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CANDIDATE CONSERVATION AGREEMENT

for the

Louisiana pine snake
Pituophis ruthveni

BETWEEN

U. S. Fish and Wildlife Service

U.S. Forest Service

Fort Polk, U. S. Department of Defense

Texas Parks and Wildlife Department

Louisiana Department of Wildlife and Fisheries

September 2003

SUMMARY

This Candidate Conservation Agreement (CCA) is intended to identify and establish management protection for the Louisiana pine snake (*Pituophis ruthveni*), a candidate for Federal listing, on National Forest lands in Texas and Louisiana, and on Fort Polk Military Reservation in Louisiana. Longleaf and shortleaf-pine communities throughout the historic range of the Louisiana pine snake have been dramatically reduced by changes in land use. Remaining habitat has been degraded by fire suppression; the predominant use of dormant season fire; and the implementation of intensive, short-rotation silviculture on non-federal lands. A secondary threat may be mortality associated with vehicle traffic. As a result, populations of the Louisiana pine snake appear to have declined alarmingly, both in numbers and in range.

PURPOSE OF THE CANDIDATE CONSERVATION AGREEMENT

This CCA has been initiated in order to conserve the Louisiana pine snake on Federal lands by protecting known populations and habitat, reducing threats to its survival, maintaining its ecosystem, and restoring degraded habitat. This agreement is intended to establish a framework for cooperation and participation in the Louisiana pine snake's protection, conservation, and management within the boundaries of certain lands in Texas and Louisiana. While implementation of this CCA may not preclude the eventual need to list the Louisiana pine snake, it addresses pressing needs of the species. It is through such cooperation in implementing and refining conservation measures that certain candidates and species of concern may be recovered without the necessity of listing. In furtherance of these efforts, this CCA is implemented by the U.S. Fish and Wildlife Service (USFWS), U.S. Forest Service's (USFS) Southern Research Station (SRS), USFS National Forests in Texas, USFS Kisatchie National Forest in Louisiana, Department of Defense's Fort Polk Military Installation, Texas Parks and Wildlife Department (TPWD), and Louisiana Department of Wildlife and Fisheries (LDWF), collectively referred to as the Cooperators.

Management commitments made through this agreement should benefit not only the Louisiana pine snake, but also the Navasota ladies's-tresses (*Spiranthes parksii*), Texas trailing phlox (*Phlox nivalis* var. *texensis*), and red-cockaded woodpecker (*Picoides borealis*), all federally listed as endangered. Plant and animal species of concern that should benefit include the white firewheel (*Gaillardia aestivalis* var. *winkleri),* slender gay-feather (*Liatrus teuis)*, scarlet catchfly (*Silene subciliata)*, Texas trillium (*Trillium pusillum* var. *texanum),* Bachman's sparrow (*Aimophila aestivalis)*, Henslow's sparrow (*Ammodramus henslowii)*, Rafinesque's big-eared bat (*Corynorhinus rafinesquii)*, and the northern scarlet snake (*Cemophora coccinea).* Additionally, other important species such as the eastern wild turkey (*Meleagris gallopavo sylvestris*), and northern bobwhite (*Colinus virginanus*) will benefit. Management actions are anticipated to result in the restoration and protection of the longleaf pine ecosystem of east Texas and western Louisiana, a habitat that has experienced substantial decline, and continues to disappear from the landscape of the southeastern United States.

I. COOPERATORS AND IMMEDIATE POINTS OF CONTACT

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II. AUTHORITY

The authority for the respective parties to enter into this voluntary CCA derives from the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531-1544); the Fish and Wildlife Act of 1956, as amended [16 U.S.C. 742(a)-754]; and the Fish and Wildlife Coordination Act, as amended [16 U.S.C. 661-667(e)]. In 1973, the ESA was enacted with the purpose of conserving threatened and endangered species and preventing their extinction. All federal agencies were called upon to utilize their authorities in furtherance of the purposes of the ESA by carrying out conservation programs for these species.

The USFWS is a Federal land-management and regulatory agency responsible for implementation of the ESA and coordination with Federal and State agencies in their efforts to prevent the extinction of species and loss of their habitats. The USFWS is responsible for monitoring candidates and species of concern, and facilitating conservation programs through inter-agency agreements. These CCA are intended to direct specific conservation efforts to species of concern, to outline management practices that will prevent further decline of their habitat, and to ensure regular, periodic review of their status.

The USFS is a land management agency responsible for 192 million acres of national forests and grasslands within 44 states. This area serves as habitat for many native plant and animal species, including rare and endangered species. As a result, the USFS has implemented a national policy to specifically manage much of this area for the benefit of sensitive plant and animal species in order to prevent their need for federal listing (USFS Manual 2670).

On January 25, 1994, the USFWS and several other agencies entered into a Memorandum of Understanding (MOU), initiated by the USFS, in order to facilitate the conservation of candidate and other sensitive species. The purpose of the MOU was to establish a framework for cooperation in the conservation of species that are tending toward federal listing as threatened or endangered. The MOU calls for the development of Conservation Agreements that are intended to address site-specific and species-specific threats. This Conservation Agreement, dealing with a species that lies within USFS boundaries in east Texas and western Louisiana, is developed under authority of the 1994 MOU. Furthermore, the 1996 Revised Land and Resource Management Plan for the National Forests and Grasslands in Texas, and the 1999 Revised Land and Resource Management Plan for the Kisatchie National Forest, include the following goals: manage for the long-term sustainability of diverse ecological systems; manage for ecosystems which are unique and recognized as declining within Louisiana and Texas; and enhance threatened, endangered, and sensitive species through restoration of the processes and habitats these populations require.

