

# **DRAFT**

## **SAFE HARBOR AGREEMENT**

**Between**

**BOY SCOUTS OF AMERICA,  
CAPITOL AREA COUNCIL #564**

**and**

**U.S. DEPARTMENT OF THE INTERIOR,  
FISH AND WILDLIFE SERVICE**

## TABLE OF CONTENTS

	<b>Page</b>
1. INTRODUCTION.....	
1	
2. LIST OF COVERED SPECIES.....	1
Description of Covered Species.....	1
3. DESCRIPTION OF ENROLLED LANDS.....	3
Description of Present and Planned Use of Lost Pines Scout Reservation.....	3
Description of Current Vegetation and Habitat Conditions.....	5
4. BASELINE DETERMINATION.....	6
5. CONSERVATION ACTIVITIES.....	7
Conservation Benefit.....	10
Risks.....	10
Incidental Take.....	11
Net Benefit.....	11
6. OTHER RESPONSIBILITIES OF THE PARTIES.....	12
7. AGREEMENT DURATION.....	14
8. ASSURANCES TO THE BSA/CAC REGARDING TAKE OF COVERED SPECIES.....	14
9. MODIFICATIONS.....	15
10. OTHER MEASURES.....	15
11. LITERATURE CITED.....	18
12. SIGNATURES.....	21

## ATTACHMENTS

- A. Location Map - LCRA/Lost Pines Scout Reservation
- B. Aerial Photography - LCRA/Lost Pines Scout Reservation
- C. Key to Development Plan - Lost Pines Scout Reservation
- D. Soils - LCRA/Lost Pines Scout Reservation
- E. Detailed Vegetation and Habitat Conditions – LCRA/Lost Pines Scout Reservation submitted to the Boy Scouts of America/Capitol Area Council by David Wolfe of Environmental Defense
- F. Proposed Management Areas of the LCRA/Lost Pines Scout Reservation
- G. Safe Harbor Habitat Enhancement and Metapopulation Connectivity Goals for the Houston toad on the LCRA/Lost Pines Scout Reservation Submitted to the Boy Scouts of America/Capitol Area Council by Michael R.J. Forstner, Ph.D. – December 1, 2004
- H. Compilation of Houston Toad Survey Data and Interpretation Supporting a Zero Baseline Assessment for the LCRA/Lost Pines Scout Reservation Bastrop County, Texas by Michael R.J. Forstner, Ph.D. - August 1, 2004

# SAFE HARBOR AGREEMENT

## 1. INTRODUCTION

This Safe Harbor Agreement (Agreement) is entered into between the Boy Scouts of America, Capitol Area Council #564 (BSA/CAC) and the U.S. Fish and Wildlife Service (Service); hereinafter collectively called the “Parties.” The purpose of this Agreement is to enhance a subpopulation of the Houston toad (*Bufo houstonensis*) and its habitat through the implementation of specific habitat enhancement activities on property owned by the BSA/CAC. This Agreement follows the Service’s Safe Harbor Agreement policy (64 FR 32717, 64 FR 52676) and regulations (64 FR 32706), both of which implement section 10(a)(1)(A) of the Endangered Species Act (Act) of 1973, as amended.

## 2. LIST OF COVERED SPECIES

This Agreement covers the following federally-listed species, which is hereafter referred to as the “covered species”:

Houston toad

### Description of Covered Species

In October 1970, the Houston toad was federally-listed as an endangered species (35 FR 16047). Critical habitat was designated for this species in January 1978 (43 FR 4022). Houston toads are generally brown and speckled, although individual coloration can vary considerably. The Houston toad’s underside is usually pale with small, dark spots. Males have dark throats, which appear bluish when distended. Adult Houston toads are 2 to 3.5 inches (5 to 9 centimeters) long and, like all toads, are covered with raised patches of skin that resemble warts (Brown 1971). Although Houston toads are similar in appearance to the closely-related Gulf Coast toad (*B. valliceps*) and Woodhouse’s toad (*B. woodhouseii*), these species can be discerned by physical and genetic characteristics (Brown 1971, Hillis et al. 1984). Mitochondrial DNA sequence analysis indicates that the Houston toad is a unique evolutionary unit separate from the other species (Forstner and Dixon 2000).

The Houston toad is endemic to east central Texas and is only known to occur in nine Texas counties (Dixon 2000). It is believed to have been extirpated from its former range east of the Trinity River in Harris, Liberty, and Fort Bend counties, Texas (Hillis et al. 1984, Yantis 1989, 1990, 1991, 1992). Houston toad habitat consists of rolling uplands characterized by pine and/or oak woodlands underlain by deep, sandy soils (Kennedy 1962, Brown 1971, Seal 1994). Tree species vary, but typically include loblolly pine (*Pinus taeda*), post oak (*Quercus stellata*), blackjack oak (*Q. marilandica*), and/or sandjack oak (*Q. incana*)(Forstner 2003). Although the Houston toad does not appear to be tied to the presence of a particular tree species, pine is dominant in the Lost Pines forest of Bastrop County (Brown and Thomas 1982), which is home to the largest known populations of Houston toads (Hillis et al. 1984, Seal 1994).

There is a high correlation between the occurrence of the Houston toad and outcrops of the Eocene Epoch Sparta Sand, Weches, Queen City Sand, Recklaw, and Carrizo Sand formations (Yantis 1991, Seal 1994, Forstner 2003). The Carrizo Sand and Recklaw formations give rise to deep sandy soils, such as the Patilo-Demona-Silstid and Axtell-Tabor soils that are often found in toad habitat (Dixon et al. 1990, Forstner 2003).

Water is an important component of the Houston toad's habitat. Houston toads are known to breed in small pools of water and ephemeral ponds (Kennedy 1962, Brown 1971, Forstner 2003). They also have been heard calling or have been captured in man-made ditches, lakes, plowed fields, puddles in roads, moist areas in yards, flooded pastures, potholes, streams, stock tanks, and permanent ponds (Forstner 2001, Forstner 2003). Survival of eggs, tadpoles, and emerging juveniles may be low in permanent water bodies (Forstner 2003) because they are more likely to harbor predators such as birds, mammals, snakes, turtles, fish, aquatic invertebrates, and bullfrogs (Quinn and Ferguson 1983, Dixon et al. 1990) and potential competitors, such as Woodhouse's and Gulf Coast toads (Hillis et al. 1984). Permanent water bodies also have an increased probability of livestock usage (Forstner 2003).

The life expectancy of the Houston toad is at least three years, but may be longer (Price 1993). Males reach sexual maturity at about one year of age, but females require one to two years to achieve reproductive maturity (Quinn 1981, Quinn and Mengden 1984). In mark-recapture surveys of Houston toads in Bastrop County, observed sex ratios of males to females have been highly skewed in favor of males ranging from 3:1 to 10:1 (Dixon et al. 1990; Forstner 2002a, 2002b, 2003). The Houston toad is an "explosive" breeder, appearing in large numbers at breeding ponds where the males call to attract females over a period of a few nights throughout the breeding season, beginning as early as January 18 (Hillis et al. 1984, Dixon et al. 1990). Houston toads typically breed from late January to June (Kennedy 1962, Hillis et al. 1984). Reported egg-laying dates in the field range from February 18 to June 26 (Kennedy 1962, Dixon 1982, Hillis et al. 1984). Breeding is believed to be triggered in part by rainfall and warm nighttime temperatures (Kennedy 1962); however, all cues that may stimulate breeding activity in the Houston toad are not known. This species tends to concentrate their reproductive efforts into producing large numbers of eggs, but each egg has less than one percent probability of survival (Seal 1994). Eggs are laid in strings in the water, and hatch into tadpoles that metamorphose into juvenile toadlets approximately 60 days after egg deposition (Hillis et al. 1984).

Small, sedentary species with restricted distributions, specialized habitat niches, and narrow climatic tolerances are especially sensitive to changes in habitat conditions (deMaynadier and Hunter 1998, Welsh 1990). The distribution of the Houston toad appears to be restricted naturally as the result of specific habitat requirements for breeding and development. These natural restrictions make them particularly vulnerable to the negative effects of human-induced changes that result in habitat loss, degradation, and fragmentation (Hillis et al. 1984). Habitat disturbance also encourages the establishment and proliferation of red-imported fire ants (*Solenopsis invicta*) (fire ants). Fire ants are known to prey on newly-metamorphosed toadlets (Freed and Neitman 1988, Forstner 2002a) as well as the invertebrate community that is believed to be an important part of the food base for the Houston toad (Bragg 1960) and for most toad species within the genus *Bufo* (Clarke 1974). Paved roads and other forms of urban development

can prevent or hinder amphibian dispersal (Van Gelder 1973, Reh and Seitz 1990, Soulé et al. 1992, Fahrig et al. 1995, Yanes et al. 1995, Findlay and Houlihan 1997, Gibbs 1998, Vos and Chardon 1998, Knutson et al 1999).

Other forms of habitat loss or disturbance include expanding urbanization, conversion of woodlands to agricultural use, logging, mineral production, alteration of watershed drainages, wetland degradation or destruction, and other processes that contribute to loss of suitable breeding, feeding, or sheltering habitat (Brown 1971, Seal 1994). 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. Maintaining several relatively large populations of equal sizes that are interconnected so as to allow dispersal and re-colonization can enhance population survival (Seal 1994).

### **3. DESCRIPTION OF ENROLLED LANDS**

The property covered by the Agreement and its associated Permit is the entirety of the Lower Colorado River Authority (LCRA)/Lost Pines Scout Reservation, including the Lost Pines Boy Scout Camp and Camp Tom Wooten (collectively referred to as LPSR), an approximately 541-acre (218.9 hectares) parcel located in Bastrop County, Texas. The location of LPSR is shown on a map dated 2006 (Attachment A). The property boundary relative to the north shore of Lake Bastrop is shown in the aerial photograph in Attachment B. The entirety of LPSR is considered the “enrolled property” as defined in the Service’s final Safe Harbor Policy.

The LPSR lies within an area designated as critical habitat for the Houston toad, as delineated in Attachment A. The BSA/CAC operates a camp for youth involved in Cub Scouting, Boy Scouting, and Venturing on the LPSR. Public lands within the county that contain Houston toad habitat and where Houston toads have been documented within one mile of the enrolled property include Bastrop and Buescher State Parks and the LCRA’s property around Lake Bastrop (total about 6,000 acres, Attachment A).

#### Description of Present and Planned Use of LPSR

The BSA/CAC was chartered in 1912 as the Austin Council. With the addition of Travis County in 1924, it became the Austin-Travis County Council. In 1928, nine counties were added to the council service area and the name was changed to the Austin Area Council. In 1934, it was renamed the Capitol Area Council. By 1936, five additional counties had been added, expanding the service area to cover the present territory of fifteen counties in Central Texas. In 1987, the Capitol Area Council served over 10,000 young people. By 1999, the Capitol Area Council had doubled in size serving 21,444. In 2005, the Capitol Area Council served over 25,000 co-ed youth.

From 1965 to 1997, the Capitol Area Council leased 541 acres known as the LPSR located in Bastrop, Texas from the LCRA. In 1998, the Capitol Area Council purchased that property from the LCRA. The LPSR consists of two sections. Although there is no designated boundary between the two sections, they serve as two different camps. One section, which serves as the

present-day summer camp for Boy Scouts, is known as Lost Pines Boy Scout Camp. In 2003, there were 2,398 total campers in attendance. That number includes staff, adult leaders, and youth campers. A total of 1,289 youth campers and 248 adult leaders were from Capitol Area Council. The balance of 564 youth campers and 167 adult leaders were from other councils. The other section, which serves as the site for present-day Cub Resident Camp for Cub Scouts, is known as Camp Tom Wooten. In 2003, there were 1,208 total campers that included 771 youth and 437 parents.

The Camp Tom Wooten portion of the LCRA/LPSR consists of approximately 150 acres. The BSA/CAC plans to develop a Cub World for Cub Scouts at Camp Tom Wooten. The following are planned revisions to the existing Camp Tom Wooten (as illustrated on Attachment C):

- Leave existing bridges in place (versus demolition)
- Move campsite #1 closer to the athletic field
- Relocate restroom/shower house building to work with relocated campsite #1
- Main parking area should be paved
- Locate a ranger residence
- The typical restroom/shower house building shared by two campsites for a maximum of 80 people will have four shower and five toilet compartments

In addition, the following facilities will be constructed as part of the Cub World development:

- Entrance with gateway
- 10 campsites with platforms and pavilions
- Dining hall and parade field
- Campfire ring
- Shower and restrooms for every two campsites
- Chapel
- Administration and medical facilities
- Activity field
- Fort/bb gun range
- Native American Village/Cub archery area
- Pool
- Nature lodge
- Handicraft lodge
- Mine Shaft
- Obstacle Course
- Pirate ship with Fishing Dock and Paddle Boating
- Paved roads
- Parking lot for 200 cars
- Staff parking
- Staff area
- Maintenance Yard

The Lost Pines Boy Scout Camp portion of the LCRA/LPSR consists of approximately 391 acres (158.2 hectares) and is the current site for the BSA/CAC's summer camp for Boy Scouts. The

BSA/CAC considers the conversion of the existing septic system to a new waste water sewage system an urgent issue at the camp. This issue is vitally important to meet state standards and to continue to operate a camp on this property. In addition, the following are the planned revisions or modifications to the existing Lost Pines Scout Camp:

- Relocate entrance
- Old trading post becomes the Nature Environmental and Conservation program area
- Old dining hall becomes Trading Post and multiple use building
- Relocate Outdoorsman and Scout craft program areas
- Convert Trading Post into Nat-E-Con (nature lodge)
- Convert office into pavilion (add restrooms)
- Big house becomes rangers home
- Old ranger's residence becomes second ranger's home
- Re-Open old Gaskin and Lindsay campsites
- Enlarge chapel

The following are planned additions to the camp:

- New Administration building with lodging for Camp Master on the weekends
- New dining hall
- New pool
- New commissioner's area
- New sports field with basketball and volleyball courts
- Second campfire ring near main parking
- Connect all facilities to LCRA sewer system
- New showers and restrooms for every two campsites
- Pavilions in each campsite
- Tent platforms in all campsites
- Main road paved
- Main parking area to be paved
- New Council Ring near main parking area and outdoorsman area
- Add a gate south of main parking

These improvements are generally depicted on Attachment C.

#### Description of Current Vegetation and Habitat Conditions

The LPSR is underlain with the Calvert Bluff geologic formation and Patilo-Silstid-Demona and Axtell-Tabor deep sandy soils, which have been shown to provide habitat for the Houston toad on the nearby Griffith League Scout Ranch. The soils of the LPSR are depicted on Attachment D.

Three "natural" vegetation types are present on the LPSR. The two dominant types, each covering approximately 200 acres (80.9 hectares) of LPSR, are loblolly pine forest and post oak – blackjack oak – eastern red cedar (*Juniperus virginiana*) woodland. The third is a transitional type that consists of elements of the aforementioned forest and woodland types. In a few cases,

such as former pine beetle (*Dendroctonus frontalis*) infestation areas, the transitional type consists primarily of eastern red cedar woodland. These transitional areas account for approximately 100 acres (40.4 hectares). The balance of approximately 41 acres (16 hectares) consists of buildings, parking areas, lawns, etc. A detailed description of vegetation and habitat conditions is contained in “Detailed Vegetation and Habitat Conditions LCRA/Lost Pines Scout Reservation” incorporated as Attachment E.

Within the LPSR, management areas have been delineated to enhance habitat conditions for and survivability of Houston toads. These areas are described in Attachment E and are delineated on a map of the LPSR in Attachment F. Management areas were delineated on the LPSR based on: (1) proposed or existing manmade features and natural features that can serve as fire breaks during any prescribed burns, and (2) provision of enhancing habitat conditions to enhance movement among existing foraging and breeding areas to the south and southeast of the LPSR.

