

## Appendix I

### Comments Concerning Federally Listed Endangered Species

*The Houston Toad, Ocelot/Jaguarundi, Attwater's Prairie Chicken, and Bald Eagle are some of the Federally listed endangered and threatened species that are found in portions of the Gulf Prairies and Marshes ecological area. The following information and management guidelines are from the 130 page book "Endangered and Threatened Animals of Texas - Their Life History and Management", by Linda Campbell. Published by the Texas Parks and Wildlife Press, Austin, Texas in 1995. Distributed by the University of Texas Press, Austin, Texas, and revised in 2003 as an electronic book available on the TPWD website at [www.tpwd.state.tx.us](http://www.tpwd.state.tx.us).*

#### **Houston Toad**

##### **Management Guidelines for the Houston Toad**

The following guidelines address land management practices that can be used to maintain existing Houston Toad habitat or enhance degraded habitat. They are intended primarily to serve as general guidance for landowners and managers in Texas. The guidelines are based on our current understanding of the biology of this species.



##### **Protect Pond Habitat**

Avoid modification or disturbance of temporary wet-weather ponds and other small natural ponds located within one-half mile of deep sandy soils supporting post oak or loblolly pine woodland or savannah. These small ephemeral wetlands are prime breeding habitat for the Houston Toad. Extensive clearing of native vegetation and alteration of drainage patterns should be avoided in and around these ponds.

Because predators and other toad species live in and near permanent ponds, it is important that these ponds be located away from breeding ponds. To reduce predation and hybridization between Houston Toads and other toads, permanent ponds for livestock water should be located as far as possible from any existing temporary or natural pond. Also, permanent ponds should not impound ephemeral ponds or wetlands, in order to discourage predation and hybridization. Alternatives for livestock water, such as pipelines and windmills, should be considered in lieu of disturbing natural ponds and seeps that could serve as breeding habitat.

Since predation can be an important factor in reducing Houston Toad populations, predatory fish should not be introduced into breeding ponds. In addition, a fungus commonly found in hatchery raised fish has been shown to be harmful to the eggs of other toad species and could be a potential problem.

##### **Conserve and Manage Existing Post Oak or Loblolly Pine Woodland and**

## **Savannah and the Associated Native Plant Communities**

Conservation and wise management of rangeland and native grassland pasture in the Gulf Prairies and Marshes ecological region are the keys to preserving Houston Toad habitat. Preventing overuse by livestock is important. Maintaining and improving range condition through moderate stocking, rotational grazing, and prescribed burning, will help restore the plant communities with which the Houston Toad evolved and is dependent. Good range management practices such as these will also benefit livestock, deer, and other wildlife.

Prescribed burning is an important management tool for maintaining the open woodland savannah preferred by the Houston Toad. Periodic burning (every 3 to 5 years) will stimulate native bunchgrasses, improve plant diversity, and reduce excessive mulch buildup. Prescribed burning also improves forage quality and availability for livestock and enhances habitat for deer, quail, turkey and other wildlife. Generally, prescribed burning should be done during cold, dry periods when toads are most likely to be hibernating in burrows. Burning prior to February 1 is recommended to avoid the breeding season. The timing of prescribed burning may vary from year to year depending on how weather conditions affect the toad's activity and the vegetation.

At this time, little is known concerning the effects of prescribed burning on Houston Toads. During the next five years, studies will be conducted to address questions concerning how prescribed burning affects Houston Toads and their habitat. Because prescribed burning could result in the death or injury of individual toads, landowners are advised to contact Texas Parks and Wildlife or U.S. Fish and Wildlife Service for further information concerning prescribed burning in Houston Toad habitat.

Clearing of trees and brush should be limited to reducing woody canopy enough to allow sufficient sunlight to reach the ground for herbaceous plant production. Initial brush management can then be followed by prescribed burning to maintain a more open savannah grassland.

## **Reduce Loss of Habitat Due to Pasture Establishment**

The introduction of sod-forming grasses, such as bermudagrass and bahiagrass, on deep sandy soils has reduced habitat for the Houston Toad in the Gulf Prairies and Marshes ecological region. Ideally, areas of potential habitat should be managed as native rangeland pasture for the production of native bunchgrasses and forbs. If improved forage production through pasture establishment is an objective, it is better to plant high quality native bunchgrasses that are adapted to local conditions and sandy soils, such as indiagrass and little bluestem.

## **Use Safe, Effective Alternatives to Chemicals Whenever Possible**

Amphibians such as the Houston Toad are susceptible to chemical contamination. The toads can be affected either directly, or through reduction in their food supply. Some pesticides can impact water quality and adversely affect the Houston Toad and other species. Alternatives, such as integrated pest management, organic gardening, and the use and proper management of native vegetation, reduce reliance on chemicals and

can improve cost effectiveness.

When insecticide or herbicide treatments must be used, label directions should be carefully followed. Avoid contamination of temporary ponds and other natural wetlands by limiting use of these products near them. Dispose of rinse water and empty containers in strict accordance with label directions. Contact the Texas Department of Agriculture or the U.S. Natural Resources Conservation Service (formerly Soil Conservation Service) for guidance on ways to minimize the environmental effects of agricultural chemicals.

### **Control Fire Ants**

Although the full impact of fire ants on the Houston Toad is not known, fire ants are believed to be a serious and increasingly important threat. You can help control fire ant infestations by limiting soil disturbance, inspecting imported soil and nursery products thoroughly for fire ants, and properly disposing of trash. Controlling heavy fire ant infestations in Houston Toad habitat may help minimize their impact.

Where fire ant control is needed, the U.S. Fish and Wildlife Service recommends treatment of individual fire ant mounds with commercial fire ant bait. Bait should be placed only near fire ant mounds and not near the mounds of native ant species. To avoid affects on non-target species apply bait when ants are actively foraging and prevent accumulations of excess bait.

### **For More Information**

Technical assistance in range and wildlife management, including management for endangered species, is available to landowners and managers by contacting Texas Parks and Wildlife, U.S. Natural Resources Conservation Service, or Texas Agricultural Extension Service. Further guidance and specific questions concerning landowner responsibilities under the Endangered Species Act, should be directed to the U.S. Fish and Wildlife Service.

## **Bald Eagle**

### **Habitat Management Guidelines for Bald Eagles in Texas**

The following guidelines were developed to help landowners and managers maintain or improve their land for the benefit of the Bald Eagle. Information is also provided so that landowners may recognize and avoid or minimize human-related disturbance to eagles, particularly nesting pairs.



### **Nesting Habitat**

The protection of an actual nest is important, but so is protection of the nest area and all the surrounding habitat factors that attracted the nesting pair to the area. Once the eagles establish a suitable breeding territory, they will return to the same area year after year, often using several nests within the territory during different years. When a given nest or the tree that it is in falls, a pair generally returns to the same territory to begin another nest. If one member of a pair dies, the nest may go unused for several years and then be recolonized by the surviving member returning with a new mate. Nesting territories can even be inherited by offspring. Therefore, protection of nesting territories should apply to “abandoned” nests for at least five consecutive years of documented nonuse.

The following habitat management guidelines are based on two management zones surrounding each nest site, with certain restrictions recommended for each zone.

### **Primary Management Zone For Nest Sites**

This zone includes an area extending 750 to 1,500 feet outward in all directions from the nest site. It is recommended that the following activities not occur within this zone:

1. Habitat alteration or change in land use, such as would result from residential, commercial, or industrial development; construction projects; or mining operations.
2. Tree cutting, logging, or removal of trees, either living or dead.
3. Use of chemicals labeled as toxic to fish and wildlife.
4. Placement of above-ground electrical transmission or distribution lines.

Since collision with powerlines and electrocution on powerline structures remain an important cause of death, placement of underground lines is recommended near Bald Eagle nests and winter concentration sites.

5. Helicopter or fixed-wing aircraft operation within 500 feet vertical distance or 1,000 feet horizontal distance of the nest site during the nesting season (October-July).

6. Activities which create minimal disturbance, such as hiking, fishing, camping, and bird-watching can be carried out safely during the non-nesting season if there is no physical alteration of the habitat within the zone. Traditional farming, ranching, and hunting activities which are existing practices and have occurred

historically on the site can be carried out safely during the non-nesting season as long as habitat alteration is avoided.

Human presence within this zone should be minimized during the nesting season, especially during the early nesting period from October-April. Traditional agricultural activities and low impact recreational activities are generally not a problem even during the nesting season as long as they do not appear to be adversely affecting nesting success, there is no increase in the level of disturbance from historic levels, and physical alteration of the habitat is avoided. However, activities of any kind should be stopped if it becomes apparent that the birds are suffering from disturbance. The key point is whether the activities keep the breeding birds away from the nest, eggs, or young for extended periods of time. If they do, they are harmful. In general, it is important to protect the nest from human disturbance during very hot or very cold weather, since the parents' absence at these times can be particularly deadly for the eggs or young.