III. SPECIES INVOLVED

The species addressed by this CCA is the Louisiana pine snake, a non-venomous constrictor of the Colubridae family. Formerly described as a pine snake subspecies (*Pituophis melanoleucus ruthveni*) based on two specimens taken in Louisiana (Stull 1929), its taxonomic status has been reassessed and determined to be a valid evolutionary species, both geographically isolated and genetically distinct (Reichling 1995). The Louisiana pine snake has subsequently been accepted as a full species (Collins 1997).

The Louisiana pine snake is a large snake, usually 120 to150 cm (4 to 5 feet) long (Tennant 1998; Young and Vandeventer 1988). The largest reported specimen was 178 cm (5.8 feet) long (Conant and Collins 1991, Davis 1971). A recent study by Himes *et al.* (2002) suggests that one-year-old and two-year-old snakes reach 80 to100 cm (2 to 3 feet) and 100 to 120 cm (3 to 4 feet) in total length, respectively. Juvenile females increased in mean total length by 15.1% during the 8 to 13-month period of study. The species also exhibited allometric growth in length to mass ratio, indicating an optimum body shape for adults. Although more robust snakes gained mass more rapidly throughout the period of study, their largest snake (157.1 cm [5.2 feet]) experienced the greatest reduction in mass (from 996.9 to 606.4 grams) and died during the study.

Sexual maturity may be attained at a minimal total length of 120 cm (4 feet) and an age of at least three years (Himes *et al.* 2002). A female is known to have oviposited at a total length of 154 cm (5.1 feet) (Reichling 1990). The species is oviparous, with a gestation period of about 21days (Reichling 1988), followed by 60 days of incubation. This species exhibits a remarkably low reproductive rate, with the smallest clutch size (3 to 5) of any North American colubrid snake and the largest eggs of any U.S. snake (Reichling 1990), generally 12 cm (5 in.) long and 5 cm (2 in.) wide. It also produces the largest hatchlings reported for any North American snake, ranging 45 to 55 cm (18 to 22 in.) in length, and up to 107 grams in weight. This low fecundity magnifies other threats to the Louisiana pine snake; species with such low reproductive rates are typically incapable of quickly recovering from events that affect population size, increasing their potential for local extirpations.

Pocket gophers appear to be the primary food source of Louisiana pine snakes (Rudolph *et al.* 2002), although other reported food items include other rodents, cottontails, amphibians, and ground-nesting birds and eggs (Dundee and Rossman 1989; Tennant 1998). In captivity, they refused day-old chicks but fed readily on small rats (Reichling 1988).

Louisiana pine snakes appeared to be most active March-May and fall (especially November) and least active December-February and summer (especially August) (Himes 1998). Even during the active season, Louisiana pine snakes spend the majority of their time below-ground in mammal burrows, specifically pocket gopher burrow systems (Ealy 1998; Himes 1998; Rudolph *et al.* 1998). Although diurnal, snakes remained underground

and inactive (short-range movements of only 3 to 8 m) nearly 60% of their day. Above-ground Louisiana snakes usually moved underground at least once during the day, possibly for foraging, body cooling, or predator avoidance. Louisiana pine snakes were most active between 1000 to1800 hours, especially late-morning and mid-afternoon (Ealy 1998, Himes 1998). Snakes generally emerged from below-ground burrows before noon, except in October when they did not appear until 1400 to1600 hours (Ealy 1998). Hibernation sites were always within pocket gopher burrow systems.

During May-October, body temperatures of seven underground snakes ranged 15 to 33 degrees C, while active snakes above-ground ranged 20 to 36.7 degrees C. Above-ground snakes tended to move to underground burrows or to above-ground shade as their body temperatures approached 34 degrees C (Ealy 1998).

The annual home range of Louisiana pine snakes varied 5 to 78 hectares (ha) (12 to195 acres) in size, and averaged 27.7 ha (69 ac) (Rudolph and Burgdorf 1997). Himes (1998) found that adult males had larger home ranges (58 ha [145 ac]) than females (14 ha [25 ac]) and juveniles (5 ha [12 ac]). Ealy (1998) reported that Louisiana pine snakes in east Texas usually moved less than 10 m (33 feet) daily. However, when snakes did move longer distances, usually from one pocket gopher burrow system to a new one, the average daily distance moved was 163 m (538 feet): 204 m (673 feet) for females and 173 m (571 feet) for males (Ealy 1998). Adult males in Louisiana moved an average of 150 m (495 feet) daily, adult females 105 m (346 feet), and juveniles 34 m (112 feet) (Himes 1998). Males tended to make moves of more than 150 m (495 feet) in May-July, while females moved long distances primarily in July-September (Ealy 1998). Movement frequency (moving more than 10m/day) of individual pine snakes ranged 14 to 86% and averaged 46% of sample days. There was no indication of seasonal migration.

