Attachment 1:

Life History for the Threatened and Endangered Species

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1. AMERICAN BURYING BEETLE

1.1. SPECIES LISTING STATUS

The American burying beetle (*Nicrophorus americanus*) was listed as endangered by the U.S. Fish and Wildlife Service (USFWS) on July 13, 1989 (USFWS, 1989). A recovery plan was approved by the U.S. Fish and Wildlife Service on September 27, 1991. A five-year review was released on June 16, 2008. To date, the USFWS has not published a critical habitat designation for the American burying beetle (USFWS, 2010).

1.2. DESCRIPTION

N. americanus, a shiny black beetle of the order Coleoptera, is a member of the Silphidae family, a group of beetles known for burying vertebrate carcasses (USFWS, 1991). These vertebrate carcasses are used as sites of mating and egg laying (USFWS, 1991).

Beetles of this group have hardened forewings that meet in a straight line on the back, and orange-tipped antennae that abruptly terminate in a club-like manner (USFWS, 1991). American burying beetles are active at night, and typically only when temperatures exceed 15^{o}C (60 ^{o}F) (USFWS, 1991). The antennae of *N. americanus* have chemoreceptors which are used to locate carrion (USFWS, 1991). Many individuals appear to carry on a mutualistic relationship with phoretic mites (*Poecilochirus* sp.), which consume microbes and fly eggs associated with the carcass (USFWS, 1991).

N. americanus is the largest species of the genus and grows to a length of 25-35 mm (USFWS, 1993). It can be distinguished from the 15 other beetles of the genus sharing a North American distribution by a large orange-red marking on the anterior dorsal plate (USFWS, 1991).

Nicrophorous beetles make large investments in parental care, tending, guarding, and feeding their offspring (USFWS, 1991). Many entomologists consider *Nicrophorous* to have the highest level of sociality within the order Coleoptera (USFWS, 1991).

1.3. DISTRIBUTION

Historical range

The American burying beetle was once found in 150 counties in 35 different states, with the majority of documentation coming from the area bounded by Nebraska to the west, Maine to the east, and Florida to the south (USFWS, 1991). The historical distribution of *N. americanus* also had fringe populations in places like southwestern Texas, central Montana, and Nova Scotia (USFWS, 1991). Documentation of *N. americanus* exists in greater spatial and temporal specificity among the northeastern and mid-Atlantic states (USFWS, 1991).

American burying beetle declines are traced to the early 1900's (USFWS, 1991). By 1930, many previously recorded populations along the eastern seaboard had been extirpated (USFWS, 1991).

Current range

The American burying beetle is known to occur in the following states: Arkansas, Kansas, Massachusetts, Michigan, Missouri, Nebraska, Ohio, Oklahoma, Rhode Island, South Dakota,

and Texas (USFWS, 2010). *N. americanus* is considered to exist statewide in Massachusetts, Michigan, and Rhode Island (USFWS, 2010).

- In Arkansas, *N. americanus* has been documented in the following counties: Franklin, Little River, Logan, Scott, and Sebastian (USFWS, 2010).
- In Kansas, *N. americanus* distribution occurs in the following counties: Chautauqua, Elk, Montgomery, and Wilson (USFWS, 2010).
- In Missouri, *N. americanus* is known to occur in Newton County (USFWS, 2010).
- In Nebraska, *N. americanus* is distributed in 16 counties: Blaine, Boyd, Brown, Cherry, Custer, Dawson, Frontier, Garfield, Gosper, Holt, Keya Paha, Lincoln, Loup, Rock, Thomas, and Wheeler (USFWS, 2010).
- In Ohio, *N. americanus* is known to occur in the following colonies: Athens, Hocking, Morgan, Perry, and Vinton (USFWS, 2010).
- In Oklahoma, *N. americanus* is known to occur in the following 34 counties: Adair, Atoka, Bryan, Cherokee, Choctaw, Coal, Craig, Creek, Delaware, Haskell, Hughes, Johnston, Latimer, Le Flore, Marshall, Mayes, McCurtain, McIntosh, Muskogee, Nowata, Okfuskee, Okmulgee, Osage, Ottawa, Pawnee, Pittsburg, Pontotoc, Pushmataha, Rogers, Seminole, Sequoyah, Tulsa, Wagoner, and Washington (USFWS, 2010).
- In South Dakota, *N. americanus* is known to occur in the following counties: Bennett, Brookings, Gregory, Haakon, Todd, Tripp, and Union (USFWS, 2010).
- In Texas, *N. americanus* is known to occur in Lamar and Red River counties (USFWS, 2010).

Captive-reared individuals were used to establish colonies in Ohio (1998-2000 and 2003-2006) and Massachusetts (Penikese Island 1990-1993, and Nantucket Island 1994-2006) (USFWS, 2008). The Block Island, Rhode Island population is currently being provisioned with carcasses in efforts to sustain the colony (USFWS, 2008).

1.4. USFWS CRITICAL HABITAT

No critical habitat has been designated by USFWS for the American burying beetle.

1.5. HABITAT

Records of historical distribution indicate that the American burying beetle is a habitat generalist (USFWS, 1991). Its distribution is entirely within the eastern deciduous forest biome. Recent documentation of *N. americanus* has identified populations inhabiting riparian deciduous forests, grasslands, pastures, and maritime scrub thickets (USFWS, 1991). Soil types at three 1989 Oklahoma capture sites were identified separately as; Shermore fine sandy loam, Neff and Nexor silt loam, and Counts-Wing Complex silt loam (USFWS, 1991). These sites were further quantified as topographically level, well-drained, and having a substantive detritus layer (USFWS, 1991). Theoretically, any mesic region with a top-soil or humus layer of sufficient depth for carcass burial is a potential habitat of the American burying beetle (USFWS, 1990).

It is plausible that the American burying beetle is drawn to a habitat based not on the occurrence of some specific plant community or soil structure, but rather on the availability of preferred carrion (USFWS, 1991). Research by Holloway and Schnell (1997) found a positive correlation between the abundance of small vertebrate species and the occurrence of the American burying beetle, irrespective of vegetative cover characterization (USFWS, 2008).

1.6. DIET

American burying beetle adults are known to feed on a broad range of available carrion, and possibly prey on live insects (USFWS, 1991). As it relates to brood-rearing, *N. americanus* preys on large (100-200g) mammal and bird carcasses, although they may bury and successfully rear a brood from a carcass as small as 35g (USFWS, 1991). Two avian species, the ring-necked pheasant and American woodcock, are preferred size carrion of the American burying beetle (USFWS, 1991). As these sorts of carrion attract numerous other predatory mammals, the American burying beetle commonly faces interspecific resource competition from raccoons, opossum, mustelids, and canids (USFWS, 1991). One popular hypothesis as to why *N. americanus* populations have persisted on islands contends that reduced competition for carrion resources (as presented by other predators) enables the beetle to secure more carcasses in which to reproduce (USFWS, 1991).

1.7. LIFE HISTORY AND REPRODUCTION

The American burying beetle is generally considered active from April through September; although collection records indicate that it may be seen as early as February and as late as October (USFWS, 1991). For the Block Island population, breeding tends to take place between June and July (USFWS, 1991). In Oklahoma, breeding may take place any time between late April and mid-August (USFWS, 1991). *N. americanus* reproduction can be divided into three stages which include locating a suitable vertebrate carcass; digging and burying the carcass; and mating (USFWS, 1991). Eggs are laid in a brood chamber adjacent to the buried carrion, with brood sizes ranging between three and 31 individuals (USFWS, 1991). Following hatching, the first instar larvae are moved to the carcass by the adult beetle(s) that remained with the brood, who feed the larvae regurgitated meat (USFWS, 2008). Once capable of feeding themselves, the larvae burrow away from the carcass and form pupation cells, and they will emerge as new adults within 45 days (USFWS, 2008). Depending on the latitude of the site, the recently emerged American burying beetle adult may become reproductively active, although the species is generally considered univoltine (having one generation per year) (USFWS, 1991). The life expectancy of the American burying beetle is approximately 12 months (USFWS, 2008).

N. americanus overwinters by burrowing into the soil and will remain buried until soil temperature rises again in the spring (USFWS, 1991). Overwintering may result in mortality for 25-70 percent of the population (USFWS, 2008). Even if they do survive overwintering it is not thought that *N. americanus* remains reproductively viable for longer than a single season (USFWS, 1991).

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2. BLACK-CAPPED VIREO

2.1. SPECIES LISTING STATUS

The black-capped vireo (*Vireo atricapillus*) was listed as endangered on October 6, 1987 (52 FR 193) by the U.S. Fish and Wildlife Service (USFWS) (USFWS, 1987). The recovery plan for the black-capped vireo was approved and published on September 30, 1991 (USFWS, 1991). No critical habitat has been designated by the USFWS for the black-capped vireo (USFWS, 1987).

2.2. DESCRIPTION

The black-capped vireo is an 11 cm (4 in) insectivorous bird (USFWS, 1987). It is one of the smallest of the vireos and weighs 9 to 10 grams (USFWS, 1991). It was discovered when two specimens were collected along the Rio San Pedro (now called Devil's River) in Sutton County, Texas on May 26, 1851 (USFWS, 1987). "Adult male black-capped vireos are olive green on the upper surface and white beneath and have faintly yellowish green flanks" (USFWS, 1987). "The crown and upper half of the head is black with a partial white eye-ring and lores; this pattern is unique in the family Vireonidae" (USFWS, 1987). "The iris is brownish red, the bill black" (USFWS, 1987). The black-capped vireo is "[u]nique among vireos in being sexually dichromatic" (USFWS, 1991). "Adult females are duller colored, with the crown slate gray instead of black and the underparts washed with greenish yellow" (USFWS, 1987).

2.3. DISTRIBUTION

Historical range

The black-capped vireo's historic breeding range is believed to have extended "in a strip from south-central Kansas, broadly through central Oklahoma south through central Texas to the Edwards Plateau, then south and west to central Coahuila (Mexico) and Big Bend National Park" (USFWS, 1991). "The vireo may also have occasionally bred in Nuevo Leon and Tamaulipas" (USFWS, 1991). The black-capped vireo's historic wintering range is less well known than the breeding range but is generally on the Pacific slope of Mexico (USFWS, 1991). "Records are primarily from Sinaloa and Nayarit but extend north to southern Sonora, and east to Oaxaca" (USFWS, 1991). "Reports where vireos were considered to have occurred 'accidentally' exist for eastern Nebraska, northeastern Kansas, Louisiana, Arizona, and Nuevo Leon (Mexico)" (USFWS, 1991).

Current range

No recent breeding records exist for Kansas with the last sighting occurring in the 1950's (USFWS, 1991). As for Oklahoma, black-capped vireos have been reduced to three focal areas in the west-central part of the state (USFWS, 1991). The focal area on the border of Canadian and Caddo counties is diminished with only one bird sighted there in 1990 (USFWS, 1991). The second focal area, in Blaine County, is also at very high risk with six breeding pairs during the 1990 season (USFWS, 1991). The most substantial population in Oklahoma, and the third focal area, is within Wichita Mountains Wildlife Refuge and adjacent Fort Sill Military Reservation with over 225 adults observed in 1990 (USFWS, 1991).

Black-capped vireo populations are still present in a number of areas across Texas (USFWS, 1991). Populations are concentrated on the Lampasas Cut Plains and Edwards Plateau (USFWS, 1991). "The eastern and southern edges of the range follow the Balcones Escarpment closely from Waco (McLennan County) to Brackettville (Kinney County). However, the range is likely discontinuous across the Llano Uplift and deterioration of these populations may be extensive, particularly from north-central Texas south broadly to the San Antonio Region" (USFWS, 1991). "From 1985 to 1990, about 1,500 adult birds have been observed in Texas, summing only site maximums, or most recent counts for areas with multiple-year data" (USFWS, 1991).

2.4. USFWS CRITICAL HABITAT

No critical habitat designation has been made for the black-capped vireo (USFWS, 1987, 1991, and 2007).

2.5. HABITAT

Black-capped vireo breeding habitat consists of "shrubby growth of a forest-grassland ecotone from Kansas (formerly) to Coahuila, Mexico" (USFWS, 1991). "From Oklahoma through Texas, this type of vegetational configuration occurs most frequently on rocky substrates with shallow soils, in rocky gullies, on edges of ravines, and on eroded slopes" (USFWS, 1991). Due to processes such as fire, grazing or other forms of periodic site disturbance, shrubland habitat can be successional and pass through periods of suitability and unsuitability for the black-capped vireo (USFWS, 1991). High densities of deciduous vegetation up to three meters tall is common in black-capped vireo habitat (USFWS, 1991). Of secondary importance is within-territory heterogeneity in vegetation structure (USFWS, 1991). Additionally, total woody cover of 35% to 55% in height zones relevant to the black-capped vireo is an indicator of appropriate habitat (USFWS, 1991).

2.6. DIET

The black-capped vireo is insectivorous, with beetles and caterpillars making up a large part of their diet. They will also forage for spiders and some fruits (NatureServe, 2010).

2.7. LIFE HISTORY AND REPRODUCTION

Black-capped vireos arrive from their wintering grounds in Mexico to Texas from late-March to mid-April and arrive in Oklahoma from mid-April to early May (USFWS, 1991). Migration back to the wintering grounds occurs by late August to September for Oklahoma populations and mid-September for Texas populations (USFWS, 1991). Black-capped vireo breeding pairs will occupy a territory ranging in size from one to 10 acres with an average size of two to four acres (USFWS, 1991). These territories are often clustered in groups averaging in size from 10 to 15 territories per cluster depending on the amount of habitat available (USFWS, 1991). Larger groupings of territories have a tendency to inspire more site fidelity as black-capped vireos from previous seasons return to the same breeding site (USFWS, 1991). "Adult males breeding in the larger groupings exhibit the greatest site fidelity, returning to virtually the same territory, and have never been detected moving to another location in subsequent years" (USFWS, 1991). Females also have site fidelity but not to the same extent as males (USFWS, 1991).

"Nesting begins when the females arrive and continues through August" (USFWS,1991). "Nests are placed in small forks of bushes. Different species are used in different areas, but the

frequently used species are deciduous" (USFWS, 1991). Nests are built by the male and female (USFWS, 1991). Complete clutches have been found as early as April 4 and the latest known nesting start is July 21 (USFWS, 1991). A complete clutch consists of three to four white eggs and as many as six nesting attempts may be made per season (USFWS, 1991). Incubation lasts 14 to 19 days with incubation initiated at the laying of the second or third egg (USFWS, 1991). Incubation is performed by both the female and male (USFWS, 1991). The nestling stage lasts 9 to 12 days and the fledgling stage is 30 to 45 days post-hatching (USFWS, 1991). The young may leave the nest one or two days prior to fledging but are attended by one or both parents (USFWS, 1991). "The female may leave care of the young to the male and attempt another nesting effort or she may desert the male to remate with another male" (USFWS, 1991). "Males will often keep the young within the confines of their territories, but females attending young often wander off the male's territory" (USFWS, 1991).

2.8. REFERENCES

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3. BLACK-FOOTED FERRET

3.1. SPECIES LISTING STATUS

The black-footed ferret (BFF) (*Mustela nigripes*) was listed as endangered throughout its entire range on March 11, 1967 (32 FR 4001) by the U.S. Fish and Wildlife Service (USFWS) (USFWS, 2008). The most recent recovery plan for the BFF was approved on August 8, 1988, and a five-year review was published by the USFWS in 2008 (USFWS, 2008). No critical habitat has been designated by the USFWS for the BFF (USFWS, 2010).

3.2. DESCRIPTION

The BFF is a medium-sized member of the weasel family (*Mustelidae*), exhibiting the typical short legs and slender body (USFWS, 2008). Adult individuals weigh between 1.4 and 2.5 pounds, and lengths have been recorded between 19 and 24 inches, including a 5 or 6 inch tail (USFWS, 2008). The BFF has large ears and eyes, and a black "mask" stripe which extends across the eyes (USFWS, 2008). Its short-haired coat is predominantly buff and brown in coloration, with white fur on the snout and chest, and black fur on the legs and tail tip (USFWS, 2008). Some individuals exhibit lighter coat coloration during the winter months (Matthews, 1990). The BFF is nocturnal, and is thought to have a very keen sense of smell that would aid in dark burrow hunting (USFWS, 2008).

3.3. DISTRIBUTION

Historical range

The BFF is endemic to North America and once occupied an estimated 100 million acres of grassland habitat between Saskatchewan, Canada and the Chihuahua province of northern Mexico (USFWS, 2008). Over this range, the BFF shared the same distribution as the black-tailed prairie dog (BTPD), the white-tailed prairie dog (WTPD), and Gunnison's prairie dog (GPD) (USFWS, 1988). Perhaps as many as 5.6 million ferrets inhabited this area in the late 1800's (USFWS, 1988).

A fringe area of the historical BFF distribution in Meeteetse, Wyoming is now considered to have been a refugium isolated following the last ice age (USFWS, 2008). This remnant population of 186 individuals was discovered in 1981, eight years after the collapse of the last known wild BFF population (USFWS, 1988). Canine distemper decimated this population's numbers in the years between 1984 and 1987, and by 1987 the 18 surviving BFFs had been removed from Meeteetse for a captive breeding program (USFWS, 1988).

Current range

BFF distribution sharply declined because of BTPD habitat fragmentation (USFWS, 1988). At present, it appears that all wild BFF populations have been extirpated (USFWS, 2008). However, efforts to reintroduce BFFs (captive-bred from surviving members of the last known wild population in Meeteetse, Wyoming) to various locations within the historic range have been ongoing since 1991 (USFWS, 2008).

The current BFF range accounts presented by both the 2008 5-Year Review and the USFWS Species Profile website are included below.

According to the 5-Year Review, the sites of BFF reintroduction—through October 2008—are listed alphabetically by state in Table 1 (USFWS, 2008).

Table 1. Sites of BFF reintroduction between 1991 and October 2008.

State	Site
Arizona	Aubrey Valley
Arizona	Espee Ranch
Colorado	Wolf Creek
Kansas	Logan County
Montana	BLM 40 Complex
Montana	Fort Belknap
Montana	Northern Cheyenne
Montana	UL Bend NWR
New Mexico	Vermejo Ranch
South Dakota	Badlands NP
South Dakota	Cheyenne River
South Dakota	Conata Basin
South Dakota	Lower Brule
South Dakota	Rosebud
South Dakota	Wind Cave NP
Utah	Coyote Basin
Wyoming	Shirley Basin

The USFWS Species Profile website reports current BFF range by state and county. This information is presented in Table 2. Further, the Species Profile has listed the BFF as occurring statewide in Colorado, Montana, and Utah (USFWS, 2010).

Table 2. U.S. counties in which the BFF is known to occur (USFWS, 2010)

State	County	State	County
Arizona	Coconino	Nebraska	Gosper
Arizona	Yavapai	Nebraska	Antelope
Arizona	Navajo	Nebraska	Webster
Arizona	Apache	Nebraska	Sheridan
Kansas	Logan	Nebraska	Scotts Bluff
Nebraska	Nance	Nebraska	Nuckolls
Nebraska	Loup	Nebraska	Hooker
Nebraska	Knox	Nebraska	Hayes
Nebraska	Kearney	Nebraska	Hall
Nebraska	Cheyenne	Nebraska	Garfield
Nebraska	Brown	Nebraska	Frontier
Nebraska	Wheeler	Nebraska	Dundy

Nebraska	Howard	Nebraska	Dawson
Nebraska	Grant	Nebraska	Blaine
Nebraska	Garden	Nebraska	Adams
Nebraska	Furnas	New Mexico	Colfax
Nebraska	Dawes	North Dakota	Grant
Nebraska	Custer	North Dakota	Adams
Nebraska	Buffalo	North Dakota	Dunn
Nebraska	Thomas	North Dakota	Stark
Nebraska	Sioux	North Dakota	Morton
Nebraska	Morrill	North Dakota	Mercer
Nebraska	McPherson	North Dakota	Hettinger
Nebraska	Holt	North Dakota	McKenzie
Nebraska	Cherry	North Dakota	Golden Valley
Nebraska	Arthur	North Dakota	Billings
Nebraska	Rock	North Dakota	Oliver
Nebraska	Red Willow	North Dakota	Sioux
Nebraska	Hitchcock	North Dakota	Slope
Nebraska	Harlan	North Dakota	Bowman
Nebraska	Clay	South Dakota	Ziebach
Nebraska	Chase	South Dakota	Tripp
Nebraska	Box Butte	South Dakota	Todd
Nebraska	Banner	South Dakota	Dewey
Nebraska	Valley	South Dakota	Shannon
Nebraska	Sherman	South Dakota	Mellette
Nebraska	Hamilton	South Dakota	Pennington
Nebraska	Greeley	South Dakota	Gregory
Nebraska	Boone	South Dakota	Jackson
Nebraska	Phelps	Wyoming	Uinta
Nebraska	Logan	Wyoming	Sublette
Nebraska	Lincoln	Wyoming	Fremont
Nebraska	Kimball	Wyoming	Hot Springs
Nebraska	Keya Paha	Wyoming	Big Horn
Nebraska	Keith	Wyoming	Sweetwater
Nebraska	Franklin	Wyoming	Natrona
Nebraska	Deuel	Wyoming	Lincoln
Nebraska	Boyd	Wyoming	Carbon
Nebraska	Perkins	Wyoming	Washakie
Nebraska	Merrick	Wyoming	Park

In 2009, Scott Larson of the South Dakota USFWS Field Office provided the Environmental Fate and Effects Division of EPA's Office of Pesticide Programs with a list of counties into which the BFF has specifically been introduced and adjacent counties into which the species may have expanded. This list, in Table 3 below, does not necessarily represent all areas where the BFF may occur, nor does it necessarily represent all areas where BFF habitat may be at issue.

Table 3. U.S. counties where the BFF has been introduced (USFWS, 2009b)

State	County
Kansas	Logan *

Montana	Big Horn
Montana	Blaine
Montana	Phillips
Montana	Rosebud
New Mexico	Colfax *
South Dakota	Corson
South Dakota	Custer
South Dakota	Dewey
South Dakota	Fall River
South Dakota	Jackson*
South Dakota	Lyman
South Dakota	Meade
South Dakota	Mellette *
South Dakota	Pennington *
South Dakota	Shannon
South Dakota	Stanley
South Dakota	Todd*
South Dakota	Zeibach *

* indicates county reported in Table 2

In 2009, the USFWS published a map of block-cleared counties in Colorado which included all BTPD habitat in eastern Colorado (USFWS, 2009a). "Block-clearance means that activities within these areas that result in the removal of black-tailed prairie dogs and/or their habitat will no longer required to meet the USFWS survey guidelines for black-footed ferrets, or undergo consultation under section 7 of the Endangered Species Act" (USFWS, 2009a). This information is presented in Table 4 below.