### **Secondary Management Zone For Nest Sites**

This zone encompasses an area extending outward from the primary zone an additional 750 feet to 1 mile. Recommended restrictions in this zone are intended to protect the integrity of the primary zone and to protect important feeding areas, including the eagle's access to these areas. The following activities are likely to be detrimental to Bald Eagles at any time, and in most cases should be avoided within the secondary zone:

1. Development of new commercial or industrial sites.
2. Construction of multi-story buildings or high-density housing developments between the nest and the eagle's feeding area.
3. Placement of electrical transmission or distribution lines between the nest site and the eagle's feeding area.
4. Construction of new roads, trails, canals, or rights-of-way which would tend to facilitate human access to the eagle nest.
5. Use of chemicals labeled as toxic to wildlife.

Certain activities that involve only minimal alteration or disturbance to the habitat can be carried out safely in the secondary zone during the non-nesting season. Examples of these activities include: minor logging or land clearing, minor construction, seismographic exploration employing explosives, oil well drilling, and low-level aircraft operation. However, these activities should avoid major alteration or loss of Bald Eagle habitat as much as possible.

If logging is done, it is best to retain as many large trees as possible for roost and perch trees. Retention of at least 10 to 15 live trees per acre is suggested. Ideally, the trees left uncut should be the largest in the stand, preferably those with open crowns and stout lateral limbs. Selective forestry practices such as seedtree, shelterwood, and single tree selection are recommended over clear-cutting.

Minimal disturbance recreational activities (hiking, fishing, camping, picnicking, bird-watching, hunting) and everyday farming and ranching activities that cause no new

alteration of habitat can be safely carried out in the secondary zone at any time.

### **Feeding Areas**

The use of toxic chemicals in watersheds and rivers where Bald Eagles feed should be avoided as much as possible. Where agricultural herbicides and pesticides are used within the watershed, label directions should be strictly followed, including those describing proper disposal of rinse water and containers.

Alteration of natural shorelines where Bald Eagles feed should be avoided or minimized as much as possible. Degraded or eroded shorelines should be revegetated whenever possible.

### **Winter Roost Concentration Areas**

Logging or land clearing activity should be avoided within 1,500 feet of a roosting concentration area. Disruptive, noisy, or out-of-the-ordinary land use activities should be avoided near communal roost sites. Normal agricultural activities which have occurred traditionally on the land are generally acceptable near these roost sites as long as they do not appear to be affecting roosting eagles. However, it is best to avoid even normal activities during evening, night, and early morning hours.

### **For More Information**

Landowners and managers can contact Texas Parks and Wildlife, U.S. Fish and Wildlife Service, U.S. Natural Resources Conservation Service (formerly Soil Conservation Service), or Texas Agricultural Extension Service for technical assistance in managing habitat and protecting Bald Eagle nest sites.

# Jaguarundi

Scientific Name: *Felis yagouaroundi cacomitli*  
Federal Status: Endangered,  
6/14/76 • State Status:  
Endangered

## Description

The Jaguarundi is a small, slenderbodied, unspotted cat, slightly larger than a domestic cat (7-22 pounds).

Jaguarundis are characterized by slender, elongated bodies, small flattened heads, and long tails (11-24 inches) more reminiscent of an otter or weasel than a cat. Other characteristics include short legs standing at a height of 11 inches at the shoulder; and short, rounded, widely spaced ears. There are three color phases: black, reddish-brown and a brownishgray. Because of similarity in size, the Jaguarundi can easily be confused with a large black feral cat, especially when seen in low light or dense cover.



## Habitat

Little is known about the habitat of Jaguarundis in Texas. It is thought that they occur in the dense thorny shrublands of the Rio Grande Valley. Their habitat may be very similar to that of the Ocelot, although sightings and information from Mexico indicate that the Jaguarundi may be more tolerant of open areas, such as grasslands and pastures, than the Ocelot. Typical habitat consists of mixed thornshrub species such as spiny hackberry, brasil, desert yaupon, wolfberry, lotebush, amargosa, whitebrush, catclaw, blackbrush, lantana, guayacan, cenizo, elbowbush, and Texas persimmon. Interspersed trees such as mesquite, live oak, ebony, and hackberry may also occur. Riparian habitats along rivers or creeks are sometimes used by Jaguarundis. Canopy cover and density of shrubs are important considerations in identifying suitable habitat. Little information exists concerning optimal habitat for the Jaguarundi in Texas. Scientists speculate that these elusive cats are similar to the Ocelot in their requirement for dense brush cover. Tracts of at least 100 acres of isolated dense brush, or 75 acres of brush interconnected with other habitat tracts by brush corridors, are considered important habitat. Even brush tracts as small as 5 acres, when adjacent to larger areas of habitat, may be used by Jaguarundis. Roads, narrow water bodies, and rights-of-way are not considered barriers to movements. Brushy fence lines, water courses, and other brush strips connecting areas of habitat are very important in providing escape and protective cover. These strip corridors are considered important habitat.

Texas counties where Jaguarundis occurred during the past 30 years include Cameron and Willacy.

## Life History

Little information is available concerning the biology of the Jaguarundi in Texas. Most of

what is known comes from anecdotal or historical writings and information gained through the study of Ocelots in south Texas. Jaguarundis hunt primarily during the day with peak activity occurring at midday. They are less nocturnal than the Ocelot and have been observed more often during the day. Jaguarundis forage mainly on the ground. Prey includes birds, rabbits, reptiles, and small rodents. Historical accounts from Mexico suggest that Jaguarundis are good swimmers and enter the water freely. Little is known regarding Jaguarundi reproduction in Texas. In Mexico, Jaguarundis are said to be solitary, except during the mating season of November and December. Kittens have been reported in March and also in August. It is not known whether females produce one or two litters each season. The gestation period is 60 to 75 days, and litters contain two to four young.

### **Threats and Reasons for Decline**

Historically, dense mixed brush occurred along dry washes, arroyos, resacas, and the flood plains of the Rio Grande. The extensive shrub lands of the Lower Rio Grande Valley have been converted to agriculture and urban development over the past 60 years. Much of this land, particularly the more fertile soils, has been cleared for production of vegetables, citrus, sugarcane, cotton, and other crops. Unfortunately for the Jaguarundi and Ocelot (another endangered South Texas cat), the best soil types also grow the thickest brush and thus produce the best habitat. Less than 5% of the original vegetation remains in the Rio Grande Valley. The Jaguarundi is one of the rarest cats in Texas, with only the Jaguar, which has not been reported in recent years, being rarer. Information about this species is urgently needed. Unless vigorous conservation measures are taken soon, this elusive cat may join the list of species extirpated from the United States.

### **Recovery Efforts**

Very little is known concerning Jaguarundi biology in south Texas. Research regarding capture techniques, reproduction, rearing of young, dispersal, home range, and movements is urgently needed. Recently initiated Jaguarundi research in northeast Mexico, where they are more common, will enable biologists to better understand the requirements for a viable population. This information can then be used to assist conservation efforts for the Jaguarundi in Texas. Efforts to inform landowners and the public about the habitat needs, land management options, and biology of the Jaguarundi are also critical to recovery. Conservation of remaining habitat, and maintenance or creation of brush corridors connecting these habitats, is necessary for survival of the Jaguarundi population in Texas. The U.S. Fish and Wildlife Service, Texas Parks and Wildlife Department, The Nature Conservancy, and many local landowners have been working to protect, acquire and restore Jaguarundi habitat in the Rio Grande Valley. Restoration generally involves revegetating previously cleared areas with native trees and shrubs.

### **Where To Learn More About Jaguarundis**

The best places to visit to learn more about the Jaguarundi are the Laguna Atascosa National Wildlife Refuge near Rio Hondo (956) 748-3607, Santa Ana National Wildlife Refuge near Alamo (956) 787-3079, Bentsen-Rio Grande Valley State Park near

Mission (956) 585-1107, Las Palomas Wildlife Management Area near Edinburg (956) 447-2704, and Audubon's Sabal Palm Grove Sanctuary near Brownsville (956) 541-8034.

### **How You Can Help**

You can be involved with the conservation of Texas' nongame wildlife resources by supporting the Special Nongame and Endangered Species Conservation Fund. Special nongame stamps and decals are available at Texas Parks and Wildlife Department (TPWD) field offices, most state parks, and the License Branch of TPWD headquarters in Austin. The Feline Research Program at the Caesar Kleberg Wildlife Research Institute (Texas A&M University-Kingsville) also accepts contributions to its Cat Conservation Fund. These funds are dedicated to the research and recovery of free-ranging wild cats of Texas. For more information, contact the Feline Research Program at (361) 593-3922. The public is asked to report sightings of Jaguarundis to the Feline Research Program, Texas Parks and Wildlife Department, or U.S. Fish and Wildlife Service. Be sure to note size, color, habitat, behavior, location, date, and time of day seen.