IV. HABITAT OF THE LOUISIANA PINE SNAKE

The Louisiana pine snake is generally associated with sandy, well-drained soils; open pine forests, especially longleaf pine savannah; moderate to sparse midstory; and a well-developed herbaceous understory dominated by grasses. Its activity appears to be heavily concentrated on low, broad ridges overlain with sandy soils (Rudolph and Burgdorf 1997).

Using radiotelemetry, Himes (1998) studied the habitat preferences of 9 native adults and one juvenile Louisiana pine snake in Louisiana's Bienville Parish, along with one adult and 7 juvenile captive-bred snakes released into the area, during 1995 to 1997. Native Louisiana pine snakes were recorded most frequently in pine forests (56%), followed by pine plantation (23%) and clear-cuts (9%). They were found minimally, or not at all, in grasslands, pine-hardwood, hardwood, and hardwood-pine sites. The captive-released snakes were found more frequently in pine plantations (38%) and pine forests (29%), followed by minimal use in other habitat types (Himes 1998).

Baird's pocket gophers (*Geomys breviceps*) appear to be an essential component of Louisiana pine snake habitat. They create the burrow systems in which Louisiana pine snakes are most frequently found, and serve as a major source of food for the species (Rudolph and Burgdorf 1997; Rudolph and Conner 1996; Rudolph *et al.* 1998b; Rudolph *et al.* 2002). Up to 90% of radio-tagged snake relocations have been underground in pocket gopher burrow systems, and movement patterns are typically from one pocket gopher burrow system to another. In Louisiana, habitat selection by Louisiana pine snakes seemed to be determined by the abundance and distribution of pocket gophers and their burrow systems (Himes 1998). Although active snakes did utilize debris and logs as temporary shelters, they were most often found adjacent to pocket gopher burrows. Snakes disturbed on the surface retreated to nearby burrows, and hibernation sites were always within burrows. Both native and captive-released snakes were found most frequently in areas containing an ample number of pocket gopher mounds (Himes 1998), and snakes stayed active longer and moved greater distances where pocket gopher burrows were abundant (Ealy 1998).

Pocket gopher abundance is dependent upon an abundance of herbaceous ground-cover and loose, sandy soils. The amount of herbaceous vegetation is related to canopy cover. Generally, a rich ground layer requires a high degree of solar penetration onto the forest floor. Himes (1998) found that pocket gopher abundance was associated with a low density of trees and an open canopy, which allowed greater sunlight, more understory growth, and better forage for pocket gophers. Pocket gopher mounds were commonly found in pine forests and open pine plantations. However, they were not commonly found in clear-cuts and other forest types.

V. STATUS AND DISTRIBUTION OF THE LOUISIANA PINE SNAKE

The Louisiana pine snake historically occurred in portions of northwest Louisiana and central-east Texas, its range roughly coinciding with a disjunct portion of the longleaf pine ecosystem situated west of the Mississippi River. A total of 61 historical records confirmed an original range of 7 Louisiana parishes and 12 Texas counties (Jennings and Fritts 1983). Analysis conducted by the USFS SRS expanded the historic range to 9 parishes and 14 counties. However, only three Texas records were post-1980, and all post-1980 Louisiana records involved only one parish.

Records collected in Texas since 1993 by the USFS SRS have confirmed the presence of the Louisiana pine snake in Angelina, Jasper, Newton, Sabine, and Tyler counties, generally the southern portion of Sabine National Forest (NF) (Sabine County); and the southern portion of Angelina NF (Angelina, Jasper, and Tyler counties) (Rudolph *et al.* 1999). However, nearly all recent records are from two separate areas, each measuring less than 7 km (4 miles) in radius, within a larger area approximately 70x20 km (42x12 miles) in extent. A third population occurs in Scrappin' Valley, land managed by Temple-Inland Forest Products Corporation in northern Newton County.

Louisiana records since 1993 document the presence of Louisiana pine snakes in at least 4 parishes: Bienville, Vernon, Sabine, and Natchitoches. The majority (12) of these records have been from Bienville Parish on forestland owned by International Paper (Rudolph *et al.* 1999). Federal lands in Vernon Parish, managed by USFS and used by the U. S. Army for military training, also provide habitat. Seven pine snakes have been found in south Vernon Parish on Fort Polk and USFS's Vernon Unit. Fort Polk is currently funding a study to determine pine snake distribution and habitat on its lands. Three more snakes, and possible evidence of a third population area, have been found near the juncture of Vernon, Sabine and Natchitoches parishes on Peason Ridge and the Kisatchie Ranger District.

Most of the recent pine snake records are based on captures (19) made during extensive trapping (20,000 trap-days) by the USFS SRS for radio-telemetry studies (Rudolph and Burgdorf 1997, Rudolph *et al.* 1999). Louisiana pine snakes have not been documented in over a decade in some of the best remaining habitat within the historical range, suggesting that the species is no longer present, or has become extremely rare in these areas.