Table 4. USFWS block-cleared areas, by county, for black-footed ferret surveys in Colorado (USFWS, 2009a)

Adams	Kit Carson
Arapahoe	Larimer
Baca	Las Animas
Bent	Lincoln
Boulder	Logan
Broomfield	Morgan
Cheyenne	Otero
Crowley	Phillips
Denver	Prowers
Douglas	Pueblo
El Paso	Sedgwick
Elbert	Washington
Jefferson	Weld
Kiowa	Yuma

3.4. USFWS CRITICAL HABITAT

No critical habitat designation has been made for the black-footed ferret (USFWS, 2008).

3.5. HABITAT

The BFF is associated with short and midgrass prairie habitat consistent with the North American grassland biome (Nowak, 1999 and USFWS, 1988). The BFF is a prairie dog obligate species (USFWS, 1988). It has been known to take advantage of prairie dog burrows for shelter and travel, and "may modify prairie dog burrows for its own use" (Nowak, 1999). The historical range of the BFF coincided overwhelmingly with that of the BTPD—perhaps on the order of 85 percent—although the BFF also inhabited WTPD and GPD areas (USFWS, 2008). The USFWS is considering whether to designate BFF distinct population segments and target recovery based on host species of prairie dog (USFWS, 2008).

Habitat models that consider relationships between the BFF and prairie dog have been mentioned in USFWS assessments and are considered helpful in identifying the parameters that would indicate a successful BFF recovery (USFWS, 1988). The development of these models has led to an understanding of the importance of prairie dog complex size in the successful recovery of the BFF; where "complex" is defined as "a group of prairie dog colonies distributed so that individual black-footed ferrets (and thus [BFF] genetic material) can migrate among them commonly and frequently" (USFWS, 1988). In the recovery plan, this minimum size requirement is quantified as 124 acres of prairie dog habitat per individual BFF (USFWS, 1988). A linear relationship has been observed between prairie dog habitat reduction and the number of individual BFFs supported by an area (USFWS, 1988).

3.6. DIET

The BFF predominantly consumes prairie dogs (*Cynomys* spp.) (Nowak, 1999). Scat analyses indicate that the prairie dog may comprise as much as 87 or 91 percent of the BFF's diet (USFWS, 1988). Using data on captive-fed BFF consumption, specific metabolic demands, and projected activity, intake was estimated at 124 kcal of prairie dog per day (USFWS, 1988). The BFF has also been observed to consume prairie dog carrion, and may cache prairie dogs (USFWS, 1988). BFFs in captivity consume between 60 and 360 grams of whole prey and ground food per day (USFWS, 1988). Female BFFs with young likely consume many more calories, as lactating weasels are considered to require three times as much energy as non-lactating adult weasels (USFWS, 1988).

While prairie dogs are the main food item of the BFF, it may also consume lagomorphs, mice, voles, ground squirrels, pocket gophers, birds, and insects (USFWS, 1988).

3.7. LIFE HISTORY AND REPRODUCTION

The BFF reaches sexual maturity within one year of birth (USFWS, 1988). For wild populations, breeding takes place between the months of March and May, with BFF females in estrus for 8 or 9 days (USFWS, 1988). Generally solitary dwellers, male and female BFFs will share common burrows during this time (USFWS, 1998). The gestation period lasts for 41-45 days, and wild BFF litters vary in size from one to five young (USFWS, 1988). Survival of the young into adulthood is sex-variable, as evidenced by the 2:1 female to male ratio recorded (USFWS, 1988). As the sex ratio at birth is approximately 1:1, it is likely that males face increased mortality as a consequence of their larger home ranges (USFWS, 1988). Natural predators of the BFF include great-horned owls, golden eagles, and coyotes (USFWS, 1988). Life expectancy for wild BFFs is generally considered to be less than five years (USFWS, 1988).

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4. CALIFORNIA CONDOR

4.1. SPECIES LISTING STATUS

The California condor (*Gymnogyps californianus*) was listed as an endangered species on March 11, 1967 (32 FR 4001) by the U.S. Fish and Wildlife Service (USFWS, 1996). Critical habitat was designated on September 24, 1976 (41 FR 187) (USFWS, 1976 and 1996). The first 5-year review of the species was initiated by the USFWS on March 25, 2009 (74 FR 12878 12883) (USFWS, 1996 and 2009a).

4.2. DESCRIPTION

The California condor is one of seven species of the Cathartidae family, and is one of the largest flying birds in the world with an adult wingspan of up to 9.5 feet (2.9 m) (USFWS, 1996). Adults weigh up to 22 pounds (10 kg) (USFWS, 1996). Males can weigh slightly more than females, at an average of 8.8 kg, with females averaging 8.1 kg (Synder and Schmitt, 2002). Condors are sexually monomorphic and adults are black except for a naked head and neck with gray skin that grades into red, orange and yellow shades (USFWS, 1996). White feathers are present on the underwing linings and on the upper secondary coverts (USFWS, 1996). Juveniles up to three years old have mottled or dark wing linings which then turn whiter, and grayish-black heads which turn yellow so that by five or six years of age they look like adults (USFWS, 1996). Chicks hatched from wild-laid eggs at the Zoological Society of San Diego had an average weight of 185.3 g, with a range of 156.6 g to 205.7 g (n=12) (Snyder and Schmitt, 2002). Chicks reared in this facility have reached adult size in 100 to 110 days, about two months before fledging (Snyder and Schmitt, 2002).

4.3. DISTRIBUTION

Historical Range

Before the late Pleistocene North American extinctions, the California condor ranged over most of the southern United States from Nuevo Leon, Mexico to Florida, including nesting sites in New Mexico, Texas, and Arizona (USFWS, 1996). Fossils have been found in the Rancho La Brea tar pits in Los Angeles, and bones have also been found in upstate New York (USFWS, 1996). At the time of European settlement of North America, condors inhabited the west coast from British Columba, Canada to Baja California Norte, Mexico (USFWS, 1996). Condors were observed in the Columbia River Gorge of the north Pacific Coast until the mid-1800's, and were in northern Baja California until the early 1930's (USFWS, 1996). The range between the late1930's and the early1960's included a wishbone shaped area around the southern San Joaquin Valley and included parts of San Benito, Monterey, Fresno, Kings, San Luis Obispo, Santa Barbara, Ventura, Los Angeles, Kern, and Tulare counties in California (Snyder and Schmitt, 2002). By the 1980's the northwest area of this range was nearly completely unused by the condors, leaving only Santa Barbara, Ventura, Los Angeles, Kern, all but northern San Luis Obispo, and Tulare counties (Snyder and Schmitt, 2002). In the 1984 California Condor Recovery Plan, the wishbone shaped area that encompassed six counties north of Los Angeles were designated the range of primary concern by the California Condor Recovery Team (USFWS, 1996).

Current Distribution

The last wild condor was taken into captivity in 1987 (USFWS, 1996). The condor was taken captive at Bitter Creek National Wildlife Refuge in Kern County, southern California (Los Angeles Times, 1987). Releases of captive California condors began in 1992 by the USFWS at sites north of Los Angeles in Southern California including Ventura, Santa Barbara, San Luis Obispo, and Monterey counties (Snyder and Scmitt, 2002). The California Condor Recovery website of the Arizona Game and Fish Department (AZGFD) indicates that California condor release sites are currently located in the California counties cited above, with the addition of Kern County (AZGFD, 2009). California condor releases began in 1996 in the Grand Canyon area of northern Arizona, at Vermillion Cliffs in Coconino County (USFWS, 1996). This designated non-essential experimental reintroduction area in Arizona also includes southern Utah and part of Nevada to accommodate for future condor movement (61 FR 54043 54060) (USFWS, 1996). In central California, condor releases also began in Big Sur in 1997 and in Pinnacles National Monument in 2003 (Ventana Wildlife Society, 2009). In 2002, a release site was added in Baja California, Mexico (AZGFD, 2009). These reintroduced populations are not self-sustaining (Snyder and Scmitt, 2002 and American Ornithologists' Union (AOU), 2008).

California condor release sites are currently managed by different entities (USFWS, 2009b). The Southern California sites are managed by the USFWS, the Big Sur, California site is managed by Ventana Wildlife Society, the Pinnacles National Monument, California site is managed by the National Park Service (NPS), the northern Arizona site is managed by the Peregrine Fund, and the Baja California, Mexico site is managed by the Zoological Society of San Diego (USFWS, 2009b). Condors are currently housed at the following zoos: the Chapultepec Zoo in Mexico City, the Los Angeles Zoo, the Oregon Zoo in Portland, the San Diego Wild Animal Park, the San Diego Zoo, the Santa Barbara Zoo, and the World Center for Bird of Prey in Boise, Idaho (USFWS, 2009b).

According to the USFWS Species Profile, the California condor is currently known to exist in Inyo, Kern, Los Angeles, Mono, Monterey, San Benito, San Bernardino, San Luis Obispo, Santa Barbara, Tulare, and Ventura counties in California (USFWS, 2010b). In Arizona, the California condor is known to exist in Apache, Coconino, Mohave, Navajo, and Yavapai counties (USFWS, 2010b). In Utah, the California condor is known to exist in Grand, Piute, Garfield, Sevier, Emery, Iron, Washington, Kane, Millard, San Juan, Beaver, and Wayne counties (USFWS, 2010b).

4.4. USFWS CRITICAL HABITAT

Critical habitat designated for the California condor in 1976 included the "land, water, and airspace" no less than 3,000 feet above the terrain of several areas: Sespe-Piru Condor Area that includes the Sespe Condor Sanctuary, in Ventura and Los Angeles counties, Mantilija Condor Area in Ventura and Santa Barbara counties, Sisquoc-San Rafael Condor Area in Santa Barbara County, the Hi Mountain-Beartrap Condor Area in San Luis Obispo County, Mount Pinos Condor Area in Ventura and Kern counties, the Blue-Ridge Condor Area in Tulare County, Tejon Ranch in Kern County, Kern County Rangelands between California State Highway 65 and the western boundary of Sequoia National Forest, and Tulare County Rangelands between California State Highway 65, State Highway 198, and the western boundary of Sequoia National Forest (41 FR41914) (USFWS, 1976).

Primary Constituent Elements (PCE's) are not described. However, several factors were considered in designating critical habitat. The Sespe-Piru, Mantilija, Sisquoc-San Rafael, and the Hi Mountain-Beartrap areas were considered critical for nesting and related year-long activities (USFWS, 1976). The Mount Pinos and Blue-Ridge area were considered critical for roosting (USFWS, 1976). The Tejon Ranch, Kern County Rangelands, and Tulare County Rangelands were considered critical for feeding and other related activities; specifically, the Tejon County Rangelands are important because it is the only feeding area close to the Sespe-Piru nesting area (USFWS, 1976). Further, areas of open range with limited disturbance that provide food are needed within the designated areas to maintain the species, since food availability is directly related to condor distribution and reproduction (USFWS, 1976).

4.5. HABITAT

The California condor is not a habitat specialist (Snyder and Schmitt, 2002). The condor inhabited a diversity of habitat types, with nesting habitat ranging from scrubby chaparral to forested montane areas, mostly on cliffs but also occasionally in cavities of giant sequoia trees (*Sequoiadendron giganteum*) (Synder and Scmitt, 2002). Foraging habitat has been observed to be separate, occurring mostly in open grassland, but condors were also known historically to forage from beaches to high montane meadows (Synder and Scmitt, 2002). Condors forage on open terrain on foothill grasslands and oak savannah without steep terrain or brush, to enable location of food as well as space for take off and landing (USFWS, 1996). The condor requires open habitat to locate food by sight, as well as mass air movements and thermal cells that provide uplift and allow for soaring flight during foraging activities (Synder and Scmitt, 2002). California condors can soar on thermal updrafts for several hours, reaching up to 15,000 feet in altitude and speeds of 55 mile per hour (USFWS, 2010a). Nesting birds have been reported to travel up to 180 km from the nest in search of food, and ranges of non-breeding birds have been observed to cover 7,000 km (AOU, 2008). Condors roost on large trees, snags, cliffs and rocky outcrops where they can easily take off for flight (USFWS, 2010a). They often roost in groups at the same sites, and spend most of their time preening and sunning while perched (USFWS, 2010). After feeding, condors bathe in rock pools, but if no water is available, they will clean their necks and heads on grass, tree branches, and rocks (USFWS, 2010a).

4.6. DIET

California condors forage exclusively on the carcasses of dead animals one to three days per week (USFWS, 1996). Condors eat up to 3 or 4 pounds of meat at a time (USFWS, 2010a). Before European settlement, condors likely ate mule deer (*Odocoileus hemionus*), tule elk (*Cervus elaphus nannoides*), and pronghorn antelope (*Antilocapra americana*), as well as whales, sea lions, and other marine species along the shore (USFWS, 1996). It was estimated by Kolford in 1953 that the diet within the past 200 years has primarily (95%) consisted of cattle, domestic sheep, mule deer, horses, and ground squirrels, though feeding on 24 different species had been observed (USFWS, 1996). Other species in this list include burros (*E. asinus*), mules (*E. caballus x asinus*), pigs (*Sus scrofa*), sheep (*Ovis aries*), goats (*Capra* sp.), domestic dogs (*Canis familiaris*), domestic cats (*Felis catus*), coyotes (*Canis latrans*), bobcats (*Lynx rufus*), black-tailed jackrabbits (*Lepus californicus*), desert cottontails (*Sylvilagus audubonii*), mountain lions (*Felis concolor*), grizzly bears (*Ursus arctos horribilis*), skunks (*Mephitis mephitis*), and salmon (*Oncorhynchus* sp.) (Synder and Scmitt, 2002). Cattle, and especially calves, made up

over half of observations, likely due to their availability, but deer were noted to be preferred (USFWS, 1996). Further studies confirm the importance of these species, but also suggest the importance of smaller to medium sized mammals as well, including coyotes, rabbits, ground squirrels, gray foxes (*Urocyon cinereoargenteus*), long tailed weasels (*Mustela frenata*), kangaroo rats (*Dipodomys* sp.), Botta's pocketgophers (*Thomomys bottae*), and occasionally a coachwhip snake (*Masticophis flagellum*) or carrion of other bird species (Synder and Scmitt, 2002). Condors fly long distances to locate food, and circle above a located meal to notify other condors before landing, where they then wait on the ground as other condors or golden eagles feed (USFWS, 1996). California condors eat according to the hierarchy in the group (USFWS, 2010a).

4.7. LIFE HISTORY AND REPRODUCTION

Condors are long lived and have very low reproductive rates (AOU, 2008). California condors can reproduce at six years of age, but have been observed in captivity to attempt to breed earlier (USFWS, 1996). Condors remain with the same mate unless one of the birds dies (USFWS, 2010). Courtship rituals include a display by the male, who partially holds the wings out with the head down and neck arched forward, while both birds will perform aerobatic flights where one partner follows the other (USFWS, 2010a). Wild California condors court and nest between December and spring, with one egg laid between late January and early April which hatches after 56 days of incubation by both parents (USFWS, 1996). If the first or even second egg fails, another may be laid, depending upon the stage of incubation, time of year, and variation in the individual, its genetics, or in the climate (USFWS, 1996). Nests are located in rock formations such as crevices, overhanging ledges, potholes, and rarely in giant sequoia trees (USFWS, 1996). The factors affecting nest site choice are poorly understood, but all share certain characteristics in entrance and chamber size, substrate, and accessibility of landing points (USFWS, 1996). Both parents feed the chick daily for about two months (USFWS, 1996). Two to three month old chicks leave the nest while still staying in the area to continue to be fed by the parents, though less frequently (USFWS, 1996). Chicks don't fly until six to seven months of age (USFWS, 1996). The parents may continue to provide the chicks with food during this period (USFWS, 1996). The juvenile may not be independent until up to a year after it begins to fly, which may determine whether the parents reproduce again that year, which is unlikely if chick fledging occurs later in the year (USFWS, 1996). In a three year period, a pair may produce two fledglings (AOU, 2008). The lifespan of California condors is not known precisely, but it is thought that they don't live to be much older than 40 years of age in the wild (USFWS, 2010a).

California condors are non-migratory, and there is no evidence for seasonal absences from the historic range or of the condor using part of its range only in the winter season (Synder and Scmitt, 2002). However, there were some seasonal changes in the use of parts of the range (Snyder and Schmitt, 2002). Portions of Tulare County, California were used more frequently in the summer, by the remnant condor population of the mid-1900's (Snyder and Schmitt, 2002).

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5. CANADA LYNX

5.1. SPECIES LISTING STATUS

The contiguous United States Distinct Population Segment (DPS) of the Canada lynx (*Felis canadensis*), hereafter referred to as lynx, was listed as threatened on April 24, 2000 by the U.S. Fish and Wildlife Service (USFWS) (USFWS, 2000). A recovery outline for the contiguous United States DPS of the species was published by the USFWS on September 14, 2005 (USFWS, 2010). The most recent critical habitat rule for the lynx was published by the USFWS on February 25, 2009 (USFWS, 2010).

5.2. DESCRIPTION

Taxonomically, the lynx is a member of the family Felidae (Nowak, 1999). The lynx is a medium-sized cat, weighing between 5.1 and 17.2 kg (11-38 lbs) (Nowak, 1999). Length from snout to tail is typically between 80 and 100 cm (31- 39 in); the tail measuring only 5.1 to 13.8 cm (Nowak, 1999). The lynx has relatively long legs and large paws; both are thickly furred (Nowak, 1999). Its hind legs are longer than the front legs, which leads to its stooped appearance (USFWS, 2000). Coat color is variable, but the long, thick fur is commonly yellowish brown or gray. Color of the underbelly pelage is lighter, and may have a pattern of dark spots (Nowak, 1999). Distinctive black fur tufts crown the triangular ears of the lynx (Nowak, 1999). The species is mainly nocturnal (Nowak, 1999).

Individual lynx occupy territories between 4 and 70 square kilometers in area (males) or between 4 and 25 square kilometers in area (females) (Nowak, 1999). Variable home range size is tied to factors including the abundance of prey, the density of the lynx population, animal age, and season (USFWS, 2010). As most records come from trapping—and thus the winter months—seasonal range changes are a USFWS inference (USFWS, 2000). The USFWS suspects that some segregation of spring, summer, and fall habitat occurs among the lynx and coincident species of bobcat, mountain lion, and coyote (USFWS, 2000). Additionally, long-range exploratory movement is frequently recorded, and one individual was identified 483 kilometers from the site of its release (Nowak, 1999).

5.3. DISTRIBUTION

Historical range

F. canadensis historically occurred throughout the boreal forest (taiga) of Canada and wherever the boreal forest extended into United States territory (USFWS, 2009). In the contiguous United States, this included the Cascades Range of Washington and Oregon; the Rocky Mountain Range in Montana, Wyoming, Idaho, eastern Washington, eastern Oregon, northern Utah, and Colorado; the western Great Lakes Region; and the northeastern U.S. Appalachian corridor from New York to Maine (USFWS, 2000). At the time of species listing, the USFWS defined historical range of the lynx in the United States to include 15 states: Alaska, Colorado, Idaho, Maine, Michigan, Minnesota, Montana, New Hampshire, New York, Oregon, Utah, Vermont, Washington, Wisconsin, and Wyoming (USFWS, 2000).

Current range

F. canadensis is currently listed by the USFWS as occurring in 15 of the 48 contiguous United States (USFWS, 2010). Of the 15 states, the lynx is listed as known to occur statewide in California, New Hampshire, New York, and Vermont (USFWS, 2010). Lynx distribution in the other 11 states— Colorado, Idaho, Maine, Michigan, Minnesota, Montana, Oregon, Utah, Washington, Wisconsin, and Wyoming—includes 191 counties (USFWS, 2010).

5.4. USFWS CRITICAL HABITAT

The USFWS published a critical habitat rule for the contiguous United States DPS of the Canada lynx on March 27, 2009 (USFWS, 2009). In this rule, boreal forest of multiple successional stages was identified as the sole primary constituent element (PCE) of lynx critical habitat (USFWS, 2009). Landscape level parameters were identified as subcategories, including:

- The presence of snowshoe hares and their preferred habitat conditions, which include low and dense vegetation that protrudes above the snow, and mature multistoried stands with conifer boughs at the snow surface;
- Winter snow conditions of deep powder present for extended periods of time;
- Potential den sites characterized by abundant coarse woody debris; and
- Matrix habitat (e.g., hardwood forest, dry forest, non-forest, or other habitat types that do not support snowshoe hares) which connect patches of boreal forest foraging sites used by the lynx within a home range (USFWS, 2009).

Five discreet critical habitat units were designated based on the representation of the above factors (USFWS, 2009).

- Unit 1 is located in northern Maine and encompasses 9,497 square miles of private, state, and federal land in portions of Aroostook, Franklin, Penobscot, Piscataquis, and Somerset counties (USFWS, 2009).
- Unit 2 is located in northeastern Minnesota and encompasses 8,065 square miles of private, state, and federal land in portions of Cook, Koochiching, Lake, and St. Louis counties, plus tracts in Superior National Forest (USFWS, 2009).
- Unit 3 includes 10,102 square miles of private, state, and federal land in northwestern Montana and northeastern Idaho in portions of Boundary County, Idaho, and Flathead, Glacier, Granite, Lake, Lewis and Clark, Lincoln, Missoula, Pondera, Powell, and Teton counties in Montana, plus National Forest lands and Bureau of Land Management (BLM) lands in the Garnet Resource Area (USFWS, 2009).
- Unit 4 includes 1,836 square miles in portions of Chelan and Okanogan counties of north-central Washington, plus BLM lands in the Spokane District (USFWS, 2009).
- Unit 5 includes 9,500 square miles in Yellowstone National Park and surrounding areas in southwestern Montana and northwestern Wyoming (USFWS, 2009). Portions of Carbon, Gallatin, Park, Stillwater, and Sweetgrass counties in Montana; and Freemont, Lincoln, Park, Sublette, and Teton counties in Wyoming are part of Unit 5 (USFWS, 2009).

5.5. HABITAT

In the contiguous Unites States, the lynx is associated with the southern, transitional reaches of the cool and moist boreal forest (USFWS, 2009). Where it occurs at these lower latitudes, the boreal forest forms a mixed conifer and conifer-hardwood landscape (USFWS, 2005). More specific lynx habitat associations vary from state to state. Montana lynx populations have been

associated with older age-class multistory stands where the stem density is low (USFWS, 2009). In Maine, lynx are associated with 15 to 30 year-old regenerating stands of spruce and fir marked by high stem density (USFWS, 2009). In Minnesota, lynx are associated with upland stands of pine, spruce, and fir less than 50 years old (USFWS, 2009). In areas where the lynx occurs in the north Cascades (Washington) and northern Rockies, elevation is considered an important habitat parameter as most documentation comes from above 4,000 feet (USFWS, 2009). Throughout its range, lynx occupied habitat is nearly coincident with that of the snowshoe hare (*Lepus americanus*) (USFWS, 2005). *L. americanus* is found in boreal forest landscapes in association with shrubby areas and high-density stands having a high percentage of horizontal branches (USFWS, 2009). The USFWS *Recovery Outline for the Contiguous United States Distinct Population Segment of the Canada Lynx* (2005) states that "a lynx population can only persist in a large boreal forested landscape that contains the appropriate forest types, snow depths and high snowshoe hare densities."