### **For More Information Contact**

Texas Parks and Wildlife Department  
Wildlife Diversity Branch  
4200 Smith School Road  
Austin, Texas 78744  
(512) 912-7011 or (800) 792-1112

or

U.S. Fish and Wildlife Service  
Laguna Atascosa National Wildlife  
Refuge  
P.O. Box 450  
Rio Hondo, Texas 78583  
(956) 748-3607

or

U.S. Fish and Wildlife Service  
Ecological Services – LRGV Office  
Route 2, Box 202-A  
Alamo, Texas 78516  
(956) 784-7560

Management guidelines are available from the Texas Parks and Wildlife Department or U.S. Fish and Wildlife Service for landowners and managers wishing to conserve and improve habitat for the Jaguarundi.

### **References**

- Burt, W.H. and R.P. Grossenheider. 1964. *A field guide to the mammals*. Houghton Mifflin Company, Boston, Mass. 284pp.
- Davis, W.B. and D.J. Schmidly. 1994. *The mammals of Texas*. Texas Parks and Wildlife

- Press. Austin, Texas. 338pp.
- Tewes, M.E. and D.J. Schmidly. 1987. "The neotropical felids: jaguar, ocelot, margay, and jaguarundi" in M. Novak, J. Baker, M.E. Obbard and B. Malloch (eds.) *Wild Furbearer Management and Conservation in North America*. Ministry of Natural Resources, Ontario. 703-705.
- U.S. Fish and Wildlife Service. 1990. *Listed cats of Texas and Arizona recovery plan (with emphasis on the ocelot)*. Endangered Species Office, Albuquerque, N.M.
- Walker, E.P., F. Warnick, K.I. Lange, H.E. Uible, and P.F. Wright. 1975. *Mammals of the world. Vol. 2*. John Hopkins Univ. Press, Baltimore. 1500pp.

# Ocelot

Scientific Name: *Leopardus pardalis*

Federal Status: Endangered,  
3/30/72 • State Status: Endangered



## Description

The Ocelot is a beautiful medium-sized spotted cat with body dimensions similar to the bobcat (30-41 inches long and 15-30 lbs). Its body coloration is variable; with the upper parts gray or buff with

dark brown or black spots, small rings, blotches, and short bars. A key feature is the parallel stripes running down the nape of the neck. The under parts are white spotted with black. The Ocelot's long tail is ringed or marked with dark bars on the upper surface. The backs of the rounded ears are black with a white central spot.

## Habitat

In Texas, Ocelots occur in the dense thorny shrub lands of the Lower Rio Grande Valley and Rio Grande Plains. Deep, fertile clay or loamy soils are generally needed to produce suitable habitat. Typical habitat consists of mixed brush species such as spiny hackberry, brasil, desert yaupon, wolfberry, lotebush, amargosa, whitebrush, catclaw, blackbrush, lantana, guayacan, cenizo, elbowbush, and Texas persimmon. Interspersed trees such as mesquite, live oak, ebony, and hackberry may also occur. Canopy cover and density of shrubs are important considerations in identifying suitable habitat. Optimal habitat has at least 95% canopy cover of shrubs, whereas marginal habitat has 75-95% canopy cover. Shrub density below the six foot level is the most important component of Ocelot habitat. Shrub density should be such that the depth of vision from outside the brush line is restricted to about five feet. Because of the density of brush below the six foot level, human movement within the brush stand would often be restricted to crawling. Tracts of at least 100 acres of isolated dense brush, or 75 acres of brush interconnected with other habitat tracts by brush corridors, are considered very important. Even brush tracts as small as 5 acres, when adjacent to larger areas of habitat, may be used by Ocelots. Roads, narrow water bodies, and rights-of-way are not considered barriers to movement. Brushy fence lines, water courses, and other brush strips connecting areas of habitat are very important. Historical records indicate that the Ocelot once occurred throughout south Texas, the southern Edwards Plateau Region, and along the Coastal Plain. Over the years, the Ocelot population declined primarily due to loss of habitat and predator control activities. Today, Texas counties that contain areas identified as occupied habitat are: Cameron, Duval, Hidalgo, Jim Wells, Kenedy, Kleberg, Live Oak, McMullen, Nueces, San Patricio, Starr, Willacy, and Zapata.

## Life History

Ocelots normally begin their activities at dusk, when they set out on nightly hunts for rabbits, small rodents, and birds. They move around during the night, usually within a

well-established home range (area of activity) of one to two square miles for females and three to four square miles for males. Most mornings they bed down in a different spot within the territory. Male Ocelots tend to travel more than females. Males generally cover an extensive area in a short time, whereas females cover less area but use the home range more intensively. Female Ocelots occupy a den for their kittens in thick brush or dense bunchgrass areas surrounded by brush. The den is often a slight depression with the dead leaves and mulch scraped away. The usual litter size is one or two kittens. The mother goes off to hunt at night, but spends each day at the den site. The kittens begin to accompany their mother on hunts at about 3 months of age. They stay with her until they are about a year old. Studies have shown that kittens are born from late spring through December.

### **Threats and Reasons for Decline**

Historically, the South Texas Plains supported grassland or savanna-type climax vegetation with dense mixed brush along dry washes and flood plains of the Rio Grande. The extensive shrub lands of the Lower Rio Grande Valley have been converted to agriculture and urban development over the past 60 years. Much of this land, particularly the more fertile soils, has been cleared for production of vegetables, citrus, sugarcane, cotton, and other crops. Unfortunately for the Ocelot, the best soil types also grow the thickest brush and thus produce the best habitat. Less than 5% of the original vegetation remains in the Rio Grande Valley. Only about 1% of the South Texas area supports what is currently defined as optimal habitat. Most of this habitat occurs in scattered patches probably too small to support Ocelots for extended periods. As a result, young cats dispersing from areas of suitable habitat have no place to go and most are probably hit by cars or die of disease or starvation. Road mortality is a more recent reason for decline. As Ocelot habitat in South Texas becomes fragmented by bigger highways with faster traffic, Ocelots have become increasingly vulnerable to being struck by vehicles while crossing roads. About half of the Ocelot mortality documented in the past 20 years has been from road mortality. The Ocelot population in Texas is very small, probably no more than 80 to 120 individuals. Approximately 30 to 35 live in the chaparral remaining at or near the Laguna Atascosa National Wildlife Refuge. Unless vigorous conservation measures are taken soon, this beautiful cat may join the list of species extirpated from the United States.

### **Recovery Efforts**

Much information has been obtained recently concerning Ocelot biology in south Texas. However, there is still much to be learned regarding reproduction, rearing of young, dispersal, home range, and movements. Efforts to inform landowners and the public about the habitat needs, land management options, and biology of the Ocelot are critical to recovery. Conservation of remaining habitat, and maintenance or creation of brush corridors connecting these habitats, is necessary for survival of the Ocelot population in Texas. The U.S. Fish and Wildlife Service, Texas Parks and Wildlife Department, The Nature Conservancy, and many local landowners have been working to protect, acquire and restore Ocelot habitat in the Rio Grande Valley. Restoration generally involves revegetating previously cleared areas with native trees and shrubs. The U.S. Fish and Wildlife Service and the Texas Department of Transportation are also working together

to try and reduce Ocelot road mortality by installing Ocelot underpasses under roads where Ocelots are known to frequently cross.

### **Where To Learn More About Ocelots**

The best places to visit to learn more about the Ocelot are the Laguna Atascosa National Wildlife Refuge near Rio Hondo (956) 748-3607, Santa Ana National Wildlife Refuge near Alamo (956) 787-3079, Bentsen-Rio Grande Valley State Park near Mission (956) 585-1107, Las Palomas Wildlife Management Area near Edinburg (956) 447-2704, and Audubon's Sabal Palm Grove Sanctuary near Brownsville (956) 541-8034.

### **How You Can Help**

You can be involved with the conservation of Texas' nongame wildlife resources by supporting the Special Nongame and Endangered Species Conservation Fund. Special nongame stamps and decals are available at Texas Parks and Wildlife Department (TPWD) field offices, most state parks, and the License Branch of TPWD headquarters in Austin. The Feline Research Program at the Caesar Kleberg Wildlife Research Institute (Texas A&M University-Kingsville) also accepts contributions to its Cat Conservation Fund. These funds are dedicated to the research and recovery of free-ranging wild cats of Texas. For more information, contact the Feline Research Program at (361) 593-3922. The non-profit group, Friends of Laguna Atascosa Refuge, has an Adopt-an-Ocelot program in which 100% of the donated funds go towards ocelot conservation. For a small donation, participants receive an adoption packet that includes life histories and pictures of ocelots living at Laguna Atascosa National Wildlife Refuge, ocelot facts, and an adoption certificate. To learn more, contact Linda Laack at (956) 748-3607 or write Adopt-an-Ocelot, P.O. Box 942, Rio Hondo, Texas 78583. The public is asked to report sightings of Ocelots to the Feline Research Program, Texas Parks and Wildlife Department, or U.S. Fish and Wildlife Service. Be sure to note tail length, size, color, habitat, behavior, location, date, and time of day seen.