Surveys documenting the current condition of fire climax longleaf pine forests, and the results of pine snake radio telemetry, suggest that extensive population declines and local extirpations of the Louisiana pine snake have occurred during the last 50 to 80 years. Rudolph (2000) conducted a habitat assessment of all known historical localities of the Louisiana pine snake and categorized each location as excellent, good, marginal or poor

based on habitat characteristics of occupied sites. Of the 77 sites assessed, only 34% (26) were considered capable of supporting a viable population of pine snakes.

Although once considered fairly common, the Louisiana pine snake is now recognized as one of the rarest snakes in North America, and one of the rarest vertebrate species in the United States (Young and Vandeventer 1988). As a candidate, the Louisiana pine snake receives no formal Federal protection under the Endangered Species Act. It is State listed as threatened in Texas and protected from direct harm and unauthorized collection. It is classified as imperiled to vulnerable in Louisiana.

VI. PROBLEMS FACING THE LOUISIANA PINE SNAKE

Possible threats to the Louisiana pine snake may include direct human predation and collection for the pet trade. Urban development, conversion to agriculture, intensive short-rotation silvicultural practices, road construction, and mining have all contributed to loss and fragmentation of Louisiana pine snake habitat. Remaining habitat occurs in isolated blocks and is often degraded by fire suppression. The primary threats to the pine snake continue to be habitat loss and alteration of the fire regime, apparently restricting the pine snake to only portions of its previous range (Rudolph and Burgdorf 1997). In addition, vehicle mortality may be increasing in importance.

HABITAT LOSS AND FRAGMENTATION

Virtually all remaining timber in the South was cut during intensive commercial logging from 1870 to 1920, followed by conversion to pine plantations (Frost 1993). In 1935, possibly only 1.2 million ha (3 million ac) of longleaf pine forests remained in Louisiana and Texas, and only 3% of this existed as uncut, mature pine stands. Published data from the 1980's indicated that only 15% in Louisiana and 7% in Texas of the 1935 levels of natural longleaf-pine forest still remained (Bridges and Orzell 1989).

The majority of historic longleaf and shortleaf pine savannah forests have been replaced with dense plantations of fast growing loblolly and slash pine. Slash pine is not native to this area, and loblolly was historically restricted to downslope areas with moist soils, or on higher areas along riparian terraces and bottomlands.

Commercial pine plantations (non-Federal land) are typically grown in very dense, closed canopy stands that are harvested on very short rotations of less than 40 years. These forests have sparse and poorly structured understory plant communities, an early successional trait that is present at the time of harvest and throughout the rotation, rendering them generally unsuitable for pocket gophers.

Most of the recent pine snake records in Louisiana have occurred on industrial forest land owned by International Paper in Bienville Parish, indicating that this site may currently support the densest known pine snake population. However, timber stands here are now being harvested, altering current habitat conditions with unknown results to the pine snake. The corporation is replanting the site to reduce impacts, but the potential for success has not be determined.

FIRE SUPPRESSION

The suppression of natural fire events from the upland landscape may represent the greatest threat to the Louisiana pine snake in recent years, decreasing both the quantity and quality of habitat available for pine snakes (Rudolph and Burgdorf 1997). The longleaf pine savannah forest occupied by the pine snake had evolved as a fire climax community, adapted to the occurrence of frequent, but low-intensity, ground fires. These natural fire events on sandy, well drained soils typically maintained an overstory dominated by longleaf pine, with minimal midstory cover but a well developed understory of native bunch grasses and herbaceous plants. These "park-like" forests supported ideal habitat for pocket gophers and, subsequently, Louisiana pine snakes.

In the absence of frequent and effective fires, these upland pine savannah ecosystems rapidly develop a mid-story of hardwoods and off-site species (that would have normally occurred on more moist, downslope soils) which suppresses or eliminates any herbaceous understory. Since the presence of pocket gophers is directly related to the extent of herbaceous vegetation available to them, their population numbers and distribution declines as such vegetation declines.

Ealy (1998) studied the activity of seven (7) pine snakes at two sites in east Texas, one which received prescribed burns, and one which did not. The frequently burned area maintained a rich herbaceous groundcover that supported more pocket gophers, allowing snakes in this area to make use of both pocket gopher burrows and rotten stumps/root systems that had burned out. As a result, snakes at this site were able to stay active longer and move greater distances than snakes at the unburned site. No pine snakes have been captured in areas substantially degraded by fire suppression (Rudolph and Burgdorf 1997).

These problems are further compounded by a current trend to replace prescribed burning with applications of herbicides to reduce vegetative competition. However, this practice also eliminates herbaceous growth. Further research on the long-term implications of this practice, particularly impacts on understory plant communities, is necessary.

The largest and densest existing population of Louisiana pine snakes occurs on industrial forestland owned by International Paper in Louisiana's Bienville Parish, where burning has historically been used to reduce and manage undergrowth. Sawtimber stands are now being

harvested from this site, but the corporation is designing management actions for the pine snake that include prescribed burning.

Observations by Rudolph *et al.* (1998b) suggest that Louisiana pine snakes are adapted to the periodic occurrence of fire. Nine Louisiana pine snakes residing in areas subjected to prescribed burns during 1994 to1997 all survived with no apparent damage. Three snakes observed during the fires all moved into pocket gopher burrows as flames neared. Active (above-ground) snakes are usually found within a few meters of pocket gopher burrows, and can quickly retreat underground as a fire approaches. Louisiana pine snakes above ground but away from known burrows could be at greater risk (Rudolph et.al. 1998b).