Areas of downed timber serve as potential den sites for the lynx, providing security and thermal cover for lynx kittens (USFWS, 2009). The lynx has also been documented to den under rock ledges and shrubs (Nowak, 1999).

5.6. DIET

The snowshoe hare (*Lepus americanus*) is the lynx's primary prey (USFWS, 2000). When snowshoe hare populations are not abundant, the lynx will opportunistically feed on small mammals and birds (USFWS, 2009). Other prey is considered to include rodents and fish (Nowak, 1999). Lynx also prey on ungulates which are "utilized heavily in certain areas" during the winter (Nowak, 1999).

5.7. LIFE HISTORY AND REPRODUCTION

Lynx kittens are born between the months of May and June in litters of 1-8, and weigh between 197 to 211 grams at birth (Nowak, 1999). Postpartum mortality of kittens resulting from lack of food is not uncommon, particularly when hare populations are experiencing cyclic lows (Nowak, 1999). When hare density is low, there is even a reduced rate of pregnancy in females (Nowak, 1999). Kittens are weaned after 5 months, although some meat may be eaten by kittens as early as the first month (Nowak, 1999). Sexual maturity is attained prior to two years of age (Nowak, 1999). Mating takes place in February and March, and the gestation period lasts 9 or 10 weeks (Nowak, 1999).

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6. CHIRICAHUA LEOPARD FROG

6.1. SPECIES LISTING STATUS

The Chiricahua leopard frog (CLF) (*Lithobates [Rana] chiricahuensis*) was listed as threatened on June 13, 2002 (67 FR 40790) by the U.S. Fish and Wildlife Service (USFWS) with an effective date of July 15, 2002 (USFWS, 2002). The genus name of "*Lithobates*" is now being used by the Society for the Study of Amphibians and Reptiles, as well as other authorities, for all leopard frog species (USFWS, 2010 a). Leopard frogs were previously in the genus "*Rana*"; however, this change is controversial and still under debate (USFWS, 2010 a). The recovery plan for the CLF was approved on June 4, 2007 (USFWS, 2007 a). No critical habitat has been designated by the USFWS for the CLF (USFWS, 2002).

6.2. DESCRIPTION

The CLF is a medium-to-large sized frog about 109 mm (4.3 inches) in length (USFWS, 2007 a and 2010 a). The snout-to-vent length of adults ranges from 54 to 139 mm (2.1 to 5.4 inches) in length (USFWS, 2002 and 2007 b). Adults can weigh up to 100 grams (Center for Biological Diversity, 1989). The CLF is green or brown with numerous, relatively small dark dorsal spots (USFWS, 2007 a and 2010 a). It has pale yellow to white skin on its underside (Pima County, Arizona, 2010). It has a distinctive color pattern of small, raised, cream-colored spots or tubercles on the rear of its thighs which contrasts against a dark background (USFWS, 2002, 2007 a, and 2010 b). It has relatively rough skin on its back and sides and is often greenish on its head and back (USFWS, 2007 b and 2010 b). It also has a raised fold of skin running down each side of its back (dorsolateral folds) (USFWS, 2007 a and b). Its call, a distinctive snore of one to two seconds, distinguishes this species from other leopard frogs (USFWS, 2002, 2007 a, and 2010 b). It is also distinguished from other leopard frogs by its distinctive salt and pepper pattern on the rear of its thighs, dorsolateral folds that are interrupted and inset towards the

posterior (deflected medially), stocky body, relatively high and upturned eyes, and rough skin on its back and sides (USFWS, 2002, 2007 a, and 2010 a).

6.3. DISTRIBUTION

The range of the CLF is divided into two groups: 1) "a southern group of populations (the majority of the species' range) located in mountains and valleys south of the Gila River in southeastern Arizona, extreme southwestern New Mexico, and Mexico; and 2) northern montane populations in west-central New Mexico and along the Mogollon Rim in central and eastern Arizona" (USFWS, 2002, 2006, and 2007 a and b). Recent genetic analyses support describing the northern populations as a distinct species (USFWS, 2002 and 2007 a and b).

Historical range

The CLF was historically found in "central, east-central, and southeastern Arizona (Santa Cruz, Apache, Gila, Pima, Cochise, Greenlee, Graham, Yavapai, Coconino, and Navajo counties); west-central and southwestern New Mexico (Catron, Grant, Hidalgo, Luna, Soccoro, and Sierra counties); and in Mexico, northeastern Sonora and the Sierra Madre Occidental of northwestern Chihuahua" (USFWS, 2002, 2007 a, and 2008). Distribution of the CLF in Mexico is poorly known (USFWS, 2008). "A total of 298 and 182 historical localities are known for the species in Arizona and New Mexico, respectively. An additional 34 localities are known from Sonora and Chihuahua, Mexico" (USFWS, 2008)

Current range

The CLF "occurs in the mountains of central and east-central Arizona into west-central New Mexico, and also in the mountains and high valleys of southeastern Arizona, the bootheel of southwestern New Mexico, and south through western Chihuahua and northeastern Sonora, Mexico" (USFWS, 2007 a and b and 2010 a). "Specifically in Arizona, it is found in the montane central part of the state, east and south of the Mogollon Rim" (Pima County, Arizona, 2010). "It is also found in the southeastern montane sector and adjacent Sonora" (Pima County, Arizona, 2010). "Elevational range is from 3,500 to 8,040 feet, and 1,219 to 4,023 feet at the Arizona/Mexico" border (Pima County, Arizona, 2010).

"The species' current range is similar to its historical range, but the frog is not well-represented in many areas now, and has apparently disappeared from some drainages and mountain ranges. At the time of listing (2002) the frog was likely extant at an estimated 87 and 31-41 localities in Arizona and New Mexico, respectively" (USFWS, 2008). As of February 2008, it was estimated that "the frog is extant at 49 and 30-35 localities in Arizona and New Mexico, respectively; which represents extirpation from 82-84 percent of historical U.S. localities. The status of the 34 collection localities in Mexico is poorly known" (USFWS, 2008).

The USFWS lists Arizona and New Mexico as the only states where the CLF is known to occur in the U.S. (Table 1).

Table 1. Counties where the CLF is known to occur in the United States (USFWS, 2010 b)

State	County
Arizona	Apache

Arizona	Cochise
Arizona	Coconino
Arizona	Gila
Arizona	Graham
Arizona	Greenlee
Arizona	Navajo
Arizona	Pima
Arizona	Santa Cruz
Arizona	Yavapai
New Mexico	Catron
New Mexico	Grant
New Mexico	Hidalgo
New Mexico	Luna
New Mexico	Sierra
New Mexico	Socorro

6.4. USFWS CRITICAL HABITAT

No critical habitat designation has been made for the CLF (USFWS, 2002, 2007 a, and 2010b).

6.5. HABITAT

The CLF is known currently or historically from montane streams and springs, and river valley bottom cienegas (mid-elevation wetland communities often surrounded by arid environments or wet meadows), springs, pools, livestock/cattle tanks (i.e., small earthen ponds or existing or future impoundments in an ephemeral drainage or upland site constructed primarily as a watering site for livestock), lakes, reservoirs, streams, and rivers at elevations of 1,000 to 2,710 meters (3,281 to 8,890 feet) (USFWS, 2002 and 2007 a and b). Historically, CLFs "in southeastern Arizona were most abundant under natural conditions in lowland cienegas and marshy streams, which are more productive and had a greater aerial extent than suitable montane aquatic systems" (USFWS, 2007 a). "In natural cienega settings, water levels would have fluctuated over long periods and on a seasonal basis, creating significant areas in which leopard frog tadpoles would have thrived in the presence of little competition or predation from fishes. Current situations in cienegas retain little of this possibility; most cienegas have been reduced, dammed, or otherwise simplified, and fish, even native fish, tend to have been spread throughout the waters of cienegas" (USFWS, 2007 a). CLFs "are rarely found in abundance in natural montane settings in southern Arizona; rather they sometimes achieve high reproductive success and population density in constructed ponds in the mountains. The optimal setting appears to include a stream or tinaja-studded canyon within dispersal distance of suitable pond habitats. The ponds provide reproductive habitat, whereas natural waters provide either drought refugia, habitat complexity as a buffer against unpredictability, additional reproductive output, or a combination or some or all of these factors" (USFWS, 2007 a).

Historically, prior to introduction of non-native predators, adult CLFs were aquatic habitat generalists that were found in a variety of natural and man-made aquatic habitat types, but now are limited primarily to the comparatively few aquatic systems that support few or no non-native

predators (e.g. American bullfrogs, fish, and crayfish) (USFWS, 2007 a and b, 2008, and 2010 a). "Natural systems include rivers, permanent streams, permanent pools in intermittent streams, beaver ponds, cienegas, and springs. Artificial systems in which they have been recorded included earthen cattle tanks, livestock drinkers, irrigation sloughs or acequias, wells, abandoned swimming pools, ornamental back yard ponds, and mine adits at elevations of 3,281 to 8,890 feet" (USFWS, 2007 a). It seems that CLFs are now limited to livestock tanks and other man-made waters, as well as headwater streams, cienegas, and springs in the upper portions of watersheds where non-native predators either have yet to invade or habitats are marginal (USFWS, 2010 a and 2008). "In the Southwest, leopard frogs are currently so strongly impacted by harmful non-native species, which are most prevalent in perennial waters, that their occupied niche is increasingly restricted to environments that tend to be ephemeral and unpredictable" (USFWS, 2007 a).

CLFs are highly aquatic frogs and have been described as "probably the most aquatic of the Southwestern leopard frogs" (USFWS, 2007 a and 2010 a). As a result, the CLF needs "permanent to semi-permanent water for survival" (USFWS, 2007 a). "The tadpole is fully aquatic, thus water must be available in sufficient quality and quantity long enough ($\geq$3 months) for metamorphosis" (USFWS, 2007 a). The CLF requires "water characterized by low levels of contaminants and moderate pH, and may be excluded or exhibit periodic die-offs where a pathogenic chytridiomycete fungus is present" (USFWS, 2007 a and b). "Highly polluted waters do not support" CLFs (USFWS, 2007 a).

"Except during overland dispersal during wet periods, these frogs rarely are found far from these water bodies" (USFWS, 2007 a). However, "during summer rains it can move overland and along normally dry drainages" (USFWS, 2010 a). Frogs may form a metapopulation (a set of local populations that interact via individuals moving among local populations) "between nearby (within 5 miles) habitats with adults moving between sites via connecting waters or overland during seasonal rainfall events" (USFWS, 2007 a and 2010 b). "Small patches of suitable aquatic habitat must be within the dispersal range of metamorphs" as "these aquatic corridors may be critical in the conservation" of CLFs (USFWS, 2007 a). "Tadpoles may be washed into new habitats by higher streamflows after rains" (USFWS, 2010 b). Even though CLFs "are found in intermittent bodies of water, mechanisms by which they survive the loss of surface water are unknown" (USFWS, 2007 a). However, Southwestern leopard frogs, including the CLF, "have been observed to survive drought by burrowing into muddy cracks and holes around drying water sources" (USFWS, 2007 a). "Where water is not permanent, adult frogs may persist but reproduction is likely not successful" (USFWS, 2010 b).

The CLF is "usually found on the edges of ponds or streams" (USFWS, 2010 a). "Habitats with a variety of plants, depths, in-water structure, and other complexities are desired" (USFWS, 2010 b). "The role of habitat heterogeneity within the aquatic and terrestrial environment is unknown, but is likely to be important: shallow water with emergent and perimeter vegetation provide egg deposition, tadpole and adult thermoregulation or basking sites, and foraging sites, while deeper water, root masses, and undercut banks provide refuge from predators and potential hibernacula" (USFWS, 2007 a). "Shoreside vegetation and rooted aquatic vegetation that provide cover are important for the conservation and maintenance of" CLF populations (USFWS, 2007 a). "Vegetation cover sufficient to provide refuge from predators and desiccation must be present

for long-term survival" (USFWS, 2007 a). Sites that lack some vegetation cover tend to have a relatively "depauperate invertebrate fauna and thus less potential prey for leopard frogs" (USFWS, 2007 a). "Aquatic sites should have substrate (some mud and not just bare rocks as in some tinaja pools) that will allow for the growth of algae and diatoms to serve as food for developing tadpoles and to allow for overwintering hibernation sites" (USFWS, 2007 a). "Those populations that occur in aquatic habitats that are only seasonally inundated and have only muddy banks with no vegetative cover generally consist of metamorphs that will soon disperse from these sites" (USFWS, 2007 a). "However, a few large adults may inhabit these sites if cover exists in the form of rooted aquatic vegetation, deep muddy water, root wads, undercut banks, or flood debris" (USFWS, 2007 a). The lack of cover at these sites increases the predation pressure and populations tend to be small and secretive" (USFWS, 2007 a). Most perennial waters supporting CLFs have "fractured rock substrata, emergent or submergent vegetation, deep water, root masses, undercut banks, or some combination of these features that frogs may use as refugia from predators and extreme climatic conditions" (USFWS, 2007 a). "Surrounding upland vegetation includes oak and mixed oak and pine woodlands, and ranges into areas of chaparral, grassland, and desert" (Pima County, Arizona, 2010). "Male home range sizes (dry season mean = 1,733 feet^2: wet season, mean = 4,044 feet^2) tended to be larger than those of females (dry season mean = 614 feet^2: wet season, mean = 992 feet^2)" (USFWS, 2007 a). CLFs "likely overwinter at or near breeding sites, although microsites for these "hibernacula" have not been studied" (USFWS, 2007 a). "Other leopard frogs typically overwinter at the bottom of well-oxygenated ponds or lakes, and may bury themselves in the mud" (USFWS, 2007 a).

Juvenile CLF habitat requirements are not well studied; however, "some spatial and temporal separation of adults and juveniles may enhance survivorship" (USFWS, 2007 a). Observations of the lowland leopard frog "found that juveniles were more frequently associated with small pools and marshy areas while adults were associated with large pools" (USFWS, 2007 a). Furthermore, juveniles tend to be more active during the day, whereas the adults are more active at night (USFWS, 2007 a).

6.6. DIET

Larval CLFs are primarily herbivorous (USFWS, 2007 a). "Available food items at one site examined within the range of this species include bacteria, diatoms, phytoplankton, filamentous green algae, water milfoil (*Myriophyllum* sp.), duckweed (*Lemna minor*), and detritus" (USFWS, 2007 a and 2010 b; and Pima County, Arizona, 2010). "Metamorphs and adults will eat aquatic or terrestrial invertebrates and small fish, frogs, or toads" (USFWS, 2010 b). The CLF is expected to be an invertebrate generalist, "consuming a wide variety of flying and terrestrial insects and other arthropods" (USFWS, 2007 a). "Stomach contents of other members of the leopard frog complex from the western United States show a wide variety of prey items including many types of aquatic and terrestrial invertebrates (e.g., snails, spiders, and insects) and vertebrates (e.g., fish, other anurans (frogs and toads) (including conspecifics), and small birds)" (USFWS, 2007 a). The CLF may also eat fresh-water shrimp (Pima County, Arizona, 2010).

6.7. LIFE HISTORY AND REPRODUCTION

The eggs and larvae of the CLF are entirely aquatic and the adults are primarily aquatic (USFWS, 2007 a). CLF eggs masses have been reported in all months except November, December, and January, "but reports of oviposition in June are uncommon" (USFWS, 2007 a and 2010 a). CLF populations at elevations below 5,900 feet tend to oviposit (lay their eggs) from spring through late summer (March through June), with most activity taking place before June (USFWS, 2007 a and 2010 b). "Populations above 5,900 feet breed in June, July, and August" (USFWS, 2007 a and 2010 b). Breeding in the early part of the year appears to be limited to sites where the water temperatures do not get too low, including spring-fed sites (USFWS, 2007 a). "Frogs at some of these sites may oviposit year-round" (USFWS, 2007 a). The minimum-maximum water temperatures for CLF embryos is around 53.6-88.7°F (USFWS, 2007 a).

Spherical egg masses of 300 to 1,485 eggs are laid in quiet pools, and are typically found suspended within two inches of the surface attached to rooted aquatic vegetation (e.g., *Polygonum*, *Potamogeton*, *Ranunculus*, *Rorippa*, *Echinochloa*, *Leersia*, Cyperaceae, and Gramineae) (USFWS, 2007 a and 2010 a). "However, the lack of such vegetation does not preclude egg deposition, and eggs are occasionally deposited on submerged or partially submerged debris including Russian thistle (*Salsola* sp.) and other wind blown debris" (USFWS, 2007 a). "Nothing is known about the survivorship of eggs attached to rooted aquatic vegetation versus debris" (USFWS, 2007 a). The number of eggs in an egg mass is apparently correlated with the female's body size (USFWS, 2007 a). Hatching occurs within a week or two and tadpoles remain in the water where they feed and grow (USFWS, 2007 a and 2010 b). "Metamorphosis may occur in 3 to 9 months depending on the temperature of the site and in some sites, tadpoles may overwinter" (USFWS, 2007 a and 2010 b). "Adult status is dependent on size rather than age" (USFWS, 2010 b). Post-metamorphic CLFs are "generally inactive from November through February; however, this is regulated by temperature and warmer sites may have more winter activity" (USFWS, 2007 a and 2010 b). However, a "detailed study of wintertime activity or habitat use has not been done" (USFWS, 2007 a).

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7. ESKIMO CURLEW

7.1. SPECIES LISTING STATUS

The Eskimo curlew (*Numenius borealis*) was listed in 1967 as an endangered species under the Endangered Species Preservation Act of 1966 (32 FR 4001) by the U.S. Fish and Wildlife Service (USFWS) (USFWS, 1967). The Eskimo curlew was also listed as an endangered species in Canada in 1980 (Gollop et. al., 2006).

7.2. DESCRIPTION

There are four species of curlew in the Western Hemisphere, and the Eskimo curlew is the smallest (USFWS, 2006). The Eskimo curlew is a medium sized shorebird, about 30 cm long, with a bill about 5 cm long that is curved down slightly (USFWS, 1980). The range of body length is given as 32 to 37 cm (Environment Canada, 2007). The Eskimo curlew is easily confused with,other species of curlew such as the whimbrel (*N. phaeopus*), and with other shorebird species like sandpipers (Environment Canada, 2007). Eskimo curlews have smaller bodies and shorter and more slender bills than Wimbrels (USFWS, 1980). The wings are 19 to 23 cm in length and the wing tips cover the tail (Environment Canada, 2007). The primary feathers are uniformly dark in color, with greenish colored legs, and a dark unstriped crown (USFWS, 1980). There is no eye stripe (Environment Canada, 2007). The body and crown are solid brown, with a rusty-yellow underside and streaks on the side of the neck and face (Environment Canada, 2007). There are no bars on the undersides of the primaries, with wing linings that are a “pale to rich cinnamon” color (Environment Canada, 2007). Eskimo curlews weigh 270 to 454 g (Environment Canada, 2007).

7.3. DISTRIBUTION

Historical Range

The Eskimo curlew once nested in two known breeding areas in the Northwest Territories, in the south of Bathurst Peninsula in the area of the Anderson River, and in the Amundsen Gulf/Coronation Gulf/Coppermine River area (Environment Canada, 2007). This area is also described as the Arctic tundra between the McKenzie and Coppermine Rivers in northwestern McKenzie, Northwest Territories, Canada (USFWS, 1980). The Eskimo curlew probably also nested west of this area as far as the Bering Sea (USFWS, 1980). It may also have bred in Alaska, the Yukon, and in western Russia (Environment Canada, 2010). The birds migrated to South America for the winter, with a staging area in Labrador, Canada (USFWS, 1980). During the fall migration they were seen in every Canadian province except for British Columbia (Environment Canada, 2010). They also staged for migration in Newfoundland and in some years in Ontario, Quebec, and the Maritimes in Canada as well as in New England in the United States (Environment Canada, 2010). From there the migration route went over the Atlantic to South America (Environment Canada, 2010). The spring migration northward returned via the Gulf of Mexico and up into Texas, the Midwestern United States and then the prairies of Canada (Environment Canada, 2010).

Current Distribution
While the Eskimo curlew was once a species population of hundreds of thousands of birds, since the 1870's it has been very rare, and possibly extinct, primarily due to overhunting (Environment Canada, 2007). There are very few if any Eskimo curlews left, with no confirmed sightings in the world since the 1960's, and no nests identified since 1866, though searches have been made in the 1970's, 1980's, and 1990's in the breeding ranges that were used historically (Environment Canada, 2007). Estimates from searches in these decades placed the population at 23 to 100 birds, but these were based upon "guesswork" (Environment Canada, 2007). The sightings in the 1960's were in Galveston Island, Texas; Barbados, West Indies; and North Point on James Bay in Ontario (USFWS, 1980). Eighty possible sightings between 1945 and 1985 were reported in North America, but may be misidentified shorebirds of other species (Environment Canada, 2007). Winter range area searches also found no Eskimo curlews in 1992-1993 (Environment Canada, 2007).

The online USFWS Species Profile indicates that the Eskimo curlew is known to occur statewide in Alaska, Kansas, Montana, and Nebraska (USFWS, 2010). The Eskimo curlew is also known to occur in Canadian, Osage, Woods, and Woodward counties in Oklahoma; in Brown and Yankton counties in South Dakota; and in Galveston County, Texas (USFWS, 2010).

7.4. USFWS CRITICAL HABITAT

No critical habitat has been established for the Eskimo curlew (USFWS, 2010).