### **For More Information Contact**

Texas Parks and Wildlife Department  
Wildlife Diversity Branch  
4200 Smith School Road  
Austin, Texas 78744  
(512) 912-7011 or (800) 792-1112

or

U.S. Fish and Wildlife Service  
Laguna Atascosa National Wildlife Refuge  
P.O. Box 450  
Rio Hondo, Texas 78583  
(956) 748-3607

or

U.S. Fish and Wildlife Service  
Ecological Services – LRGV Office  
Route 2, Box 202-A

Alamo, Texas 78516  
(956) 784-7560

Management guidelines are available from the Texas Parks and Wildlife Department or U.S. Fish and Wildlife Service for landowners and managers wishing to conserve and improve habitat for the Ocelot.

### **References**

- Burt, W.H. and R.P. Grossenheider. 1964. *A field guide to the mammals*. Houghton Mifflin Company, Boston, Mass. 284pp.
- Davis, W.B. and D.J. Schmidly. 1994. *The mammals of Texas*. Texas Parks and Wildlife Press. Austin, Texas. 338pp.
- Tewes, M.E. and D.J. Schmidly. 1987. "The neotropical felids: jaguar, ocelot, margay, and jaguarundi" in M. Novak, J. Baker, M.E. Obbard and B. Malloch (eds.) *Wild Furbearer Management and Conservation in North America*. Ministry of Natural Resources, Ontario. 697-711.
- U.S. Fish and Wildlife Service. 1990. *Listed cats of Texas and Arizona recovery plan (with emphasis on the ocelot)*. Endangered Species Office, Albuquerque, N.M.
- Walker, E.P., F. Warnick, K.I. Lange, H.E. Uible, and P.F. Wright. 1975. *Mammals of the world. Vol. 2*. John Hopkins Univ. Press, Baltimore. 1500pp.

*The following guidelines address land management practices that can be used to maintain, enhance, or create habitat for the Jaguarundi and Ocelot. They are intended primarily to serve as general guidance for landowners or managers of livestock/ wildlife operations in South Texas. The guidelines are based on our current understanding of the biology of these species.*

## **Management Guidelines for the Jaguarundi and Ocelot**

### **Habitat Preservation**

Conservation of dense stands of mixed thornshrub, which serve as habitat for the Ocelot and Jaguarundi, is vital to the survival of these cats in Texas. Habitat preservation around the Laguna Atascosa National Wildlife Refuge, in the Lower Rio Grande Valley, and in counties directly north of this area is particularly important.

Mechanical or chemical brush control, including prescribed burning, should not be conducted in habitat areas or in brushy corridors connecting larger areas of habitat. In everyday agricultural operations (i.e., livestock water facilities, fence construction), it is important to minimize disturbances that would destroy the integrity of a habitat tract or corridor. Tracts of at least 100 acres of isolated brush (of the required density and structure), or 75 acres of brush interconnected with other habitat tracts by brush corridors, are considered important habitat. Useful habitat can be provided by smaller tracts especially if these tracts are adjacent to larger areas of habitat.

On rangeland that does not provide the required brush cover and density (non-habitat areas), normal brush management practices, including prescribed burning, are not considered detrimental.

### **Habitat Restoration**

Where dense mixed brush has developed into a tree form, or shrub density below four feet is inadequate, mechanical brush treatment methods such as chaining or roller chopping may be used to restore or create suitable habitat. These mechanical methods encourage basal sprouting by breaking off limbs or trunks of established plants, and can be used to increase cover and density of brush below the four foot level. Adapted native shrubs, such as ebony, brasil, and granjeno, can be planted to increase habitat or to provide interconnecting corridors to existing habitat. Methods are currently being developed to allow for more successful establishment of these species. Technical assistance in habitat management is available to landowners and managers by contacting the Texas Parks and Wildlife Department, U.S. Natural Resources Conservation Service (formerly Soil Conservation Service), U.S. Fish and Wildlife Service, Texas Agricultural Extension Service, or the Caesar Kleberg Wildlife Research Institute.

# Attwater's Prairie Chicken

Scientific Name: *Tympanuchus cupido*

Federal Status: Endangered, 3/11/67 • State Status: Endangered

## Description

The Attwater's Prairie Chicken is a brownish, strongly black-barred, medium-sized grouse with a short, rounded, blackish tail. Males have long tufts on the sides of the neck, called pinnae, which point forward during courtship. Males also have a yellow-orange comb above the eyes, and, on each side of the neck, an area of yellow-orange skin that inflates during courtship display.

## Habitat

Attwater's Prairie Chickens are found only in the coastal prairie of Texas. They use different areas of coastal prairie grassland for various activities; so a mixture of native grasses at different heights is optimum. For example, the birds use short grass cover



(less than 10 inches in height) for courtship, feeding, and to avoid moisture during heavy dew or after rains. Midgrass areas (10-16 inches in height) are used for roosting and feeding. Tall grasses (16-24 inches in height) are needed for nesting, loafing, feeding, and escape cover. Very dense stands of grass are generally avoided, but are occasionally used for shade during summer, and as protection against inclement weather and predators. Studies have shown that prime habitat consists of

tall grass prairie dominated by bunchgrasses such as little bluestem, Indiangrass, switchgrass and big bluestem; along with flowering plants such as Ruellia, yellow falsegarlic, and ragweed. The birds prefer open prairies without any woody cover, and avoid areas with more than 25% cover of shrubs. Preferred habitat is also characterized by knolls and ridges, with the minor variations in topography and soils on these sites resulting in a variety of vegetation types.

## Life History

Prairie chicken breeding activity occurs on or near leks. A lek or booming ground is a specific area typically used year after year. They are usually located on bare ground or short grass areas which allow the males to be seen by the females. Booming grounds vary in size from one-eighth acre to several acres. They may be naturally occurring short grass flats or artificially maintained areas such as roads, runways, oil well pads, and drainage ditches. Areas around windmills, ponds, and other cattle concentration areas are often heavily grazed, and therefore provide the short grass cover used for booming sites. Active booming grounds are usually in close proximity to mid and tall grass cover.

Males begin to set up territories on the booming grounds in late January-February. Fighting ensues when one male enters the territory of another. This fighting early in the booming season determines the social structure of the males on the lek. Usually one or two males will be dominant. Booming is usually heard from about daylight to 9 a.m. and in the late evening.

The hens start coming to the booming grounds in late February and early March. They appear quietly, often staying on the edge of the booming ground. When a hen is on the booming ground, the males become much more vocal and active. This increased activity often causes males not on the ground to fly in and start booming. Most mating occurs in early March, with one or two dominant males doing the majority of the breeding. Booming activity gradually ceases during the last week of April and the first two weeks of May. By mid May, the males have abandoned the booming grounds.

Nesting is usually initiated in early March. Most nests are located within one mile of the booming ground. The nest is a well-concealed, shallow depression about eight inches in diameter lined with dry grass and feathers from the hen. Hens prefer to nest in mid to tall grass cover with the grass canopy concealing the nest. Also preferred are areas with openings that facilitate walking, including cow trails used for access to their nests. Clutch size ranges from 4 to 15 eggs, with the average being 12 eggs. During the 26 day incubation period, the hen leaves the nest only for short periods (45-90 minutes) during the morning and again in the afternoon to feed nearby (usually within 1/4 mile). The peak of the hatch is in late April to early May. If a nest is destroyed, a hen will reneest; although reneesting attempts are limited because males leave the booming grounds by mid-May. Nesting losses are often the result of predators such as snakes, raccoons, opossums, skunks, and coyotes, and flooding of nests. Because of the flat nature of coastal prairie rangeland, nests and small young are unable to survive heavy rains and flooding. The most detrimental rainfall pattern for nests is heavy rains in late April and early May. The April rains destroy initial nests, and May rains ruin reneesting attempts. Hailstorms and human activities such as shredding during the nesting season can also destroy nests.

When the eggs hatch, the hen leaves the nest site. She takes her brood into more open areas, since it is difficult for young chicks to travel in dense vegetation, although some heavy cover is important for escape areas. The chicks are quite mobile at hatching, and can fly short distances by two weeks of age. Heavy or frequent rainfall during May is especially detrimental to young chicks.