VEHICLE MORTALITY

Louisiana pine snakes are also impacted by vehicle-caused mortality, both on state roads and on off road trails by off road vehicles, but the full extent of the impact is still unknown. The USFS SRS documented the loss of 3 snakes (25%) from its radio telemetry study to vehicle traffic, including off road vehicles (Rudolph *et al.* 1999). Further research by the USFS SRS indicates that roads with moderate to high traffic levels can reduce adjacent populations of large snakes by 50 to75%. Moreover, measurable impacts to population numbers and community structure may extend up to 850 meters (2,805 feet) away from road corridors (Rudolph *et al.* 1999). Rudolph *et al.* (1998a) found that distribution of timber rattlesnakes (*Crotalus horridus*) was significantly associated with low road density. Populations in east Texas may be restricted to riparian habitats due to a greater road density and mortality in the adjacent uplands.

Fort Polk is currently funding a study of the Louisiana pine snake on its reservation lands and on USFS's Vernon Unit to identify possible impacts from roads on Federal lands. Although initial results have found no evidence of road mortality for the Louisiana pine snake (C. Rudolph pers. comm., 2003), this may be a function of both low capture rates (and possibly few pine snakes) and low traffic volume in the study area. Additional research is necessary, but other data suggest that motorized vehicles on certain roads and trails have the potential to impact Louisiana pine snake abundance and community structure.

Known conflicts between Louisiana pine snakes and motorized vehicles currently exist in the Longleaf Ridge Area of south Angelina NF. Compartments with the greatest potential for pine snake loss include 74 thru 77, 79 thru 92, and south portions of 73 and 78. Motorized vehicles have eliminated a large part of the Millstead Branch bog community and the Catahoula Barrens community in Compartment 84. The southern portion of the Upland Wilderness Area may also provide important habitat. In Sabine NF, pine snake habitat is at similar risk of vehicle conflict in Compartments 139 (Foxhunter's Hill), 141 and 142 (Stark Tract).

VII. CONSERVATION ACTIONS TO BE CARRIED OUT

All Cooperators agree to support educational programs involving the Louisiana pine snake. All Cooperators will seek funding for carrying out the Conservation Actions identified below, and will collaborate on cost-sharing opportunities as they become available. It is understood that all funding commitments made pursuant to this CCA are subject to budget authorizations and approval by the appropriate agency. Cooperators will plan to meet on an annual basis to evaluate the activities identified below and determine their effectiveness in conserving the Louisiana pine snake.

For all parties, the areas discussed herein will be treated as special management areas for the pine snake, and protected as such to the maximum extent possible. Adverse impacts to the species will be avoided, and beneficial management activities will be continued or implemented. In consideration of the premises of this document, the respective responsibilities and provisions of each party are as follows:

A. U.S. Fish and Wildlife Service agrees to the following conditions for the designated period of time:

1. Continue to record and report the status of the Louisiana pine snake, as required by Congress and current policy.

2. Review and comment on any management plans, proposed strategies, reports, and other documents that may impact the Louisiana pine snake.

3. Work with cooperators on ways to reduce adverse impacts associated with any proposed project or activity that could adversely affect the Louisiana pine snake or habitat areas covered by this CCA.

4. Seek funding to support Louisiana pine snake research and habitat restoration and management.

B. The National Forests in Texas agree to the following conditions for the designated period of time:

1. Compartments 73 thru 81 and 84 thru 92 of the Angelina National Forest, and Compartments 90 thru 92, 114 thru 124 (Moore Plantation), 126 thru 129, 132, 135, and 139 (Foxhunters Hill), and 140-142 (Stark Tract) of Sabine National Forest, are specifically identified for the following conservation measures. Within these areas, management actions such as prescribed burning, thinning, and longleaf pine restoration will be prioritized to maintain

or establish herbaceous-dominated vegetative understory conditions on appropriate sites. Upland Island Wilderness area actions are limited to prescribed burning only.

a. Conduct an aggressive prescribed burning program that is specifically designed to reduce or eliminate existing shrub encroachment, restore herbaceous dominated conditions, and prevent future woody shrub encroachment, within existing and potential longleaf pine woodlands.

b. Target burning for optimum, or potentially optimum, longleaf pine habitat areas, and ensure that prescribed burns in the Longleaf Ridge area receive priority.

c. Ensure that burns are carried out during the most effective season and on a periodic and regular basis, preferably every 2 to 3 years in longleaf pine habitat, in order to ensure sufficient and timely restoration of herbaceous communities.

d. Initiate detailed monitoring to measure the success of burns at reducing understory and restoring herbaceous conditions. Modify burn program, if needed, as new information on fire management is developed.

2. Within historical longleaf pine habitat, where practicable, continue aggressive thinning and early conversion of existing slash pine and loblolly pine stands to longleaf pine forest. Retain all residual longleaf pines within these stands.