While vegetation and habitat conditions have been defined in 20 management areas (MAs) across the LPSR, the primary focus of Houston toad habitat restoration efforts will be in MAs 1-12 along eastern, south, and southeastern boundaries of the LPSR. The reasoning behind the habitat restoration efforts is described below in the “Conservation Measures/Net Conservation Benefit” section of this document and in “Safe Harbor Habitat Enhancement and Metapopulation Connectivity Goals for the Houston Toad on the LCRA/Lost Pines Scout Reservation” (Attachment G) prepared by Michael R.J. Forstner, Ph.D.

#### **4. BASELINE DETERMINATION**

While the LPSR lies between areas where Houston toads have been found to exist, surveys and habitat conditions indicate that they are not on the LPSR. In 1993, Dr. James Dixon of Texas A&M University conducted a survey on the LPSR, but was unable to locate any breeding choruses of Houston toads. Dr. Dixon heard Houston toads chorusing on the adjacent LCRA property, but heard no Houston toads within the boundaries of LPSR. In 2001, Dr. Michael Forstner of Texas State University at San Marcos and his students examined about 20 (8.1 hectares) acres on the eastern portion of the LPSR for water bodies that could serve as potential breeding ponds for the Houston toad. Although the visit followed a significant rain event, no standing water bodies were found. In 2002 and 2003, Dr. Forstner and his students conducted audio surveys on the LPSR by establishing listening stations that covered the entirety of the property. No toads were heard chorusing within the property boundaries. During these surveys, Houston toads again were heard chorusing from a pond on the adjacent LCRA property. The possibility of toads being able to move onto the LPSR from the LCRA property is unlikely given the extremely dense vegetation that is found in the eastern, south, and southeastern portions of the LPSR nearest to the point where the toads were heard calling. Based upon his work and the prior work of Dr. Dixon, Dr. Forstner has concluded that Houston toads do not presently inhabit the LPSR. The results of surveys conducted in 1993, 2001, 2002, and 2003 are set forth in the “Compilation of Houston Toad Survey Data and Interpretation Supporting a Zero Baseline Assessment” attached as Attachment H.

The parties agree that LPSR shall have a zero baseline for Houston toads, as several surveys conducted on the property have failed to detect the presence of the Houston toad. The

occasional presence of toads moving through the upland habitat from the adjacent LCRA property is highly unlikely given the current habitat conditions on the LPSR. The zero baseline shall be considered current as of the date of this Agreement.

## 5. CONSERVATION ACTIVITIES

The BSA/CAC will work collaboratively with the Service, the Texas Forest Service, Texas State University at San Marcos, and Environmental Defense to implement conservation activities to improve the quality of Houston Toad habitat within the designated areas on the LPSR. The rationale for the habitat restoration to be employed by the BSA/CAC is described in Attachment G.

The goals of the Safe Harbor management program are:

1. Restore and establish suitable habitat that will allow a sustainable resident Houston toad population to become established on the LPSR or establish a means of toad dispersal through the LPSR by providing habitat connectivity across the property.
2. Restore and maintain a healthy primary forest ecosystem on the LPSR.
3. Document and distribute the results from monitoring activities and evaluation of outcomes from forest management strategies to assist with the recovery of the Houston toad.

Specific conservation activities will include the following:

- **Thin understory vegetation in woodlands and forests within the eastern, south, and southeastern areas of LPSR**

Much of the once dominant pine forest in this area was hard hit by pine beetle during the 1990s drought and is being replaced by cedar thickets and mesquite (*Prosopis glandulosa*). The suppression of wildfires has led to a dramatic increase in the densities of these species and a decline in the cover and diversity of the herbaceous layer. The positive correlation between insect and plant community diversity is commonly recognized, as explained and demonstrated by Siemann et al. (1998). Thus, the reduction in vegetation community complexity on the forest floor of the LPSR may have led to a decline in insect diversity and abundance, a food source for the Houston toad.

Understory brush will be removed from MAs 1, 3, and 10 in the first year and MAs 6, 13, and 12 in the second year within the woodlands and forests by mechanical shears or chainsaw, depending on the circumstances at each location. The first year of thinning will begin immediately following the finalization of the Agreement and issuance of the associated Permit. The primary species to be controlled are mesquite, eastern red cedar, and yaupon (*Ilex vomitoria*). Understory cover will be reduced in accordance with an experimental design under the supervision of Texas State University at San Marcos that will include two, or possibly three, levels of reduction. The design seeks to evaluate the trend in forest floor plant diversity under different management approaches specifically examining the regrowth of invasives like mesquite and yaupon. The untreated MAs (MAs 2, 8, 11, 9) adjacent to

each treated MA will be used as controls. The first level of reduction will be accomplished through hand thinning in MAs 3 and 6, the second by mechanical, low impact brush mower in MAs 10 and 13, and the third by tree thinning and removal of understory by both mechanisms (hand and mechanical) in MAs 1 and 12. Quantification of the regrowth, diversity, and effects can be measured by standard vegetation surveys in the treated areas and comparison with the control areas. The first year that thinning occurs in each MA will be followed by a year of vegetation data collection and analyses. All subsequent treatments will incorporate information gained during the first, two-year treatment period. The Service will be allowed to review and comment on the experimental design prior to implementation.

One goal of these efforts is to better understand the impacts of understory thinning intended to improve habitat suitability for the Houston toad. Forest thinning is expected to increase canopy openness and light availability, which may increase the herbaceous vegetation diversity on the forest floor. This research will help determine if thinning can mimic the results of a natural wildfire by increasing forest canopy openness to enhance the ability of existing native herbaceous vegetation to flourish and serve as an alternative forest management technique of fuel load reduction that works effectively within dangerously suppressed forests such as those in Bastrop County. This technique may also reduce the occurrence and persistence of exotic grasses that are inhospitable to the Houston toad, and provide conditions that will facilitate the planting and survival of native herbaceous plants to prevent the extensive growth of Bermuda grass (*Cynodon dactylon*) or other heavy, rhizomatous mat forming grasses. This is particularly important as the transplanting of native tree seedlings and understory shrubs will occur in each of the first years of the study in MAs 4, 5, and 7 to initiate succession of forested habitat in these areas. Thinning activities are expected to provide benefits to the Houston toad 2 to 5 years after implementation.

- **Restore/replant native vegetation in the eastern, south, and southeastern areas of LPSR**

Loblolly pines and oaks native to the area, such as post oak and blackjack oak, will be replanted in open areas and in areas where the overstory trees were decimated by the pine beetle. MA's 4, 5, and 7 provide the best connectivity pathway for Houston toad movement among known chorusing populations to the north of the LPSR and those to the south and southeast of the LPSR. Transplanting of native tree saplings and understory shrubs will be conducted in these areas. Native vegetation restoration activities are expected to provide benefits to the Houston toad 2 to 5 years after implementation.

- **Develop and implement a prescribed fire plan for the entire LPSR**

The restored or enhanced habitat may be subjected to prescribed “maintenance” burns approximately five to seven years following the initial restoration work and contingent on the results of prescribed fire planning in cooperation with the Texas Forest Service and the Service. Burns would be limited to the period between July and December to minimize the possibility of direct toad mortality. The purpose of the burns is to maintain the open understory and enhance the quality and cover of the native herbaceous vegetation, thereby increasing native insect prey abundance and diversity and improving conditions for toad movement. Although the effects of fire on arthropod diversity is not well-studied, McCollough et al. (1998) summarized existing literature on the effects of fire on insects in northern boreal forests and indicated that such effects vary among taxonomic groups, sampling time after fire, and the intent of the research study. 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 opening the forest canopy through prescribed burning will increase the diversity of plant species and, subsequently, the diversity of the arthropod community (Siemann et al. 1998). Prescribed burning activities are expected to provide benefits to the Houston toad within 2 years after implementation.

- **Create shallow ephemeral ponds designed to facilitate and enhance toad breeding success**

Ephemeral ponds will be created along the eastern boundary (in MA 8) and within the southern portion of the LPSR (in MA 10) in different size/shape configurations to provide new breeding sites for the toad. Until woody understory reduction and vegetation restoration is underway, the upland habitat will not provide suitable conditions for juvenile Houston toad survival. It would be imprudent to draw sexually reproductive toads to Lost Pines until the habitat can support their life cycle. For this reason, Dr. Michael Forstner of Texas State University at San Marcos recommends that pond construction be deferred on the LPSR for a minimum of five years following understory reduction and replanting along the eastern boundary of the property. After ponds are constructed, it is expected that they will begin to provide benefits to the Houston toad within 1 to 2 years. Although there are several areas in the southern portions of the LPSR that may currently be suitable for pond construction, Dr. Forstner recommends a minimum of two years of understory reduction and replanting prior to constructing new ponds.

Pond creation will be done according to the following guidelines:

1. Ponds will be located within one-half mile of deep sands.
2. Canopy cover adjacent to or surrounding the site will be 50 percent or greater (Greuter and Forstner 2004).
3. Ponds will have a slope no greater than 5:1 (Forstner and Ahlbrandt 2003).
4. Pond construction will be done outside of the Houston toad breeding season and emergence period (outside of January 1 through June 20).

5. Pond edges will be revegetated with native perennial bunch grasses. Annual grasses (e.g. ryegrass (*Lolium perenne*), oats (*Avena fatua*), or wheat (*Elymus smithii*)) should be planted to provide cover for emerging toadlets during the first year after pond construction.
6. Established forested canopy alongside native herbaceous plant community regrowth in low lying areas are good indicators of the habitat that can support juvenile Houston toads. Results of concurrent studies examining microhabitat preferences for juvenile Houston toads will be used to evaluate habitat surrounding the ponds.
7. Prior to construction, the BSA/CAC will consult with the Service and other appropriate parties, such as Texas Parks and Wildlife Department.

- **Treat fire ant mounds in the vicinity of the ponds**

Following the construction of ponds, fire ant mounds in the vicinity of the ponds will be controlled through the application of a Service-approved fire ant control to individual mounds once in the summer after the end of the breeding season (with one follow-up application) and (if needed) once in the fall (with one follow-up application). This management practice is expected to have direct benefits for the Houston toad by reducing toad and toadlet mortality. Indirect benefits, such as an increase in native insect abundance and diversity, are also expected. Benefits to the Houston toad are expected almost immediately after mound treatment. Fire ant control activities will be reevaluated and modified based upon information, such as: (1) fire ant mound densities after treatment, (2) toadlet emergence success, and (3) available information on treatment of fire ant mounds in the area.

### Conservation Benefit

One of the foremost threats to the Houston toad is habitat fragmentation, which restricts gene flow, inhibits toad movement between subpopulations, promotes the invasion of non-native species, and threatens the viability of the pine-oak ecosystem. Houston toads are known to travel from pond to pond within and between breeding seasons. With the implementation of the conservation activities outlined in section 5 above, the LPSR could provide a means of habitat connectivity for the Houston toad populations to the south and southeast of LPSR with the chorusing populations found to the north of the LPSR on Griffith League Ranch and adjacent areas (See Attachment A and Figure 2 in Attachment G ). This Agreement will restore the health of the ecosystem by thinning out dense shrubs such as cedar and yaupon that shade out native herbs and grasses that supported the prey base for the Houston toad. The loss of suitable ephemeral ponds as a result of drought, deforestation, modification, and degradation is also a major threat to the toad. When appropriate, new ephemeral ponds will allow expanded reproduction sites on the LPSR.

The conservation activities in this agreement are expected to result in the following conservation benefits to the Houston toad:

- Expansion and enhancement of potential breeding, foraging, and hibernating habitats for the population of Houston toads currently on adjacent and nearby properties.
- Protection and preservation of habitat to enhance the movement of Houston toads among existing foraging and breeding areas located to the south and southeast of the LPSR.
- Creation of Houston toad breeding habitat through pond creation.
- Collection of research data related to the effects from conservation activities and planned enhancements on the Houston toad, which will help in the design of future management strategies for this species.

The Service anticipates conservation benefits will begin accruing within 2 to 5 years after the initiation of the conservation activities in each MA. If the BSA/CAC continues to implement these activities until the Agreement has been in place for 13 years, the Service anticipates that these activities will result in at least 8 to 11 years of conservation benefit to the Houston toad. Following 13 years of implementing these conservation activities, the BSA/CAC may cease management activities and return the property to its baseline conditions within a 2-year period in accordance with the Permit associated with this Agreement. This provision is subject to the BSA/CAC's right to terminate the Agreement pursuant to Part 9. B. of this document.

### Risks

The proposed conservation activities are designed to increase the use of the LPSR by the Houston toad. Consequently, it is reasonable to expect that Houston toads will be found on the property after the conservation activities are implemented. They could encounter injury or mortality as a result of moving onto the LPSR from adjacent properties. For example, RM 1441 lies between the LPSR, the Griffith League Ranch, and adjacent areas that support Houston toad populations. Although it is currently a lightly traveled two-lane road, more traffic is expected on this road as the area develops. This could result in toad mortality if toads are enticed onto LPSR and attempt to travel between populations. As Houston toads move onto the LPSR, they may also risk injury or mortality as a result of the camp improvements that are described under "Description of Present and Planned Use of LPSR" in section 3 of this document.

### Incidental Take

During the term of the Agreement, implementation of the conservation activities may cause Houston toads to move onto the LPSR. This could result in a minor amount of incidental take of toads during understory thinning and prescribed burning activities. In addition, as a result of the creation and enhancement of habitat, it is reasonably foreseeable that there may be an increased risk of death or injury to individual toads as a result of normal camp activities (including those activities involving the expansion of camp facilities).

Implementation of the conservation activities described in this Agreement is likely to result in improvements to the habitat for the Houston toad and the expansion of the population onto the property. 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. Net conservation benefits are expected to accrue 13 years after this Agreement is finalized. After a 13-year management period, BSA/CAC is authorized to return the LPSR to its baseline conditions for the remaining 2 years of the Agreement. Specifically, the BSA/CAC may:

- Eliminate the ephemeral pond(s) created for breeding;
- Discontinue treatment of fire ant mounds;
- Discontinue planning and implementation of prescribed fire;
- Discontinue clearing of understory brush in woodlands to maintain an open understory; and

The Service believes that the extent of incidental take from returning the LPSR to baseline are largely limited to the elimination of ephemeral breeding ponds. The BSA/CAC will not undo any of the habitat improvements until the BSA/CAC has given the Service notice and a reasonable opportunity to relocate any affected individual Houston toads. This opportunity will include the next spring breeding season so as to permit capture at the ponds.

The conservation activities described in section 5 of this Agreement are expected to create habitat suitable for Houston toads to expand onto the LPSR from surrounding properties. Additional Houston toad management activities not pertaining to this Agreement are already underway on other properties located adjacent to or near the LPSR. The combined effects of these efforts are expected to result in enhanced habitat conditions for the Houston toad on a landscape level. Because the implementation of this Agreement will likely contribute to the overall population dispersal and expansion of Houston toads, incidental take that may occur from returning the LPSR to its baseline conditions is not expected to negatively affect Houston toad populations on surrounding properties in Bastrop County.

If the BSA/CAC chooses to maintain the enhanced habitat and forgo any take of above-baseline individuals, populations, habitats, or enhancements and terminates the Permit or allows the Permit to expire, the BSA/CAC acknowledges that it may accrue additional take liability under the Act.

#### Net Conservation Benefit

The conservation activities described in section 5 of this Agreement are expected to enhance Houston toad habitat on the LPSR. This is likely to result in Houston toads moving onto the property as the habitat improves over time. As Houston toads move onto the LPSR, they may encounter a greater risk of mortality or injury as a result of the factors described above. However, these are considered small risks overall, given the scope and expected benefits of the planned enhancements. Because a zero baseline has been established for Houston toads on the LPSR prior to the initiation of the conservation activities, any contribution of the habitat enhancements to the Houston toad population in Bastrop County is expected to result in a net conservation benefit for the species.

The BSA/CAC and the Service believe that the conservation activities, as described in this Agreement, will provide net conservation benefits for the Houston toad. The BSA/CAC and the

Service also believe that the duration of the Agreement and associated Permit are sufficient to achieve these conservation benefits.