7.5. HABITAT

The Eskimo curlew breeds beginning in May in the tundra and woodland transition zones, which consist of dwarf shrub-graminoid tundra complex ("barrens") and grassy meadows (Environment Canada, 2007 and 2010). This habitat supports grass species such as polargrass (*Arctagrostis latifolia*), Artic bluegrass (*Poa arctica*), and glaucus bluegrass (*P. glauca*), sedges such as *Carex* sp., and cottongrass (*Eriophorum* sp. and *Dryas sp.*) and shrubs such as glandular birch (*Betula glandulosa*) (Environment Canada, 2007). During the fall migration, Eskimo curlews fed in coastal and crowberry areas such as those found in Labrador as well as terrestrial habitats (Environment Canada, 2007 and 2010). Curlews were found in such habitats as salt marsh, intertidal flats, sand dunes, meadows, pastures, and old fields in Massachusetts (Environment Canada, 2010). Ericaceous heath habitat was used in Alaska, the Northwest Territories, northern Ontario, southern Quebec, Newfoundland, Labrador, and the Maritime Provinces (Environment Canada, 2007). Eskimo curlews wintered in South America in treeless pampas with permanent or ephemeral wetlands in Argentina and possibly in the wet meadows and intertidal areas in the south of Patagonia (Environment Canada, 2007). During spring migration, curlews used tallgrass and eastern mixed-grass prairies, often disturbed by fire or cultivation (USFWS, 2007). Records from Nebraska and Illinois indicate that curlews stopped in burned prairies, wetlands, and plowed fields while migrating (Gollop et. al., 2006). Areas near water sources disturbed by bison were also used (Environment Canada, 2007). Other sources note that curlews were rarely found near water in the Midwest (Gollop et. al., 2006).

7.6. DIET

Eskimo curlews ate berries including blueberries (*Vaccinium* sp.) and crowberries (*Empetrium nigrum*), Dipteran larvae and adult snails, coastal invertebrates including amphipods and isopods, earthworms, and insects such as beetles, young grasshoppers and grasshopper eggs before the fall migration (Environment Canada, 2007 and 2010). The Labrador and Newfoundland heath shrub habitats provide berries, and nearby littoral areas provided crustaceans and insects (USFWS, 2006). Curlews also ate ants on the breeding grounds, and ate ant egg capsules from unplowed land during spring migration (USFWS, 1980). On plowed land, curlews ate grubs and cutworms (USFWS, 1980). Other spring migration food consisted primarily of juvenile grasshoppers and their larvae, particularly the Rocky Mountain grasshopper (*Melanoplus spretus*) (now extinct), as well as other insects, berries, and earthworms (Environment Canada, 2007; and USFWS, 2006).

7.7. LIFE HISTORY AND REPRODUCTION

Eskimo curlews were migratory birds (Environment Canada, 2007). They arrived at breeding grounds in the McKenzie District of the Northwest Territories in May and established a nesting territory (Environment Canada, 2010). Breeding age of the curlew is not known, but related species do not breed until three years of age (Environment Canada, 2010). Nests were made by scraping a shallow depression in the ground, where clutches of four eggs were laid from mid to late June (Environment Canada, 2010). At Fort Anderson, McKenzie, eggs were present on the nests from May 27 to June 13 (USFWS, 1980). Eggs hatched from early to mid July and only one brood was raised in a season (Environment Canada, 2010). Species related to the Eskimo curlew are monogamous and share incubation responsibilities (Environment Canada, 2010). It is presumed that the Eskimo curlew also uses this mating system (Environment Canada, 2010). Chicks fed themselves beginning on the first day after hatching (Environment Canada, 2010). The young left the nest with their parents on the first or second day following hatching and were able to migrate at the end of the month (Environment Canada, 2010). By July, the breeding season was over and adults left to head south, with the juveniles soon to follow (USFWS, 1980). Related species live ten to 30 years (Environment Canada, 2010). It is possible that the Eskimo curlew also lives this long (Environment Canada, 2010).

The Eskimo curlew migrated from July to October to winter over in South America (Environment Canada, 2010). After staging primarily in Labrador and Newfoundland, Canada, they flew nonstop over the Atlantic Ocean probably to the pampas of Argentina, and also to Uruguay and further south (Environment Canada, 2010). The curlews arrived at wintering grounds by early September (USFWS, 1980). Additionally, there was another migration route used by fewer birds traveling down the western side of the Hudson Bay with some birds reaching areas in the Great Lakes, Hamilton County, Ohio, and Cooke County, Texas; however, the remainder of the migration route to wintering grounds is unknown (USFWS, 1980). The return migration in the spring began in April or May and traveled along the Pacific coast of South America, progressed to Central America, over the Gulf of Mexico, and into the Midwest of the United States and then Canada (Environment Canada, 2010). Other sources report the spring migration beginning in late February, arriving in Texas and Louisiana by early March, and then heading north through the Midwestern states to eastern South Dakota and then to breeding grounds in Canada by the end of May (USFWS, 1980).

Special roosting requirements are unknown, and were probably in the same open habitat as those used for nesting, migration, and winter feeding (USFWS, 1980).

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8. GOLDEN-CHEEKED WARBLER

8.1. SPECIES LISTING STATUS

The golden-cheeked warbler (*Dendroico chrysoparia*) was listed as an endangered species under an emergency rule on May 4, 1990 (55 FR 18844) by the U.S. Fish and Wildlife Service (USFWS) (USFWS, 1990 a). A final rule was issued to list the golden-cheeked warbler as an endangered species on December 27, 1990 (55 FR 53153) (USFWS, 1990 c). The recovery plan for the golden-cheeked warbler was approved and published on September 30, 1992 (USFWS, 1992). No critical habitat has been designated by the USFWS for the golden-cheeked warbler (USFWS, 1990 b).

8.2. DESCRIPTION

The golden-cheeked warbler is a small bird with yellow cheeks (USFWS, 1990 b). In males, the cheeks are outlined in black (USFWS, 1990 b). Male golden-cheeked warblers, in breeding plumage, have a "black stripe extending through the eye to the side of the nape. Its crown, upperparts, throat, neck, upper breast, and streaking along the flanks are jet black. Wings are black with two distinct white bars, and the tail is blackish"(USFWS. 1990 b). "Winter plumage of adult males is similar to the breeding plumage except that the black feathers of the throat are edged with yellow or cream" (USFWS, 1992). "The female is less colorful than the male. Her upperparts are yellowish-olive green, the wings and tail are grayish, and the cheeks are not as bright yellow as the males" (USFWS, 1990 b). "Juveniles are similar to adult females. Their backs are brownish olive. Wings are dark drab, wing-bars brownish, and cheeks are dull buff-colored. Throat, chest, an abdomen are drab or grayish white" (USFWS, 1992). "[A]verage breeding weights were 10.2 g for 7 adult males, and 9.4 g for 11 adult females" (USFWS, 1992).

8.3. DISTRIBUTION

Current distribution of the golden-cheeked warbler reflects historic distribution though habitat within the distribution is limited due to habitat destruction (USFWS, 1992). "This species is the only endemic breeding bird of Texas whose entire nesting range occurs within the state. It occurs in central Texas from Palo Pinto and Bosque Counties, south through the eastern and south-central portions of the Edward Plateau" (USFWS, 1990 b). "[This species] has been reported as a breeding species from the following counties: Bandera, Bastrop, Bell, Bexar, Blanco, Bosque, Burnet, Comal, Concho, Coryell, Dallas, Eastland, Edwards, Erath, Gillespie, Hamilton, Hays, Hood, Johnson, Kendall, Kerr, Kimble, Kinney, Lampasas, Lee, Llano, McLennan, Medina, Palo Pinto, Real, San Saba, Somervell, Stephens, Tom Green, Travis, Uvalde, and Williamson"(USFWS, 1992). However, this species "may no longer nest in Tom Green, Concho, Dallas, Lee, McLennan, and Bastrop counties"(USFWS, 1992). "In the period of July-October, [the species migrates] southward through the coniferous-oak woodlands of the Sierra Madre Oriental of Coahuila, Nuevo Leon, Tamaulipas, Queretaro, Veracruz, and Chiapas" (USFWS, 1992). "[The species] winters in Guatemala, Honduras, Nicaragua, Mexico, and possibly Belize" (USFWS, 1990 b).

8.4. USFWS CRITICAL HABITAT

No critical habitat designation has been made for the golden-cheeked warbler (USFWS, 1987 and 1990 b).

8.5. HABITAT

"Golden-cheeked warbler habitat consists of Ashe juniper [*Juniperus ashei*] and various species of oak, such as *Quercus durandii breviloba* (scrub oak) and *Quercus buckleyi* = *Q. texana* (Texas oak). Oaks (especially deciduous species) apparently provide essential foraging substrate" (USFWS, 1990 b). "The breeding range of the golden-cheeked warbler coincides closely with the range of *Juniperus ashei* (Ashe juniper). The golden-cheeked warbler depends on Ashe juniper for nesting materials and substrate, and singing perches" (USFWS, 1990 b). "[It] is [a] mature forest dweller because of its dependence on several old-growth attributes of Ashe juniper-oak woodland including nearly closed canopy, canopy height, and shredding bark of old junipers" (USFWS, 1990 b). "The species has a narrow tolerance in habitat requirements. If habitat is destroyed, the birds that are dependent upon it are eliminated from the breeding population" (USFWS, 1990 b). Habitat quality may also depend on the proximity to "free water" and the presence of steep slopes or rugged terrain (USFWS, 1992). "Estimates of territory size range from 1.3-2.4 ha/territory [3.2-5.9 acres/territory]" (USFWS, 1992).

8.6. DIET

"The golden-cheeked warbler feeds on whatever insects are available, including caterpillars, green lacewings, small green cicadas, katydids, walkingsticks, flies, adult moths and small butterflies. The birds also eat spiders" (USFWS, 1990 b). "[M]ost foraging time is spent on foot moving from branch to branch gleaning small insects from the foliage" (USFWS, 1992).

8.7. LIFE HISTORY AND REPRODUCTION

"[The golden-cheeked warbler] migrates to central Texas from their wintering grounds by mid-March" (USFWS, 1992). "Females begin building nests the first week of April" (USFWS, 1992). "[B]reeding season is mainly in April and May" (USFWS, 1900 b). "[The golden-cheeked warbler] uses strips of Ashe juniper bark to construct its nest. The strips of bark are bound together with cobwebs to form a compact little cup, which is then lined with fur and feathers. The nest is commonly located about 4.5 meters (15 feet) from the ground, although it varies from 1.5-10 meters (5-32 feet)" (USFWS, 1990 b). During the breeding season, "[u]sually three or four eggs, rarely five, are laid. The eggs are white or creamy white with varying amounts of brown and less predominant shades of purple"(USFWS, 1990 b). "Most complete sets of [golden-cheeked warbler] eggs have been found during the period of 3 April to 27 June. Clutches laid after the end of April probably are second renest attempts following failed or abandoned first attempts"(USFWS, 1992). "The female incubates the eggs for 12 days. The male plays an active role in feeding and care of the young. The young leave the nest when 8 or 9 days old, but remain nearby in a loose family group while being cared for by both parents. Second nesting attempts are made only when the first nest is destroyed or deserted" (USFWS, 1990 b).

8.8. REFERENCES

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9. GRAY WOLF

9.1. SPECIES LISTING STATUS

The gray wolf (*Canis lupus*) was listed as endangered by the U.S. Fish and Wildlife Service (USFWS) in the lower 48 states, except for in Minnesota where it was listed as threatened, in 1978 under the Endangered Species Act of 1973 (43 FR 9607) (USFWS, 2010a). Prior to this listing four subspecies of wolf, the timber wolf (*C. l. lycaon*), the Northern Rocky Mountain gray wolf (*C. l. irremotus*), the Mexican wolf (*C. l. baileyi*), and the Texas gray wolf (*C. l. monstrabilis*) had been listed separately in specific geographic areas (USFWS, 1978). The timber wolf (*C. l. lycaon*) had been listed previously by the USFWS as an endangered species on March 11, 1967 (32 FR 4001) under the Endangered Species Preservation Act of 1966 (USFWS, 1967). Beginning in 1974, two subspecies of gray wolf were listed as endangered, the Northern Rocky Mountain gray wolf (*C. l. irremotus*), thought to still be found in Montana, Idaho, and Wyoming, and the eastern timber wolf (*C.l. lycoan*) in the Great Lakes region (39 FR 1158) (USFWS, 1978 and 2010a). At the time of the 1974 listing the timber wolf was the subspecies thought to have inhabited the United States east of the Great Plains and from Maine to Georgia (USFWS, 1978 and 2006). The Mexican wolf (*C. l. baileyi*) was listed as endangered in the southwest and in Mexico (41 FR 17736) and the Texas gray wolf was listed as endangered in Texas (*C. l. monstrabilis*) (41 FR 24062) in 1976 (USFWS, 2010a). Relisting the gray wolf at the species level as *Canus lupus* in 1978 addressed problems regarding the uncertainty of wolf taxonomy, the narrowly defined geographic areas of subspecies protection, and the possibility that unlisted subspecies may yet occur in the lower 48 states (USFWS, 1998 and 2005). This species-wide listing still "recognized valid biological subspecies for research and conservation purposes" (USFWS, 1998). Critical habitat was designated in the same final rule, in Michigan and Minnesota (USFWS, 1978).

An experimental non-essential population of the Mexican gray wolf was established in 1998 in the Blue Range Wolf Recovery Area in Arizona and New Mexico (USFWS, 1998). In the Rocky Mountain area, experimental non-essential populations of gray wolves were established in 1994 in central Idaho and part of Montana (59 FR 60266) and in Yellowstone National Park, which is primarily located in Wyoming as well as in parts of Idaho and Montana (59 FR 60252) (USFWS, 1994a and 1994b). An additional recovery area was located in northwest Montana, where the wolves were classified as endangered (USFWS, 2002). By 2000, these efforts had met the recovery criteria, with regard to the number of breeding pairs, for delisting the Rocky Mountain wolf population in Montana, Idaho, and Wyoming (USFWS, 2002). As a result, the USFWS revised the status of the gray wolf in most of the lower 48 states from endangered to threatened in 2003, a final rule that was challenged in court and overturned in 2005 (USFWS, 2005).

A Western Great Lakes (WGL) distinct population segment (DPS) of gray wolves was established in 2007, in the area including the states of Minnesota, Wisconsin, and Michigan, as well as in the eastern halves of North and South Dakota, the northern half of Iowa, northern areas of Illinois and Indiana, and the northwestern area of Ohio (72 FR 6051) (USFWS, 2007). In the same final rule, the WGL DPS was delisted (USFWS, 2007). A Northern Rocky Mountain (NRM) DPS was established in 2008 in an area including the eastern third of Oregon and

Washington, a small area in north-central Utah, and in the states of Montana, Idaho, and Wyoming (73 FR10513) (USFWS, 2008). In the same final rule, the NRM DPS was delisted, except for in Wyoming, where gray wolves would remain designated as an experimental non-essential population (USFWS, 2008). In 2008, both the WGL DPS and the NRM DPS were relisted as endangered, except for in Minnesota where they were relisted as threatened. This decision was court ordered (73 FR 75356) (USFWS, 2008).

In 2009, the NRM DPS was once again removed from the Endangered Species list, except for in Wyoming, where gray wolves remain designated as an experimental non-essential population (74 FR 15123) (USFWS, 2009a). The WGL DPS was also removed from the Endangered Species list in 2009 (74 FR 15069); however, it was then relisted as endangered except for in Minnesota, where it was relisted as threatened (74 FR 47483) (USFWS, 2009a). In summary, the gray wolf is now listed as endangered in the lower 48 states, except for where it is listed as a non-essential experimental population in all of Wyoming and parts of New Mexico, Texas, and Arizona, in Minnesota where it is listed as threatened, and where it has been delisted in Montana, Idaho, eastern Washington, eastern Oregon, and north central Utah (USFWS, 2010b and 2010c). It should be noted that the online USFWS Species Profile indicates that the gray wolf is endangered statewide in Oregon, Washington, and Utah except where delisted and where experimental, but that the gray wolf is also shown to be delisted as part of the NRM DPS statewide in Oregon and Utah, and in Okanogan County in Washington (USFWS, 2010c). Also, the gray wolf is shown to be both endangered and experimental statewide in New Mexico (USFWS, 2010c).

9.2. DESCRIPTION

Gray wolves are members of the Canidae family, and are the largest wild canids (USFWS, 2009). There were 32 recognized subspecies of the gray wolf, 24 of which were believed to have inhabited North America, at the time of the writing of the Timber Wolf Recovery Plan in 1992 (USFWS, 1992). Taxonomists have since suggested that only five or fewer subspecies of gray wolf are native to North America (USFWS, 1994a).

Adult males are 5 feet to 6.5 feet from nose to tip of tail, and females are 4.5 feet to 6 feet in length (USFWS, 1987). Wolves measure 26 to 32 inches at the shoulder (USFWS, 1987). Adults range from 40 lbs (18 kg) to 175 lbs (80 kg), depending upon the sex of the animal and the region where it is found (USFWS, 2009a). Male wolves in Wisconsin average 77 lbs (35 kg) and range from 57 lbs (26 kg) to 102 lbs (46 kg) (USFWS, 2006). Wisconsin females average 62 lbs (28 kg) and range from 46 lbs (21 kg) to 75 lbs (34 kg) (USFWS, 2006). In the NRM DPS, male wolves average 100 lbs (45 kg) but can weigh up to 130 lbs (60 kg) and females weigh a little less (USFWS, 2009a). Fur color can vary from pure white to black, but is often gray (USFWS, 2006). Wolves have longer legs, bigger feet, a wider head and snout, and a straighter tail than either coyotes (*Canis latrans*) or domestic dogs (*Canis familiaris*) (USFWS, 2006). They also have a deep, narrow chest and are well suited to traveling long distances (USFWS, 1987). Wolves also appear to have sharp sight for detecting movement, and can hear other wolves from up to six miles away (USFWS, 1987).

9.3. DISTRIBUTION

Historical Range

Gray wolves in North America were once found from Alaska, Canada, and Greenland to the central mountains and down to the high plateau of southern Mexico (USFWS, 2006). California, as well as parts of the eastern and southeastern United States which were inhabited by the red wolf (*Canis rufus*) or possibly by a speculative species of eastern wolf (*Canis lycaon*), probably never had gray wolves (USFWS, 2006). The southeastern corner of Georgia may be the southern boundary of the historic gray wolf range, but others contend that the gray wolf did not extend into the southeast at all, or may have to a limited degree at higher elevations (USFWS, 2003). Instead, it is thought that the red wolf was historically found in the mid-Atlantic and southeastern states and possibly into the northeast, though the amount of range overlap with the gray wolf is not known (USFWS, 2003). Other areas excluded from its historic range include southern and interior Greenland, coastal areas in Mexico, coastal areas and other areas in California, all of Central America, and mountaintops and arid deserts in the western U.S. (USFWS, 2003). The USFWS considers the historical range of the gray wolf, pending further evidence, as areas "north of the Ohio River, the southern borders of Pennsylvania and New Jersey, and southern Missouri, and west from central Texas and Oklahoma" (USFWS, 2003).

Current Distribution

The gray wolf is endangered in the lower 48 states except for where it is listed as a non-essential experimental population in all of Wyoming and parts of New Mexico, Texas, and Arizona, in Minnesota where it is listed as threatened, and where it has been delisted in Montana, Idaho, eastern Washington, eastern Oregon, and north central Utah (USFWS, 2010b and 2010c). The USFWS species profile for the gray wolf indicates that the endangered population of gray wolves is known to occur statewide in Colorado, Utah, South Dakota, Oregon, and Washington (USFWS, 2010c). In New Mexico, the endangered population of gray wolves is known to occur in Catron, Grant, and Sierra counties (USFWS, 2010c). In North Dakota, the endangered population of gray wolves is known to occur in Adams, Barnes, Benson, Billings, Bottineau, Bowman, Burke, Burleigh, Cass, Cavalier, Dickey, Divide, Dunn, Eddy, Emmons, Foster, Golden Valley, Grand Forks, Grant, Griggs, Hettinger, Kidder, LaMoure, Logan, McHenry, McIntosh, McKenzie, McLean, Mercer, Morton, Mountrail, Nelson, Oliver, Pembina, Pierce, Ramsey, Ransom, Renville, Richland, Rolette, Sargent, Sheridan, Sioux, Slope, Stark, Steele, Stutsman, Towner, Traill, Walsh, Ward, Wells, and Williams counties (USFWS, 2010c).

In Michigan, the endangered population gray wolves are known to occur in Alger, Baraga, Chippewa, Delta, Dickinson, Gogebic, Houghton, Iron, Keweenaw, Luce, Mackinac, Marquette, Menominee, Ontonagon, and Schoolcraft counties (USFWS, 2010c). In Wisconsin, the endangered population of gray wolves is known to occur in Adams, Ashland, Barron, Bayfield, Burnett, Clark, Douglas, Eau Claire, Florence, Forest, Iron, Jackson, Juneau, Langlade, Lincoln, Marathon, Marinette, Marquette, Menominee, Monroe, Oconto, Oneida, Polk, Portage, Price, Rusk, Sawyer, Shawano, Taylor, Vilas, Washburn, and Wood counties (USFWS, 2010c).

The threatened population of gray wolves in Minnesota is known to occur in Aitkin, Becker, Beltrami, Carlton, Cass, Clearwater, Cook, Crow Wing, Hubbard, Itasca, Isanti, Kanabec,

Kittson, Koochiching, Lake, Lake of the Woods, Marshall, Mille Lacs, Morrison, Otter Tail, Pine, St. Louis, Mahnomen, Pennington, Roseau, and Wadena counties (USFWS, 2010c).

The experimental non-essential population of gray wolves in Wyoming is known to occur in Big Horn, Fremont, Hot Springs, Lincoln, Park, Sublette, and Teton counties (USFWS, 2010c). The experimental non-essential population in the southwest is known to occur statewide in New Mexico, statewide in Texas, and in Apache, Gila, Greenlee, and Navajo counties in Arizona (USFWS, 2010c).

The USFWS Gray Wolf Population and Range in the United States map, available from the USFWS Midwest Region website, indicates the presence of gray wolves in the Upper Peninsula of Michigan, the northern half of Wisconsin and the northern half of Minnesota, the majority of central and northern Idaho, the northwestern corner of Wyoming, and in Montana from the southwest corner to the northwest corner in the western third of the state (Figure 1) (USFWS, 2009b). The southwest recovery area is located centrally on the western border of New Mexico and the Eastern border of Arizona, with an additional area in south central New Mexico (USFWS, 2009b).

Figure 1. Current range occupied by gray wolves in the NRM DPS, WGL DPS and the Southwest Recovery Area (USFWS, 2009).

9.4. USFWS CRITICAL HABITAT

Critical habitat was designated in Michigan and Minnesota for gray wolves in 1978 when the species was reclassified as *Canis lupus* on the Endangered Species List (USFWS, 1978). In Michigan, Isle Royal National Park was designated as critical habitat (USFWS, 1978). In Minnesota, critical habitat was designated as "areas of land, water, and airspace" in Beltrami, Cook, Itasca, Koochiching, Lake, Lake of the Woods, Roseau, and St. Louis counties (USFWS, 1978). The boundaries of this critical habitat are the same as those for Zones 1, 2, and 3, located

in northern Minnesota, described in the same final rule (USFWS, 1978). Zone 1 is 4,488 mi^2 in size, Zone 2 is 1,856 mi^2 in size, and Zone 3 is 3,501 mi^2 in size (Figure 2) (USFWS, 1978). Primary constituent elements (PCEs) are not described. However, key habitat components are described in the Recovery Plan and described below in the Habitat section.