3. Inventory and evaluate off road vehicle use and trails within sensitive pine snake habitat to determine if and where motorized vehicular use is adversely affecting pine snake populations. Take appropriate management action (including closure), in order to minimize damage to resources and ensure their integrity and sustainability.

a. Maintain existing area closures south of Hwy. 63 (current closure order expires 12/15/04) to motorized off road vehicles within sensitive pine snake habitat. Close roads to public vehicle use south of Hwy. 63 to the extent reasonably possible, from February through October, unless the road is required for administrative use, access to private land, school bus route, or permitted special use.

b. Roads in Compartments 73 thru 81 and 84 thru 92 of the Angelina NF, and in Compartments 139 thru 142 of the Sabine NF, including FDR 113 and FDR 196, will be considered for closure.

4. Continue to support research involving trapping and other techniques to better determine the population numbers, range, habitat, behavior, and specific management requirements of the pine snake.

5. Support research, as funding and personnel are available, to establish and maintain herpetofaunal monitoring stations throughout longleaf pine woodland habitat to document the seasonal presence/absence of terrestrial reptiles and amphibians in the forest.

6. As funding and personnel are available, support studies to determine pocket gopher dynamics within USFS boundaries, including population numbers, distribution, suitable habitat, and the effects of fire.

7. Develop an information and education program that encourages forest users to refrain from harassing or harming snakes.

8. Provide for review to the Cooperators any management plans or other documents that may affect pine snake recovery.

9. Seek funding and staffing necessary to carry out the above management actions through all available channels.

10. Participate in an annual Louisiana pine snake meeting to discuss the results of implementing this CCA.

C. Kisatchie National Forest agrees to the following conditions for the designated period of time:

1. Continue a prescribed burning program that is specifically designed to reduce or eliminate existing shrub encroachment, restore herbaceous-dominated conditions, and prevent future woody shrub encroachment within the existing and potential longleaf-pine ecosystem.

   a. Target burning for the best longleaf pine and restorable longleaf pine habitats.

   b. Visually ensure that the burning program enhances maintenance or restoration of herbaceous communities.

2. Continue thinning and conversion of existing slash pine, loblolly, and shortleaf pine stands to longleaf pine habitat on suitable sites, consistent with the Kisatchie NF Forest Plan.

3. Determine if and where motorized vehicular use is adversely affecting pine snake populations, and take appropriate management action to reduce these threats.

4. Cooperate with studies involving trapping and other techniques to better determine the population numbers, range, habitat, behavior, and specific management requirements of the pine snake.

5. Provide for review to the Cooperators any management plans or other documents that may affect pine snake recovery.

6. Develop an information and education program that encourages forest users to refrain from harassing or harming snakes.

7. Support Louisiana pine snake studies, as funding and personnel are available, to determine pocket gopher dynamics within USFS boundaries, including population numbers, distribution, suitable habitat, and the effects of fire.

8. Participate in an annual Louisiana pine snake meeting to discuss the results of implementing this CCA.

D. The U.S. Forest Service's Southern Research Station, agrees to the following conditions for the designated period of time:

1. Continue, as funding permits, surveys for the Louisiana pine snake throughout its historic range to better determine its current status and distribution.

2. Continue, as funding permits, to assess the impacts of vehicular traffic on snake populations.

3. Consult with cooperators on the status and management of Louisiana pine snakes.

E. The Fort Polk Military Installation agrees to the following conditions for their lands for the designated period of time:

1 Within guidance of the Fort Polk Management Plan and the Integrated Natural Resources Management Plan, continue a prescribed burning program that is specifically designed to reduce or eliminate existing shrub encroachment, restore herbaceous dominated ground cover conditions, and prevent future woody shrub encroachment within longleaf pine woodlands.

a. Target burning for the best longleaf pine and restorable longleaf pine habitats.

b. Initiate monitoring to measure the success of burns at reducing understory and restoring herbaceous conditions. Modify burn program, if needed, as new information on fire management is developed.

2. Continue thinning and early conversion of existing slash pine and loblolly pine stands to longleaf pine woodland habitat on suitable sites, where practical.

3. Continue to educate soldiers and civilians on Fort Polk about the Louisiana pine snake.

a. Provide information on the Louisiana pine snake at the 40-hour Environmental Compliance Officer's Course.

b. Continue distribution of flyers with photos of the Louisiana pine snake and information on its habitat and status.

4. Cooperate with research involving trapping and other techniques to better determine population numbers, range, habitat, behavior, and specific management requirements of the Louisiana pine snake.

5. Cooperate in establishing and maintaining herpetofaunal monitoring stations throughout longleaf pine woodland habitat to document the seasonal presence/absence of terrestrial reptiles and amphibians.

6. Provide for review to the Cooperators any management plans or other documents that may affect Louisiana pine snake recovery.

F. Texas Parks and Wildlife Department agrees to the following conditions for the designated period of time:

1. Review and comment on plans or proposed strategies that may impact the pine snake within Texas.

2. Work with other cooperators on proposed projects or activities within Texas that could adversely affect the pine snake.

3. Work cooperatively to support specific projects that will create or maintain suitable habitat for the Louisiana pine snake.

4. Work cooperatively to support projects that will educate the public concerning the plight of the Louisiana pine snake and the management requirements that will produce suitable habitat.