## **6. OTHER RESPONSIBILITIES OF THE PARTIES**

A. In addition to carrying out the conservation activities set forth in paragraph 5, the BSA/CAC agrees to:

1. Notify the Service 60 days in advance of any planned activity that the BSA/CAC reasonably anticipates will result in take (i.e., death, injury, or other harm) of the covered species on the enrolled property as a result of the conservation activities outlined in paragraph 5 above or from returning the property to baseline, and provide the Service the opportunity to capture and/or relocate any potentially affected Houston toads, if appropriate. Emergency situations, such as hurricanes, floods, droughts, insect infestations, or epidemic disease, may require management actions not specified in this Agreement. In these situations, the Parties acknowledge that it may be impossible to provide the 60-day notice required by the Agreement prior to initiation of activities that could result in take of the Houston toad. However, the BSA/CAC will notify the Service within 10 days of discovering such a situation and will make reasonable accommodations to the Service to survey for and/or relocate affected Houston toads prior to these management actions post-emergency. The Parties acknowledge that survey and translocation may be precluded by certain urgent or emergency situations.
2. The BSA/CAC, in collaboration with Texas State University at San Marcos or other suitably qualified institution or individual approved by the Service, will monitor implementation of the Agreement annually, as specified in the terms and conditions of the associated Permit. At a minimum, monitoring will consist of a description and discussion of the implemented conservation activities and the presence or absence of Houston toads during the breeding season. Specifically, the monitoring program will include chorus surveys, pond surveys, and surveys during the emergence period of juvenile Houston toads to determine recruitment success in existing ponds and ponds that may be constructed in the future. Monitoring will evaluate the outcomes of the various management techniques on the quality of the Houston toad habitat. Annual searches of the upland habitat during the spring will be conducted to examine species diversity and abundance of reptiles and amphibians in treated and untreated (control) areas. The results of these monitoring activities will be applied to subsequent management decisions and guide adaptive management strategies for forest management practices in Bastrop County.
3. Allow access to the enrolled property upon reasonable notice by the Service or other agreed-upon party for purposes related to this Agreement. This includes any activities for which the Service is responsible, such as monitoring or capture and relocation of the covered species.
4. Notify the Service of any transfer of ownership, so that the Service can attempt to contact the new owner, explain the baseline responsibilities applicable to the enrolled property,

and seek to interest the new owner in signing the existing Agreement or a new one to benefit listed species on the enrolled property.

5. Report to the Service any dead, injured, or ill specimens of the covered species observed on the enrolled property.
6. The BSA/CAC, in collaboration with Environmental Defense, will provide the Service with an annual report by August 31 of each year. The report will include information on progress made in implementing the specified conservation activities (compliance monitoring), results of monitoring activities (biological monitoring), and any take of the covered species that has occurred.
7. No other landowners are a Party to this Agreement or any Permit associated with this Agreement. If BSA/CAC's voluntary conservation activities result in the Houston toad or any other federally-listed species occupying adjacent properties, the Service will use the maximum flexibility allowed under the Act to address incidental take coverage on those neighboring properties. However, the implications to neighboring landowners and the potential need to actively address these implications will be determined on a case-by-case basis. The BSA/CAC will notify neighboring landowners. If the owner of land adjoining any parcel to which this Agreement and an associated Permit applies, requests the opportunity to receive safe harbor assurances, the BSA/CAC will refer him or her to the Service for a determination of the baseline applicable to the neighboring property and for negotiation of a separate agreement that meets the requirements of Part 14 of the Service's Safe Harbor Policy between the neighboring landowner and the Service.
8. The BSA/CAC will make a good faith effort and use due diligence to implement the provisions of this Agreement and to adhere to the terms and conditions of the associated Permit. The BSA/CAC will provide sufficient in-kind labor and obtain funding necessary to implement the conservation activities described in this Agreement. For many of the planned conservation activities, such as brush management, the BSA/CAC will provide labor and other forms of in-kind services. They also plan to work with other organizations and agencies to obtain grants and services to conduct prescribed burning activities and construct ephemeral breeding ponds. Reports will be provided to U.S. Fish and Wildlife Service, Austin Ecological Services Field Office, 10711 Burnet Road, Suite 200, Austin, Texas 78758 and U.S. Fish and Wildlife Service, Regional Office, P.O. Box 1306, Room 4102, Albuquerque, New Mexico 87103.
9. The Service and the BSA/CAC will ensure that the Agreement and the actions covered in the Agreement are consistent with applicable Federal and State laws and regulations. The BSA/CAC will abide by all other applicable Federal, State, Tribal, and local laws and regulations when returning the covered species to its baseline conditions at the end of the Agreement.
10. The Service and the BSA/CAC will ensure that the terms of this Agreement will not be in conflict with any ongoing conservation or recovery programs for the covered species. Nothing in this Agreement will be construed to limit or constrain any Party or any other

entity from taking additional actions at its own expense to protect or conserve the covered species. Nothing in this Agreement will limit the ability of Federal and State conservation authorities to perform their lawful duties and conduct investigations as authorized by statute and by court guidance and direction.

B. In consideration of the foregoing, the Service agrees to:

1. Upon execution of the Agreement and satisfaction of all other applicable legal requirements, issue an enhancement of survival Permit to the BSA/CAC in accordance with Act section 10(a)(1)(A), authorizing take of the covered species as a result of lawful activities on the enrolled property in accordance with the terms and conditions of such Permit.
2. Provide BSA/CAC with technical assistance, to the maximum extent practicable, when requested; and provide information on Federal funding programs.

## **7. AGREEMENT DURATION**

The Agreement becomes effective upon issuance by the Service of the Section 10(a)(1)(A) enhancement of survival Permit, and will be in effect for 15 years. Both the Agreement and Permit may be extended in duration by agreement of both of the parties.

## **8. ASSURANCES TO THE BSA/CAC REGARDING TAKE OF COVERED SPECIES**

Provided that such take is **consistent with maintaining the baseline conditions** identified in Part 4 hereof, the Section 10(a)(1)(A) Permit referenced in Part 6 shall authorize the BSA/CAC to take the covered species incidental to otherwise lawful activities in the following circumstances:

1. Implementing the conservation activities identified in Part 5 hereof.
2. Carrying out any normal (e.g., agricultural, silvicultural, recreational, or other) activities on the enrolled property consistent with the current and planned use of the LPSR, as identified in the "Description of Enrolled Lands" section of this Agreement after conservation activities identified in Part 5 have been initiated. This includes activities related to expansion of the camp facilities.
3. Making any lawful use of the enrolled property after the conservation activities identified in Part 5 have been fully implemented for 13 years as described in the Conservation Activities section of this document. Implementation of the conservation activities described in this Agreement is likely to result in improvements to the habitat for the covered species above the baseline on the property and an increase in its population size. At the end of the 13-year management period, the BSA/CAC may return to baseline by ceasing the conservation activities and/or undoing the improvements to the habitat during the remaining 2 years of the Agreement. Specifically, the BSA/CAC may:
  - Discontinue understory thinning activities in the woodlands and forests;
  - Discontinue native plant restoration;
  - Discontinue planning and implementation of prescribed fire;

- Fill the shallow, ephemeral ponds constructed to serve as Houston toad breeding sites; and,
- Discontinue treatment of the red imported fire ant mounds.

## 9. MODIFICATIONS

A. Modification of the Agreement. Either party may propose amendments to this Agreement, as provided in 50 CFR 13.23, by providing written notice to, and obtaining the written concurrence of, the other Party. Such notice shall include a statement of the proposed modification, the reason for it, and its expected results. The Parties will use their best efforts to respond to proposed modifications within 30 days of receipt of such notice. Proposed modifications will become effective upon the other Parties' written concurrence.

B. Termination of the Agreement. BSA/CAC may terminate the Agreement for any reason, in which case the Permit referenced in Part 6.B.1, above, shall immediately cease to be in effect. In addition, as provided for in Part 12 of the Service's Safe Harbor Policy (64 FR 32717), the BSA/CAC may terminate the Agreement for circumstances beyond BSA/CAC's control. In such circumstances, BSA/CAC may return the enrolled property to baseline conditions even if the conservation activities identified in Part 5 have not been fully implemented, provided that the BSA/CAC gives the Service the notification required by Part 6.A.1, above, prior to carrying out any activity likely to result in the taking of the covered species and describes the circumstances beyond BSA/CAC's control.

C. Permit Suspension or Revocation. The Service may suspend or revoke the Permit referred to in Part 6.B.1, above, for cause in accordance with the laws and regulations in force at the time of such suspension or revocation. The Service also, as a last resort, may revoke the Permit if continuation of permitted activities would likely result in jeopardy to the covered species (50 CFR 13.28(a)). In such circumstances, the Service will exercise all possible measures to avoid revoking the Permit.

## 10. OTHER MEASURES

A. Remedies. Each party shall have all remedies otherwise available to enforce the terms of the Agreement and the Permit, except that no party shall be liable in damages for any breach of this Agreement, any performance or failure to perform an obligation under this Agreement, or any other cause of action arising from this Agreement.

B. Dispute Resolution. The Parties agree to work together in good faith to resolve any disputes, using dispute resolution procedures agreed upon by all Parties.

C. Succession and Transfer. If the BSA/CAC transfers his or her interest in the enrolled property to a non-federal entity, the Service will regard the new owner as having the same rights and responsibilities with respect to the enrolled property as the BSA/CAC, if the new property owner agrees and commits in writing to become a party to this Agreement and the Permit referenced in Part 6.A. above in place of the BSA/CAC.

D. Availability of Funds. Implementation of this Agreement is subject to the requirements of the Anti-Deficiency Act and the availability of appropriated funds. Nothing in this Agreement will be construed by the Parties to require the obligation, appropriation, or expenditure of any funds from the U.S. Treasury. The Parties acknowledge that the Service will not be required under this Agreement to expend any Federal agency's appropriated funds unless, and until, an authorized official of that agency affirmatively acts to commit to such expenditures as evidenced in writing.

E. Relationship to Other Agreements. BSA/CAC, in collaboration with Environmental Defense, intends to seek additional partnership opportunities that will facilitate the implementation of the habitat enhancement activities described herein. Examples of potential opportunities include Texas Park and Wildlife Department's Landowner Incentive Program and the Service's Partners for Fish and Wildlife Program. Any agreements that are signed as a result of these partnerships shall fully support both the content and intent of the provisions of this Agreement.

F. No Third-Party Beneficiaries. This Agreement does not create any new right or interest in any member of the public as a third-party beneficiary, nor shall it authorize anyone not a party to this Agreement to maintain a suit for personal injuries or damages pursuant to the provisions of this Agreement. The duties, obligations, and responsibilities of the Parties to this Agreement with respect to third parties shall remain as imposed under existing law.

G. Other Listed Species, Candidate Species, and Species of Concern. Although the Service regards it as unlikely, the possibility exists that other listed, proposed, or candidate species, or species of concern may occur in the future on the enrolled property as a direct result of the conservation activities specified in Part 5 above. If that occurs and the BSA/CAC so requests, the Parties may agree to amend the Agreement and associated Permit to cover additional listed species and to establish appropriate baseline conditions for such other species.

H. Notices and Reports. Any notices and reports, including monitoring and annual reports, required by this Agreement shall be delivered to the persons listed below, as appropriate:

Thomas O. Varnell  
Scout Executive  
Boy Scouts of America, Captiol Area Council  
7540 Ed Bluestein Boulevard  
Austin, Texas 78723-2399  
(512) 926-6363, Ext. 13

Supervisor, Austin Ecological Services  
U.S. Fish and Wildlife Service  
10711 Burnet Road, Suite 200  
Austin, Texas 78758  
(512) 490-0057

Regional Director, Southwest Region  
U.S. Fish and Wildlife Service  
P.O. Box 1306, Room 4102  
Albuquerque, NM 87103  
(505) 248-6920

## 11. LITERATURE CITED

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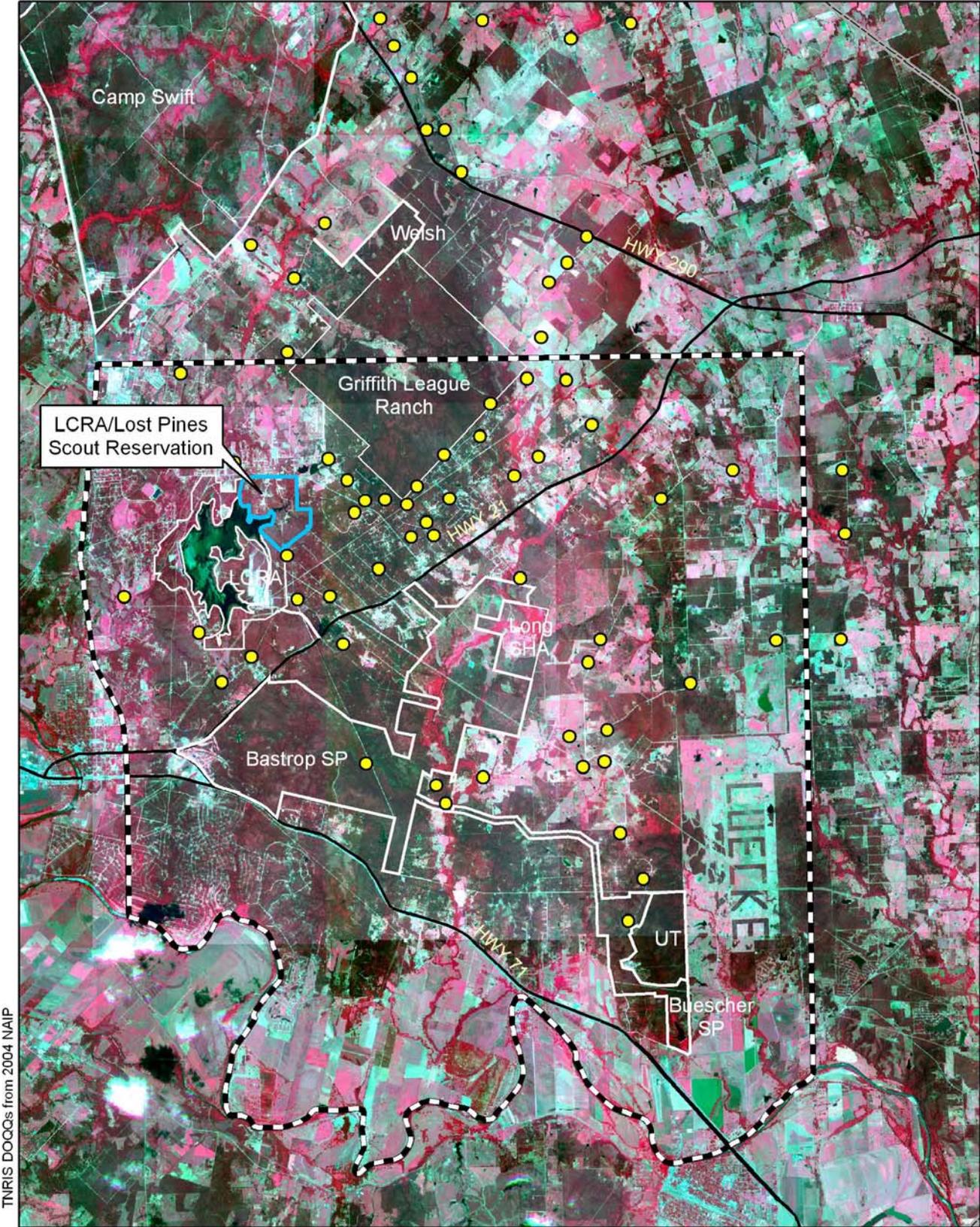
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Benjamin N. Tuggle, Ph.D.  
Acting Regional Director, Southwest Region  
U.S. Fish and Wildlife Service

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Date

Attachment A. Location Map – LCRA/Lost Pines Scout Reservation and Known Houston Toad Occurrences



TNIRIS DOQQs from 2004 NAIP

Prepared by USFWS 2006

Critical Habitat

LCRA/Lost Pines Scout Reservation

● Toad occurrences - Forstner 2003  
 (Bastrop State Park and Griffith League Ranch occurrences are not all shown)