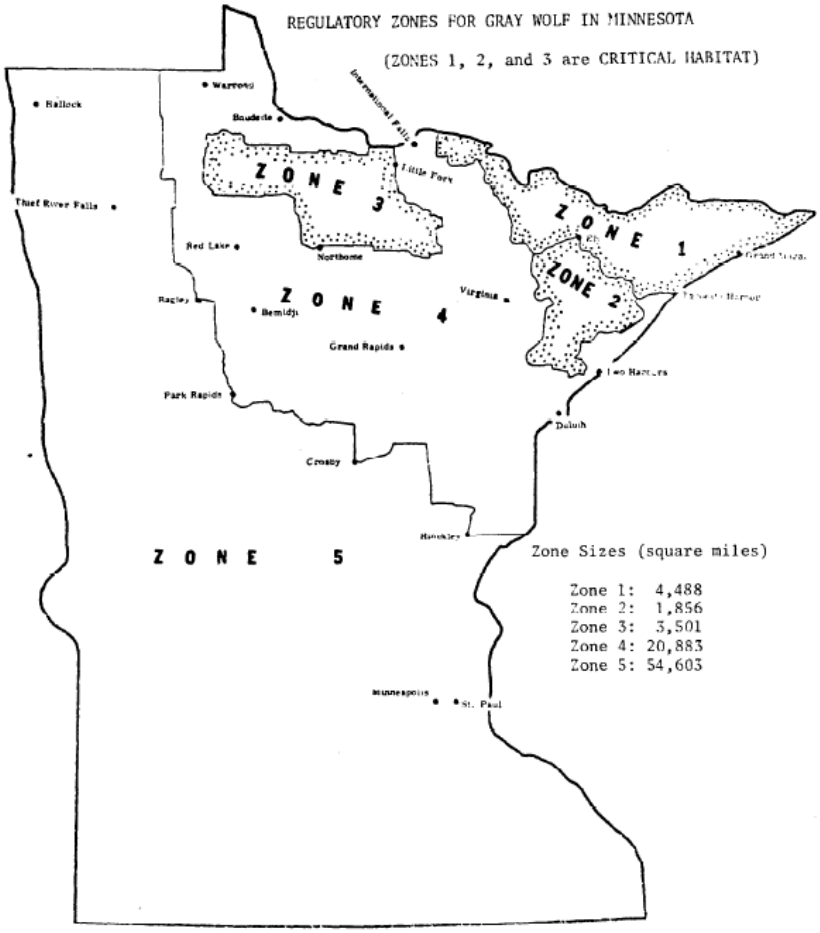

Figure 2. Zones 1, 2, and 3 in Minnesota are designated as critical habitat for the gray wolf

9.5. HABITAT

Wolves have historically used a variety of habitats, and primarily require an abundance of prey, and in recent times, a lack of human disturbance (USFWS, 1987). Nearly all habitat types found in the northern hemisphere have been used by wolves, except for true deserts (USFWS, 1987). Wolves in different social units, such as pairs versus packs, use different key habitat components (USFWS, 1987). Wolves may also use different combinations of key habitat components or use them in different areas of their territory, or switch territories all together (USFWS, 1987). The key components are a year-round abundance of ungulate prey and alternate prey, secluded and suitable denning and rendezvous sites, and sufficient space with low human disturbance (USFWS, 1987). Wolf habitat requirements are highly related to those of their ungulate prey, which vary between regions (USFWS, 1987). Each component is discussed generally below.

Denning sites may be dug weeks before pups are born (USFWS, 1987). Sites are usually located on moderately steep southern slopes that are overlooking lower lying areas, with well drained soils and within 400 yards of a source of water (USFWS, 1987). Dens may also be located in rock caves or in abandoned beaver lodges (USFWS, 1987). Certain dens may be used every year, or an area with several dens, typically five square miles in size, may be used in different years (USFWS, 1987). Wolves are sensitive to human disturbance near den sites and will abandon the den as a result of human disturbance (USFWS, 1987).

Wolves move to a rendezvous site, a gathering and resting area, when the pups are eight to ten weeks old in late May to early July, within one to six miles from the den site (USFWS, 1987). A series of rendezvous sites, one to four miles away from the previous site, are used as the pups grow and until they can travel with the adult wolves in September or early October (USFWS, 1987). Sites, especially the first one, may be used year after year and are occupied for between ten and 67 days (USFWS, 1987). Complexes of meadows with adjacent forested hills with water nearby have been observed as rendezvous sites (USFWS, 1987). Bogs, abandoned beaver ponds, and streams serve as water sources (USFWS, 1987). Sites vary from 0.5 acre to a 0.6 mile long drainage, but most are approximately 1.0 acre in size (USFWS, 1987).

Cover is needed in the sense that wolves require areas free of human disturbance and concealing vegetation at certain times of the year (USFWS, 1987). Den and rendezvous sites are near forested cover and far from human activity (USFWS, 1987). Cover needs are also indirectly related to the cover requirements of the main prey species (USFWS, 1987).

9.6. DIET

Wolves hunt medium to large sized mammals, and are opportunistic predators (USFWS, 1987 and 2009). Given the availability of two prey species, wolves will choose the smaller and most easily caught (USFWS, 1987). However, wolves are inefficient hunters of small mammals which can dodge into small spaces, and are more efficient hunters of larger prey, even though it is more difficult to kill and less abundant (USFWS, 1987). In addition, the most vulnerable in terms of age, sex, and condition with regard to disease, nutrition and infirmity are chosen as prey, as well as solitary or rutting adult males (USFWS, 1987).

Prey species include white-tailed deer (*Odocoileus virginianus*), mule deer (*O. hemionus*), moose (*Alces alces*), elk (*Cervus elaphus*), woodland caribou (*Rangifer caribou*), barren ground caribou (*R. articus*), bison (*Bison bison*), muskox (*Ovibos moschatus*), bighorn sheep (*Ovis canadensis*), Dall sheep (*Ovis dalli*), and mountain goats (*Oreamnos americanus*) (USFWS, 2006). Beaver (*Castor canadensis*), snowshoe hare (*Lepus americanus*), muskrat (*Ondatra zibethicus*), and small mammals, birds and large invertebrates can also be prey (USFWS, 2006). Domestic animals can also be preyed upon by wolves (USFWS, 2006). Horses, cattle, sheep, goats, llamas, and pigs, geese and other fowl, dogs and cats, and captive white tailed deer have been documented as kills in the WGL DPS in the last 25 years (USFWS, 2006). Wolves depend more upon large ungulates in the winter, and add in smaller prey in the spring through the fall, such as beaver (USFWS, 1987). When they are abundant in spring through fall, beaver can make up 25% to 75% of the wolf diet in some areas, though ungulates still make up most of the biomass consumed (USFWS, 1987). Where beaver are not plentiful, the diet is 90% ungulates, and in the Rocky Mountains elk, moose, and deer are the primary prey (USFWS, 1987).

Wolves have been estimated to consume between two and twenty pounds of food per wolf per day, with six to 13 pounds per wolf per day the common estimate (USFWS, 1987). Winter consumption is estimated at eight pounds per wolf per day (USFWS, 1987). Wolves can go for several days without eating, and have a large stomach to eat large amounts of food in a short period of time (USFWS, 1987).

9.7. LIFE HISTORY AND REPRODUCTION

Wolves live in packs of two to twelve animals and defend territories from other wolves and wolf packs (USFWS, 2009a). Packs are family groups composed of the breeding alpha pair, their pups from the current year and from one to two years previous, and an unrelated wolf on occasion (USFWS, 2006). There may be a positive relationship between the size of main prey species and the size of the pack (USFWS, 1987). The average pack size in protected areas of the NRM DPS is 10 wolves, but larger packs have formed in Yellowstone (USFWS, 2009a). The average pack size in the Upper Peninsula of Michigan is 2.7 to 4.6 wolves, with a range of 2 to 14 wolves per pack during winters for the 1995 to 2005 period (USFWS, 2006). Wisconsin pack sizes averaged 3.8 to 4.1 wolves, ranging from 2 to 11 wolves in 2004 to 2005 (USFWS, 2006). Minnesota average wolf pack size was 5.55, 5.4, and 5.3 wolves for the periods of 1988-1989, 1997-1998, and 2004-2005 winters, respectively (USFWS, 2006). In general, territory sizes range from 20 mi^2 to 214 mi^2 (50 km^2 to 550 km^2) (USFWS, 2006). Territories in the NRM DPS range from 200 mi^2 to 500 mi^2 (518 km^2 to 1,295 km^2) (USFWS, 2009a). The midwestern wolves typically have smaller territories, with an average in Minnesota of 102 km^2 from 2003-2004, an average in the Upper Peninsula of 267 km^2 from 2000-2001, and an average in Wisconsin of 37 km^2 from 2004-2005 (USFWS, 2006). Once territories are occupied by wolves, the population grows and is regulated by mortality from conflict with other wolves, the amount of available food, dispersal and other causes of mortality (USFWS, 2009a).

The breeding season is later for wolves further north, but generally begins between January and April (USFWS, 1987). Wolves breed beginning at two years of age and continue up until 10 years old and over, though only the alpha male and female in the pack breed and produce a litter of pups (USFWS, 2009a). Wolves can produce pups annually, with an average litter of five pups but the size can range from one to eleven pups (UFWS, 2009a). Although usually only one litter is produced per year, two or three litters have been observed in Yellowstone (USFWS, 2006). The gestation period is 63 days (USFWS, 1987), and pups are born in April and May (USFWS, 2006). In the NRM DPS, pups are born anywhere from late March to late April, and sometimes in early May (USFWS, 1987). Typically, four out of five pups survive until winter (USFWS, 2009). When wolves are a year old they usually disperse, but some remain with the natal pack (USFWS, 2006). Less frequently, wolves leave the pack at five months or as adults (USFWS, 2006). Lone wolves may range over large areas as solitary animals or start their own pack with a wolf of the opposite sex in an unoccupied territory (USFWS, 2006). Only 1% to 15% of an established wolf population is composed of lone wolves (USFWS, 1987). In northwestern Minnesota, pairing of dispersed wolves occurred in the fall, within a month of leaving the natal pack (USFWS, 1987).

Packs have a social hierarchy that is “adaptable and resilient” (USFWS, 2009a). If the breeding pair dies the pups can be raised by other pack members, and the breeding pair is replaced from

within or from outside of the pack (USFWS, 2009a). Population increases of almost 100% per year have been observed in suitable habitat with low wolf densities, and in two years, packs can more than double in size if mortality decreases (USFWS, 2009a). Wolves can live up to thirteen years, but the wolves of the NRM DPS average less than a four year lifespan (USFWS, 2009a).

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10. GRIZZLY BEAR

10.1. SPECIES LISTING STATUS

The grizzly bear (*Ursus arctos horribilis*) was listed as threatened on July 28, 1975 by the U.S. Fish and Wildlife Service (USFWS) (USFWS, 1993). A recovery plan for the grizzly bear was first approved by the USFWS on January 29, 1982, and a revised recovery plan was approved by the USFWS on September 10, 1993 (USFWS, 1993). On March 29, 2007 a USFWS ruling declared a Yellowstone distinct population segment (DPS) of grizzly bears and in the same rule delisted the Yellowstone DPS; however, a court order on September 21, 2009 overturned this rule so that all grizzlies in the Greater Yellowstone Area (GYA) have been reinstated as a threatened species, and the GYA DPS designation nullified (75 FR 14496). Within the lower 48 States today, every grizzly bear is protected by the provisions which apply to threatened species (75 FR 14496).

10.2. DESCRIPTION

The grizzly bear earns its name from the silver-tipped, or grizzled, hairs which comprise its commonly brown coat, although the actual coat color may vary from black to beige depending on habitat and diet (USFWS, 1993). The humped shoulders and concave facial disk are identifying features of this species (USFWS, 1993). It is the largest of extant carnivores, with populations exhibiting weight variability across geographic regions (Nowak, 1999). Grizzly bears of the lower 48 states will grow to an average weight of 400-600 pounds for males, and an average of 250-350 pounds for females (72 FR 14866). Full-grown adults in the Yellowstone region typically weigh between 102 and 324 kg (225 to 714 pounds) (Nowak, 1999). From snout to tail, the adult grizzly's size may range from 1,700 to 2,800 mm (5.5-9.1 feet), and shoulder height is typically between 900 and 1,500 mm (3.1-4.8 feet) (Nowak, 1999).

Grizzlies are rarely seen together in the wild, although exceptions include mothers with cubs and pairing during the mating season (USFWS, 1993). However, range overlap frequently occurs as adults, particularly males, roam over large areas (USFWS, 1993).

The grizzly enters hibernation between the months of October and December and will exit its den at some point between March and May (Nowak, 1999). Remote, sheltered areas at high elevations are typically selected as hibernation den sites. Bears will excavate a burrow beneath a large rock or the roots of a mature tree (Nowak, 1999). Hibernation intervals may be reduced or non-existent in "certain southerly areas" (Nowak, 1999). This statement was ambiguous in its original context, and it was not clear to what "certain southerly areas" referred. It was implied that in these areas the warmer climate resulted in a lack of hibernation.

10.3. DISTRIBUTION

Historical Range

The grizzly bear once inhabited areas throughout much of Western North America, with populations in Arizona, California, Colorado, New Mexico, Oregon, and Texas, in addition to a Great Plains population (USFWS, 1993). A grizzly bear skull found in Labrador, Canada offers evidence of a historical distribution extending east of Hudson Bay (Nowak, 1999). Estimates of

grizzly bear numbers in the conterminous United States during the early nineteenth century exceed 50,000 individuals (USFWS, 1993).

Current Distribution

Of the contiguous 48 states, grizzly bears presently inhabit only sections of Washington, Wyoming, Idaho, and Montana (USFWS, 1993). Grizzly population remnants have been identified in six areas in the Rocky Mountains within the United States; the Greater Yellowstone Ecosystem (GYE), the Northern Continental Divide Ecosystem (NCDE), the Bitterroot Ecosystem (BE), the Cabinet-Yaak Ecosystem (CYE), the Selkirks Ecosystem (SE), and the Northern Cascades Ecosystem (NCE) (USFWS, 1993). In the GYE, encompassing Yellowstone and Grand Teton National Park and interconnected tracts of the Shoshone, Bridger-Teton, Targhee, and Gallatin, Beaverhead, and Custer National Forests, grizzlies inhabit more than 9,500 square miles; in the NCDE, including Glacier National Park, sections of Flathead and Blackfeet Indian Reservations, and areas within five national forests (Flathead, Helena, Kootenai, Lewis and Clark, and Lolo), 9,600 square miles have been designated grizzly-occupied habitat; in the CYE of northwestern Montana and northeastern sections of the Idaho panhandle, 2,600 square miles are considered grizzly habitat; in the SE of northwestern Idaho and northeastern Washington, 1,081 square miles have been designated as a recovery range (USFWS, 1993). Additionally, the Bitterroot Ecosystem of northeastern Idaho and Montana, and the North Cascades Ecosystem of northern Washington have been designated as grizzly habitat (USFWS, 1993). Among these sites, grizzly population density is quite variable, corresponding to habitat type and foraging opportunities (USFWS, 1993). Current total grizzly population numbers within the contiguous 48 states are estimated to be between 1,200 and 1,400 individuals (USFWS, 2007).

10.4. USFWS CRITICAL HABITAT

Critical habitat was proposed for the grizzly bear on November 5, 1976 (41 FR 48757). Under the Endangered Species Act (ESA), critical habitat is defined as the specific area within the known range of the species containing either biotic or abiotic features which are deemed essential to the conservation of the species, or which may require tailored management or protection plans (ESA, 1973). Critical habitat designation may also include tracts outside of the known range of the species if such areas are deemed essential for the conservation of the species (ESA, 1973). Four critical habitat zones which coincide with the distribution of the grizzly in the contiguous 48 States have been designated; 1: The juncture shared among Wyoming, Montana, and Idaho, including Yellowstone National Park and adjacent areas; 2: The northwestern corner of Montana, including Glacier National Park, the Bob Marshall Wilderness Area, and Flathead National forest; 3: The border area between northwestern Montana and the upper Idaho panhandle, predominantly in the Kootanai, Kaniksu, and Lolo National Forests in the Cabinet Mountains region; and 4: The northern reaches of the Idaho panhandle and Northeastern Washington in the Kaniksu National Forest (USFWS, 1976).

10.5. HABITAT

Grizzly bears inhabit areas which are relatively isolated and distant from direct anthropogenic influence (USFWS, 1993). Beyond concerns of habitat fragmentation as a result of human construction of roads and houses, such activities facilitate contact and thus conflict between

humans and grizzlies (USFWS, 1993). Highways are thought to constrict grizzly bear movements, and are implicated in population fragmentation (USFWS, 1993).

Prime grizzly habitat will offer diversity of terrain, cover, and natural food sources (USFWS, 1993). The grizzly chiefly achieves these variations through a wandering lifestyle, and individuals range over as much as 1,500 mi^2 (USFWS, 1993). A range of this size encompasses mountainous areas that are suitable for denning, forested areas utilized for temporary cover, and an array of natural food sources that preclude dependence on unpredictably available foods (USFWS, 1993). Migrations among habitats are common, and they follow a seasonal pattern (USDA Forest Service, 1991). For instance, the grizzly is found in low elevation riparian sites, wet meadows, and alluvial plains in the spring (USDA Forest Service, 1991). During the summer and fall, grizzlies will inhabit higher elevation forests, meadows, and open, grassy timber sites (USDA Forest Service, 1991).

The specific composition of forested areas most frequented by the grizzly bear include subalpine fir (Abies lasiocarpa)-whitebark pine (Pinus albicaulis), lodgepole pine (P. contorta)-Douglas-fir (Pseudotsuga menziesii), and spruce (Picea spp.)western redcedar (Thujaplicata)-hemlock (Tsuga spp.) forests (USDA Forest Service, 1991). Meadows, shrubfields, and low- and high-elevation riparian communities also constitute important habitat (USDA Forest Service, 1991). Other habitat with which the grizzly is associated includes seeps, alpine slabrock areas, and avalanche chutes (USDA Forest Service, 1991).

10.6. DIET

The grizzly has the physiology of a carnivore but typically maintains an omnivorous lifestyle (USFWS, 1993). Grizzlies are considered to be opportunistic feeders that will prey or scavenge upon available food sources such as ungulates, ground squirrels, carrion, and garbage (USFWS, 1993). Since grizzlies lack a caecum, their diets tend towards easily digestible foods that are high in starch, sugar, protein, or stored fat (USFWS, 1993). Freshly emergent herbaceous vegetation is consumed preferentially for these reasons, and grizzlies may follow spring weather from the lowlands up to higher elevations to keep pace with plant phenology (USFWS, 1993). Grasses, sedges, roots, tubers, and berries compose a large part of the bear's diet in many areas (Nowak, 1999). The grizzly bear has also been documented to prey on mice, ground squirrels, and marmots after digging them out of their burrows (Nowak, 1999).

10.7. LIFE HISTORY AND REPRODUCTION

Grizzly bear cubs are born weighing between 340 and 680 grams (11.9-23.8 oz) (Nowak, 1999). They are weaned after about 5 months, although they may remain with their mother for as many as four years (Nowak, 1999). Grizzlies reach puberty between four and six years, but will continue to grow after that point (Nowak, 1999). Captive holding of grizzlies indicates that they are a long-lived species, potentially attaining ages in excess of 50 years (Nowak, 1999).

Mating in grizzly populations takes place between the months of May and July, but researchers contend that individual female estrus periods do not exceed one month (Nowak, 1999). Implantation of the blastocyst(s) is delayed until after the female enters hibernation, some four or five months later (USFWS, 1993). The average number of young in a litter is two, but litters of as many as four cubs have been recorded (Nowak, 1999). Mated females will not enter estrus

again for at least two years, the average period being three years between estrus (Nowak, 1999). If the young do not survive, however, the female may enter estrus and breed in that same year (USFWS, 1993). Long intervals between litters, small litter size, and late-onset reproductive maturity combine to leave the grizzly with one of the lowest reproductive rates of terrestrial mammals (USFWS, 1993).

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11. GULF COAST JAGUARUNDI

11.1. SPECIES LISTING STATUS

The Gulf Coast jaguarundi (GCJ) (*Herpailurus yagouaroundi cacomitli*) was listed as endangered on June 14, 1976 by the United States Fish and Wildlife Service (USFWS) under Section 4 of the Endangered Species Act of 1973 (USFWS, 1976). Although included in the 1990 USFWS *Listed Cats of Texas and Arizona Recovery Plan (With Emphasis On The Ocelot)*, no jaguarundi-specific recovery plan has subsequently been produced (USFWS, 2010). No critical habitat has been designated by the USFWS for the GCJ (USFWS, 2010).

11.2. DESCRIPTION

The jaguarundi is a long slender cat, a little larger than a house cat, but much longer (USFWS, 1990). Jaguarundis have a combined head and body length of 55 to 77 cm, and a tail length of 33 to 60 cm (Nowak, 1999). Adult weights for this species range from 4.5 to 9.0 kg (Nowak, 1999). Jaguarundis have a small, flattened head with short, rounded ears (Nowak, 1999). Two distinct fur color phases have been recorded; blackish to brownish gray, and fox red to chestnut (Nowak, 1999). Jaguarundis are most active at night, although they tend to be seen during the daylight hours as they seek out water to drink (USFWS, 2001).

11.3. DISTRIBUTION

Historical range

Four subspecies of *H. yagouaroundi* have been identified in North and Central America: *H. y. fossata, H. y. panamensis, H. y. cacomitli, and H. y. tolteca* (Matthews, 1990). *H. y. cacomitli* (the Gulf Coast jaguarundi) and *H. y. tolteca* (the the Sinaloan jaguarundi) have historically ranged into the United States (Matthews, 1990). Subspecies of jaguarundi were once distributed across a range that included southern Texas, the east and west coasts of Mexico, southern Mexico, and Central and South America (USFWS, 2001). The USFWS notes that historical evidence in support of jaguarundi occurrence in Arizona is nonexistent (USFWS, 2001). The Arizona Game and Fish Department (AGFD) wrote that there exists "no documented record for Arizona, Sonora, [or] Chihuahua" in a discussion of jaguarundi total range (AGFD, 2004).