Prairie chickens feed on a wide variety of plant parts and insects. Potential food sources, both vegetation and insects, vary by season, location, and availability. Studies have shown that green foliage and seeds make up most of the diet, whereas insects are important seasonally. The foliage and seeds of native forbs (flowering plants) are particularly important in the diet. Most commonly consumed plants include *Ruellia*, yellow falsegarlic, upright prairie-coneflower, leavenworth vetch, stargrass, bedstraw, doveweed, and ragweed. Predators that feed on prairie chickens include Great-horned Owls, hawks, bobcats and coyotes. Insects make up the majority of the diet of chicks. The chicks generally hatch when insect populations are high. Hens take their broods to

weedy areas where insect density is greatest.

### **Threats and Reasons for Decline**

Habitat loss and alteration are the primary reasons for the population decline of Attwater's Prairie Chicken. Loss of habitat due to land use changes since 1930 are particularly significant. It is estimated that 6 million acres of coastal Texas were once covered with suitable tall grass prairie habitat. Only a few patches of this immense expanse of prairie chicken habitat now remain. Currently, it is estimated that less than 200,000 acres of suitable habitat remain. This represents a 97% loss of habitat within the historic range, and a 57% loss since 1937.

This loss of habitat has been the result of several factors. The biggest single change was brought about by the start of rice production along the Gulf Coast. From about 1892 to present, about two million acres of grassland were converted to rice production.

Other factors, such as overgrazing by cattle in some locations and conversion of rangeland to introduced grass pastures have also reduced habitat. High stocking rates and continuous grazing over a period of many years have caused declines in range condition on parts of the Coastal Prairie. The climax tall grass plant community with its associated native wildlife, which existed before the influence of European man, was ideal habitat for the prairie chicken. Unfortunately, tall grasses such as big bluestem, little bluestem, and Indiangrass required by prairie chickens for nesting are also preferred cattle forage. Without proper grazing management, continuous intensive grazing by livestock will reduce desirable grasses and forbs and replace them with a plant community unable to support the nesting and food requirements of prairie chickens. Also, much coastal prairie rangeland has been converted to introduced grasses such as coastal bermudagrass. Over a million acres have been planted to introduced grass pastures in an effort to boost livestock production. The conversion was especially rapid from 1940 to 1970, when fertilizer on which introduced grass production depends was relatively inexpensive. This was another setback for the prairie chicken, since introduced grass pastures do not provide habitat.

The invasion of woody species such as Chinese tallow and Macartney rose (introduced exotics), wax myrtle, Baccharis, running liveoak, huisache, and mesquite have also contributed to loss of over a million acres of coastal prairie habitat. The invasion of brush is the result of overgrazing combined with lack of fire. Historically, the coastal prairie burned periodically. These natural and man-made fires helped to maintain healthy and diverse grassland. Finally, urbanization and industrial expansion have taken their toll on prairie chicken habitat. Losses have been most evident along the upper Texas coast. The considerable urban sprawl of Houston, Galveston, and other coastal cities has led to irreplaceable habitat losses. The loss of diverse tallgrass prairie has not only affected the prairie chicken, but also plants such as Texas windmillgrass (*Chloris texensis*), Texas prairie dawn (*Hymenoxys texana*), and Houston camphor daisy (*Rayjacksonia aurea*), which have become rare components of the ecosystem.

In 2003, fewer than 60 birds remained in two fragments of habitat located in Galveston

and Colorado counties. We must find a way to reverse the factors contributing to the loss of tallgrass coastal prairie and the life it supports. The Attwater's prairie chicken now literally stands on the brink of extinction. Time is running out for this spectacular inhabitant of our coastal grasslands.

## **Recovery Efforts**

Research is continuing regarding the interaction of limiting factors on prairie chicken populations. Efforts to provide information and incentives for private landowners to manage rangeland for the benefit of prairie chickens as well as livestock are an essential part of the recovery process, and many landowners have implemented habitat improvements under the protection of a Safe Harbor Habitat Conservation Plan developed in 1995.

Cooperative habitat management projects involving private landowners, Texas Parks and Wildlife Department, and the U.S. Fish and Wildlife Service have made a start at reversing the devastating habitat losses.

An active captive breeding program began in 1993, with the first supplementation of wild populations accomplished in 1995. The captive breeding program continues to expand, with seven zoos or research facilities producing 131 Attwater's Prairie Chicken for release in 2002. Release efforts will continue to supplement wild populations, while concurrent efforts seek to increase the amount of habitat available to the species. Reintroduction may also be attempted on restored habitat owned by willing landowners.

## **Where To Learn More About the Attwater's Prairie Chicken**

The best place to visit to learn more about prairie chickens is the Attwater Prairie Chicken National Wildlife Refuge. The refuge is located off F.M. 3013 about 6 miles northeast of Eagle Lake, Texas.

## **How You Can Help**

You can be involved with the conservation of Texas' nongame wildlife resources by supporting the Special Nongame and Endangered Species Conservation Fund and the Adopt-A-Prairie Chicken Program ([www.tpwd.state.tx.us/apc](http://www.tpwd.state.tx.us/apc)). Special nongame stamps and decals are available at Texas Parks and Wildlife Department (TPWD) field offices, most state parks, and the License Branch of TPWD headquarters in Austin. The Nature Conservancy of Texas also accepts gifts specifically for Attwater's prairie-chicken recovery efforts. For more information, contact the Attwater Prairie Chicken National Wildlife Refuge at (979) 234-3021.

## **For More Information Contact**

Texas Parks and Wildlife Department  
Wildlife Diversity Branch  
4200 Smith School Road  
Austin, Texas 78744  
(512) 912-7011 or (800) 792-1112

or

U.S. Fish and Wildlife Service

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

or

U.S. Fish and Wildlife Service  
Corpus Christi Ecological Services Office  
c/o TAMU-CC, Campus Box 338  
6300 Ocean Drive, Room 118  
Corpus Christi, Texas 78412  
(361) 994-9005

or

The Nature Conservancy's Texas City Prairie Preserve website at:  
<http://nature.org/wherewework/northamerica/states/texas/preserves/texascity.html>

Management guidelines are available from Texas Parks and Wildlife Department for landowners and managers wishing to improve habitat for Attwater's Prairie Chicken.

### References

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- U.S. Fish and Wildlife Service. 1993. *Attwater's prairie chicken recovery plan*. Endangered Species Office, Albuquerque, N.M.



## Management Guidelines for Attwater's Prairie Chicken

Habitat for the Attwater's Prairie Chicken consists of open tall grass coastal prairie dominated by bunchgrasses such as little bluestem, Indiangrass, switchgrass, and big bluestem, along with various flowering plants. Preferred habitat is characterized by high plant diversity and variations in grass height. Management for Attwater's Prairie Chicken involves good grazing management and carefully planned prescribed burning and brush management. Range management practices aimed at achieving and maintaining Good and Excellent Range Condition (i.e., greater than 50% climax vegetation present) will benefit the prairie chicken, as well as other

plants and animals that share its habitat, including livestock.

## **Grazing Management**

The tall grass prairie evolved under grazing by bison and other herbivores. Carefully managed livestock grazing is a beneficial tool for maintaining healthy and diverse tall grass prairie habitat for prairie chickens. Cattle recycle nutrients, break up homogeneous grass stands, and provide trails. Prairie chickens are known to nest in proximity of these trails and other openings. Grazing also produces a patchy, open cover, and a diversity of forbs; which provide the bulk of the adult prairie chicken's diet.

Prairie chickens need rangeland in Good to Excellent Condition, with a high percentage of decreaser plants (plants which decrease with continued heavy grazing pressure) such as little bluestem and Indiangrass in the plant composition. Proper stocking and periodic deferment are the keys to preventing overuse of the range and a decline in range condition. Animal numbers should be managed to maintain the proper degree of use (i.e., no more than 50% use of annual forage production). Grazing pressure should also be balanced with soil types and rainfall. Flexible stocking and timely responses to changing environmental conditions are necessary. Implementation of rotational grazing is desirable to prevent decline of highly desirable plants through selective grazing. These desirable tall grasses and forbs provide nesting habitat and good for prairie chickens. In summary, good range management which achieves maintenance and restoration of tall grass prairie (i.e., rangeland in Good to Excellent Condition) will benefit sustained livestock production and prairie chickens.

## **Prescribed Burning**

The coastal tall grass prairie evolved under the influence of natural and man-caused fires. Prescribed burning, therefore, is an excellent management tool for maintaining healthy grassland and improving prairie chicken habitat. Periodic burning keeps woody plant invasion under control. It also reduces rank growth of vegetation, which is unpalatable for cattle and too dense for prairie chickens. Burned areas are often used for booming grounds, especially if short grass areas are in short supply. Prescribed burning also improves plant diversity and, in the case of winter burns, provides succulent food for prairie chickens during the winter and early spring. Prescribed burning in occupied habitat should be completed by late February; however, when prairie chickens are absent, summer burns may be helpful in restoring prairie that has been heavily invaded by woody species.