Miles



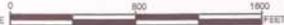
# Attachment B



## LEGEND

APPROXIMATE PROPERTY BOUNDARY 



SCALE  FEET

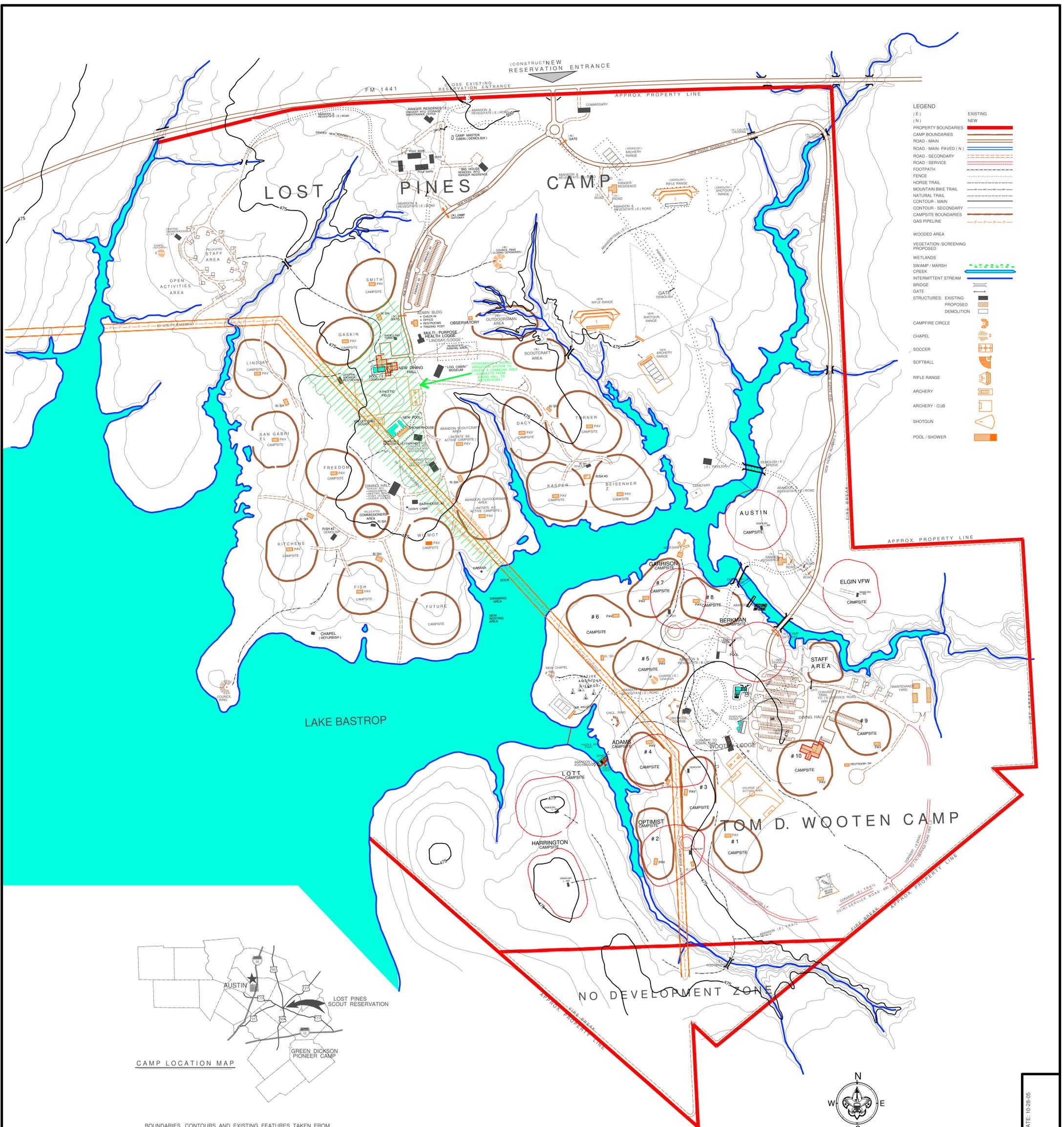
**AERIAL PHOTOGRAPHY**  
LCRA/LOST PINE SCOUT RESERVATION  
CAPITOL AREA COUNCIL / BOY SCOUTS OF AMERICA  
AUSTIN, TEXAS

Source: USGS 7.5 Min Quad Sheets, 1962 and TNRS Digital Orthophoto Quads, 2000 (Lake Bastrop & Smithville NW) Knox Survey, 1950.

Date: 11-14-04

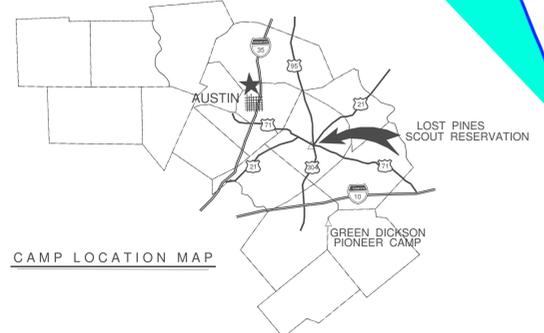
**HOLFORD GROUP**  
**DEVELOPMENT CONSULTANTS**  
4623 Spicewood Springs Rd. Suite 300  
Austin, Texas 78759  
Tel: 512 / 249-8111

  
ENGINEERING  
SERVICE  
BOY SCOUTS OF AMERICA  
100 N. WINDY HILLS  
DRIEGEL, TX 78718-0299  
DRAWN: RLC

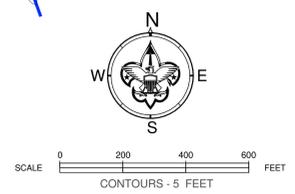


**LEGEND**

(E)	EXISTING
(N)	NEW
PROPERTY BOUNDARIES	
CAMP BOUNDARIES	
ROAD - MAIN	
ROAD - MAIN PAVED (N)	
ROAD - SECONDARY	
ROAD - SERVICE	
FOOTPATH	
FENCE	
HORSE TRAIL	
MOUNTAIN BIKE TRAIL	
NATURAL TRAIL	
CONTOUR - MAIN	
CONTOUR - SECONDARY	
CAMPSITE BOUNDARIES	
GAS PIPELINE	
WOODED AREA	
VEGETATION / SCREENING PROPOSED	
WETLANDS	
SWAMP / MARSH	
CREEK	
INTERMITTENT STREAM	
BRIDGE	
GATE	
STRUCTURES - EXISTING	
DEMOLITION	
CAMPFIRE CIRCLE	
CHAPEL	
SOCCER	
SOFTBALL	
RIFLE RANGE	
ARCHERY	
ARCHERY - CLUB	
SHOTGUN	
POOL / SHOWER	



BOUNDARIES, CONTOURS AND EXISTING FEATURES TAKEN FROM BSA DRAWING 5050-1 DATED DECEMBER 1975 BY F. W. ATKINSON / DRAWN BY A. J. HORSTMAN AND REVIEWED BY C. K. THIS DWG. CHANGED TO # 564A WAS REVISED: ON APRIL 1991 H.W.J., NOV. 1997 R.REID, AND LASTLY OCT. 20, 1998 BY R. REID / E.J.  
 BOUNDARIES, CONTOURS WERE TAKEN FROM A TOPOGRAPHIC MAP BY GEOTECHNICS & RESOURCES, INC., WHITE PLAINS, NEW YORK, AMMANN DIVISION SUPPLIED BY COUNCIL.



KEY DEVELOPMENT PLAN  
 LOST PINES SCOUT RESERVATION  
 CAPITAL AREA COUNCIL  
 AUSTIN, TEXAS

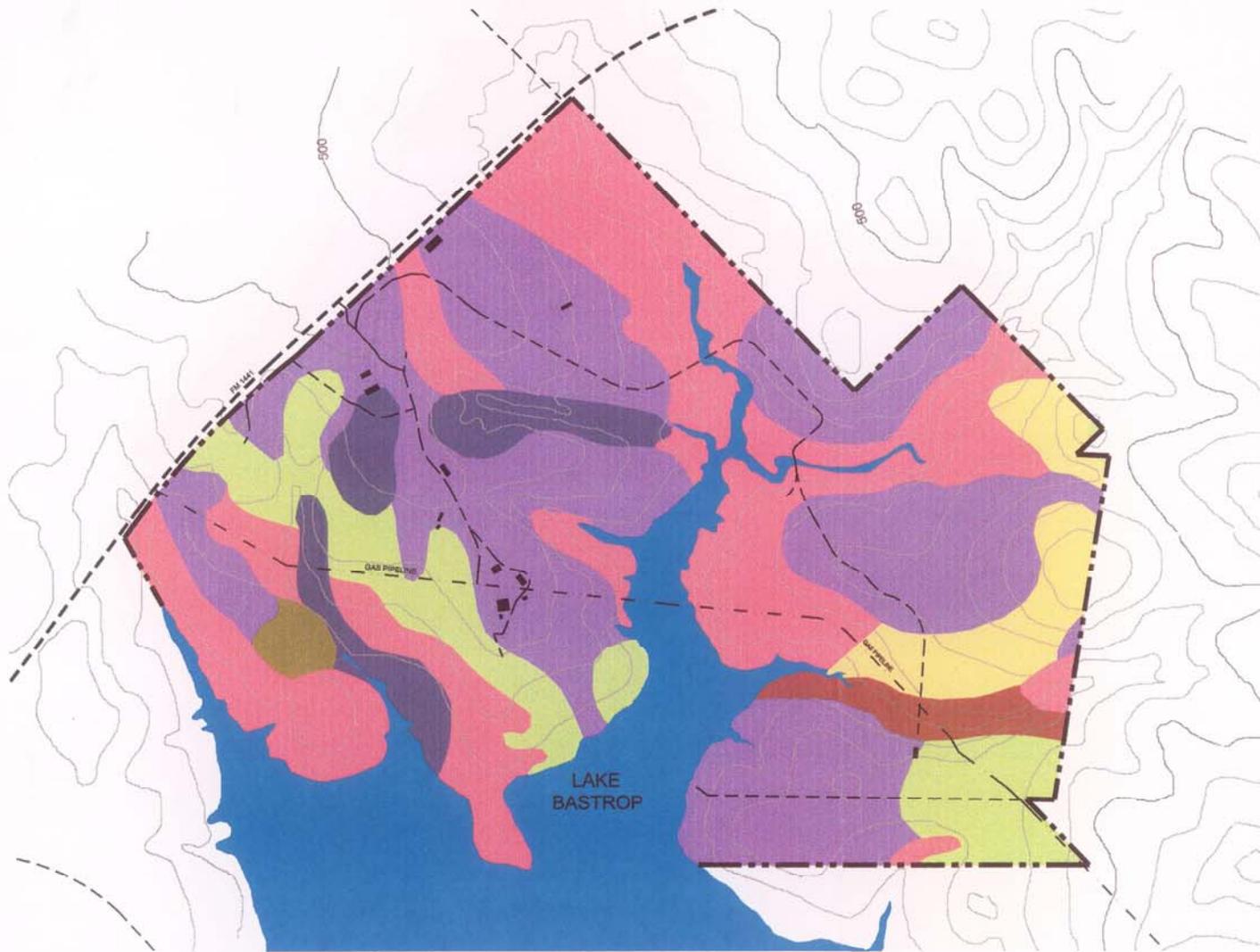
ISSUE DATE: 10-28-05

ENGINEERING SERVICE  
 554A  
 10-28-05

ORIGINATOR: R. REID  
 DRAWN: CDA

REGISTERED PROFESSIONAL ENGINEER  
 STATE OF TEXAS

# Attachment D

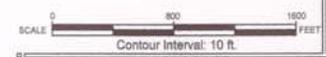


## LEGEND

<span style="color: red;">■</span>	TABOR SERIES	167 ac.
<span style="color: purple;">■</span>	AXTELL SERIES	223 ac.
<span style="color: brown;">■</span>	MABANK SERIES	6 ac.
<span style="color: darkblue;">■</span>	CROCKETT SERIES	35 ac.
<span style="color: lightgreen;">■</span>	DEMONA SERIES	65 ac.
<span style="color: darkred;">■</span>	SILSTID SERIES	13 ac.
<span style="color: yellow;">■</span>	PATILO SERIES	32 ac.

---	PROPERTY BOUNDARY
- - - -	ROAD - SECONDARY
— 600 —	50 FT CONTOUR
— 10 FT CONTOUR —	10 FT CONTOUR
—	INTERMITTENT STREAM
<span style="color: blue;">█</span>	LAKE
■	EXISTING STRUCTURES



**HOLFORD GROUP**  
 DEVELOPMENT CONSULTANTS  
 4837 Spicewood Springs Rd. Suite 202  
 Austin, Texas 78759 512 / 344-8888

**ENGINEERING SERVICE**  
 BOY SCOUTS OF AMERICA  
 12510 MIDLAND PARKWAY  
 IRVING, TX 75039-2039  
 ORIGINATOR: MS  
 DRAWN: RJC

**SOILS**  
 LCRA/LOST PINES SCOUT RESERVATION  
 CAPITOL AREA COUNCIL / BOY SCOUTS OF AMERICA  
 AUSTIN, TEXAS

Source: USGS 7.5 Min Quad Sheets, 1982 and National Wetlands Inventory, 1993 (Lake Bastrop & Smithville NV); Soils Survey, Bastrop County Texas, 1979; Knox Survey, 1950.

Date: 11-14-04

## Attachment E

### **Detailed Vegetation and Habitat Conditions LCRA/Lost Pines Scout Reservation<sup>1</sup>**

Three “natural” vegetation types are present on the LCRA/Lost Pines Scout Reservation (LPSR). The two dominant types, each covering ca. 200 acres of LPSR, are loblolly pine (*Pinus taeda*) forest and post oak (*Quercus stellata*)– blackjack oak (*Quercus marilandica*)– eastern red cedar (*Juniperus virginiana*) woodland. The third is a transitional type that consists of elements of the aforementioned forest and woodland types. In a few cases (e.g., former pine bark beetle infestation areas) the transitional type consists primarily of eastern red cedar woodland. These transitional areas account for ca. 100 acres. The balance of approximately 41 acres consists of buildings, parking areas, lawns, etc.

All 541 acres of the LPSR are included within the enrolled property designation. Within the enrolled property, twenty areas have been delineated for the purpose of focusing management activities designed to enhance habitat conditions for, and survivability of Houston toads. These twenty areas (Management Areas on the LPSR or MAs) have been delineated based primarily on existing and planned features that will serve as effective prescribed firebreaks. Locations of the MAs are shown in Attachment F.

Vegetation within each of the management areas was characterized based on the collection of relevé samples<sup>2</sup>. In this method the surveyor visually assesses the species composition and cover within circular plots located so as to capture the extent of variation within each vegetation community, as well as the transition between community types. The number of plots used to adequately characterize a particular vegetation type is dependent on the plant diversity and the degree of heterogeneity within each type. Plot sizes range from ten meters in diameter for forests to one meter for grasslands. Plot locations and photos showing the variety of vegetation types are shown in Attachment F.

Vegetation surveys were conducted and photographs were taken on March 10<sup>th</sup> and 22<sup>nd</sup> and April 21<sup>st</sup>, 2005. Surveys were conducted by Environmental Defense staff members David Wolfe (Senior Scientist) and Michele Amador (Wildlife Field Associate).

For planning and implementation purposes the management areas are separated into two groups. The first group consists of MA1 through MA12 (the southern, southeastern and eastern portions of LPSR) and the second group consists of MA13 through MA20 (the central, northern and western portions of LPSR). The primary focus of Houston toad habitat restoration efforts will be in the first group of MAs. The conservation measures identified for this group are listed and described in section 5 of this Safe Harbor Agreement.

Baseline vegetation conditions within each management areas are provided below. The composition and structure of vegetation types are described by listing dominant species in the

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<sup>1</sup> Prepared for the Boy Scouts of America/Capitol Area Council by David Wolfe, Environmental Defense.