5. Work with private landowners who may have or could create suitable habitat for Louisiana pine snakes, using incentive programs such as the Landowner Incentive Program, subject to the availability of funds.

G. Louisiana Department of Wildlife and Fisheries agrees to the following conditions for the designated period of time:

As time and staff allows, review and comment on plans or proposed strategies that may impact the pine snake within Louisiana.

2. Work with other cooperators on any proposed project or activity within Louisiana that could adversely affect the pine snake.

3. Work cooperatively to support specific projects that will create or maintain suitable habitat for the Louisiana pine snake.

4. Work cooperatively with cooperators whenever possible to support projects that will educate the public concerning the plight of the Louisiana pine snake and the management requirements that will produce suitable habitat.

5. Work with private landowners who may have or could create suitable habitat for pine snakes, using incentive programs such as the Landowner Incentive Program, as funding is available.

VIII. ADAPTIVE MANAGEMENT

This CCA is conceptually based on adaptive management principles. All Cooperators agree and recognize that implementation of the conservation actions included in this CCA will be considered experimental, consistent with the concepts of adaptive management. The experimental approach to habitat manipulations and desired forest conditions will provide managers with the most effective and efficient method to restore, enhance, maintain and/or create Louisiana pine snake habitat through the adaptive management process. The effectiveness of all conservation measures and monitoring methods will be reviewed by the Cooperators at an annual meeting. Based upon such evaluation, appropriate modifications to the management scheme will be incorporated, to the best ability of the Cooperator, to further enhance the goals of this CCA.

IX. DURATION OF AGREEMENT

A. The duration of this CCA is five (5) years following the date of the last signature below, and will automatically be extended for another five-year term, unless terminated within 90 days before the date of renewal by written notice from any party.

B. The parties involved will annually review the CCA and its effectiveness to determine whether revision is necessary. During the last month in which it is valid, the CCA must be reviewed and either modified, renewed, or terminated. If some portion of this CCA cannot continue to be carried out or if cancellation is desired, the party requesting such action will notify the parties within one month of the changed circumstances.

C. No obligation shall be in effect after expiration of this CCA, with the exception of normal provisions of the Endangered Species Act, although this CCA will be considered for renewal. If it becomes known that there are threats to the survival of the subject species that cannot be resolved through this and other Conservation Agreements, the species will be retained in candidate status and considered for listing.

X. DUPLICATE ORIGINALS

This Agreement may be executed in any number of duplicate originals. A complete original of this Agreement shall be maintained in the official records of each of the Parties hereto.

XI. SIGNATURES

The parties identified herein have caused this Louisiana Pine Snake Candidate Conservation Agreement to be executed as of the date of the last signatures shown on the following pages;

National Forests in Texas
Kisatchie National Forest
Southern Research Station
Fort Polk Military Installation
U.S. Fish and Wildlife Service, Region 2
U.S. Fish and Wildlife Service, Region 4
Texas Parks and Wildlife Department
Louisiana Department of Wildlife and Fisheries

CANDIDATE CONSERVATION AGREEMENT

for the

Louisiana pine snake
Pituophis ruthveni

September 2003

Fred J Salinas
National Forests in Texas

October 16, 2003
Date

CANDIDATE CONSERVATION AGREEMENT

for the

Louisiana pine snake
Pituophis ruthveni

September 2003

Kisatchie National Forest

11/4/03
Date

CANDIDATE CONSERVATION AGREEMENT

for the

Louisiana pine snake
Pituophis ruthveni

September 2003

Peter J. Roussopoulos

PETER J. ROUSSOPOULOS
Station Director
Southern Research Station

12/16/03
Date

CANDIDATE CONSERVATION AGREEMENT

for the

Louisiana pine snake
Pituophis ruthveni

September 2003

Fort Polk Military Installation — Date 4 Nov 03

CANDIDATE CONSERVATION AGREEMENT

for the

Louisiana pine snake
Pituophis ruthveni

September 2003

U.S. Fish and Wildlife Service
Southwest Region

12/2/03
Date

CANDIDATE CONSERVATION AGREEMENT

for the

Louisiana pine snake
Pituophis ruthveni

David N. Ferguson
Supervisor Louisiana Field Office
U.S. Fish and Wildlife Service, Region 4

8/28/03
Date

CANDIDATE CONSERVATION AGREEMENT

for the

Louisiana pine snake
Pituophis ruthveni

September 2003

Texas Parks and Wildlife Department

12-1-03
Date

CANDIDATE CONSERVATION AGREEMENT

for the

Louisiana pine snake
Pituophis ruthveni

RECEIVED
OCT 27 2003
FISH & WLDL. SERV.
LAFAYETTE, LA.

September 2003

Louisiana Department of Wildlife and Fisheries **Date** 10-20-03

James H. Jenkins, Jr., Secretary

LITERATURE CITED

Bridges, E.L. and S.L. Orzell. 1989. Longleaf pine communities of the West Gulf coastal Plain. Natural Areas Journal 9:246-253.

Collins, J.T. 1997. Standard common and current scientific names for North American amphibians and reptiles. Fourth Edition. Society of the Study of Amphibians and Reptiles Herpetological Circular 25:1-40.