Pastures generally need to be rested following a prescribed burn to allow vegetation to recover without selective grazing pressure. It may also be necessary to rest a pasture prior to the planned burn to accumulate enough grass fuel to accomplish the burn objectives. The key to a successful prescribed burning program is to have a detailed written plan and help from experienced people. Technical assistance with prescribed burning is available by contacting the Texas Parks and Wildlife Department, USDA Natural Resources Conservation Service, the U.S. Fish and Wildlife Service, The Nature Conservancy of Texas, or Texas Cooperative Extension.

In summary, prescribed burning can be used to improve grazing distribution and forage quality for livestock; reduce brush encroachment and maintain productive grassland;

improve range condition and plant diversity; and improve availability of food, nesting sites, and booming grounds for prairie chickens.

## **Brush Management**

Mechanical or chemical brush management techniques are often needed to provide initial control in areas of dense, large brush. Prescribed burning is not an option in many of these areas because there is not enough grass to carry the fire or brush is too large to be effectively controlled by fire. Each brush problem is unique, and technical assistance from knowledgeable people is helpful. Factors such as type, density and size of target species, range site and soils, past history of brush management, and surrounding land use must be considered.

The right kinds, amounts, and application techniques for herbicide treatments are important in achieving good control of target species. Many herbicides are very selective, so choosing the correct formulation of one or more herbicides is very important for successful treatment of a particular brush problem. Precise application also saves money and reduces the risk of environmental contamination. In some cases, timing of application can make the difference between good and poor results. As with any chemical, label directions should be strictly followed, including those concerning disposal of rinse water and used containers.

Combining methods of brush management, such as herbicide or mechanical control and prescribed burning, is often very effective. For example, on rangeland infested with Macartney rose, herbicide application followed by periodic prescribed burning can provide good results in reducing brush and restoring grassland. Mechanical methods such as dozing, roller chopping, or shredding can be followed by prescribed burning or herbicide application, depending on the target species. Prescriptions need to be carefully designed to achieve the best results at the lowest cost. As with any range management practice, good grazing management (i.e., proper stocking and rotational grazing) is vital to achieving cost effective treatment and improvement in range condition. Technical assistance in brush management is available from the Texas Parks and Wildlife Department, USDA Natural Resources Conservation Service, the U.S. Fish and Wildlife Service, and Texas Cooperative Extension.

## **Additional Management Practices**

The following management practices are suggested as ways to further enhance habitat quality. However, the benefits they may provide are definitely secondary to the primary goal of providing large areas of high quality prairie habitat for nesting and brood rearing.

Food plots or weedy areas of three to five acres scattered throughout pastures provide an easily available food source, although food plots probably do not add much to habitat quality if good prairie habitat is available. When planning food plots, it is best to locate them in areas that have already been farmed or otherwise disturbed, rather than plowing additional grassland. Crops planted should be those normally recommended for the local area, and could possibly include native forbs and legumes, rice, grain sorghum, annual legumes, and cool season small grains. Narrow strip plantings are

desirable to maximize prairie chicken use and minimize waterfowl depredation.

Mixtures of native mid and tall bunchgrasses, along with perennial forbs such as Illinois bundleflower, Maximilian sunflower, and Englemann daisy, should be used if needed for range seeding following mechanical brush removal or to revegetate former cropland fields. Mulching with native hay can also help reestablish native species. The goal is to use plants, preferably native species, which are commercially available and locally adapted, to approximate the species composition and structure of the tall grass prairie.

Finally, mowing can be used to provide feeding areas and brood habitat, and to control undesirable plant growth. Shredding during the nesting and brooding season (March through July 1) should be avoided to prevent destruction of nests and young chicks unable to fly.

# Whooping Crane

Scientific Name: *Grus americana*

Federal Status: Endangered, 6/2/70 •

State Status: Endangered

## Description

The stately Whooping Crane is the tallest bird found in North America, with males approaching nearly five feet in height. Adult birds are white overall with some red and black on the head. Their inner wing feathers droop over the rump in a “bustle” that distinguishes cranes from herons. With a seven foot wingspan and a slow wing beat, Whooping Cranes fly with their long necks and legs fully extended. When in flight, the birds’ black wingtips or primary feathers can be seen, and their long legs extend beyond their tail. Their dark olive-gray beaks are long and pointed. The area at the base of the beak is pink and the eyes are yellow. The Whooping Crane’s call, from which it derives its name, has been described as a shrill, bugle-like trumpeting.



Whooping Crane chicks are a reddish cinnamon color. At four months of age, white feathers begin to appear on the neck and back. Juvenile feathers are replaced through the winter months. By the following spring, juvenile plumage is primarily white, with rusty colored feathers remaining only on the head, upper neck, and on the tips of wing feathers. Young birds generally have adult plumage by late in their second summer.

There are a number of birds that may appear similar to the Whooping Crane. The Sandhill Crane, the Whooping Crane’s closest relative, is gray in color, not white. Also, Sandhill Cranes are somewhat smaller, with a wingspan of about five feet. Sandhill Cranes occur in flocks of two to hundreds, whereas Whooping Cranes are most often seen in flocks of two to as many as 10 to 15, although they sometimes migrate with Sandhill Cranes. Snow Geese and White Pelicans are white birds with black wingtips, however both of these birds have short legs that do not extend beyond the tail when in flight. In addition, Snow Geese generally occur in large flocks, are much smaller, and fly with a rapid wing beat. White Pelicans fly with their neck folded and can be distinguished by their long yellow bill. Finally, swans are all white and have short legs, and herons and egrets fly with their long necks folded.

## Status and Distribution

The historical range of the Whooping Crane extended from the Arctic coast south to

central Mexico, and from Utah east to New Jersey, South Carolina, Georgia, and Florida. Distribution of fossil remains suggests a wider distribution during the cooler, wetter climate of the Pleistocene. Although once numbering above 10,000, it has been estimated that only 500 to 1,400 Whooping Cranes inhabited North America in 1870. Although the exact number is unknown, Whooping Cranes were uncommon, and their numbers had rapidly declined by the late 19th century.

In the mid 1800's, the principal breeding range extended from central Illinois northwestward through northern Iowa, western Minnesota, northeastern North Dakota, southern Manitoba and Saskatchewan, to the area near Edmonton, Alberta. The Whooping Crane disappeared from the heart of its breeding range in the north-central United States by the 1890's. The last documented nesting in southern Canada occurred in Saskatchewan in 1922. By 1937, only two small breeding populations remained; a nonmigratory population in southwestern Louisiana and a migratory population that wintered on the Aransas National Wildlife Refuge (NWR) on the Texas coast and nested in a location that at the time was unknown. The remnant population in southwestern Louisiana was reduced from 13 to 6 birds following a hurricane in 1940, and the last individual was taken into captivity in 1950. In the winter of 1938-39, only 14 adult and 4 juvenile Whooping Cranes were found on the Aransas NWR. The nesting area of the Aransas Wildlife Refuge population was discovered in 1954 in Wood Buffalo National Park (NP), Northwest Territories, Canada. This population is the only historical one that survives.

Whooping Cranes currently exist in three wild populations and a breeding population kept in captivity. The species numbers approximately 420 birds, all in Canada and the United States. The only self-sustaining wild population is the one that winters on the Texas coast and nests primarily within Wood Buffalo NP. In 2002, this population consisted of 50 nesting pairs, with a total of 185 birds wintering in Texas.

In 1975, Whooping Crane eggs were transferred from Wood Buffalo NP to Grays Lake National Wildlife Refuge in Idaho and placed in Sandhill Crane nests in an effort to establish a migratory population in the Rocky Mountains. The Rocky Mountain birds spend the summer in Idaho, western Wyoming, and southwestern Montana, and winter in the middle Rio Grande Valley of New Mexico. Reintroductions ended in 1989 after the adult Whooping Cranes did not pair up or mate due to imprinting problems from their foster Sandhill Crane parents. The last Whooping Crane in the flock died in 2002.

The second persisting wild population in 2003 consisted of approximately 90 birds remaining from over 250 captive-reared Whooping Cranes released in central Florida south of Orlando beginning in 1993. These birds were released as the first step in an effort to establish a nonmigratory population in Florida, and in 2002, produced the first whooping crane chick born in the wild in the United States since 1939.

The third wild population was initiated in 2001 when several young captive-reared whooping cranes were released in potential nesting habitat at Necedah National Wildlife Refuge in Wisconsin. The young birds were trained to migrate to Florida's Gulf Coast by

following ultra light aircraft. Although not yet of breeding age, the birds led south in both 2001 and 2002 returned north on their own the following spring.