<sup>2</sup> Mueller-Dombois, D. and H. Ellenberg. 1974. Aims and Methods of Vegetation Ecology. John Wiley and Sons, New York, New York, USA.  
9/25/2006

canopy, sub-canopy (if present) and understory. Cover values were estimated for each layer and maximum heights and diameters at breast height (dbh) were measured for each of the dominant species. Ranges in the heights and diameters are provided in cases where these characteristics varied widely within a particular vegetation layer.

A. *MA1 Baseline Conditions.*

MA1 encompasses 20 acres and is bounded on the west by a 50' wide gas line easement, on the southeast by the boundary fence clearing and along the north by a (planned) service road. This unit consists primarily of loblolly pine forest and transitional woodland.

The loblolly pine forest in MA1 consists of a canopy of mature loblolly pine (80% cover, 75' tall and 26" dbh). The sub-canopy consists of eastern red cedar (20% cover, 35' tall and 8" dbh) and loblolly pine (5% cover, 25' tall and 6" dbh). The understory layer consists of loblolly pine (15% cover), yaupon (*Ilex vomitoria* – 20% cover), and eastern red cedar (5% cover).

The transitional woodland consists of loblolly pine (40% cover, 35-55' tall and 24" dbh), post oak (30% cover, 35-40' tall and 12" dbh) and eastern red cedar (10% cover, 35-45' tall and 18" dbh). The sub-canopy consists of eastern red cedar (50% cover, 25' tall and 6" dbh) and blackjack oak (5% cover, 20' tall and 3" dbh).



*Typical loblolly pine forest conditions in MA1. Photo 1 taken at 667316 northing and 3337709 easting, facing west.*



*Typical transitional woodland conditions in MA1. Photo 2 taken at 667254 northing and 3337844 easting, facing south. Numerous loblolly pine seedlings are present in open, sunny areas.*

*B. MA2 Baseline Conditions.*

MA2 encompasses 16 acres and is bordered on the southeast and east by the boundary fence clearing, along the north by an intermittent stream and on the west by a (planned) service road. MA2 has baseline vegetation conditions essentially the same as MA1.



*Typical transitional woodland conditions in MA2. Photo 3 taken at UTM coordinates 667768 northing and 3338085 easting, facing west.*

*C. MA3 Baseline Conditions.*

MA3 encompasses 21 acres and is bordered on the north and east by the boundary fence clearing, along the south by an intermittent stream and on the west by a (planned) paved road. MA3 consists primarily of post oak – blackjack oak – eastern red cedar woodland. A band of loblolly pine forest is present along the southern boundary of MA3 (immediately north of the intermittent creek that runs from east to west).

The canopy of the post oak – blackjack oak – eastern red cedar woodland consists of post oak (50% cover, 45’ tall and 15” dbh) and eastern red cedar (40% cover, 35’ tall and 14” dbh). The understory layer consists of yaupon (30% cover), beautyberry (*Callicarpa americana* - occasional), possumhaw (*Ilex decidua* – occasional) and farkleberry (*Vaccinium arboreum* – occasional). The composition and structure of the loblolly pine forest in MA3 are essentially the same as that described for MA1.



*Typical post oak – blackjack oak – eastern red cedar woodland in MA3. Photo 4 taken at 667748 northing and 3338499 easting, facing north.*



*Stagnant pools of water in the intermittent stream that forms the southern boundary of MA3. Photo 5 taken at 667696 northing and 3338326 easting, facing east.*

*D. MA4 Baseline Conditions.*

MA4 encompasses 3 acres and is bordered on the east by the boundary fence clearing, along the south by a footpath, on the west by a (planned) paved road and on the north by a stream. MA4 consists of post oak – blackjack oak – eastern red cedar woodland in the southern half and loblolly pine forest in the northern half.

The canopy of the post oak – blackjack oak – eastern red cedar woodland consists of post oak (70% cover, 50’ tall and 18” dbh) and loblolly pine (20% cover, 35’ tall and 12” dbh). The sub-canopy consists of eastern red cedar (50% cover, 18-30’ tall and 14” dbh) and blackjack oak

(10% cover, 30' tall and 12" dbh). The understory layer consists of yaupon (60% cover). The composition and structure of the loblolly pine forest are essentially the same as that described for MA1.

*E. MA5 Baseline Conditions*

MA5 encompasses 2 acres and is bounded on the north and east by the boundary fence clearing, on the south by a stream and on the west by a (planned) paved road. This narrow linear unit is best viewed in quarters (running from north to south) when considering the vegetation. The northernmost quarter consists of transitional woodland, the next quarter to the south consists of loblolly pine forest, the next is transitional woodland and the southernmost quarter is again loblolly pine forest. The composition and structure of the transitional woodlands are essentially the same as that described for MA14 (below) and the loblolly pine forests are essentially the same as that described for MA1.

*F. MA6 Baseline Conditions*

MA6 encompasses 8 acres and is bounded on the north by the boundary fence clearing, on the east by a stream, on the south and west by a (planned) paved road. The interior of MA6 consists of loblolly pine forest with patches of transitional woodland along the western and southern borders and a band of post oak – blackjack oak – eastern red cedar woodland in the eastern third of the unit.

The transitional woodland canopy consists of eastern red cedar (50% cover, 25-35' tall and 12" dbh) and post oak (occasional to 20' tall and 4" dbh). The understory consists of yaupon (60% cover) and occasional post oak and beautyberry.

The composition and structure of the loblolly pine forest are essentially the same as that described for MA1.

The composition and structure of the post oak – blackjack oak – eastern red cedar woodland are essentially the same as that described for MA4.

*G. MA7 Baseline Conditions*

MA7 encompasses 3 acres and is bounded on the north and west by a stream, on the east by a (planned new) paved road and on the south by a second stream. Similar to MA5, MA7 is best viewed in quarters (running from north to south) when considering the vegetation. The northernmost quarter consists of loblolly pine forest, the next quarter to the south consists of transitional woodland, the next is loblolly pine forest and the southernmost quarter is again transitional woodland. The composition and structure of the transitional woodlands are essentially the same as that described for MA14 (below) and the loblolly pine forests are essentially the same as that described for MA1.

#### H. MA8 Baseline Conditions

MA8 encompasses 21 acres and is bordered on the east by a (planned new) paved road, on the south by a stream, on the west by a branch of Lake Bastrop and on the north by a stream that enters the branch. MA8 consists of loblolly pine forest in the east central portion of the unit, post oak – blackjack oak – eastern red cedar woodland in the western half and transitional woodlands in the northern and southern ends of the unit.

The canopy of the loblolly pine forest consists of loblolly pine (40% cover, 50-60' tall and 18" dbh) and occasional post oak to 50' tall and 18" dbh. The sub-canopy consists of eastern red cedar (50% cover, 12-20' tall and 8" dbh) and occasional post oak (12' tall and 4" dbh) and mesquite (18' tall and 6" dbh). The understory consists of yaupon (30% cover), eastern red cedar (5% cover), post oak (5% cover) and farkleberry (5% cover).

The composition and structure of the post oak – blackjack oak – eastern red cedar woodland are essentially the same as that described for MA3.

The composition and structure of the transitional woodland are essentially the same as that described for MA14 (below).



*Loblolly pine forest in MA8. Photo 6 taken at UTM coordinates 667462 northing and 3338784 easting, facing east.*

#### I. MA9 Baseline Conditions

MA9 encompasses 10 acres and is bordered on the northeast by a stream, on the east by a (planned) maintenance building area, on the south and west by (planned) paved and service roads. MA9 consists of loblolly pine forest.

The composition and structure of the loblolly pine forest are essentially the same as that described for MA10 (below).



*Potential future pond building site in MA9. Photo 7 taken at UTM coordinates 667549 northing and 3338257 easting, facing north.*

#### *J. MA10 Baseline Conditions*

MA10 encompasses 45 acres and is bounded on the northeast, east, south and southwest by a (planned) service road. Various planned developments (parking area, dining hall, etc.) constitute the northwestern boundary. MA10 consists of loblolly pine forest in the northwest and eastern portions of the unit, transitional woodlands in the southern and southwestern portions and patches of post oak – blackjack oak – eastern red cedar woodland in the center of the unit.

The canopy of the loblolly pine forest consists of loblolly pine (75% cover, 75' tall and 30" dbh). The sub-canopy consists of loblolly pine (40% cover, 25' - 45' tall and 10" dbh) and eastern red cedar (10% cover, 25' tall and 8" dbh). The shrub layer consists of yaupon (40% cover), loblolly pine (10% cover) and beautyberry (occasional). The composition and structure of the transitional woodland are essentially the same as that described for MA1. The composition and structure of the post oak – blackjack oak – eastern red cedar woodland patches are essentially the same as that described for MA3.



*Typical loblolly pine forest conditions in MA10. Photo 8 taken at UTM coordinates 667366 northing and 3338194 easting, facing south.*



*Opening in transitional woodland in MA10. Photo 9 taken at UTM 667379 northing and 3338155 easting, facing south.*

#### *K. MA11 Baseline Conditions*

MA11 encompasses 39 acres and is bounded on the east and northeast by a 50' wide gas line easement, on the northwest by Lake Bastrop and on the southwest by a cleared easement (buried pipeline?). MA11 consists primarily of post oak – blackjack oak –eastern red cedar woodlands. Exceptions are a large patch of loblolly pine forest in the east central portion of the unit and transitional woodland in the northern “peninsula” of the unit.

The canopy of the post oak – blackjack oak –eastern red cedar woodland consists of post oak (60% cover, 35’ tall and 12”dbh), eastern red cedar (20% cover, 35’ tall and 16”dbh) and loblolly pine (10% cover, 45’ tall and 20”dbh). The sub-canopy consists of eastern red cedar (30% cover, 25’ tall and 14”dbh) and the understory layer consists of yaupon (10% cover).

The canopy of the loblolly pine forest consists of loblolly pine (60% cover, 70’ tall and 24”dbh). The sub-canopy consists of eastern red cedar (20% cover, 30’ tall and 12”dbh) and the understory layer consists of yaupon (20% cover).

The composition and structure of the transitional woodland are essentially the same as that described for MA1.

	<p><i>Typical post oak – blackjack oak – eastern red cedar woodland conditions in MA11. Photo 10 taken at UTM coordinates 667096 northing and 3338072 easting, facing north.</i></p>
	<p><i>Typical loblolly pine forest conditions in MA11. Photo 11 taken at UTM 667105 northing and 3337843 easting, facing south.</i></p>

*L. MA12 Baseline Conditions*

MA12 encompasses 28 acres and is bounded on the northeast by a cleared easement, on the east and southwest by the boundary fence clearing and on the northwest by Lake Bastrop. MA12 consists primarily of post oak – blackjack oak –eastern red cedar woodlands. A large patch of loblolly pine forest is present in the southeastern portion of this unit.

The composition and structure of the post oak – blackjack oak – eastern red cedar woodland are essentially the same as that described for MA11.

The canopy of the loblolly pine forest consists of loblolly pine (40% cover, 65' tall and 20" dbh). The sub-canopy consists of loblolly pine (30% cover, 40' – 50' tall and 14" dbh) and eastern red cedar (10% cover, 25' – 35' tall and 12" dbh) and the understory layer consists of yaupon (10% cover).



*Cohort of young loblolly pines within loblolly pine forest in MA12. Photo 12 taken at UTM coordinates 667019 northing and 3337593 easting, facing northeast.*

#### *M. MA13 Baseline Conditions*

MA13 encompasses 18 acres and is bounded on the northwest by Lake Bastrop, on the northeast by a branch of the lake, on the southeast by planned developments (primarily a parking area and obstacle course) and on the southwest by a 50' wide gas line easement. MA13 consists of loblolly pine forest with some transitional woodland patches. Numerous standing dead loblolly pines are present indicating past pine bark beetle infestation.

The canopy of the loblolly pine forest consists of loblolly pine (40% cover, 50 – 80' tall, and 30" dbh) and water oak (occasional to 50' tall and 26" dbh). The sub-canopy consists of loblolly pine (20% canopy, 40' tall, and 12" dbh), eastern red cedar (10% canopy, 20 – 45' tall and 14" dbh), water oak (occasional to 25' and 14" dbh) and post oak (occasional to 30' and 14" dbh). The understory consists of yaupon (30% cover).



*Loblolly pine forest in MA13. Photo 13 taken at UTM coordinates 667127 northing and 3338403 easting, facing south.*

#### *N. MA14 Baseline Conditions*

MA14 encompasses 57 acres and is bordered on the north and northwest by a (planned new) paved road, along the southwest by a stream that empties into a branch of Lake Bastrop and on the southeast and east by a second stream and branch system.

MA14 consists of several bands of vegetation that generally range from north to south through the unit. A narrow band of post oak – blackjack oak – eastern red cedar woodland forms the eastern boundary of MA14. Immediately to the west is a relatively wide band of loblolly pine forest that grades into eastern red cedar woodland as one continues moving westward. A few relatively large artificial openings and an existing access road are currently present in the center of the unit. Just to the west of the access road the north-south vegetation bands begin again with transitional woodland, followed to the west by loblolly pine forest, then post oak – blackjack oak – eastern red cedar woodland, then, finally more loblolly pine forest at the western boundary.

The transitional woodland canopy consists of loblolly pine (40% cover, 50-65' tall and 30"dbh) and post oak (40% cover, 55-70' tall and 20"dbh). The sub-canopy consists of eastern red cedar (20% cover, 30' tall and 10"dbh) and loblolly pine (5% cover, 45' tall and 8"dbh). The understory consists of yaupon (60% cover), loblolly pine (10% cover) and water oak (10% cover).

	<p><i>Eastern red cedar woodland in MA14. Photo 14 taken at UTM coordinates 667135 northing and 3339258 easting, facing south.</i></p>
	<p><i>Loblolly pine forest in MA14 with dense understory. Photo 15 taken at UTM coordinates 667363 northing and 3339004 easting, facing east.</i></p>

*O. MA15 Baseline Conditions*

MA15 encompasses 26 acres and is bordered on the northeast by a stream that empties into a branch of Lake Bastrop, on the south by the lake and on the west and north by a (planned new) commons area.

MA15 consists of post oak – blackjack oak – eastern red cedar woodland. The canopy consists of post oak (30% cover, 40 – 55’ tall and 18”dbh) and eastern red cedar (40% cover, 35 – 45’ tall and 16”dbh). The sub-canopy consists of eastern red cedar (10% cover, 14 – 30’ tall and 6”dbh) and blackjack oak (5% cover, 20 – 25’ tall and 7”dbh). The understory consists of yaupon (50% cover) and occasional individuals of beautyberry and farkleberry.



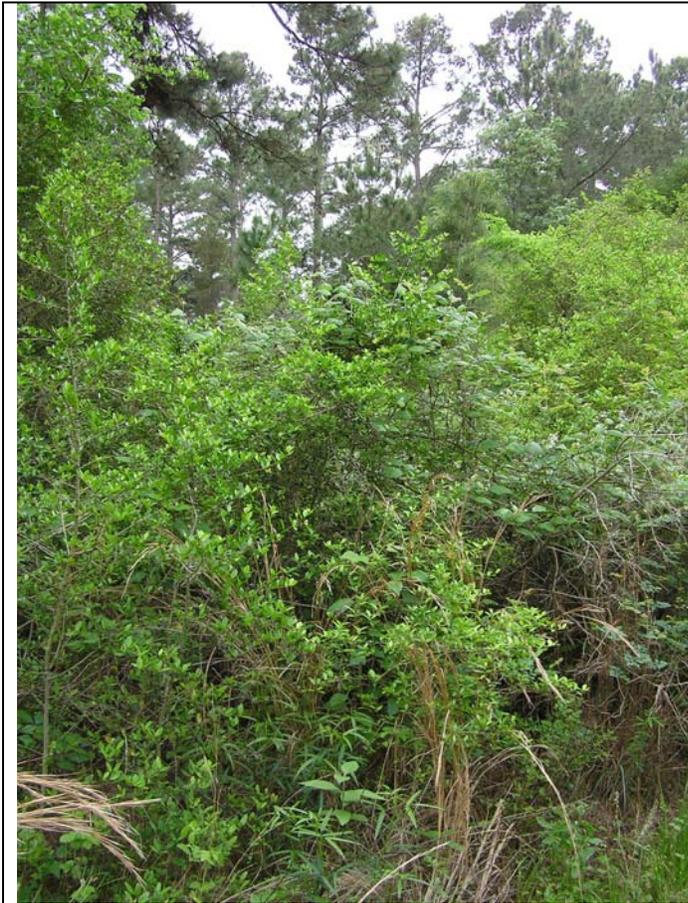
*Post oak – blackjack oak – eastern red cedar woodland in MA15. Photo 16 taken at UTM coordinates 666792 northing and 3338767 easting, facing north.*

*P. MA16 Baseline Conditions*

MA16 encompasses 21 acres and is bordered on the north by a (planned new) paved road and a stream, to the south and southwest by the limit of the (planned new) common area and to the northwest by the (planned new) dining hall and associated roads and parking areas.