Conant, R. and J.T. Collins. 1991. A field guide to reptiles and amphibians of eastern and central North America. 3rd ed. Houghton Mifflin Co., Boston, MA.

Davis, B.J. 1971. A new size record for the Louisiana pine snake, *Pituophis melanoleucus ruthveni*. Texas Journal of Science 23:145.

Dundee, H.A. and D.A. Rossman. 1993. The amphibians and reptiles of Louisiana. Louisiana State University Press, Baton Rouge, LA. 300 pp.

Ealy, M.J. 1998. Activity patterns of the Louisiana pine snake in eastern Texas. Master's thesis, Stephen F. Austin State University, Nacogdoches, TX. 74pp.

Frost, C.C. 1993. Four centuries of changing landscape patterns in the longleaf pine ecosystem. Pgs. 17-43 *In*: S.M. Hermann (ed.). Proceedings of the Tall Timbers Fire Ecology Conference, No. 18, The longleaf pine ecosystem: ecology, restoration and management. Tall Timbers Research Station, Tallahassee, FL.

Himes, J.G. 1998. Activity patterns, habitat selection, excavation behavior, growth rates, and conservation of the Louisiana pine snake (*Pituophis melanoleucus ruthveni*). Master's thesis, Louisiana State University, Shreveport, LA. 58 pp.

Himes, J.G., L.M. Hardy, D.C. Rudolph, and S.J. Burgdorf. 2002. Growth rates and mortality of the Louisiana pine snake (*Pituophis ruthveni*). Journal of Herpetology 36(4):683-687.

Jennings, R.D. and T.H. Fritts. 1983. The status of the black pine snake *Pituophis melanoleucus lodingi* and the Louisiana pine snake *Pituophis melanoleucus ruthveni*. U.S. Fish and Wildlife Service and University of New Mexico Museum of Southwestern Biology, Albuquerque, NM. 32pp.

Reichling, S.B. 1988. Reproduction in captive Louisiana pine snakes, *Pituophis melanoleucus ruthveni*. Herpetological Review 19(4):77-78.

Reichling, S.B. 1990. Reproductive traits of the Louisiana pine snake *Pituophis melanoleucus ruthveni* (Serpentes:Colubridae). Southwestern Naturalist 35(2):221-222.

Reichling, S.B. 1995. The taxonomic status of the Louisiana pine snake (*Pituophis melanoleucus ruthveni*) and its relevance to the evolutionary species concept. Journal of Herpetology 29(2):186-198.

Rudolph, D.C., and S.J. Burgdorf. 1997. Timber rattlesnakes and Louisiana pine snakes of the west Gulf Coastal Plain: hypotheses of decline. Texas Journal of Science 49:111-122.

Rudolph, D.C., and R.N. Conner. 1996. Radio-telemetry study of Louisiana pine snakes in eastern Texas and western Louisiana. Unpublished report to Texas Parks and Wildlife and Louisiana Department of Wildlife and Fisheries, Baton Rouge, LA. 7 pp.

Rudolph, D.C., S.J. Burgdorf, R.N. Conner, C.S. Collins, D.Saenz, R.R. Schaefer, C.M. Duran, M. Ealy, and J.G. Himes. 2002. Prey handling and diet of Louisiana pine snakes (*Pituophis melanoleucus*) and black pine snakes (*P. melanoleucus lodingi*) with comparisons to other selected colubrid snakes. Herpetological Natural History 9:57-62.

Rudolph, D.C., S.J. Burgdorf, R.N. Conner, and J.G. Dickson. 1998a. The impact of roads on the timber rattlesnake (*Crotalus horridus*) in eastern Texas. Proceedings of the International Conference on Wildlife Ecology and Transportation (Fort Myers, FL). G.L. Evink, P. Garrett, D. Zeigler, and J. Berry (eds.). Florida Department of Transportation, Tallahassee, FL.

Rudolph, D.C., S.J. Burgdorf, R.N. Conner, and R.R. Schaefer. 1999. Preliminary evaluation of the impact of roads and associated vehicular traffic on snake populations in eastern Texas. Proceedings of the Third International Conference on Wildlife Ecology and Transportation (Missoula, MT). G.L. Evink, P. Garrett, and D. Zeigler (eds.). Florida Department of Transportation, Tallahassee, FL. FL-ER-73-99.

Rudolph, D.C., S.J. Burgdorf, J.C. Tull, M. Ealy, R.N. Conner, R.R. Schaefer, and R.R. Fleet. 1998b. Avoidance of fire by Louisiana pine snakes, *Pituophis melanoleucus ruthveni*. Herpetological Review 29(3):146-148.

Stull, O.G. 1929. The description of a new subspecies of *Pituophis melanoleucus* from Louisiana. Occasional Papers of Museum of Zoology, University of Michigan 205:1-3.

Tennant, A. 1998. A field guide to Texas Snakes, second edition. Gulf Publishing field guide series. Gulf Publishing Company, Houston, TX. 291 pp.

Young, R.A., and T.L. Vandeventer. 1988. Recent observations of the Louisiana pine snake, *Pituophis melanoleucus ruthveni* Stull. Bulletin of the Chicago Herpetological Society 23(12):203-207.