## **Habitat**

Within Wood Buffalo NP, Whooping Cranes nest in poorly drained wetlands interspersed with numerous potholes (small areas of open water). These wetlands are separated by narrow ridges that support trees such as white and black spruce, tamarack, and willows, and shrubs such as dwarf birch, Labrador tea, and bearberry. Bulrush is the dominant plant in areas used by nesting birds, although cattail, sedge, musk-grass and other aquatic plants are common. Nest sites are often located in the rushes or sedges of marshes and sloughs, or along lake margins. An abundance of invertebrates, such as mollusks, crustaceans, and aquatic insects have been found in the ponds near occupied nests.

Whooping Cranes use a variety of habitats during their long migrations between northern Canada and the Texas coast. Croplands are used for feeding, and large wetland areas are used for feeding and roosting. Whooping Cranes are known to roost in riverine habitat along the Platte, Middle Loup, and Niobrara Rivers in Nebraska, Cimarron River in Oklahoma, and the Red River in Texas. The birds often roost on submerged sandbars in wide unobstructed channels isolated from human disturbance. Whooping Cranes also use large wetland areas associated with lakes for roosting and feeding during migration.

The Whooping Crane's principal wintering habitat consists of about 22,500 acres of marshes and salt flats on Aransas National Wildlife Refuge and adjacent publicly and privately owned wetlands. Plants such as salt grass, saltwort, smooth cordgrass, glasswort, and sea ox-eye dominate the outer marshes. At slightly higher elevations, Gulf cordgrass is more common. The interior portions of the refuge are characterized by oak mottes, grassland, swales, and ponds on gently rolling sandy soils. Live oak, redbay, and bluestems are typical plants found on upland sites. Upland sites have been managed using grazing, mowing, and controlled burning. About 14,250 acres of grassland are managed for cranes, waterfowl, and other wildlife.

## **Life History**

Whooping Cranes usually mate for life, although they will re-mate following the death of their mate. They mature at 3 to 4 years of age, and most females are capable of producing eggs by 4 years of age. It is estimated that Whooping Cranes can live up to 22 to 24 years in the wild. Captive individuals live 30 to 40 years.

Whooping Cranes begin leaving the Texas coast in late March and early April, returning to their nesting area in Wood Buffalo NP by late April. Experienced pairs arrive first and normally nest in the same vicinity each year. Nesting territories vary considerably in size, ranging from 0.5 to 1.8 square miles. From the start of egg laying until the chicks are a few months old, the birds' activities are restricted to the breeding territory. Eggs are normally laid in late April to mid May, and hatching occurs one month later. Most nests contain 2 eggs. The eggs are light-brown or olive-buff in color with dark, purplish-

brown blotches primarily at the blunt end. Whooping Cranes will occasionally re-nest if their first clutch is destroyed during the first half of the incubation period. They usually nest each year, but occasionally a pair will skip a nesting season for no apparent reason. When nesting conditions are unsuitable, some pairs do not attempt to nest.

Whooping Crane parents share incubation and brood-rearing duties, and one member of the pair remains on the nest at all times. Females take the primary role in feeding and caring for the young. During the first 3 or 4 days after hatching, parents and young return to the nest each night. After that, the young are protected by their parents wherever they happen to be during inclement weather or at nightfall. During the first 20 days after hatching, families generally remain within 1 mile of the nest site. Whooping cranes feed by probing the soil with their bills or taking food items from the soil surface or vegetation. Parents feed young chicks. Summer foods include large insect nymphs or larvae, frogs, rodents, small birds, minnows, and berries.

Fall migration begins in mid-September. Whooping Cranes normally migrate as a single, pair, family group, or in small flocks, sometimes accompanying Sandhill Cranes. Flocks of up to 10 sub-adults have been observed feeding at stopover areas. Whooping Cranes migrate during the day, and make nightly stops to feed and rest. Although they use a variety of habitats during migration, they prefer isolated areas away from human disturbance.

Whooping Cranes arrive on the Texas coast between late-October and mid-December. They spend almost 6 months on the wintering grounds at and near Aransas NWR. Pairs and family groups generally occupy and defend discrete territories, although close association with other Whooping Cranes is sometimes tolerated. Juveniles stay close to their parents throughout their first winter. Recent estimates of territory size average 292 acres. Studies indicate a declining territory size as the wintering population increases. Sub adults and unpaired adults form small flocks and use areas outside occupied territories. Sub adult birds often spend the winter near the territories where they spent their first year. Also, young adult pairs will often locate their first territory near the winter territory of one of their parents.

During the wintering period on the Texas coast, Whooping Cranes eat a variety of plant and animal foods. Blue crabs, clams, and the fruits of wolfberry are predominant in the winter diet. Clams are relatively more important in the diet when water depths are low and blue crabs are less abundant. Most clams and small blue crabs (2 inches or less in width) are swallowed whole. Larger crabs are pecked into pieces before being swallowed.

Whooping Cranes feed mostly in the brackish bays, marshes, and salt flats. Occasionally, they fly to upland sites for foods such as acorns, snails, crayfish, and insects, returning to the marshes in the evening to roost. Upland sites are more attractive when they are flooded by rainfall, burned to reduce plant cover, or when food is less available in the marshes and salt flats. Some Whooping Cranes use the upland parts of the refuge occasionally in most years, but use of croplands adjacent to the

refuge is rare.

As spring approaches, the courtship displays for which Whooping Cranes are famous begin. These displays include loud unison calling, wing flapping, head bowing, and leaps into the air by one or both birds, increase in frequency. These rituals serve to forge and strengthen pair bonds. Family groups and pairs usually depart first, normally between March 25 and April 15. The last birds are usually gone by May 1, but occasional stragglers may stay into mid-May. During the 16-year period between 1938 and 1992, a total of 27 birds have remained at Aransas NWR throughout the summer. Some of these birds were ill or crippled or mates of birds which were crippled.

Parents separate from their young of the previous year at the beginning of spring migration, while in route to the breeding grounds, or soon after arrival on the breeding grounds. Most juveniles spend the summer near the area where they were born.

### **Threats and Reasons for Decline**

Whooping Cranes gradually disappeared as agriculture claimed the northern Great Plains of the United States and Canada. Man's conversion of the native prairies and potholes to pasture and crop production made much of the original habitat unsuitable for Whooping Cranes. Rural electrification brought power lines, resulting in an increase in death and serious injury due to collisions. Human disturbance has also played a role in the decline of the Whooping Crane. The birds are wary on the breeding grounds. They will tolerate human intrusion for short intervals, but will not remain near constant human activity. The mere presence of humans during settlement of the mid-continent and coastal prairies may have interfered with the continued use of traditional breeding habitat by Whooping Cranes.

The Aransas population, the only population that is self-sustaining, remains vulnerable to accidental spills that could occur along the Gulf Intracoastal Waterway. The Intracoastal Waterway carries some of the heaviest barge traffic of any waterway in the world, and it runs right through the center of the Whooping Crane winter range. Much of the cargo is petrochemical products. Although spill response plans have been developed, an accident resulting in a spill could potentially destroy Whooping Cranes or their food resources.

Records of Whooping Cranes known to have died from gunshot or other causes from colonial times to 1948 show that about 66% of the losses occurred during migration. Shooting represented a substantial drain on the population, particularly from 1870 to 1920. Large and conspicuous, Whooping Cranes were shot for both meat and sport. Laws enacted to protect the birds have led to a decline in human caused mortality, but shootings still occur. The most recent known cases involved an adult female being mistaken for a snow goose near Aransas NWR in 1989, an adult female shot by a vandal as she migrated northward through Texas in 1991, and two shot by a vandal in Florida in 1990. Biological factors such as delayed sexual maturity and small clutch size prevent rapid population recovery.

The major population of Whooping Cranes is now restricted to breeding grounds in

northern Canada. This may hamper productivity because the ice-free season is only 4 months, barely enough time to incubate their eggs for 29 to 31 days and rear their chicks to flight age in the remaining 3 months. Unless nest loss occurs early in the incubation period, there is rarely time to successfully rear a second clutch if the first clutch fails. Drought during the breeding season presents a serious hazard because nest site availability and food supplies are reduced and newly hatched chicks are forced to travel long distances between wetlands. Drought also increases the exposure of eggs and chicks to predators such as ravens, bears, wolverines, foxes, and wolves.

Although little is known about the importance of disease and parasites as mortality factors, there have been documented cases of wild Whooping Cranes dying of avian tuberculosis, avian cholera, and lead poisoning. Coccidia, a parasite which causes digestive tract disorder, has also been found in wild and captive birds.

Finally, Whooping Cranes are exposed to a variety of hazards and problems during their long migrations. Natural events such as snow, hail storms, low temperatures, and drought can make navigation hazardous or reduce food supplies. Collision with utility lines, predators, disease, and illegal shooting are other hazards that affect migrating cranes.

## **Recovery Efforts**

The comeback story of the Whooping Crane has been heralded as one of the conservation victories of the 20<sup>th</sup> Century. The increase and stabilization of the Aransas/Wood Buffalo population has been a result of many factors, including legal protection, habitat protection, and biological research in both the United States and Canada.