The bulk of MA16 consists of maintained grasslands, although patches of loblolly pine forest (portions of which are heavily invaded by eastern red cedar and underbrush) are present in the northern and western portions of the unit.

The canopy of the loblolly pine forest consists of loblolly pine (50% cover, 60-80' tall and 26" dbh). The sub-canopy consists of eastern red cedar (15% cover, 30-40' tall and 12" dbh) and loblolly pine (20% cover, 20-60' tall and 18" dbh). The understory consists of yaupon (80% cover) and occasional beautyberry and chinaberry.



*Loblolly pine forest with dense understory in MA16. Photo 17 taken at UTM coordinates 666545 northing and 3338875 easting, facing south.*

*Q. MA17 Baseline Conditions*

MA17 encompasses 41 acres and is bordered on the north by the boundary fence and highway 1441, along the east and southeast by a (planned new) paved road, on the south by the (planned new) dining hall and associated roads and parking areas, and on the west by a drainage and stream system.

The southwestern one-third of MA17 consists of loblolly pine forest that is heavily invaded by eastern red cedar. The central one-third consists of former loblolly pine forest that is now transitional (eastern red cedar) woodland and the northeastern third consists primarily of maintained grasslands.

The composition and structure of the loblolly pine forest are essentially the same as that described for MA16.

The canopy of the transitional (eastern red cedar) woodland consists of eastern red cedar (60% cover, 14-25' tall and 14" dbh) and occasional water oak to 45' tall and 22" dbh. The sub-canopy consists of eastern red cedar (30% cover, 8-14' tall and 10" dbh) and the understory consists of yaupon (40% cover) and mesquite (10% cover).



*Former loblolly pine forest, now a eastern red cedar woodland in MA17. Note standing dead loblolly pine trees in background. Photo 18 taken at UTM coordinates 666598 northing and 3339213 easting, facing west.*

#### *R. MA18 Baseline Conditions*

MA18 encompasses 34 acres and is bordered on the north by the boundary fence and highway 1441, on the east by a drainage and stream system, on the south by a 50' wide gas line easement and on the west by a branch of Lake Bastrop.

MA18 consists primarily of loblolly pine forest. Exceptions include artificial openings that are present in the northeast corner and south central portions of the unit, and a band of post oak – blackjack oak – eastern red cedar woodland that is present at the western edge of the unit.

The canopy of the loblolly pine forest consists of loblolly pine (90% cover, 50 – 65' tall and 20" dbh) and the understory consists of yaupon (15% cover) and occasional eastern red cedar.



*Loblolly pine forest in MA18. Note relative lack of understory and total absence of herbaceous layer. Photo19 taken at UTM coordinates 666345 northing and 3339080 easting, facing north.*



*Loblolly pine forest in MA18 with dense understory. Photo 20 taken at UTM coordinates 666096 northing and 3339125 easting, facing west.*

*S. MA19 Baseline Conditions*

MA19 encompasses 25 acres and is bordered on the north by a 50' wide gas line easement, on the east and west by branches of Lake Bastrop, and on the south by the lake itself.

MA19 consists of loblolly pine forest in the northern half of the unit. In the southern half a ring of transitional woodland (heavily dominated by eastern red cedar) encircles a patch of post oak – blackjack oak – eastern red cedar woodland. The composition and structure of the loblolly pine forest are essentially the same as that described for MA16. The composition and structure of the transitional woodland are essentially the same as that described for MA17. The composition and structure of the post oak – blackjack oak – eastern red cedar woodland are essentially the same as that described for MA15

*T. MA20 Baseline Conditions*

MA20 encompasses 62 acres and is bordered on the northeast by a 50' wide gas line easement, on the south by Lake Bastrop and on the west by a branch of the lake.

The western two-thirds of this unit consists of loblolly pine forest that ranges from lightly to heavily invaded by eastern red cedar. The eastern one-third consists of post oak – blackjack oak – eastern red cedar woodland.

The “best” loblolly pine forest in MA20 has a canopy of loblolly pine (40% cover, 65' tall and 16” dbh) with an understory of yaupon (20% cover). A typical “invaded” example contains a canopy of loblolly pine (30% cover, 60' tall and 16” dbh) with a sub-canopy of eastern red cedar (30% cover, 25 – 35' tall and 8” dbh) and loblolly pine (20% cover, 30 – 40' tall and 12” dbh) and an understory of yaupon (70% cover) along with occasional individuals of beautyberry, flameleaf sumac, and gum bumelia.

The composition and structure of the post oak – blackjack oak – eastern red cedar woodland are essentially the same as that described for MA15 with the exception that yaupon accounts for 70% cover in the understory.



*Good example of loblolly pine forest in MA20. Photo 21 taken at UTM coordinates 666317 northing and 3338485 easting, facing west.*

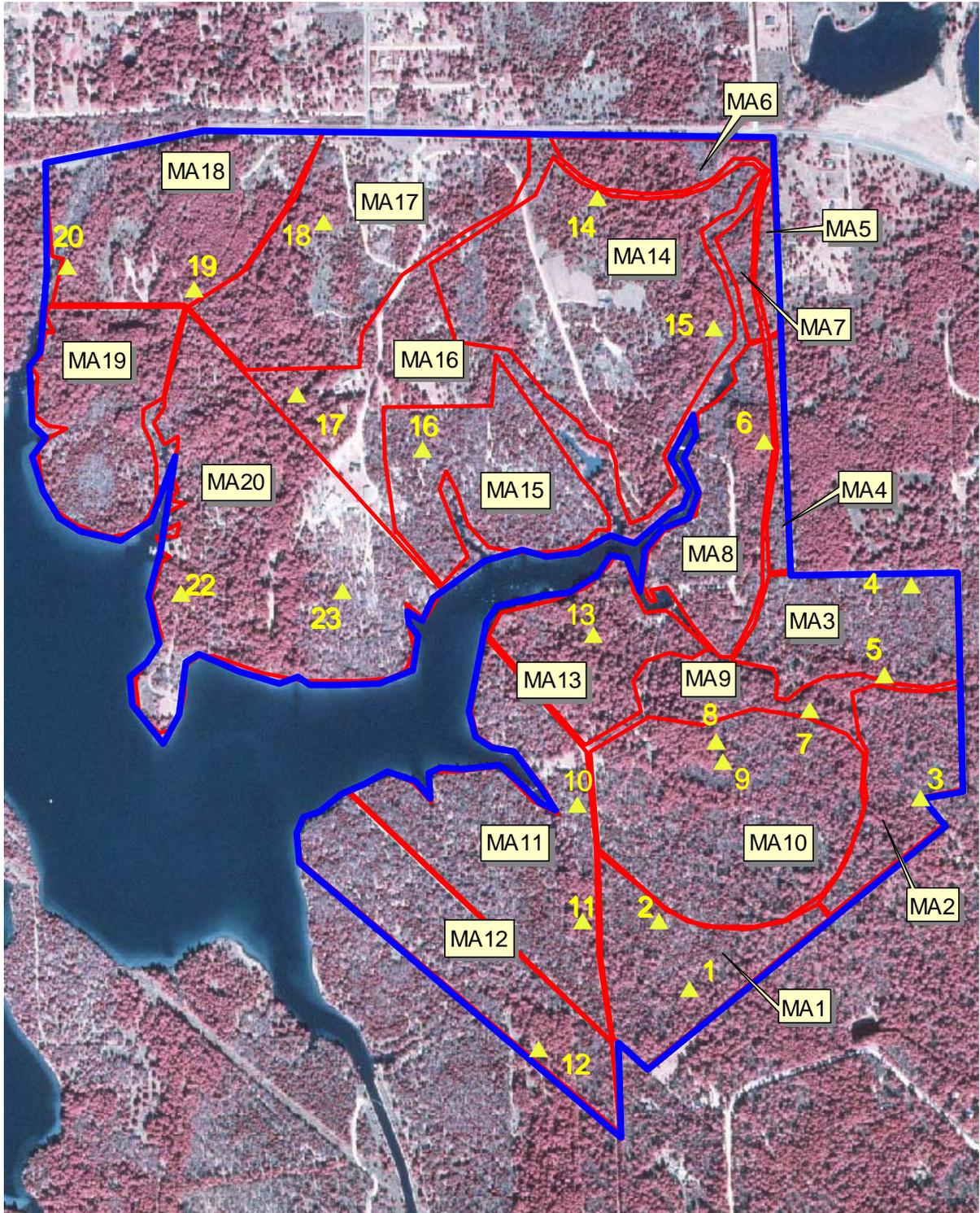


*Photo 22 taken at same location as above in MA20, facing east. Note presence of eastern red cedar and higher understory density.*



*Post oak – blackjack oak – eastern red cedar woodland in MA20. Photo 23 taken at UTM coordinates 666635 northing and 3338490 easting, facing west.*

Attachment F – Proposed Management Areas of the LCRA/Lost Pines Scout Reservation. Yellow triangles represent Attachment E photo locations.



**Attachment G**

**Safe Harbor Habitat Enhancement and Metapopulation  
Connectivity Goals for the Houston toad on the LCRA/Lost  
Pines Scout Reservation**

**Submitted to the  
Boy Scouts of America/Capitol Area Council  
by**

**Michael R.J. Forstner, Ph.D.**

**December 1, 2004**

## *Introduction*

The Houston toad is an endangered native Texan. Currently persisting at very low levels across the remaining distribution, the toad can benefit from field documentation and field research directed at understanding its ecology. In order to assess areas under their control the Capitol Area Council of the Boy Scouts of America (BSA/CAC) has conducted audio surveys for the Houston toad on their properties in Bastrop County. The BSA/CAC has collaboratively sponsored research (via grants including funding by Section 6) seeking data which are critical to the design of and management plans for Houston toads in Bastrop County and other counties. The research activity by Dr. Forstner, his students and collaborators (e.g. J.R. Dixon and J. Baccus) since 2000 has helped to clarify aspects of the field ecology of this species (Forstner and Swannack 2004).

One of the foremost issues with the toad is habitat fragmentation. This core issue represents the majority of the threats facing nearly all endangered species (Heywood and Stuart 1992). While there are various arguments for and against attempts to configure habitat fragments, especially with regard to patch size, homogeneity and connectivity (McCullough 1996), the solution remains to provide either restored or maximally connected landscapes (Beier and Noss 1998). In the case of the Houston toad key issues are precisely as found in a general case study of endangered species by Fahrig and Merriam (1994). Those authors conclude “recolonization of local extinctions is critical for regional survival of fragmented populations”.

The BSA/CAC maintains the LCRA/ Lost Pines Scout Reservation (LPSR), a Boy Scout Camp located on the North shore of Lake Bastrop (Figure 1). It is clear from examination of Figure 1 that while a significant number of chorusing Houston toads were located east of the LPSR, the camp itself appears to represent the western edge of the toad for the area of Bastrop County surrounding Lake Bastrop. Effective management of the Houston toad requires landscape scale solutions. This is important as the LPSR provides a means of connectivity for the Houston toad along the northern edge of Lake Bastrop and northward away from the Lake toward the chorusing found even further west, to the north of the LPSR (Figure 2). There are extremely few large (100 acre or greater) parcels remaining in the area of the LPSR and hence its position and land owner interest provide a significant opportunity to engage in habitat and connectivity goals for this area of Bastrop County.

Effectively, there are three large parcels of land in Bastrop County now held that are 1) likely to remain undivided into smaller parcels and 2) known to contain active chorus groups of Houston toads. These parcels are Bastrop State Park, the Lake Bastrop LCRA property, and the Griffith League Ranch (owned by the BSA/CAC). Each of these parcels provides a potential area from which Houston toads can persist and even recover sufficiently to enable recolonization of other areas of the habitat. There are large problems in that connectivity however, as Bastrop State Park lies across the potentially

lethal barrier of Highway 21 from the remaining two large parcels. This makes east/west connectivity for the Bastrop County Houston toads very tenuous. On the west side of Highway 21, a better opportunity exists in the use of the LPSR as a means of providing connectivity between the LCRA property and the Griffith League Ranch. Admittedly the increasing traffic on FM1441 is likely to be an issue as the road lies between the LPSR and the Griffith League Ranch. However, FM 1441 is far less traveled than is Highway 21.

The BSA/CAC has established a zero baseline for the LPSR by use of existing historical data, recent surveys sponsored by the BSA/CAC, and integration of the recent Bastrop County surveys (see Appendix 1). The organization has already become an active collaborator in Houston toad research within Bastrop County, and perceives another opportunity by entering into a Safe Harbor agreement with the USFWS for the Lost Pines Reservation. As part of that agreement the BSA/CAC will implement forest management strategies and enhance habitat on the LPSR. These changes will benefit the Houston toad.

*Management goals and habitat management/manipulation options for the LPSR.*

*Goals:*

It is appropriate that habitat enhancement goals be established in conjunction with the Safe Harbor Agreement. The LPSR will retain its primary objective as a functioning and effective Boy Scout Reservation, but as part of its overall management plan will seek to pursue the following goals:

- I. Recover and reestablish suitable habitat allowing a sustainable resident Houston toad population to become established on the Lost Pines Reservation
- II. Document and distribute the results from monitoring/evaluation of outcomes from forest management strategies to assist with the recovery of the Houston toad

*Habitat management strategies:*

The Houston toad exists in a radically fragmented landscape. We know that environmental perturbations like drought can dramatically affect the toad, its population size, and distribution. In fact, it is generally assumed that the drought of the 1950s alongside the increased urbanization and fragmentation in Harris County is what led to the extirpation of the toad in that county by the late 1960s or early 1970s.

Today the only significant population of Houston toads exists in Bastrop County. Proximity to Austin, TX, increased population and continuing agricultural conversions are creating nearly the same scenario as was present in Harris county during the late 1940s. After extirpation in Harris County, Houston toads remained present in Bastrop County, likely as a consequence of habitat quality. Thus, when the environment was very

harsh, the small fragmented groups in Harris County were extirpated. In contrast, the population in Bastrop made it through the drought. Many make references to other counties and other known localities, but no current survey data exists nor have any coherent range wide efforts been made to assess any of those populations. If we lose the Bastrop County population of Houston toads, it is unlikely that any of the other populations would be capable of maintaining the species. This makes efforts in Bastrop County extremely important and within Bastrop County the current landscape configuration will directly benefit from actual efforts to establish and connect areas of habitat sustaining Houston toads.

Thankfully such efforts are now being proposed. Lost Pines lies on what is the western edge for current Houston toad chorusing events. We documented much of the current chorusing distribution during recent surveys across the County (Figure 1). This allows a potential for the BSA/CAC to become involved in habitat recovery and restoration within their LPSR.