Current range

The current distribution of the jaguarundi in the United States is extremely limited (USFWS, 2001). Willacy and Cameron counties in southern Texas are locations of confirmed jaguarundi sightings (USFWS, 2001). Within these counties, however, it is thought that only a few jaguarundis survive (Matthews, 1990). The reported sightings in Cochise, Pima, and Santa Cruz counties, Arizona, were never confirmed and have since been determined to be errors (USFWS, 2001). According to the USFWS Species Profile webpage, the GCJ is known to occur in 26 counties in Texas (Table 1).

Table 1. Texas counties where the GCJ is listed as known to occur (USFWS, 2010)

Aransas	Atascosa	Bee	Brooks
Cameron*	Dimmit	Duval	Frio
Hidalgo	Jim Hogg	Jim Wells	Karnes
Kenedy	Kleberg	La Salle	Live Oak

Maverick	McMullen	Nueces	Refugio
San Patricio	Starr	Webb	Willacy*
Zapata	Zavala		

*Counties included in a 2001 USFWS GCJ distribution statement

11.4. USFWS CRITICAL HABITAT

No critical habitat designation has been made for the GCJ (USFWS, 2010).

11.5. HABITAT

Jaguarundis are found in chaparral plant communities, and the species is associated with dense brushy areas near streams and rivers (Matthews, 1990). The USFWS has stated that "brushy tracts along waterways, especially the Rio Grande, are the most valuable and sensitive areas used by ocelots and jaguarundi" (USFWS, 1990). Brushy zones along more significant waterways are thought to provide critical links to corridors used by dispersing cats (USFWS, 1990). Cacti, cat claw (*Uncaria* spp.), mesquite (*Prosopis* spp.), and granjeno (*Celtis* spp.) are among the spiny vegetation characteristic of the jaguarundi's preferred habitat (USFWS, 2001). Cleared areas may be suitable habitat for the jaguarundi, as long as thickets are also in the vicinity (USFWS, 2001).

Prior to giving birth to kittens, female jaguarundis will den in thickets, dense brush, or fallen trees (AGFD, 2004).

11.6. DIET

While the jaguarundi is an expert tree climber, it forages mainly on the ground (Nowak, 1999). Jaguarundis prey on small mammals, birds, and reptiles (USFWS, 2001). The remains of lizards, rodents (mice and rats), small birds, and cottontail rabbits, and grass were found in stomach content analyses conducted on 13 Venezuelan jaguarundis (USFWS, 2001). The jaguarundi also swims, and is presumed to prey on fish and other aquatic animals (AGFD, 2004).

11.7. LIFE HISTORY AND REPRODUCTION

Jaguarundi kittens are born in litters of one to four individuals, typically around March or August (Nowak, 1999). Kittens have light spots for a short period of time after birth (AGFD, 2004). Fur colors expressed within a single litter may represent all three color phases (AGFD, 2004). After two months, the kittens are weaned; and within 10 months of birth the young are fully independent (AGFD, 2004). Jaguarundis reach sexual maturity between 2 and 3 years of age (Nowak, 1999).

Jaguarundis are solitary cats, but are seen in breeding pairs at various times in the year (AGFD, 2004). Females are in estrus for approximately three days, and gestation lasts between 70 and 75 days (Nowak, 1999). It is unknown whether a female jaguarundi will give birth in both March and August (Nowak, 1999). Jaguarundis may live for as long as 15 years (Nowak, 1999).

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12. JAGUAR

12.1. SPECIES LISTING STATUS

In 1972, the jaguar (*Panthera onca*) was listed by the U.S. Fish and Wildlife Service (USFWS) as endangered under the Endangered Species Conservation Act (ESCA) of 1969 (USFWS, 2010a). The USFWS granted the jaguar protection under ESCA as a foreign species, since at that time the jaguar was believed to be extinct in the U.S. (USFWS, 2010a). When the ESCA was superseded by the Endangered Species Act (ESA) of 1973, the jaguar, because of a mistake in its listing, lost endangered species protection under the ESA (USFWS, 2007). The jaguar did not regain endangered status until 1997 (USFWS, 2007a). Although included in a 1990 USFWS recovery plan for the listed cats of Texas and Arizona, no jaguar-specific recovery plan has been produced since its relisting (USFWS, 1997 and 2007b).

12.2. DESCRIPTION

The jaguar is a large, muscular cat that attains a combined head and body length in the range of 44 to 72 inches (1,120 to 1,850 mm), plus a tail that measures between 17.5 and 29 inches (450-750 mm) long (Nowak, 1999). It is the largest species of cat native to the western hemisphere, and may weigh between 80 and 348 pounds (USFWS, 1997 and 2007b). In Mexico, male jaguars have been recorded to weigh between 140 and 250 pounds, and female jaguars between 100 and 180 pounds (USFWS, 2007b). On average, males are between 10 and 25 percent heavier than females (USFWS, 2007b). Jaguar coat coloration may be buff, tan, reddish yellow or reddish brown (Nowak, 1999). The characteristic black spots occur on the head, neck, and limbs; with rosette-forming large spot aggregations present from the shoulders to the flanks (Nowak, 1999). The species is most active in the hours around dawn and dusk (Nowak, 1999).

12.3. DISTRIBUTION

Historical range

The jaguar once ranged across the southern United States, from Florida to California (Nowak, 1999). Historical records of jaguars in the U.S. come from Arizona, California, Louisiana, New Mexico, and Texas (USFWS, 1994). A mid-1900's Grand Canyon sighting was the northernmost jaguar observance on record (USFWS, 2007b). Sightings in California, Louisiana, and Texas have not been documented since the turn of the 19th century (USFWS, 2010a). South of the United States, the species' distribution extended through Mexico, Central America and South America (USFWS, 1997). The Arizona Game and Fish Department (AGFD) states that occupied jaguar range has declined in northern Mexico, northern Brazil, southern Argentina, and the southern United States since the 1800's (AGFD, 2003).

Current range

The jaguar has been extirpated from 37% of its historical range, and the species' status in another 18% is unknown (USFWS, 2007b). The current distribution of the jaguar extends from northern Mexico through Central and South America as far south as northern Argentina (USFWS, 1997). Individual jaguars seen in the United States are identified as wanderers of a Sonora, Mexico population (USFWS, 2007b). Since 1996, every jaguar sighting on U.S. territory has been within 40 miles of the U.S.-Mexico border (USFWS, 2010a). These sightings are not considered indicative of a breeding population, and no female jaguars have been confirmed in the U.S. since 1963 (USFWS, 1997 and 2007a). The northernmost extant jaguar population has been identified outside the Sonora, Mexico towns of Huasabas and Sahuaripa, approximately 130 miles south of the U.S.-Mexico border (USFWS, 2007b).

The USFWS lists Arizona and New Mexico as the only states where the jaguar is known to occur in the U.S. (Table 1). The website also identifies three USFWS Refuges in which the jaguar is known to occur, including: Buenos Aires National Wildlife Refuge (Near Arivaca, Arizona), Leslie Canyon National Wildlife Refuge (Cochise County; 16 miles north of Douglas, Arizona), and San Bernardino National Wildlife Refuge (Cochise County; near Douglas, Arizona) (USFWS, 2010b).

Table 1. Counties where the jaguar is known to occur in the United States (USFWS, 2010b)

State	County
Arizona	Cochise
Arizona	Pima
Arizona	Santa Cruz
New Mexico	Hidalgo

12.4. USFWS CRITICAL HABITAT

As of 2010, no critical habitat has been designated for the jaguar (USFWS, 2010b). In 1997, it was determined by the USFWS that a critical habitat designation would not be prudent because of increased threats of take as a direct result of the designation (USFWS, 1997). In 2006, following a Center for Biological Diversity complaint, the USFWS re-evaluated the best available information but maintained that a critical habitat designation was not prudent, stating that jaguar critical habitat did not exist within the United States (USFWS, 2010a). After a Center for Biological Diversity lawsuit that argued against the 2006 conclusion, the USFWS was ordered by the court, to issue a new determination (USFWS, 2010a). The USFWS determined in 2010 that a critical habitat designation for the jaguar would be prudent (USFWS, 2010a). Critical habitat is expected to be proposed in January 2011 (USFWS, 2010a).

12.5. HABITAT

In the humid tropics of Central America, the jaguar occupies wet, lowland habitat characterized by swampy savannas and tropical rain forests (AGFD, 2003). The northern and southern reaches of current jaguar distribution are marked by far more arid habitat than is found in the areas central to the species' distribution (AGFD, 2003). Jaguars—particularly male jaguars of the northern reaches—are known to have large home ranges that encompass a variety of plant communities, including; Madrean evergreen-woodland, subalpine conifer forest, semidesert shrubland, and Sonoran desert scrub (USFWS, 1997). Washes and riparian areas with dense vegetative growth may also be valuable movement corridors for the jaguar (USFWS, 2007b).

12.6. DIET

While the jaguar is an able tree climber, most of its hunting occurs on the ground where prey is stalked or ambushed (Nowak, 1999). Jaguars of the U.S.-Mexico borderlands prey predominantly on javelina (50-80 lb wild pig), deer, and livestock (USFWS, 2007b). The jaguar is considered a predator to more than 85 species; including the capybara (75-135 lb rodent), paca (large pig-like rodent), armadillo, caiman (alligator-like reptile), and various species of turtles, birds, and fish (USFWS, 2007b).

12.7. LIFE HISTORY AND REPRODUCTION

Jaguar birth weights range between 24.5 and 31.5 oz (700 and 900 grams) (Nowak, 1999). Litter size ranged from one to four kittens but averages two kittens per litter (Nowak, 1999). Jaguar kittens remain with their mother for approximately two years, and become sexually mature between two and four years of age (Nowak, 1999). In captivity and much of the species' range, breeding takes place year-round (USFWS, 1997). However, jaguar populations toward the northern and southern limits of the species' range are considered to have a spring mating season (USFWS, 1997). Estrus for breeding females lasts between 6 and 17 days, and gestation extends for 93 to 105 days (Nowak, 1999). In Mexico, most births occur in the months of July, August,

and September (Nowak, 1999). While wild jaguars do not typically live beyond 11 years, a captive jaguar at Germany's Wuppertal Zoo lived to be 24 years old (USFWS 1997 and Nowak 1999).

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13. MEXICAN SPOTTED OWL

13.1. SPECIES LISTING STATUS

The Mexican spotted owl (MSO) (*Strix occidentalis lucida*) was listed as threatened on March 16, 1993 (58 FR 14248) (effective April 15, 1993) by the United States Fish and Wildlife Service (USFWS) (USFWS, 1993). A USFWS recovery plan for the MSO was published on October 16, 1995 (USFWS, 2010). Critical habitat was designated for the MSO on August 31, 2004 (69 FR 53181) (USFWS, 2004).

13.2. DESCRIPTION

The MSO is the fifth largest North American owl, and is one of three subspecies of *S. occidentalis* (spotted owl), the other two are *S.o. occidentalis* (California spotted owl) and *S.o. caurina* (northern spotted owl) (USFWS, 1995). MSOs have the lightest appearance of any subspecies, attributed to the mottled plumage and numerous irregular white and brown splotches on the abdomen, back, and head (USFWS, 1995). Dark eyes distinguish the spotted owl from other owl species (USFWS, 1995). However, as the MSO is nocturnal, vocalizations are used more frequently than phenotypic characteristics in identification of subspecies (and gender) (USFWS, 1995). Adult male MSOs average 519 grams (SD 32.6 grams; sample size of 37 male MSOs) while adult female MSOs average 579 grams (SD 31.2 grams; sample size of 31 female MSOs) (USFWS, 1995).

13.3. DISTRIBUTION

Historical range

A large part of the MSO's total range occurs throughout much of northern Mexico (NatureServe, 2009). Historical records of the MSO in the United States date back to 1872 and come from five states: Arizona, Colorado, New Mexico, Texas, and Utah (USFWS, 1993). In Arizona, the MSO historically occurred in low elevation riparian forests (USFWS, 1993). In Colorado, historical records come from the San Juan Mountains and the Front Range as far north as Denver (USFWS, 1993). In New Mexico, the MSO was observed in nine major mountain ranges: the Sangre de Cristo, Jemez, Manzano, Sacramento, Mogollon, Tularosa, San Francisco, San Mateo, and Black Range (USFWS, 1993). In Texas, all MSO records are from the Guadalupe Mountains near the New Mexico border (USFWS, 1993). In Utah, the MSO has been documented as far north as the Book Cliffs in the northeastern part of the state (USFWS, 1993).

Current range

The current range of the MSO is presumed to approximate the historical distribution (USFWS, 1995). However, the MSO has not recently been observed along major riparian corridors in New Mexico and Arizona (USFWS, 1995). In 1990, the U.S. Forest Service (USFS) estimated that it managed 4,698,807 acres of MSO-suitable habitat within 18 national forests (USFWS, 1993). Potential MSO habitat in excess of 725,000 acres occurs on lands managed by the Bureau of Land Management (BLM) in Colorado, Utah, Arizona, and New Mexico (USFWS, 1993). Additional suitable habitat is found on state, tribal, and private lands in the southwestern United States, amounting to a total of 6,815,557 acres reported by federal and state agencies in 1990 (USFWS, 1993).

The USFWS lists the MSO as known to occur in 13 counties in Arizona, 33 counties in Colorado, 22 counties in New Mexico, 4 counties in Texas, and 11 counties in Utah (USFWS, 2010). US counties where the Mexican spotted owl is known to occur

13.4. USFWS CRITICAL HABITAT

Critical habitat is defined in the Endangered Species Act as the specific areas within the geographic area occupied by a species at the time of its listing containing physical and biological features necessary to the species' conservation, and that may require special management consideration to protect the listed species (USFWS, 2004). Designations of critical habitat may also include areas outside of the species' geographical location at the time of listing if features of those areas are determined to be essential to the conservation of the species (USFWS, 2004). Critical habitat is designated specific to habitat areas that meet life-cycle needs of the species or contain primary constituent elements (PCEs) (USFWS, 2004). Critical habitat was designated for the MSO on August 31, 2004 (69 FR 53181) (USFWS, 2004). The 2004 designation was a revision of the 2001 USFWS critical habitat designation which excluded all Forest Service lands in Arizona and New Mexico and certain tribal lands (USFWS, 2004). In the 2004 critical habitat designation, PCEs were identified for both canyon and forested habitat areas and presented under three headings: PCEs related to forest structure, PCEs related to maintenance of adequate prey species, and PCEs related to canyon habitat (USFWS, 2004). PCEs specific to the three categories are listed below.

PCEs related to forest structure:

- A range of tree species, including mixed conifer, pine-oak, and riparian forest types, composed of varying tree sizes and ages, 30 to 45 percent of which are large trees with a trunk diameter of at least 12 inches when measured 4.5 feet from the ground
- A shade created by the forest canopy which covers at least 40 percent of the ground area
- Large dead trees with a trunk diameter of at least 12 inches when measured 4.5 feet from the ground

PCEs related to maintenance of adequate prey species:

- High volumes of fallen trees and other woody debris
- A wide range of tree and plant species, including hardwoods
- Adequate levels of residual plant cover to maintain fruits, seeds, and allow plant regeneration

PCEs related to canyon habitat:

- Presence of water
- Clumps or stringers of mixed-conifer, pine-oak, pinyon-juniper, and/or riparian vegetation
- Canyon wall containing crevices, ledges, or caves
- High percent of ground litter and woody debris

State and private lands were excluded from the 2004 critical habitat designation; they are considered by the USFWS non-essential to the conservation of the MSO (USFWS, 2004). Where MSO critical habitat boundaries extend into state and private lands, the extensions are declared unintentional and by definition are not included in the designation (USFWS, 2004).

MSO critical habitat units were designated in portions of 26 counties in four states (Table 1).

Table 1. Counties identified in the 2004 USFWS critical habitat rule* (USFWS, 2004)

State	County	State	County
Arizona	Apache	New Mexico	McKinley
Arizona	Cochise	New Mexico	Rio Arriba
Arizona	Coconino	New Mexico	Sandoval
Arizona	Graham	New Mexico	Socorro
Arizona	Pima	Utah	Carbon
Colorado	Custer	Utah	Emery
Colorado	Douglas	Utah	Garfield
Colorado	El Paso	Utah	Grand
Colorado	Fremont	Utah	Iron
Colorado	Huerfano	Utah	Kane
Colorado	Jefferson	Utah	San Juan
Colorado	Pueblo	Utah	Washington
Colorado	Teller	Utah	Wayne

* Descriptions of the 52 critical habitat units indicate that additional counties are included in the MSO critical habitat designation (USFWS, 2004). These counties include Yavapai, Gila, Maricopa, Pinal, Santa Cruz, and Greenlee counties in Arizona; and Santa Fe, San Miguel, Mora, Cibola, Lincoln, Otero, Torrence, Catron, Grant, and Sierra counties in New Mexico. Conversely, Apache County in Arizona and Rio Arriba County in New Mexico are among USFWS listed counties (Table 1), but neither is identified in the MSO critical habitat unit descriptions.

MSO critical habitat unit descriptions are provided below.

Unit SRM-C-1a. El Paso, Freemont, and Teller counties, Colorado

This unit includes 108,545 acres of land managed by the USFS (Pike/ San Isabel National Forests) and the BLM (Royal Gorge Field Office) (USFWS, 2004).

Unit SRM-C-1b. Custer, Freemont, Huerfano, and Pueblo counties, Colorado

This unit includes 110,045 acres in the Wet Mountains, west of the city of Pueblo (USFWS, 2004).

Unit SRM-C-2. Douglas and Jefferson Counties, Colorado

This unit includes 103,735 acres near Deckers within the South Platte ranger district of the Pike/San Isabel National Forests (USFWS, 2004).

Unit SRM-NM-1. Cebollita Mesa, Jemez Mountains, Sandoval County, New Mexico

This unit includes 85,758 acres in the Jemez Mountains in north-central New Mexico, mostly maintained by the USFS (Santa Fe National Forest) (USFWS, 2004).

Unit SRM-NM-4. Peralta, Jemez Mountains, Sandoval County, New Mexico

This unit includes 57,297 acres in the Jemez Mountains south of Los Alamos, in north-central New Mexico mostly maintained by the USFS (Santa Fe National Forest) (USFWS, 2004).

Unit SRM-NM-5a. Santa Fe National Forest, Santa Fe County, New Mexico

This 14,100-acre unit is nine miles east of Santa Fe in the Sangre de Cristo Mountains of north-central New Mexico (USFWS, 2004).

Unit SRM-NM-5b. Santa Fe National Forest, San Miguel, Mora counties, New Mexico

Located 18 miles west of Las Vegas, New Mexico, this 70,728-acre unit is within the Sangre de Cristo Mountains of north-central New Mexico and includes Santa Fe National Forest land (USFWS, 2004).

Unit SRM-NM-11. Jicarilla Division, Carson National Forest, New Mexico

This 12,459-acre unit is located 40 miles east and 12 miles south of Bloomfield in northwestern New Mexico (USFWS, 2004).

Unit SRM-NM-12. Jicarilla Division, Carson National Forest, New Mexico

This 10,495-acre unit is located 40 miles east and six miles north of Bloomfield in northwestern New Mexico (USFWS, 2004).

Unit CP-1. Mount Taylor, Cibola, and McKinley counties, New Mexico

This 32,469 acre-unit is located in west-central New Mexico 12 miles northeast of Grants in Cibola National Forest (USFWS, 2004).

Unit CP-2. Zuni Mountains, Cibola, and McKinley counties, New Mexico

This unit of 161,557 acres is 30 miles southeast of Gallup in west-central New Mexico, primarily within the USFS-managed Cibola National Forest (USFWS, 2004).

Unit CP-10. Arizona Strip, and Kaibab National Forest, Coconino County, Arizona

This unit consists of 918,847 acres in northwestern Arizona, mostly within Kaibab National Forest and Grand Canyon National Park (USFWS, 2004).

Unit CP-11. Iron, Washington, and Kane counties, Utah

This unit in southwestern Utah, 22 miles northeast of St. George, consists of 260,105 acres of MSO roosting, foraging, and dispersal habitat (USFWS, 2004).

Unit CP-12. Kaiparowits Plateau, Kane, and Garfield counties, Utah.

This unit consists of 402,895 acres in the vicinity of the Kaiparowits Plateau and the Cockscomb in Kane and Garfield counties, Utah (USFWS, 2004).

Unit CP-13. Glen Canyon Reef, Kane, Garfield, and Wayne counties, Utah

This unit consists of 627,267 acres primarily in the Waterpocket Fold landform that extends to Lake Powell (USFWS, 2004).

Unit CP-14. Dark Canyon Primitive and Wilderness, San Juan, Wayne, and Grand counties, Utah

This unit includes 941,068 acres of BLM (Dark Canyon Primitive) and USFS (Dark Canyon Wilderness) land in Utah (USFWS, 2004).

Unit CP-15. West Tavaputs Plateau, in Carbon and Emery counties, Utah

This 21,522-acre unit is located largely along the Desolation Canyon area of the Green River, 30 miles east of Price (USFWS, 2004).

Unit BR-E-1a. White Mountain, Lincoln/Cloudcroft in Lincoln County, New Mexico

This unit includes 54,185 acres in the Sacramento Mountains of New Mexico, mostly within Lincoln National Forest (USFWS, 2004).

Unit BR-E-1b. Lincoln/Cloudcroft in Otero County, New Mexico

This unit includes 212,882 acres in the Sacramento Mountains of New Mexico, predominantly within Lincoln National Forest (Sacramento ranger district) (USFWS, 2004).

Unit BR-E-3. Capitan Mountains

This unit includes 44,216 acres, mostly on USFS-maintained land (Smokey Bear ranger district, Lincoln National Forest) in the Capitan Mountains, north of Capitan, New Mexico (USFWS, 2004).

Unit BR-E-4. Carrizo in Lincoln County, New Mexico

This unit includes 13,753 acres in the Carrizo Mountains in Lincoln National Forest (Smokey Bear ranger district), seven miles east of Carrizozo, New Mexico (USFWS, 2004).

Unit BR-E-5. Manzano Mountains, Torrance County, New Mexico

This unit includes 25,642 acres in the Manzano Mountains (largely on Cibola National Forest land), 24 miles east of Belen, New Mexico (USFWS, 2004).

Unit BR-E-7. Sandia Mountain, New Mexico

This unit of 3,048 acres is located 12 miles to the east of Albuquerque, New Mexico in the Cibola National Forest lands of the Sandia Mountains (USFWS, 2004).

Unit BR-W-2. Prescott National Forest, Yavapai County, Arizona

This unit of 55,210 acres is found south of Prescott, Arizona in the Prescott National Forest (USFWS, 2004). The designated area reaches beyond the Gila-Salt Meridian to the east, and extends southwards between Iron Springs and Mount Francis as far as Crooks Canyon, encompassing Maverick and Lookout Mountains (USFWS, 2004).