In 1975, the U.S. Fish and Wildlife Service initiated a migration monitoring program to protect migrating Whooping Cranes from disease outbreaks and other potential hazards, and to compile information on the characteristics of stopover sites. This monitoring program is now coordinated with a network of people from the Canadian Wildlife Service, U.S. Fish and Wildlife Service, States, and Provinces along the migration corridor. Flightless young Whooping Cranes were captured and marked with colored plastic leg bands in Wood Buffalo NP from 1977 through 1988. Of the 133 birds banded, 14% could still be identified in the spring of 2003. This marking program has provided a wealth of information on Whooping Crane biology. A radio tracking program, in which miniature radio transmitters were attached to the color leg bands of young Whooping Cranes banded at Wood Buffalo NP, has also yielded valuable information concerning migration timing and routes, stopover locations, habitat use, social behavior, daily activity, and causes of death. Recently, tests of line marking devices have identified techniques effective in reducing collisions with utility lines.

The wintering territories of Whooping Cranes on the Texas coast place the birds in close proximity to human disturbance factors such as tour boats, boat and barge traffic along the Intracoastal Waterway, recreational and commercial fishing boats, airboats, and air traffic. A number of recent and ongoing studies have addressed the issue of how

human disturbance factors might affect wintering birds. Additional research studies currently underway include evaluating the relationship between freshwater inflows, blue crabs and Whooping Cranes. Significant habitat research has also been conducted on the nesting grounds in Canada.

Prescribed burning is used on Aransas NWR to reduce height and density of grasses, top kill brush, and to modify plant composition on the uplands to make them more attractive to Whooping Cranes. Burned areas are immediately used by the birds. Currently, 15 prescribed burning units averaging 1,410 acres in size are burned on a 3-year rotation.

The most complete count of the Aransas/Wood Buffalo population is made during the winter. Aerial counts are made weekly throughout the winter period, although counts are made less frequently during midwinter. These flights provide information on mortality, habitat use, pair formation, territory establishment, and age structure by identifying all color banded birds present. Additional protection of habitat outside Aransas NWR is provided by the National Audubon Society, which leases several islands from the State of Texas, by Texas Parks and Wildlife Department, and by private landowners, several of whom have signed conservation agreements to protect Whooping Cranes on their property. Monitoring of nesting pairs also takes place at Wood Buffalo NP. Construction of the Gulf Intracoastal Waterway through the marshes of Aransas NWR in the early 1940's, and subsequent erosion by wind and boat wakes, has resulted in 11% loss of wintering habitat. Between 1989 and 1992, volunteers placed over 57,000 sacks of cement to protect 8,752 feet of shoreline. In 1992, the U.S. Army Corps of Engineers placed 2,013 feet of interlocking cement mats to stop erosion. Between 1999 and 2001, additional armoring done by the Corps protected 15.3 miles of shoreline within critical habitat of the Whooping Crane.

Dredged material deposited from periodic maintenance of the Intracoastal Waterway has destroyed some marsh areas and unintentionally created others. In 1991, Mitchell Energy and Development Corporation built a dike around 10 acres of open shallow bay, filled the area with dredge material, and planted it to wetland vegetation. Whooping Cranes began using the area the following winter. In 1993 and 1995, Mitchell Energy built 20 more acres of marsh adjacent to the first area. In 1995, the Corps of Engineers created nearly 50 acres of marsh. The Corps has plans to create an additional 1,500 acres of marsh using dredged material beneficially over the next 50 years.

Several efforts have been initiated to establish new populations of Whooping Cranes as a means of safeguarding the species against a catastrophe in the Aransas/Wood Buffalo population. The effort in Idaho used Sandhill Cranes as foster parents to incubate Whooping Crane eggs, raise the chicks, and teach them migration paths to New Mexico. Foster-parenting has proved to be an unsuitable technique, however, as imprinting led to problems for the Whoopers in establishing pair bonds. An effort in Florida is using techniques developed successfully with the endangered Mississippi Sandhill Crane to try to establish a non-migratory flock of Whooping Cranes. Meanwhile, new techniques for establishing a second migratory population continue to

be explored. In 2001 and 2002, 23 Whooping Crane chicks were costume-raised and flown behind an ultralight aircraft from Wisconsin to Florida. In the spring of 2003, the 16 surviving birds led south by ultralight returned to their summer reintroduction site on their own.

These reintroduction efforts have been made possible by a successful captive breeding program for Whooping Cranes. Although Whoopers at Wood Buffalo NP lay two eggs, usually only one hatches. In most years between 1967 and 1996, biologists from the United States and Canada collected eggs from wild nests in order to establish captive populations and support reintroduction efforts. Three primary captive breeding facilities exist, including Patuxent Wildlife Research Center in Maryland, the International Crane Foundation in Wisconsin, and Calgary Zoo in Alberta, Canada. Additional breeding cranes are kept at the San Antonio Zoo, Texas, and the Audubon Center for Research on Endangered Species in Louisiana.

Finally, there is much evidence that people value Whooping Cranes. Numerous books, magazine articles, television programs, and nature documentary films have been produced about this magnificent bird. Each year 70,000 to 80,000 people visit Aransas NWR, most during the winter. These visitors spend a significant amount of money locally on lodging, gasoline, and supplies. In 2003, three large tour boats operating out of Rockport/Fulton offered trips to view Whooping Cranes along the Gulf Intracoastal Waterway. Approximately 10,000 people took these tours, paying an average of \$30 per ticket, for a total seasonal amount of \$300,000. The city of Rockport estimates that wildlife-related activities result in annual gross economic benefits of \$6 million to the local economy. Some of these benefits result from the nearby presence of Whooping Cranes. The possibility of sighting Whooping Cranes, along with large numbers of migrating Sandhill Cranes, is an additional attraction to tourists in other areas of the United States. For example, approximately 80,000 people visit the Platte River area of Nebraska each year during the peak of spring crane migrations, spending approximately \$15 million. The Chamber of Commerce of Grand Island, Nebraska has responded by sponsoring an annual festival, "Wings over the Platte," to further promote this interest in birds.

### **Where To See Whooping Cranes**

Visit Aransas National Wildlife Refuge near Austwell, Texas during November through March to see Whooping Cranes as well as migratory waterfowl and other wildlife. As mentioned above, there are a number of commercially operated boat tours, departing from both Rockport/Fulton and Port Aransas which offer visitors the chance for a close look at Whooping Cranes, waterfowl, shorebirds, herons, and hawks. Contact Aransas NWR (361) 286-3559, Rockport/Fulton Chamber of Commerce (800) 242-0071, or Port Aransas Chamber of Commerce (800) 452-6278 for more information. Also, the San Antonio Zoo exhibits captive Whooping Cranes as part of the recovery effort.

### **How You Can Help**

Whooping Cranes migrate over north and east-central Texas on their way to and from Aransas NWR each fall and spring. The birds are particularly vulnerable to human

disturbance and other hazards during this migration period. They sometimes stop in fields or wetlands near rivers or lakes to feed or rest. If you see migrating Whooping Cranes, view them from a distance and be careful not to disturb them. Report sightings to the Texas Parks and Wildlife Department ([webcomments@tpwd.state.tx.us](mailto:webcomments@tpwd.state.tx.us) or 1-800-792-1112) or the U.S. Fish and Wildlife Service. Remember that harassing, shooting, or attempting to capture a Whooping Crane is a violation of Federal Law. If you find a dead or injured bird, report it immediately to one of the numbers listed below or to your local game warden. Since injured Whooping Cranes are delicate and require special care, you should quickly contact a representative of Texas Parks and Wildlife or U.S. Fish and Wildlife and carefully follow their instructions.

You can be involved in the conservation of Texas' nongame wildlife resources by supporting the Special Nongame and Endangered Species Conservation Fund. Special nongame stamps and decals are available at Texas Parks and Wildlife Department (TPWD) Field Offices, most State Parks, and the License Branch of TPWD headquarters in Austin. Some of the proceeds from the sale of these items are used to conserve habitat and provide information concerning rare and endangered species. Conservation organizations such as the Whooping Crane Conservation Association, National Audubon Society, International Crane Foundation, and The Nature Conservancy of Texas also welcome your participation and support.

### **For More Information Contact**

Texas Parks and Wildlife Department  
Wildlife Diversity Branch  
4200 Smith School Road  
Austin, Texas 78744  
(512) 912-7011 or (800) 792-1112

or

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

or

U.S. Fish and Wildlife Service  
Corpus Christi Ecological Services Field Office  
c/o TAMU-CC, Campus Box 338  
6300 Ocean Drive, Room 118  
Corpus Christi, Texas 78412  
(361) 994-9005

or

Aransas National Wildlife Refuge  
P.O. Box 100  
Austwell, Texas 77950  
(361) 286-3559

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