The LPSR itself is bisected by a large steep and likely toad impassable drainage of Lake Bastrop (Figure 2). Houston toads entering the property from the south or east would proceed westward only around the northern end of the main drainage. Likewise northward movement is only possible by moving up the eastern edge of the drainage and then northward, or as just mentioned, moving west around the northern edge of the drainage arm. This creates an opportunity for the direction of initial management options on the property (Figure 3) to benefit both the health of the forest ecosystem (especially its consequent suitability for the toad) and the overall suitability for the primary mission of Scouting.

That opportunity is in effecting habitat management strategies along the southeastern and eastern boundaries of the property which do not currently support Houston toads (Figure 3). Those changes will seek to accomplish the management goals articulated above, by first reducing the understory (See Figure 4; panels 1, 2, 3 and 6) , then replanting areas which have lost canopy (Figure 4; panel 4), and finally after progress on the first two efforts, by creating artificial ponds, along this eastern boundary in the hope of providing breeding sites for the toad.

The work on the nearby Griffith League Ranch provides at least some direction for that management effort. We have extensively documented the habitat in which Houston toads are most prevalent. Using that as a direction I recommend implementing an overall forest management plan that leads to a forest system like that supporting the majority of the Houston toads on the GLR. Hence the closest habitat on the Lost Pines currently representing the character of “best” toad habitat would be that shown in Figure 4 (panel 5). Yet even then, it is critical to note that even panel 5 (Figure 4) has a significant duff layer, in this case, of pine needles and very little herbaceous vegetation at the forest floor.

The negative impacts that fire suppression on all forest ecosystem components are well documented. Based on the data from the last four years of work on the GLR, I believe that prescribed fire is the only route to a beneficial effect on the ecosystem and the toad. Unfortunately we have no detailed information on the effects of fire on the Houston toad, its reproduction, or its sympatric fauna. Toward that end I have resubmitted a Section 6 grant to evaluate the effects of fire on the Houston toad, its sympatric faunal components, and the duff layers in such forests. Using the results from that work we would seek to use the best prescribed fire forest management practices deduced to bring the LPSR into high quality habitat for the Houston toad. However, until experimental fires have been conducted that provide quality, high resolution preburn and postburn data, it is impossible to adequately describe the use of fire in the overall forest management of LPSR in context with the toad.

However, we can move in the appropriate directions by using what we do know. Reduction of understory vegetation can be accomplished fairly quickly by hand clearing and in keeping with several activities of annual Scouting events. Revegetation can also be incorporated within several of the Scouting activities. However, the regrowth toward mixed canopy will take time on the scale of decades. Pragmatically it makes little sense to create breeding habitat until the upland habitat can support juvenile toads and adults outside of the breeding season. Hence, while it would be an eventual goal to create new potential breeding ponds on the eastern border of the property, that will not be undertaken until progress toward improving the quality of the forest uplands has been made. I would foresee at least a five year plan for understory reduction and canopy tree transplanting into the currently open areas before recommending that new ponds be constructed on the eastern boundary. In the southern portions of the property there are several areas that would be immediately suitable for having a new pond constructed. Even there, I would recommend at least a two year period of understory reduction prior to construction new breeding locations for the toad.

In some ways the decision to delay construction on the breeding ponds is a difficult one. There are breeding locations just east of the Lost Pines Reservation and documenting the success of any management options will depend, in part, on detecting Houston toads on the property itself. Without breeding choruses, detection of Houston toads is very difficult. Hence, delaying placement of new breeding ponds, or a new breeding pond, makes it very difficult to evaluate the success of any management options in a direct test. However it will be possible to document the sites of management implementations prior to the understory clearing and then examine those sites subsequently to detect any changes in the forest floor vegetation community.

### *Conclusions and Recommendations*

Succinctly stated, the LPSR does not currently support a permanent population of Houston toads, nor is it likely to do so without direct management intervention by the

BSA/CAC in a direction seeking to benefit the toad. Thus, it seems particularly advantageous to create a situation under which both the BSA/CAC and the Houston toad benefit. In concluding a zero baseline for the LPSR I also concluded (Forstner 2004) that several habitat enhancement strategies that will begin to restore the current LPSR habitat and create a management regime providing Safe Harbor for the Houston toad while enhancing the LPSR for both BSA/CAC uses and Houston toad occupancy.

I would suggest an overall design that would provide both occupancy and dispersal for the Houston toad across the LPSR. Based on the total evidence I have assembled, the eastern boundary of Lost Pines provides the nearest access for documented Houston toads. In fact, this area of Lost Pines provides an area that currently has little development and thus significant potential for enhancements benefiting the BSA/CAC and the toad. Indeed much of the once dominant pine forest in that area was hard hit by pine beetle in the 1990s drought and is being replaced by cedar thickets and even mesquite. The eastern and southeastern boundaries of the LPSR should form an area of focus for habitat enhancement and directed management benefiting the toad: habitat enhancement areas. The encroachment by cedar, yaupon, and mesquite can be offset with replanting of pines and oaks, clearing of the undesirable vegetation, especially thick understory, and eventually creating new potential breeding habitats.

As with my collaborative efforts on the nearby BSA/CAC Griffith League Ranch, I believe that most if not all of following suggestions will provide as great a benefit to the value of the property for BSA/CAC use LPSR as they will for the Houston toad. Thus, the habitat enhancement areas are not “Scout exclusion areas”, far from it. The areas instead become a long term investment by the BSA/CAC in establishing and maintaining a healthy climax Loblolly pine or Pine/Oak forest which has long been a significant feature of the LPSR. Obviously, this will be very attractive for outdoor Scouting activities across decades, providing forest for Scout uses at the same time providing Houston toad habitat. Even more attractive are the low overall costs and concurrent necessity of involving generations of Boy Scouts in the process of recreating and then maintaining this habitat on Lost Pines.

Foremost among the suggested management options is revegetation/restoration of the eastern and southeastern region of LPSR and removal of a majority of the existing woody understory dominating the current canopied forests. Restoration in those areas (currently impacted by pine beetle or anthropogenic clearing) should include planting native pines and vegetation as an immediate management objective. While the overall goal should be to provide canopied forest continuity across the entirety of the LPSR, the initial focus should remain on the eastern boundary. The eventual design goal does not require a completely dominant forest across the property but would seek instead to establish the possibility of toad dispersal through the property by providing an overall design that allows general connectivity across the property. In the suggested habitat enhancement areas this process would be fairly complete and seek to maintain a healthy

primary forest. Concurrent with the tree planting would be a comprehensive and well planned effort to first document and map the currently canopied areas that have the heaviest woody vegetation understory. Then techniques would be utilized to remove and thin that woody understory to regain the arthropod communities and herbaceous vegetation on the forest floor. This effort alone cannot remove the heavy duff layers, but it will be both conducive to herbaceous growth and act to decrease fire intensity levels at the forest floor as prescribed fire becomes a viable option for toad management.

After that process of understory removal is underway and the canopy eventually begins to become significant in the eastern areas, several ephemeral ponds should be established in different size/shape configurations allowing Houston toads the option of breeding on the property. However, the timing of that pond construction is important. Until woody understory reduction and vegetation restoration is underway, the upland habitat is not suitable to allow the juvenile toads to survive. It would be imprudent to draw reproductive toads to Lost Pines until the habitat can support their life cycle. Without the appropriate habitat to support them, juveniles would simply die after emerging from the pond. Thus, only after a program of habitat restoration and forest management would the actual construction of planned future breeding ponds be recommended.

These suggestions are designed to integrate with current plans for the LP Reservation and seek to make the most of the data collaboratively assembled by the GLR research efforts. In fact, the work completed on the GLR in the last few years has formed a primary guide for my suggestions for the Lost Pines Reservation. Obviously some program of evaluation and monitoring should be established that provides the required data for adaptive management on the LPSR over time. This is particularly true, especially as the results are nearly certain to be positive and provide additional recognition for the efforts of the BSA/CAC on behalf of the Houston toad.

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Appendix 1. Abstracted summary of the Zero Baseline assessment for the Lost Pines Reservation, Bastrop Co., TX. (Forstner 2004).

Two basic sources of historical data for the Houston toad on the BSA/CAC LCRA/Lost Pines Scout Reservation (“LPSR”) are available in 2004. The first of those represents a continuation of the previous years of endangered species surveys relying on audio surveys of the property during the annual spring breeding season. This portion of the data assembled involves the completion of up to 20 nights of audio surveys with the goal of detecting and describing the occurrence of Houston toads on the property. The second type of information is not from audio surveys but instead is taken from physical surveys of the property during daylight hours by myself, or others, seeking tadpoles or juvenile Houston toads in ponds or ephemeral water. Additional information can be drawn from such work on adjacent properties much as audio surveys from nearby locations can provide evidence of the proximity of Houston toads to the LPSR boundaries. Taken together these two approaches allow inference to be made of the current status and distribution of Houston toads in the area and more specifically on the property. Using the assembled evidence I have suggested directions for management options enhancing the property to become better Houston toad habitat and potentially supporting Houston toad reproduction in the future.

*Surveys*

Obviously one of the most important aspects about managing endangered species is knowing where they are and how many of them are left. Conducted on an annual basis, audio surveys allow development of a trendline for the activity of male Houston toads. Likewise, such data provide the information necessary to define the areas used by the toads during the spring and to monitor changes in the abundance or distribution of chorusing toads over time. Audio surveys for the Houston toad have minimum acceptable guidelines established by the USFWS. The audio surveys completed for the BSA/CAC meet and exceed those guidelines.

All audio surveys are conducted on nights when climatic conditions appear favorable to Houston toad breeding events. A series of established listening stations are monitored for a period of (minimally) five minutes and the calls of all amphibians are noted. When Houston toads are heard, attempts are made to physically locate the individuals if this can be accomplished without undue disturbance to the chorus. Individuals are then permanently marked using microchip transponders (AVID) and physical measurements are taken. Upon completion of the data collection all individuals are released back into the breeding pond. Prior to the initiation of the breeding season all ponds are examined and data regarding the water levels and chemistry are collected. Subsequent to active chorus nights, positive ponds are searched during daylight or early evening to evaluate the success of the breeding chorus by counting the number of egg

strings found in each pond. Finally, at the end of the season at the time when juveniles emerge from the ponds, each pond is checked to determine whether or not juvenile Houston toads are seen at the ponds' edges. Performing these activities has assisted in more complete evaluations of Houston toad activity than would have been possible from audio surveys alone.

### *Results*

Historical surveys of the LPSR have been performed. According to the literature I have available, during the early 1990s two distinct examinations of the area were conducted. The first Houston toad study was performed in 1992 by Dr. Andrew Price of the Texas Parks and Wildlife Department. Dr. Price visited LPSR and during a single daylight visit observed tadpoles in several areas of the Camp. At that time Dr. Price found what he describes as “ a few” *Bufo* tadpoles in small ponds and catchments on the LPSR area. In 1993 the LCRA commissioned surveys of LPSR in order to evaluate proposed renovations to septic systems. A one year survey was performed by a group of researchers from Texas A&M University. The A&M survey was completed by Dr. James R. Dixon and two of his graduate students during the breeding season of 1993. They were unable to locate any breeding chorus' of Houston toads on the LPSR site. While it is certainly plausible that successful reproductive sites in 1992, failed to breed in 1993, it is likewise plausible that the tadpoles observed by Dr. Price in 1992 were not Houston toads. Dr. Price himself relays that assertion in his report dated 13 April 1992. I have no information regarding any surveys of LPSR by anyone, other than myself, subsequent to that of Dr. Dixon in 1993.

In the years subsequent to 1993 surveys were performed on the LCRA Lake Bastrop property and in some of those surveys Houston toads were detected on the Lake Bastrop property. This simultaneously supports the result from Dr. Dixon's survey conclusion that toads were calling across the inlet from LPSR on the LCRA property and that Houston toads occur very near LPSR.

In 2001 I examined the eastern portion of the property along FM1441 at the request of the Bastrop County School district. The BISD was considering construction of a school on the eastern acreage of Lost Pines. On May 8, 2001, two trained herpetology master's students (John Malone and Janie Nelan) and I examined the area. My visit followed a four inch rain and would have revealed any potential breeding ponds. The eastern border of LPSR does have a drainage which crosses roughly from the ENE corner through toward the SSW. The drainage has nearly vertical banks which would preclude it from consideration as a breeding site for Houston toads. Overall the habitat represents a mixed woodland with a majority of the adult loblolly pines in decline. In summary, the 20 acres I examined did not contain any significant standing water bodies and while the habitat is suitable to support Houston toads I did not examine the subsurface soils which may be a significant factor. My conclusion based on the available data was that it was

not likely that Houston toads would be found on the site in the event of a standardized three year survey.

In 2002 I performed an audio survey of the LPSR. Table 1 provides the compilation of results for the 2002 surveys of LPSR. No toads were heard to chorus within the property boundaries, but chorusing did occur within two hundred meters of the eastern LPSR fenceline.

Finally, in 2003 a series of Bastrop County sponsored surveys were completed by myself and my colleagues. Those surveys included a wide area, but several listening posts were adjacent to the LPSR (Figure 1). Toads were heard chorusing quite near the property but were not detected on the property itself. Across the 20 year plus span of time, only the evidence provided by Dr. A. Price of TPWD provides the tentative conclusion placing Houston toads within the boundaries of the LPSR. However, nearly all of the remaining survey data assembled provides data placing Houston toads nearby and directly adjacent to the property.

Table 1. Houston toad audio survey results for the LCRA Lost Pines Scout Reservation, Bastrop County for 2002. No toads were in chorus within the property boundaries, but chorusing did occur within two hundred meters of the LPSR fenceline.

Date	18-Jan	17-Feb	19-Feb	8-Mar	18-Mar	5-Apr	9-Apr
Temp (F)	71	75	52	75	68	69	65
Humidity	?	67	?	?	70	46	65
Wind	15	1	1	0	1	0	4
Moon	0	0	0.333	0	0	0	0
Post 1	1RS	0	0	1BH (SE)	2BH (SSE)	0	0 2RS,
Post 2	1AC	0	0	5RS	3RS	1RS	2HVC
Post 3	0	0	0	0	0	0	0
Post 4	0	0	0	0	0	0	3BH (S)

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Species Key =	0=None	BX=Bufo sp. hybrid?	PS= <i>Pseudacris streckeri</i>
			PT= <i>Pseudacris triseriatus</i>
AC= <i>Acris crepitans</i>	GC= <i>Gastrophyrne carolinensis</i>		RC= <i>Rana catesbaena</i>
BH= <i>Bufo houstonensis</i>	GO= <i>Gastrophyrne olivaceous</i>		RCL= <i>Rana clamitans</i>
BS= <i>Bufo speciosus</i>	HC= <i>Hyla cinerea</i>		RS= <i>Rana sphenacephala</i>
BV= <i>Bufo valliceps</i>	HVC= <i>Hyla versicolor/chrysocelous</i>		SH= <i>Scaphiopus couchi</i>
BW= <i>Bufo woodhousei</i>	PC= <i>Pseudacris clarki</i>		

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\*designations within parentheses represent a compass direction to the calls heard

**Attachment H**

**Compilation of Houston Toad Survey  
Data and Interpretation Supporting a Zero  
Baseline Assessment**

**for the**

**LCRA/Lost Pines Scout Reservation  
Bastrop County, Texas**

**by**

**Michael R.J. Forstner, Ph.D.**

**August 1, 2004**

## *Introduction*

The Houston toad is an endangered native Texan. Currently at very low levels in every county in which it occurs, the toad can benefit from field documentation and field research directed at understanding its ecology. In order to assess areas under its control the Capitol Area Council of the Boy Scouts of America (BSA/CAC) has conducted audio surveys for the Houston toad on its properties in Bastrop County. The BSA/CAC has further sponsored research seeking data which are critical to the design of and management plans for Houston toads in Bastrop County and across its remaining range. That involvement includes night surveys of occurrence and breeding at the LCRA/Lost Pines Scout Reservation ("LPSR"). These efforts have been documented. There are also historical from prior work concluded on LPSR itself or on adjacent properties.