Unit BR-W-3. Prescott National Forest, Yavapai County, Arizona

This unit of 15,580 acres is located in the Bradshaw Mountains within Prescott National Forest (USFWS, 2004). The northern boundary of the unit is the southern slope of Tuscumbia Mountain, and the southeastern boundary is the northern slope of Lane Mountain (USFWS, 2004).

Unit BR-W-4. Tonto National Forest, Yavapai, Gila, and Maricopa counties, Arizona

This unit of 158,624 acres is located within the Mazatzal Wilderness on the Tonto National Forest, Arizona (USFWS, 2004). The unit extends between North Peak and Buckhorn Mountain; encompassing the Mazatzal Mountains (USFWS, 2004).

Unit BR-W-5. Tonto National Forest, Gila County, Arizona

This unit of 118,940 acres is located within the Tonto National Forest in Arizona and includes the northern half of the Salome Wilderness and the Sierra Ancha Wilderness (USFWS, 2004). Boundaries are delineated by Pine Mountain, Greenback Peak, and Round Mountain (USFWS, 2004).

Unit Br-W-6. Pinal Mountains Area, Gila County, Arizona

This unit of 51,782 acres is located south of Miami and Globe, Arizona (USFWS, 2004). It is bordered by U.S. Route 60 to the north and State Highway 77 to the east (USFWS, 2004).

Unit Br-W-7. Santa Teresa Mountains Area, Graham County, Arizona

Located south of the San Carlos Indian Reservation and north of Klondyke, Arizona, this unit of 17,791 acres falls mostly on the Safford ranger district of the Coronado National Forest (USFWS, 2004).

Unit BR-W-8. Pinaleno Mountains Area, Graham County, Arizona

This unit of 107,838 acres is located primarily on the Safford ranger district of the Coronado National Forest (USFWS, 2004).

Unit BR-W-9. Galiuro Mountains Area, Graham County, Arizona

This unit of 63,259 acres encompasses the Galiuro Mountains, and falls within the Safford ranger district of the Coronado National Forest (USFWS, 2004).

Unit BR-W-10. Winchester Mountains Area, Cochise County, Arizona

This unit of 10,485 acres is located northwest of Willcox, Arizona in the Winchester Mountains (USFWS, 2004).

Unit BR-W-11. Santa Catalina and Rincon Mountains Area, Pima and Pinal counties, Arizona

This unit of 233,228 acres north and east of Tucson falls mostly on Coronado National Forest land (Santa Catalina ranger district) (USFWS, 2004).

Unit BR-W-12. Santa Rita Mountains Area, Santa Cruz and Pima counties, Arizona

This unit of 54,220 acres is located west of Sonoita, Arizona on the Nogales ranger district of the Coronado National Forest (USFWS, 2004).

Unit BR-W-13. Atascosa and Pajarito Mountains Area, Santa Cruz County, Arizona

This unit of 54,735 acres in the Nogales ranger district of the Coronado National Forest is located west of Nogales, Arizona (USFWS, 2004).

Unit BR-W-14. Patagonia Mountains Area, Santa Cruz County, Arizona

This unit of 52,158 acres is located south of Patagonia, Arizona in the Sierra Vista ranger district of the Coronado National Forest (USFWS, 2004).

Unit BR-W-15. Huachuca Mountains Area, Cochise County, Arizona

This unit of 50,844 acres is located southwest of Sierra Vista, Arizona, in the Sierra Vista ranger district of the Coronado National Forest (USFWS, 2004).

Unit BR-W-16. Whetstone Mountains Area, Cochise County, Arizona

This unit of 20,999 acres southwest of Benson, Arizona, is located largely within the Sierra Vista ranger district of the Coronado National Forest (USFWS, 2004).

Unit BR-W-18. Chiricahua Mountains Area, Cochise County, Arizona

This unit of 179,439 acres northeast of Douglas, Arizona, is located largely within the Douglas ranger district of the Coronado National Forest (USFWS, 2004).

Unit UGM-2. Magdalena Mountains, Socorro County, New Mexico

This unit of 33,794 acres is located six miles south of Magdalena, New Mexico in the Magdalena ranger district of Cibola National Forest (USFWS, 2004).

Unit UGM-3. San Mateo Mountains, Socorro County, New Mexico

This unit of 135,287 acres is located 36 miles southwest of Magdalena, New Mexico in the Magdalena ranger district of Cibola National Forest (USFWS, 2004).

Unit UGM-5a. Gila National Forest, Catron and Grant counties, New Mexico

This unit of 666,481 acres is located in Gila National Forest north of Silver City, New Mexico (USFWS, 2004).

Unit UGM-5b. Gila National Forest, Sierra, Catron, and Grant counties, New Mexico

This unit of 295,680 acres is located in Gila National Forest 30 miles west of Truth or Consequences, New Mexico (USFWS, 2004).

Unit UGM-6. Gila Mountains, Catron County, New Mexico

This unit of 63,451 acres is located in the Gila Mountains north of Silver City, New Mexico, in the Reserve ranger district of Gila National Forest (USFWS, 2004).

Unit UGM-7. Apache-Sitgreaves and Gila National Forests; Catron County, New Mexico, and Graham and Greenlee counties, Arizona

This unit of 863,344 acres is located on USFS lands in the Mogollon Rim of Arizona and New Mexico (USFWS, 2004).

Unit UGM-10. Coconino National Forest, Apache-Sitgreaves National Forest, and Tonto National Forest; Coconino, Gila, Yavapai counties, Arizona

This unit of 562,988 acres is located north, northwest, east, and southeast of Payson, Arizona (USFWS, 2004). The western border is parallel to the Yavapai-Coconino county

line as far south as the Mogollon Rim (USFWS, 2004). The unit includes the Coconino County portion of West Clear Creek, and Jacks Canyon of the Coconino National Forest (USFWS, 2004). Portions of West Chevelon, Chevelon, and Wildcat Canyons on the Apache-Sitgreaves National Forest fall within the unit, which extends south along the Tonto National Forest boundary to Gentry Mountain (USFWS, 2004).

Unit UGM-11. Coconino National Forest, Coconino and Yavapai counties, Arizona

This unit of 144,790 acres is located south of Mountainaire, Arizona (USFWS, 2004). Interstate 17 is the western boundary, and Willow Valley Dam forms the southern boundary of the unit (USFWS, 2004).

Unit UGM-12. Coconino National Forest, Coconino County, Arizona

This unit of 17,359 acres is located east of Flagstaff, Arizona (USFWS, 2004).

Unit UGM-13. Coconino National Forest, Kaibab National Forest, Prescott National Forest, and Camp Navajo Army Depot; Coconino and Yavapai counties, Arizona

This unit of 238,092 acres is located between Williams and Flagstaff, Arizona, to the north, and extends south to the Mogollon Rim (USFWS, 2004).

Unit UGM-14. Coconino National Forest, Coconino County, Arizona

This unit of 55,533 acres directly north of Flagstaff, Arizona includes the San Francisco Peaks (USFWS, 2004).

Unit UGM-15. Kaibab National Forest, Coconino County, Arizona

This unit of 22,286 acres is located west of U.S. Highway 180 and Northwest of Flagstaff, Arizona (USFWS, 2004).

Unit UGM-17. Kaibab National Forest, Coconino County, Arizona

This unit of 10,914 acres is located north of Parks, Arizona, and includes Sitgreaves Mountain, RS Hill, and Government Hill (USFWS, 2004).

13.5. HABITAT

The MSO is found in warm-temperate and cold-temperate forests; particularly mature or old-growth mixed-conifer and Madrean evergreen woodlands that have a high percentage canopy cover and relatively high tree density (USFWS, 1993). Mixed-conifer forests, which are often used by the MSO as roosting sites, are dominated by white fir, Douglas-fir, and ponderosa pine trees (USFWS, 1993). Madrean evergreen woodlands occur at lower elevations than the mixed-conifer forests, and are divided into two categories: the upper oak-pine forest, which occurs from 5,500 to 7,200 feet; and the lower evergreen oak forest, which occurs from 5,000 to 6,500 feet (USFWS, 1993).

The MSO is also associated with riparian areas and canyons (USFWS, 1995). In the northern portion of the MSO's range—including southern Utah, southern Colorado, northern Arizona, and northern New Mexico—MSOs occur primarily in steep-walled, rocky canyons (USFWS, 1995). Mesa tops, benches, and warm slopes above the canyons may become preferable to the MSO during the fall and winter, but steep slopes remain high-use areas within MSO home ranges

(USFWS, 1993). In the summer, cool canyons are the primary MSO habitat (NatureServe, 2009). In southern Utah and Colorado, most nests are either in caves or on cliff ledges in steep-walled canyons (USFWS, 1995).

Dispersing juvenile MSOs move through a variety of habitats before selecting a home range, including: spruce-fir and mixed-conifer forests, pinyon-juniper woodland, mountain shrublands, desert scrubland, and desert grasslands (USFWS, 1995). Features shared among selected habitat types include a multi-layered canopy; high percentage canopy closure; high tree density; an abundance of dead and down woody material; and a location near water (USFWS, 1993). Perennial streams, creeks, and springs, ephemeral water, small pools from runoff, and reservoir emissions are water sources associated with MSO habitat (USFWS, 2004).

Radio telemetry studies place MSO home range areas between 702 and 2,386 acres (USFWS, 1993). MSO migrations as far as 31 miles have also been recorded with radio telemetry equipment (USFWS, 1995). Observational records indicate that most MSOs occupy the same general area as their summer home ranges year-round (USFWS, 1993).

13.6. DIET

The MSO preys chiefly on woodrats (*Neotoma* spp.), peromyscid mice (*Peromyscus* spp.), and microtine voles (*Microtus* spp.) (USFWS, 2004). Hunting almost always takes place from a tree perch, and "cover [trees with dense foliage] must be present within their home range for them to successfully hunt and survive" (USFWS, 2004). Spotted owls are also known to prey on bats, birds, reptiles, and arthropods (USFWS, 1995).

13.7. LIFE HISTORY AND REPRODUCTION

The MSO is a sporadic breeder and may not nest every year (USFWS, 2010). Typically, however, male and female MSOs will begin roosting together in February (USFWS, 2004). Female MSOs have one of the smallest clutch sizes of North American owls: they lay one to three eggs in late March or early April (USFWS, 1995). The female will incubate her eggs for approximately 30 days (USFWS, 1995). If the first clutch is not successful, a second clutch may be laid (USFWS, 2010). Hatchlings emerge in early May, and the female MSO guards the owlets almost constantly for the first couple of weeks (USFWS, 1995). After four or five weeks, the flight muscles of the owlets have sufficiently developed for flight, although the owlets remain in the general area around the nest (USFWS, 1995). Owlets become increasingly independent through the summer and into the fall, but continue to beg for food from their parents until late August (USFWS, 1995). The young disperse between mid September and early October (USFWS, 1995). MSOs reach sexual maturity and breed first at two or three years of age (NatureServe, 2009).

13.8. REFERENCES

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14. NEW MEXICAN RIDGE-NOSED RATTLESNAKE

14.1. SPECIES LISTING STATUS

The New Mexican ridge-nosed rattlesnake (NMRR) (*Crotalus willardi obscurus*) was listed as threatened on August 4, 1978 by the U.S. Fish and Wildlife Service (USFWS), and a designation of critical habitat was included at the time of species listing (USFWS, 1978). A recovery plan for the NMRR was approved by the USFWS on March 22, 1985 (USFWS, 1985).

14.2. DESCRIPTION

Crotalus willardi obscurus is a subspecies of ridgenose rattlesnake, distinguished from the other four subspecies of *C. willardi* by the absence of a white vertical line on the rostral or mental, and the absence of a prominent white flash-mark (horizontal line on the sides of the head) (USFWS, 1985). Its most distinguishing characteristic is a prominent ridge on the snout (Matthews, 1990). The *C. w. obscurus* subspecies is not universally accepted, either because the initial description "deviated from accepted nomenclatural procedures," or because there is no consensus regarding what constitutes the taxonomic level of uniqueness necessary to justify the naming of a subspecies (USFWS, 1985).

The NMRR grows to a maximum length of about 60 cm (24 inches) (Matthews, 1990). According to the Arizona Ecological Services Field Office (AESFO) of the USFWS, lengths range between 30 and 61 centimeters (AESFO, 2002). NMRR weights have been recorded between 85 and 113 grams (San Diego Zoo, 2010).

Adults typically exhibit a pale gray or gray-brown coloration, and juveniles have dark gray or light yellow tails (USFWS, 2010). The dorsal region is "marked with pale crossbars lined with darker coloration along the front and back edges," and the underbelly is typically cream to white with irregular grayish or reddish brown mottled areas (USFWS, 2010).

The NMRR is considered to be diurnal; most active between the hours of 0800 and 1100 (and also around 1700) during July and August; and most active between the hours of 1100 and 1600 during September and October (USFWS, 1985). Sightings prior to July are less common, and *C. willardi* is thought to be inactive during June "unless it rains" (USFWS, 1985). In May, *C. willardi* is considered to be most active between 0900 and 1200 hours (USFWS, 1985). The NMRR may become partially nocturnal during hot summer weather (NatureServe, 2009).

A member of the Viperidae family, the NMRR is venomous, although its venom is considered to be of relatively low toxicity (NatureServe, 2009).

14.3. DISTRIBUTION

Historical range

The NMRR subspecies was "never common," and has only ever been documented in a small area of the Animas Mountains of southwestern New Mexico and adjacent portions of the Sierra San Luis Mountains in northern Mexico (Chihuahua) (Matthews, 1990). The extreme southeastern part of the state of Arizona was also included in the NMRR's historical distribution

(AESFO, 2002). The distribution of other *C. willardi* subspecies is less restricted, extending from southern Arizona and New Mexico and as far south as Durango and Zacatecas in Mexico (Matthews, 1990).

Current range

The NMRR is presently known to exist in fragmented enclaves occupying a combined total of less than two square miles of habitat in the extreme southwest corner of New Mexico (Matthews, 1990). The AESFO states that "the subspecies [NMRR] also occurs in Pelloncillo Mountains of Arizona" (AESFO, 2002). The USFWS lists the NMRR as known to occur in two counties in the United States: Hidalgo County, New Mexico, and Cochise County, Arizona (USFWS, 2010).

14.4. USFWS CRITICAL HABITAT

On August 4, 1978, the USFWS designated critical habitat for the NMRR in the same rule that accorded the NMRR with protection as a threatened species under the Endangered Species Act (ESA) (USFWS, 1978). A sole critical habitat unit was designated, encompassing "the entire range in the United States where this subspecies is known to occur" (USFWS, 1978). This unit—in Hidalgo County, New Mexico—exclusively pertains to those elevations between 6,200 and 8,532 feet within the Bear, Indian, and Spring Canyons region of the Animas Mountains (USFWS, 1978).

Before designation, critical habitat areas are determined to "satisfy all known criteria for the evolutionary, ecological, behavioral, and physiological requirements of the species" (USFWS, 1978). While Primary Constituent Elements (PCEs) are not identified by name, the critical habitat listing notice identifies certain attributes and features of the designated critical habitat area that are grouped as "constituent elements," including:

- Dens and/or denning habitat that provides shelter during the summer and winter months;
- Vegetation that provides cover for the NMRR and habitat for prey;
- Abundance of prey (lizards and rodents) (USFWS, 1978)

14.5. HABITAT

The NMRR occurs in narrow mountain canyons at elevations between 5,500 and 9,000 feet where annual precipitation averages 51 centimeters (Matthews, 1990). The NMRR "prefers to hide in leaf litter among cobbles and rocks along canyon floors" (Matthews, 1990). Rocks, leaf litter, and mesic conditions are commonalities among all confirmed *C. willardi* habitat (USFWS, 1985).

The vegetative structure of NMRR habitat areas is chiefly comprised of open stands of pine-oak forest and associated shrubs and grasses (Matthews, 1990). Specifically, plant species of the typical habitat include Arizona white oak (*Quercus emoryi*), Alligator juniper (*Juniperus deppeana*), Mexican pinyon (*Pinus cembroides*), Chihuahua pine (*Pinus leiophylla*), Gambel oak (*Quercus gambelii*), Arizona Madrone (*Arbutus arizonica*), skunkbush (*Rhus trilobata*), Manzanita (*Arctostaphylos pungens*), and birchleaf rhamnus (*Rhamnus betulaefolia*) (USFWS, 1985). The AESFO also lists bunchgrass as NMRR-associated vegetation (AESFO, 2002).

14.6. DIET

Ridgenose rattlesnakes prey on a variety of animals, including small mammals, birds, lizards, other snakes, and arthropods (USFWS, 1985). The USFWS specifies that "diets of small-bodied rattlesnakes such as *Crotalus willardi* generally consist more of lizards than small mammals" (USFWS, 1985). Additionally, "the natural feeding of *C. Willardi* may include scavenging," as captive individuals have been known to consume carrion (USFWS, 1985).

14.7. LIFE HISTORY AND REPRODUCTION

Female NMRR's are ovoviviparous, and give birth to live young (Matthews, 1990). The NMRR is a biennial species: mating occurs in the summer and fertilized eggs are retained in the oviducts until ready to hatch the following summer (Matthews, 1990). The gestation period averages 13 months (Matthews, 1990). Available information regarding the exact time of year that births occur is inconsistent. In the recovery plan, births for "most species of rattlesnake" are stated to occur between August 1st and October 15th (USFWS, 1985), but Matthews reports that most NMRR births are in April and May (Matthews, 1990). "Parturition in Mexican rattlesnakes coincides with the rainy season, possibly because of the greater abundance of prey at that time" (USFWS, 1985). Although young rattlesnakes may be found sharing a hiding place with their mother, they typically disperse within a few days of parturition (USFWS, 1985).

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15. NORTHERN APLOMADO FALCON

15.1. SPECIES LISTING STATUS

The northern Aplomado falcon (*Falco femoralis septentrionalis*) (falcon) was listed as an endangered species on February 25, 1986 within its range in Texas (51 FR 6686) by the U.S. Fish and Wildlife Service (USFWS) (USFWS, 1986). A recovery plan for the falcon, the *Aplomado Falcon Recovery Plan*, (Recovery Plan) was established in June 1990 (USFWS, 1990). The falcon was included in the initiation of a 5-year status review of 14 southwestern species on March 29, 2010 (USFWS, 2010a). The USFWS established a non-essential experimental population (NEP) of falcons in all of New Mexico and Arizona on July 26, 2006 (71 FR 42298-42315) (USFWS, 2006).

15.2. DESCRIPTION

The northern Aplomado falcon is one of three subspecies of the Aplomado falcon *(Falco femoralis)* (USFWS, 1990). The weak differentiation between the subspecies is based upon size and coloration (Keddy-Hector, 2000). The other two subspecies (*F. f. femoralis* and *F. f. pichincae*) are smaller and darker than *F. f. septentrionalis* and range from Central America to eastern South America (USFWS, 1990). The northern Aplomado falcon range overlaps with that of *F. f. femoralis*, but it can be distinguished by its larger size and lighter dorsal coloring (USFWS, 1990). Adult northern Aplomado falcons can also be indentified by their rust-colored underparts, a gray dorsum, a long banded tail, long legs and a distinctive black and white facial pattern (USFWS, 1986). The falcon is medium sized, about 14 to 18 inches long, with a 31 to 40 inch wingspan (USFWS, 2007). Aplomado falcons weigh 208 g to 500 g, similar in size to a Cooper's Hawk (*Accipiter cooperii*) (Keddy-Hector, 2000). Females are larger than males (USFWS, 2007), at least by 45% (Keddy-Hector, 2000). Upon hatching, Aplomado falcon chicks are 17.5 g (Keddy-Hector, 2000).

15.3. DISTRIBUTION

Historical Range

The Aplomado falcon in general ranges from the southwestern United States to Tierra del Fuego in neotropical lowland savannas, coastal prairies, and grasslands at higher elevations (Keddy-Hector, 2000).The northern Aplomado falcon's historic range in the United States extended from Trans-Pecos in Texas to southern New Mexico and southeastern Arizona (USFWS, 1990). The range extended down to Chiapas, northern Yucatan, and along the Mexican Gulf Coast and the Pacific slope of Central America north of Nicaragua (USFWS, 1990). In Guatemala and Nicaragua, it was considered a straggler from its northern range (Keddy-Hector, 2000). In the United States, the southern Gulf Coast of Texas provided coastal prairie habitat, and the border area of Mexico and Texas as well as southern New Mexico and southeastern Arizona provided savanna and grassland habitat (USFWS, 2006). The falcon was prolific in these habitat areas until the 1940's when the subspecies rapidly declined (USFWS, 2006).

Current Distribution

Since 1950, there have been scattered sightings that indicate "ephemeral occupancy" by the falcon in the United States, and the dispersal of individuals up from Mexico (Keddy-Hector,

2000). There are records of past nesting activity for six generalized areas located in southeastern Arizona, western Texas and the southern Texas coast, and south-central New Mexico (Keddy-Hector, 2000).

Since 1952, only one wild pair of falcons had successfully produced fledglings in Arizona and New Mexico (USFWS, 2006). The USFWS Arizona Ecological Services Office indicates that there has been a recent confirmed report, as well as other unconfirmed reports, of the falcon in Cochise County, Arizona (USFWS, 2010d). Since 1980, the falcon has been documented in New Mexico in Hidalgo, Grant, Eddy, Socorro, Grant, Dona Ana and Otero counties (Keddy-Hector, 2000). The USFWS New Mexico Ecological Services Field Office indicates that the falcon is located in Chaves, Dona Ana, Eddy, Grant, Hidalgo, Lea, Lincoln, Luna, Otero, Sierra, and Socorro counties (USFWS, 2010b). In 2007, falcons were reintroduced as a nonessential experimental population in New Mexico on Bureau of Land Management (BLM) lands, the White Sands Missile Range, and on New Mexico state lands (USFWS, 2007).

In Texas, since 1980, falcons have been reported in Presido and Culberson counties as well as in the Laguna Atascosa NWR in Cameron County (Keddy-Hector, 2000). The Laguna Atascosa National Wildlife Refuge (NWR) in Texas and some surrounding private lands were the only areas to be categorized as habitat occupied by the falcons at the time of the writing of the Recovery Plan in 1990 (USFWS, 1990). Also, falcons had been seen in the Rio Grande Valley NWR located near Harlingen, Texas, in the Gabrielson and Palmview units of the refuge (USFWS, 1990). The Peregrine Fund first released falcons in 1985 on King Ranch in Texas, and then later in Laguna Atascosa NWR and Matagorda Island, with a total of eight release sites along the Gulf Coast of Texas (Keddy-Hector, 2000). The USFWS Species Profile website indicates that the falcon currently occurs statewide in Texas (USFWS, 2010c).

15.4. USFWS CRITICAL HABITAT

No critical habitat has been designated for the northern Aplomado falcon (USFWS 1990).

