finalized a formal section 7 consultation with the Army Corps of Engineers for the construction of a petroleum pipeline through a portion of the Houston toad's habitat in Bastrop County. Mitigation for this project will serve to fund ongoing Houston toad captive propagation efforts. Also, the Service reinitiated a formal consultation with the Federal Highways Administration on the rehabilitation of U.S. Highway 290 within Bastrop County. Projects such as these are reasonably foreseeable to continue into the future since human population growth and subsequent development is projected to increase within the Houston toad's range.

Since 2000, two properties have been purchased through the section 6 land acquisition grant program for Houston toad conservation. The 454-acre (184-hectare) Welsh tract, which is adjacent to the GLR, was acquired by Bastrop County in 2003. It is now managed by Texas State University specifically for Houston toad research and conservation through an agreement with Bastrop County. An in-situ Houston toad headstarting facility was constructed on this site in 2008 from funds from the Service's preventing extinction grant program. After being destroyed by wildfire in 2011, the facility was rebuilt at the same location in 2012 by the Federal Emergency Management Agency. Another tract (Alum Creek) approximately 800 acres (324 hectares) in size was acquired through a section 6 grant as an addition to Bastrop State Park in 2001.

In addition to the tracts conserved through the section 6 land acquisition grant program, the Pines and Prairies Land Trust and the Trust for Public Land protected the 302-acre (122-hectare) Yegua Knobbs Preserve that stretches across the Bastrop County and Lee County boundaries. Although the Houston toad has not yet been detected on this property, suitable habitat for the species occurs there. Funding for this acquisition was secured through the settlement of an environmental lawsuit unrelated to the Houston toad in 2004. There are no other Houston toad habitat areas known to have been conserved within this species' range. Although acquisition of Houston toad habitat remains an important aspect of the recovery strategy for this species, it is difficult to raise funds needed to purchase large tracts for Houston toad conservation.

Habitat loss through destruction, fragmentation, fire suppression, and conversion to agriculture or urbanization are primary threats to the species' continued existence. Direct and indirect

effects of invasive species, such as predation by red-imported fire ants and habitat destruction by feral hogs; inter-specific competition and hybridization; herbicides and pesticides; disease; and effects from catastrophic events, such as prolonged drought and wildfire are additional significant threats to the species. Although these threats can be reasonably foreseen to continue into the future, ongoing Houston toad headstarting and captive propagation efforts are expected to aid considerably in the species' recovery so long as sufficient habitat can be identified, restored, maintained, and conserved to provide for multiple sustainable populations across the range. The proposed action would provide an efficient mechanism to allow private landowners to undertake voluntary conservation activities for this species without the risk of further restrictions pursuant to section 9 of the Act.

Current impacts to the existing environment within the covered area and impacts from future actions under the Preferred Alternative are described above. Effects to the current environment will be localized across the Houston toad's nine-county range according to which properties will be enrolled under the programmatic Agreement. Because of the large area to be covered and the localized nature of the impacts to each property enrolled under the programmatic Agreement, impacts are anticipated to be beneficial, generally neutral, or insignificant either locally or across the range. Therefore, these impacts, when combined with past, present, and reasonably foreseeable future activities in the action area, are not expected to result in significant adverse cumulative impacts to the human environment.

## **5.0 PUBLIC INVOLVEMENT**

### **5.1 AGENCY INVOLVEMENT**

The programmatic Agreement and this draft Environmental Assessment was developed with TPWD and will be forwarded to appropriate staff at the U.S. Army Corps of Engineers, Texas Forest Service, Natural Resources Conservation Service, and Texas Department of Agriculture for review during the public review process discussed below. Comments will be incorporated, as applicable.

### **5.2 PUBLIC REVIEW**

This document, along with the Agreement will be made available for public review. The review period will be for 60 days. A Notice of Availability will be published in the Federal Register and will be mailed or e-mailed to interested parties and agencies. It will also be posted on the Austin Ecological Services Field Office website.

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Figure 1. Texas Counties Included in the Houston Toad Programmatic Safe Harbor Agreement.