The objective of this report is to describe the current status of the Houston toad on LPSR and, after providing the available evidence, form conclusions regarding its occurrence on LPSR in 2004. Afterward specific management options which might positively influence future populations of toads on LPSR and aspects of continued monitoring are provided. My supervision of considerable Houston toad research, especially in recent years, leads me to compose this report in the context of the CAC-BSA goal to provide management directions that allows toad population levels to increase alongside the scope of the BSA/CAC utilization of the property.

## *Methods*

Two basic sources of historical data for the Houston toad on the BSA/CAC Lost Pines Reserve are available in 2004. The first of those represents a continuation of the previous years of endangered species surveys relying on audio surveys of the property during the annual spring breeding season. This portion of the data assembled involves the completion of up to 20 nights of audio surveys with the goal of detecting and describing the occurrence of Houston toads on the property. The second type of information is not from audio surveys but instead is taken from physical surveys of the property during daylight hours by myself, or others, seeking tadpoles or juvenile Houston toads in ponds or ephemeral water. Additional information can be drawn from such work on adjacent properties much as audio surveys from nearby locations can provide evidence of the proximity of Houston toads to the LPSR boundaries. Taken together these two approaches allow inference to be made of the current status and distribution of Houston toads in the area and more specifically on the property. Using the assembled evidence I have suggested directions for management options enhancing the property to become better Houston toad habitat and potentially supporting Houston toad reproduction in the future.

## *Surveys*

Obviously one of the most important aspects about managing endangered species is knowing where they are and how many of them are left. Conducted on an annual basis, audio surveys allow development of a trendline for the activity of male Houston toads. Likewise, such data provide the information necessary to define the areas used by the toads during the spring and to monitor changes in the abundance or distribution of chorusing toads over time. Audio surveys for the Houston toad have minimum acceptable guidelines established by the USFWS. The audio surveys completed for the BSA/CAC meet and exceed those guidelines.

All audio surveys are conducted on nights when climatic conditions appear favorable to Houston toad breeding events. A series of established listening stations are monitored for a period of (minimally) five minutes and the calls of all amphibians are noted. When Houston toads are heard, attempts are made to physically locate the individuals if this can be accomplished without undue disturbance to the chorus. Individuals are then permanently marked using microchip transponders (AVID) and physical measurements are taken. Upon completion of the data collection all individuals are released back into the breeding pond. Prior to the initiation of the breeding season all ponds are examined and data regarding the water levels and chemistry are collected. Subsequent to active chorus nights, positive ponds are searched during daylight or early evening to evaluate the success of the breeding chorus by counting the number of egg strings found in each pond. Finally, at the end of the season at the time when juveniles emerge from the ponds, each pond is checked to determine whether or not juvenile Houston toads are seen at the ponds' edges. Performing these activities has assisted in more complete evaluations of Houston toad activity than would have been possible from audio surveys alone.

### *Results*

Historical surveys of the Lost Pines Reserve have been performed. According to the literature I have available, during the early 1990s two distinct examinations of the area were conducted. The first Houston toad study was performed in 1992 by Dr. Andrew Price of the Texas Parks and Wildlife Department. Dr. Price visited Lost Pines and during a single daylight visit observed tadpoles in several areas of the Camp. At that time Dr. Price found what he describes as "a few" *Bufo* tadpoles in small ponds and catchments on the Lost Pines Reserve area. In 1993 the LCRA commissioned surveys of Lost Pines in order to evaluate proposed renovations to septic systems. A one year survey was performed by a group of researchers from Texas A&M University. The A&M survey was completed by Dr. James R. Dixon and two of his graduate students during the breeding season of 1993. They were unable to locate any breeding chorus' of Houston toads on the Lost Pines site. While it is certainly plausible that successful reproductive sites in 1992, failed to breed in 1993, it is likewise plausible that the tadpoles observed by Dr. Price in 1992 were not Houston toads. Dr. Price himself relays that assertion in his report dated 13 April 1992. I have no information regarding any surveys of Lost Pines by anyone, other than myself, subsequent to that of Dr. Dixon in 1993.

In the years subsequent to 1993 surveys were performed on the LCRA Lake Bastrop property and in some of those surveys Houston toads were detected on the LCRA property. This simultaneously supports the result from Dr. Dixon's survey conclusion that toads were calling across the inlet from Lost Pines on the LCRA property and that Houston toads occur very near Lost Pines.

In 2001 I examined the eastern portion of the property along FM1441 at the request of the Bastrop County School district. The BISD was considering construction of a school on the eastern acreage of Lost Pines. On May 8, 2001, two trained herpetology master's students (John Malone and Janie Nelan) and I examined the area. My visit followed a four inch rain and would have revealed any potential breeding ponds. The eastern border of Lost Pines Camp does have a drainage which crosses roughly from the ENE corner through toward the SSW. The drainage has nearly vertical banks which would preclude it from consideration as a breeding site for Houston toads. Overall the habitat represents a mixed woodland with a majority of the adult loblolly pines in decline. In summary, the 20 acres I examined did not contain any significant standing water bodies and while the habitat is suitable to support Houston toads I did not examine the subsurface soils which may be a significant factor. My conclusion based on the available data were that it was not likely that Houston toads would be found on the site in the event of a standardized three year survey.

In 2002 I performed an audio survey of the LPSR Reserve. Table 1 provides the compilation of results for the 2002 surveys of Lost Pines. No toads were heard to chorus within the property boundaries, but chorusing did occur within two hundred meters of the eastern LPSR Reserve fenceline.

Table 1. Houston toad audio survey results for the Lost Pines BSA property, Bastrop County for 2002. No toads were in chorus within the property boundaries, but chorusing did occur within two hundred meters of the LPSR Reserve fenceline.

Date	18-Jan	17-Feb	19-Feb	8-Mar	18-Mar	5-Apr	9-Apr
Temp (F)	71	75	52	75	68	69	65
Humidity	?	67	?	?	70	46	65
Wind	15	1	1	0	1	0	4
Moon	0	0	0.333	0	0	0	0
Post 1	1RS	0	0	1BH (SE)	2BH (SSE)	0	0
Post 2	1AC	0	0	5RS	3RS	1RS	2RS, 2HVC
Post 3	0	0	0	0	0	0	0
Post 4	0	0	0	0	0	0	3BH (S)

Species Key =	0=None	BX=Bufo sp. hybrid?	PS= <i>Pseudacris streckeri</i>
AC= <i>Acris crepitans</i>		GC= <i>Gastrophyrne carolinensis</i>	PT= <i>Pseudacris triseriatus</i>
BH= <i>Bufo houstonensis</i>		GO= <i>Gastrophyrne olivaceous</i>	RC= <i>Rana catesbaena</i>
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BV= <i>Bufo valliceps</i>		HVC= <i>Hyla versicolor/chrysocelous</i>	RS= <i>Rana sphenacephala</i>
BW= <i>Bufo woodhousei</i>		PC= <i>Pseudacris clarki</i>	SH= <i>Scaphiopus couchi</i>

\*designations within parentheses represent a compass direction to the calls heard

Finally, in 2003 a series of Bastrop County sponsored surveys were completed by myself and my colleagues. Those surveys included a wide area, but several listening posts were adjacent to the LPSR Reserve (Figure 1). Toads were heard chorusing quite near the property but not detected on the property itself. Across the 20 year plus span of time, only the evidence provided by Dr. A. Price of TPWD provides the tentative conclusion placing Bufo tadpoles within the boundaries of the Lost Pines Reserve. I would remind the reviewer that it is impossible to clearly distinguish Houston toad tadpoles or young juveniles from other toad species without molecular analyses. Just as importantly, all of the subsequent survey data that has been assembled provides data placing Houston toads nearby and directly adjacent to the property, but not on the LPSR Reserve.

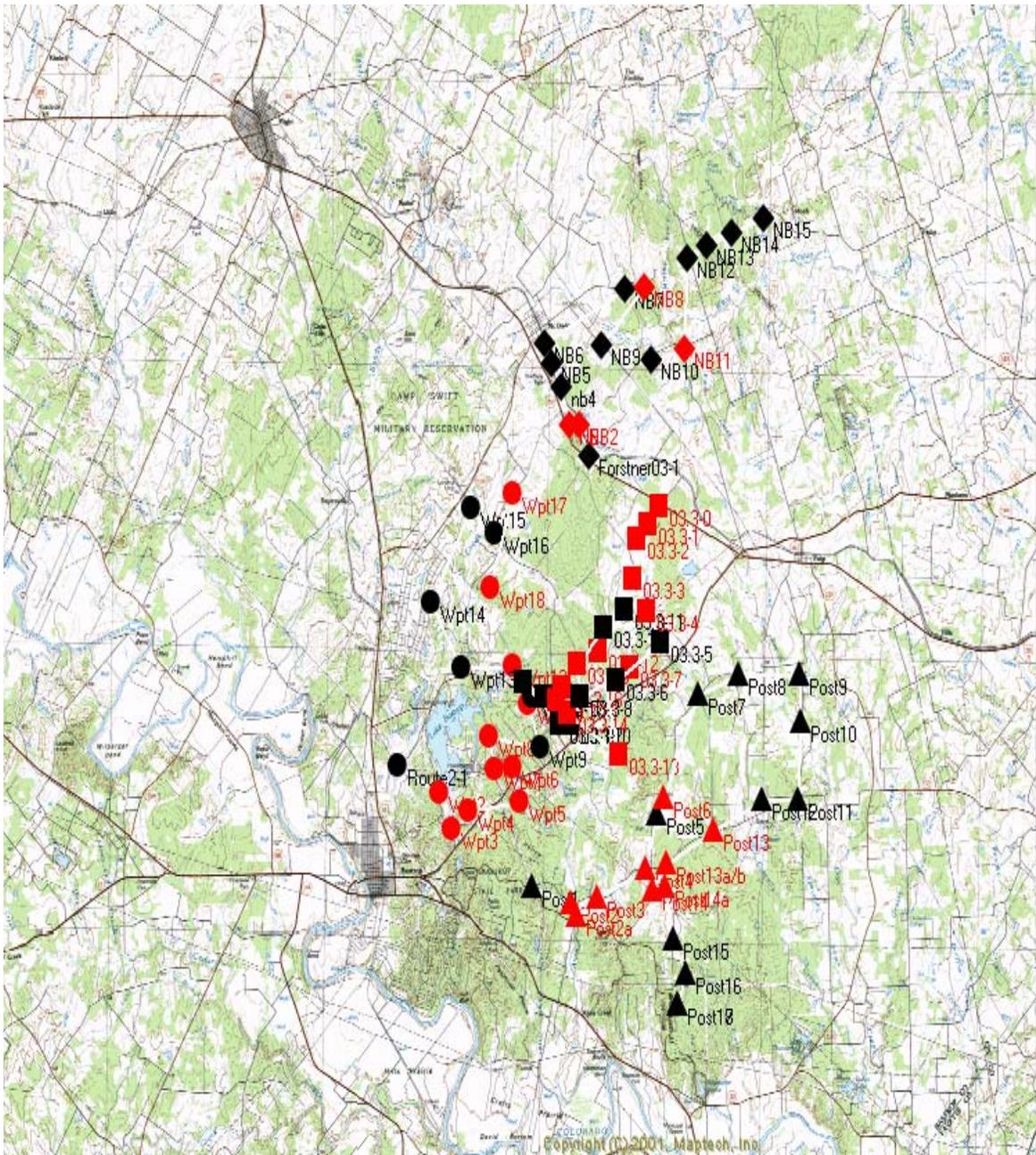


Figure 1. Geographic depiction of Houston toad audio survey listening post locations completed in 2003. The map represents the central and northern section of Bastrop County, Texas with the top of the map due North. Each different symbol shape represents a different individual survey route. Symbols in red indicate a listening post from which Houston toad chorusing could be heard. Route 1 is indicated by triangles, Route 2 by circles, Route 3 by squares, and Route 4 by diamonds. An additional set of 19 listening posts on Route 4 were completed in southern Bastrop County in the Pine Valley and Sandy Creek subdivisions. However, those locations are not depicted here nor were Houston toads heard at any of those locations.

### *Conclusions and Recommendations*

Based on the assembled evidence, I conclude that Houston toads do not currently chorus on the Lost Pines Reserve. Nor do I have evidence that conclusively supports the contention that they reproduce on the property. Houston toads are at low ebb and that low abundance may be the underlying reason for the lack of toads on LPSR. The underlying soils, vegetation, and overall geographic location are all correct for supporting Houston toads. Seemingly everything is correct for the toads, but no toads appear to be present. I would predict that Houston toads at least occasionally are present in the upland habitats of Lost Pines but, at the current time, if present, those individuals are rare and do not persist on the property.

Succinctly stated, the Lost Pines Reserve does not support a permanent population of Houston toads, nor is it likely to do so without direct management intervention by the BSA/CAC in a direction seeking to benefit the toad. Thus it seems particularly advantageous to create a situation under which both the BSA/CAC and the Houston toad benefit. In concluding a zero baseline for the Lost Pines Reserve I also conclude that several management options exist to enhance the current LPSR habitat and create a management regime providing Safe Harbor for the Houston toad while enhancing the Reserve for both BSA/CAC uses and Houston toad occupancy.

I would suggest an overall design that would provide both occupancy and dispersal for the Houston toad across the LPSR Reserve. Based on the total evidence I have assembled, the eastern boundary of Lost Pines provides the nearest access for documented Houston toads. In fact, this area of Lost Pines provides an area of the Reserve that currently has little development and thus significant potential for enhancements benefiting the BSA/CAC and the toad. Indeed much of the once dominant pine forest in that area was hard hit by pine beetle in the 1990s drought and is being replaced by cedar thickets and even mesquite. I would recommend that the eastern and southeastern boundaries of the Reserve form an area of focus for habitat enhancement and directed management benefiting the toad: a Toad Zone.

As with my collaborative efforts on the nearby BSA/CAC Griffith League Ranch, I believe that most if not all of following suggestions will provide as great a benefit to the value of the property for BSA/CAC use of the LPSR Reserve as they will for the Houston toad. Thus, the areas managed for the toad are not "Scout exclusion areas", far from it. The areas instead become a long term investment by the BSA/CAC in establishing and maintaining a healthy climax Loblolly pine or Pine/Oak forest as a feature of the Lost Pines Reserve. Obviously, this will be very attractive for low impact scouting across decades, providing forest for scout uses at the same time providing Houston toad habitat. Even more attractive are the low overall costs and concurrent necessity of involving generations of Boy Scouts in the process of creating and then maintaining this habitat on Lost Pines.

Foremost among the suggested management options would be re-vegetation/restoration of the eastern and southeastern region of LPSR. I would suggest that the restoration in those areas (currently impacted by pine beetle or anthropogenic clearing) by planting native pines and vegetation as an immediate management goal. While the overall goal should be to provide canopied forest continuity across the entirety of the LPSR reserve, the initial focus should remain on the eastern boundary. The eventual design goal does not require a completely dominant forest across the property but would seek instead to establish the possibility of toad dispersal through the property by providing an overall design that allows connectivity across the property. In the suggested "toad zone" on the eastern and southeastern boundaries this process would be fairly complete and seek to maintain a healthy primary forest. After that process is underway and the canopy begins to become significant in the eastern areas, several ephemeral ponds should be

established in different size/shape configurations allowing Houston toads the option of breeding on the property. However, the timing of that pond construction is important. Until vegetation restoration is underway and the upland habitat is established to allow the juvenile toads to survive, it would be imprudent to draw reproductive toads to Lost Pines. Without the appropriate habitat to support them, juveniles would simply die after emerging from the pond. Thus, the actual construction of planned future breeding ponds should be deferred until (after a program of vegetation restoration and forest management) has been undertaken.

These suggestions are designed to integrate with current plans for the LPSR Reserve and seek to make the most of the data collaborative assembled by the GLR research efforts. In fact, the work completed on the GLR in the last few years has formed a primary guide for my suggestions for the Lost Pines Reserve. Obviously, a program of evaluation should be established that provides the ability for adaptive management on LPSR over time. Especially as the results are nearly certain to be positive and provide additional recognition for the efforts of the CAB-BSA on behalf of the Houston toad.