15.5. HABITAT

Northern Aplomado falcon habitat is made up of open terrain with scattered trees or shrubs (USFWS, 1990). The ideal habitat is "probably open savanna or grassland surrounded by or bordering extensive woodland or wetlands (Keddy-Hector, 2000)." Habitats within the United States include sand ridges covered with yucca (*Yucca torreyi*, *Y. elata*, *Y. treculeana*) found in coastal prairies, desert grasslands with scattered yucca and mesquite (*Prosopis glandulosa*), and riparian woodlands in open grasslands (USFWS, 1990 and Keddy-Hector, 2000). These areas are also described as riparian "gallery forests" and oak woods within desert grasslands (Keddy-Hector, 2000). Trees and shrubs in falcon habitat do not form a continuous tree crown because they are sparsely scattered (USFWS, 1990), or located along stream and marsh edges (Keddy-Hecotr, 2000). Suitable habitat has been found in one study to have the following cover characteristics: (1) inter-tree distances averaged 30 m (range 15 – 45 m); (2) tree densities averaged 19 trees per 100 acres; (3) tree height averaged 9 m; and (4) ground cover vegetation was around 92% within 75 cm of the ground and 70% within 50 cm of the ground (USFWS, 1990). In south Texas, falcon foraging areas have been observed to have 2.6 trees/ha (Keddy-Hector, 2000).

The falcon also requires nesting platforms such as stick nests or bromeliads (USFWS, 1985). The falcon kleptoparasitizes the nests of other birds (Keddy-Hector, 2000). For this reason, the abundance of small birds that build such nests is probably an important factor in determining falcon nesting density (USFWS, 1990). For example, at active falcon nest sites had an average of nine small birds/ha, and similarly, in coastal brushland areas of Texas there were an average of ten small birds/ha (USFWS, 1990). Birds that construct nesting platforms that are used by the falcon, as well as prey species, require forest and thorn scrub habitat (Keddy-Hector, 2000).

15.6. DIET

The falcon preys upon small birds, insects, rodents, and reptiles (USFWS, 1990). In eastern Mexico, 97% of prey biomass comes from birds; however, 65% of individual prey items are insects (USFWS, 1990). Avian prey items can be as large as the bird Chachalaca (*Ortalis vetula*; 570 grams) but the observed average avian prey size is 67 grams with 77% of observed avian prey being less than 100 grams (USFWS, 1990). Preferred avian prey in eastern Mexico include mourning dove (*Zenaida macroura*), white-winged dove (*Z. asiatica*), common ground-dove (*Columbina passerine*), yellow-billed cuckoo (*Coccyzus americanus*), groove-billed ani (*Crotophaga sulcirostris*), common nighthawk (*Chordeiles acutipennis*), whip-poor-will (*Caprimulgus vociferous*), golden-fronted woodpecker (*Melanerpes formicivorous*), great-tailed grackle (*Quiscalus mexicanus*), eastern meadowlark (*Sturnella magna*), melodious blackbird (*Dives dives*), various orioles (*Icterus* spp.), indigo bunting (*Passerina cyanea*), Cassin's sparrow (*Aimophila cassinii*), lark sparrow (*Chondestes grammacus*), dickcissel (*Spiza americana*), and lark bunting (*Calamospiza melanocorys*) (USFWS, 1990). Other vertebrate prey include frogs, lizards, bats, kangaroo rats (*Dipodomys* spp.), pocket mice (*Perognathus* spp.), and white-footed mice (*Peromyscus* spp.) (USFWS, 1990). Falcons also prey upon invertebrates such as grasshoppers, beetles, dragonflies, cicadas, crickets, butterflies, moths, wasps, and bees (USFWS, 1990). Fiddler crabs (*Uca subcylindrica*) have been observed as prey in southern Texas (Keddy-Hector, 2000).

15.7. LIFE HISTORY AND REPRODUCTION

The falcon nests in eastern Mexico during the dry season between January and June (USFWS, 1990). Falcons are presumed to be monogamous (Keddy-Hector, 2000). Clutches may be produced as early as January but most clutches are produced between March and May (USFWS, 1990). Clutches are incubated for 31-32 days before hatching (USFWS, 1990). Nestlings fledge at 32-40 days (USFWS, 1990). After fledging, the young are still dependent for four more weeks (USFWS, 1990). Based on this, young must still be dependent on their parents as late as August (USFWS, 1990). The average clutch contains 2.6 eggs and the fledging rate is 1.8 young per nest (USFWS, 1990).

The falcon does not construct its own stick platform for nesting but relies on a preexisting platform for nesting (USFWS, 1990). Nests are found in large arboreal bromeliads and on stick platforms previously built by crows, ravens, hawks and kites (USFWS, 1990). The bases of palm fronds, the joint of large branches with tree trunks, and on other larger branches serve as nest platforms (Keddy-Hector, 2000). Falcons released in southern Texas have been observed to nest directly on the ground, and on platforms located on the crossarms of power-line poles (Keddy-Hector, 2000). The falcon is tolerant of close proximity to humans, and has been observed to nest in association with well-managed livestock grazing operations in Mexico and Texas, as well as within 100 m of roadways in eastern Mexico (USFWS, 2006). In a sample of

five falcon nests, nests were found to range in size from 28 cm to 100 cm, with nest cup diameters ranging from 6 cm to 18 cm (USFWS, 1990).

Falcons have nesting territories, which males survey by soaring flights and by perching within 1 km of the nest (Keddy-Hector, 2000). Males have been observed to fly long distances in eastern Mexico to challenge an intruding male, but resident adult falcons do not respond predictably to female intruders (Keddy-Hector, 2000). Soaring pairs passing through a nesting territory may be tolerated (Keddy-Hector, 2000).

There is little knowledge regarding the migratory behavior of the falcon (USFWS, 1990). In eastern Mexico, pairs remain at their nest sites year-round (USFWS, 1990). The falcon appears to be non-migratory throughout its range (USFWS, 2010c). The falcon apparently spent the winter in the U.S. historically, where numerous specimens were collected there during that season (USFWS, 1990). Pairs also remain in their nesting territories year-round in eastern Mexico (USFWS, 1990).

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16. OCELOT

16.1. SPECIES LISTING STATUS

The ocelot (*Leopardus pardalis*) was listed as an endangered foreign species, but not as a native species, under the Endangered Species Conservation Act of 1969 (USFWS, 1982 and 1990). This Act had separate procedures and lists for endangered domestic and foreign species (USFWS, 1982 and 1990). With the passage of the 1973 Endangered Species Act (ESA), foreign populations of ocelots were carried over to the 1973 combined endangered species list, but the procedures for listing the U.S. population were not completed (USFWS, 1982 and 1990). The ocelot was officially listed as an endangered species in the U.S. on July 21, 1982 (47 FR 31670) by the U.S. Fish and Wildlife Service (USFWS, 1982). Critical habitat has not been determined for the ocelot (USFWS, 1982). According to the USFWS 2009 Action Plan for the ocelot, there is currently an internal working draft of the Ocelot (*Leopardus pardalis*) Recovery Plan, dated November 2007 (USFWS, 2009b).

16.2. DESCRIPTION

The ocelot is a spotted, medium-sized cat (USFWS, 1990). Ocelots are 50 cm to 100 cm long from the head to the end of the body, with a tail from 30 cm to 45 cm long (Nowak, 1999). Ocelots weigh between 11.3 kg and 15.8 kg (Nowak, 1999). The ocelot may vary in color from pale to dark tawny (USFWS, 2010a). Color may also be whitish to tawny yellow, reddish gray, and gray (Nowak, 1999). The two subspecies that historically ranged in the United States, the Sonoran ocelot (*L. p. sonorienses*) and the northern ocelot (*L. p. albescens*), are both pale in color, but the northern ocelot is larger and has a longer and more angular skull (USFWS, 1990). The coat has brown spots with black borders that resemble chain links and sweep downward in lines (USFWS, 2010a). A black line above each eye extends to the back of the head (USFWS, 2010a). The tail is ringed or has dark bars on the upper side, and there are one to two transverse stripes on the inside of the legs (Nowak, 1999).

16.3. DISTRIBUTION

Historical Range

There are two ocelot subspecies known to occur historically within the U.S, the Sonoran ocelot *(L. p. sonorienses)* and the northern ocelot (*L. p. albescens*) (USFWS, 1990). These two subspecies are isolated from one another by the highlands of the Sierra Madre (USFWS, 1990).

The Plan for Translocation of Northern Ocelots in Texas and Tamaulipas (Translocation Plan) indicates that the Sonoran ocelot ranged from Sonora, Mexico through southeastern Arizona, but has not been documented in Arizona since the 1960's (USFWS, 2009a). The USFWS *Listed Cats of Texas and Arizona Recovery Plan with Emphasis on the Ocelot* (Recovery Plan) notes that while the Sonoran ocelot may have reached as far north as Fort Verde, Arizona, the validity of the specimen from this location has been questioned (USFWS, 1990). It has also been suggested by Brown (1985), who cited the six known reports of ocelots since 1963 in

southeastern Arizona, that this subspecies is a recent arrival from its range in Sonora, Mexico (USFWS, 1990).

The Recovery Plan indicates that the northern ocelot ranged in Mexico from Coahuila in the foothills of the Sierra Madre Oriental through Nuevo Leon and Tamaulipas to the Gulf Coast (USFWS, 1990). This subspecies is noted to have possibly ranged from southern and eastern Texas to Hedley, Texas in the north and to Marfa, Texas in the west (USFWS, 1990). While it may also have ranged into western Louisiana, records other than Pleistocene fossils are lacking (USFWS, 1990). The Translocation Plan indicates that the northern ocelot ranged from northern Coahuila, Mexico up into Texas and parts of Louisiana and Arkansas (USWS, 2009a). The population currently found in the United States, believed to number less than 50 individuals, is the northern ocelot subspecies (USFWS, 2009a).

Current Distribution

The range of the ocelot is on the edge of the United States, and is primarily located in Central and South America (USFWS, 1980). Near the time of its listing, the ocelot was only known to occur in the Rio Grande area of southeastern Texas, where evidence indicated their presence in eastern Cameron County and in Willacy and Kenedy counties (USFWS, 1980). The ocelot was thought to have never firmly established in Arizona, and at the time of its official listing in 1982 was presumed to have been eliminated there from predator control programs, apart from the presence of wandering ocelots from Mexico (USFWS, 1982).

The Translocation Plan indicates that the population currently found in the United States, believed to number less than 50 individuals, is the northern ocelot (*L. p. albescens*) subspecies (USFWS, 2009a). Other estimates place the number of ocelots in the United States at less than 100 (USFWS, 2010a). The ocelots are split into two separate populations, one located in eastern Cameron County, Texas at the Laguna Atascosa National Wildlife Refuge (NWR), and the other in northern Willacy County, Texas within the Yturria Ranch and centered at the Lower Rio Grande Valley NWR (USFWS, 2009a). Ocelots are also present at Santa Ana NWR located near Lower Rio Grande Valley NWR, and on a private ranch in the area (USFWS, 2010a).

The Recovery Plan indicates that trapping and photo-documentation records of ocelots in Texas exist for four counties, including Cameron, Willacy, Kenedy, and Hidalgo (USFWS, 1990). Areas considered to be occupied by ocelots based upon both radio tracked animals and sighting reports include Cameron, Duval, Hidalgo, Jim Wells, Kenedy, Kleberg, Live Oak, Nueces, San Patricio, Starr, Willacy, and Zapata counties in Texas (USFWS, 1990). The northern edge of Maverick County is indicated to be the northern boundary of the range in west Texas, with Calhoun County the boundary in the east (USFWS, 1990). All suitable brush habitat located south of this area is presumed to be potential ocelot habitat (USFWS, 1990).

The current USFWS Species Profile indicates that the ocelot occurs in Cochise, Pima, and Santa Cruz counties in Arizona, and in Aransas, Atascosa, Bee, Brooks, Cameron, Dimmit, Duval, Frio, Hidalgo, Jim Hogg, Jim Wells, Karnes, Kenedy, Kleberg, La Salle, Live Oak, Maverick, McMullen, Nueces, Refugio, San Patricio, Starr, Webb, Willacy, Zapata, and Zavala counties in Texas (USFWS, 2010b).

16.4. USFWS CRITICAL HABITAT

No critical habitat has been established for the ocelot (USFWS, 1982).

16.5. HABITAT

A variety of habitats can be used by ocelots (USFWS, 2010a). Ocelots appear to use areas of dense cover, and in the northern part of the range hunt in brushy forests and semi-arid deserts (USFWS, 2010a). In the southern part of its range, ocelot habitat includes tropical forests, mountain slopes, and pampas (grasslands) (USFWS, 2010a).

In studies cited in the 1990 Recovery Plan, dense thornscrub was found to be the habitat preferred by ocelots (USFWS, 1990). Ocelot habitat is located within the Tamaulipan biotic province, which is made up of many plant communities of subtropical thornscrub brush (USFWS, 1990). Ocelots have been found in the Mesquite-Granjeno Parks, Mesquite-Blackbrush Brush, Live Oak Woods/Parks, and Rio Grande Riparian plant communities of the lower Rio Grande valley (USFWS, 1990). A study characterizing ocelot habitat considered suitable habitat to be at least 99 acres in size for one brush stand (or 74 acres for two adjacent stands) with an optimal habitat classification requiring at least 95% canopy cover, suboptimal habitat ranging from 75% to 95% cover, and inadequate habitat at 75% cover or less (USFWS, 1990). This type of thornscrub plant community is dominant in many uncultivated areas north of the Rio Grande Plain due to overgrazing and agricultural activities that have altered the native mixed grassland and brush communities (USFWS, 1990). Mesquite (*Prosopis glandulosa*), post oak (*Quercus stellata*), live oak (*Q. virginiana*), cacti, and acacia species have increased in this area (USFWS, 1990). Ocelots have also been captured in woodlands adjacent to thornscrub habitat (USFWS, 1990). The Laguna Atascosa NWR contains 20,000 acres of the native brushland used by ocelots (USFWS, 1982). The total ocelot habitat remaining in the Rio Grande Valley is estimated to be less than 20,000 hectares, with Laguna Atascosa NWR being the largest area of thorn forest, at 8,280 acres in size (USFWS, 1990).

Within the Tamaulipan biotic province in the South Texas Plain, many soil types exist with varying moisture retention, which determines vegetative cover types (USFWS, 1990). The Laredo silty clay loam found in Cameron County promotes mixed vegetation and optimal ocelot habitat (USFWS, 1990). Typical ocelot sites in south Texas include deep sands, hardlands, shallow ridges, bottomlands, alkali flats, and mixed sandy land (USFWS, 1990).

16.6. DIET

Ocelots eat a variety of prey species, including rabbits, mice, birds, fish, agoutis (small Central and South American rodents), snakes, lizards, and other small to medium sized prey (USFWS, 2010). In habitat types used by two radio collared ocelots, the Mexican spiny pocket mouse (*Liomys irroratus*) was found to be dominant in the brush habitat and was speculated to be an important part of the ocelot diet (USFWS, 1990). In the brush-grass habitat, the fulvous harvest mouse (*Reithrodontomys fulvescens*) and the pygmy mouse (*Baiomys taylori*) were dominant, and in the grass habitat, pygmy mice, cotton rats (*Sigmodon hispidus*) and hispid pocket mice (*Perognathus hispidus)* were co-dominant (USFWS, 1990). Other potential prey species include other rodents, opossums (*Didelphis virginiana*), raccoons (*Procyon lotor*), javelina (*Tayassu tajacu*), white tailed deer (*Odocoileus virginianus*), skunks (*Memphitis* spp., *Conepatus* spp.),

nine-banded armadillo (*Dasypus novemcinctus*), feral pigs (*Sus scrofa*), poultry, quail, doves, chachalaca, passerine birds, waterfowl, and both colubrid and crotalis snakes (USFWS, 1990).

16.7. LIFE HISTORY AND REPRODUCTION

Ocelots are crepuscular or nocturnal (USFWS, 1990). Days are spent sleeping on high tree limbs or in a den located in a tree, small cave, or depression under vegetation (USFWS, 2010a). Some diurnal activity has been reported in the winter (USFWS, 1990). Ocelots are primarily terrestrial but can climb, jump and swim as well (Nowak, 1999).

The ranges of each sex often exclude other members of the same sex (USFWS, 1990). However, the home range of males may be wider than that of females, and may overlap with the ranges of more than one female (USFWS, 1990). In Texas, the average home range for adults was 15.18 km^2, with 17.67 km^2 the average for males and 11.04 km^2 for females (USFWS, 1990). Males travel farther distances, but females tend to use the home range more intensively (USFWS, 1990). At Laguna Atascosa NWR, ranges during the winter were significantly larger than ranges in the summer (USFWS, 1990). Though ocelots are solitary, they come into contact with one another and probably maintain social connections (Nowak, 1999). Ocelots communicate with mewing sounds, but during courtship use yowls (Nowak, 1999).

Females typically breed at two years of age, although in captivity they enter estrus as early as 8 months old (USFWS, 1990). Estrus lasts seven to ten days, but only 5.3 days if the female becomes pregnant (USFWS, 1990). Ocelots in captivity are ployestrous throughout the year (USFWS, 1990). There is probably no breeding season in the tropics (Nowak, 1999). Gestation has been recorded to last 70, 80, or 89 days (USFWS, 1990). Births have been recorded from September to January (USFWS, 1990). Births in Texas have been documented in September and October, but also in late summer, late fall, early winter, and one record from late spring (USFWS, 1990). Typically one or two kittens are born, but litters can range up to four kittens (USFWS, 1990). Young weigh 220 g to 340 g at birth (Nowak, 1999). Weaning information is not well known, but nursing has been observed at up to 6 months, though in one case lactation was observed to only last 92 days (USFWS, 1990). Juveniles may travel with their mother long after nursing has ceased, and territories of females under two years of age can significantly overlap that of their mother (USFWS, 1990). An ocelot in captivity at the Phoenix Zoo lived for 21 years, 5 months (Nowak, 1999).

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17. PIPING PLOVER

17.1. SPECIES LISTING STATUS

A determination of threatened and endangered status for populations of the piping plover (*Charadrius melodus*) was published on December 11, 1985 (50 FR 50725) by the U.S. Fish and Wildlife Service (USFWS) (USFWS, 1985). In this rule, the piping plover was listed as endangered in the Great Lakes basin area (Illinois, Indiana, Michigan, Minnesota, New York, Ohio, Pennsylvania, Wisconsin, and Ontario, Canada) and threatened throughout the remainder of the species' range: in the northern Great Plains—Iowa, northwestern Minnesota, Montana, Nebraska, North Dakota, South Dakota, and Canada (Alberta, Manitoba, and Saskatchewan); the Atlantic coast—Newfoundland, Quebec, the Canadian Maritime Provinces, and Atlantic Seaboard states from Maine to Florida; the Gulf Coast—from Florida to Mexico; the Bahamas and West Indies; and "anywhere else found in the wild except where listed as endangered" (USFWS, 1985). A recovery plan for the piping plover was approved by the USFWS on May 12, 1988 for the Great Lakes and northern Great Plains populations. A revised recovery plan for the Atlantic coast piping plover population was approved on May 2, 1996. Critical habitat was first designated for the Great Lakes breeding population of the piping plover on May 7, 2001 (66 FR 22938); and for the wintering population of the piping plover on July 10, 2001 (66 FR 36137).

17.2. DESCRIPTION

The piping plover is a small, stocky shorebird recorded to weigh between 42 and 64 grams (1.5 to 2 ounces) (USFWS, 1985). It measures approximately 17 centimeters from bill to rump, and its wings measure approximately 35 centimeters from tip to tip (USFWS, 1985). Piping plover field marks that aid in summer identification include a dark band below the collar and a dark forecrown stripe (USFWS, 1985). The plumage of the back is a light beige color, while the underparts and rump are white (USFWS, 1996). Legs and bill are orange colored during the summer months, and the bill has a black tip. During the winter, leg color fades to pale yellow, bill color reverts from orange to black, and the black bands of the pelage disappear (USFWS, 1996).

17.3. DISTRIBUTION

Historical range

Piping plovers were historically distributed over a wide geographic range, in three regions that include the Northern Great Plains, the Great Lakes, and the Atlantic Coast (USFWS, 1996). However, information on historic distribution is irregular for some areas and lacking for others, and comprehensive censusing did not begin until the 1980's (USFWS, 1996). Further, the current range of the piping plover is similar to its historic range, except for its near extirpation from the Great Lakes (USFWS, 1988).

The Great Lakes population of piping plovers once nested on the beaches of the Great Lakes in the states of Illinois, Indiana, Michigan, Minnesota, New York, Ohio, Pennsylvania and Wisconsin, as well as in Ontario, Canada (USFWS, 2003). By the 1970's the plover was gone from Illinois, Indiana, New York, Ohio, Pennsylvania and Ontario (USFWS, 2003).

The population on the Atlantic Coast breeds on the east coast beaches from Newfoundland to North Carolina and occasionally into South Carolina (USFWS, 1996). The piping plover was described as common in scattered qualitative records along the Atlantic beaches, but was declining by the early 1900's (USFWS, 1996). The most recent population decline began in the late 1940's or early 1950's, with numerous reports of local and statewide declines between 1950 and 1985 (USFWS, 1996).

The Northern Great Plains population of plovers breeds on alkali wetlands and along rivers in the prairie from Alberta and Manitoba in Canada to Nebraska in the U.S. (USFWS, 1988). Records of plover breeding grounds exist in Montana, Wyoming, North Dakota, South Dakota, Nebraska, Iowa, and New Mexico, with instances of occasional summer residents and migrants present in Colorado (USFWS, 1988).

Current range

The current range of the piping plover is similar to its historic range, except for its decline from the Great Lakes (USFWS, 1988). Information on wintering birds is sparse, and migratory routes are not described (USFWS, 1988).

From 1984 to 2002, Great Lakes plover nests were recorded in 12 counties in Michigan and two counties in Wisconsin (USFWS, 2003). In 2002, 25% of all breeding pairs in the Great Lakes nested in the Sleeping Bear Dunes located in Leelanau and Benzie counties in Michigan (USFWS, 2003). The USFWS Species Profile indicates that the endangered Great Lakes population of plover is present statewide in Indiana and New York, and in Erie County in Pennsylvania, and in Lake of the Woods County, in Minnesota (USFWS, 2010). The plover is also present in Bond, Clinton, Cook, Fayette, Franklin, Jefferson, Lake, Moultrie, Shelby, and Porter counties in Illinois (USFWS, 2010). In Michigan, the plover is present in Alger, Alpena, Benzie, Berrien, Charlevoix, Cheboygan, Chippewa, Delta, Emmet, Iosco, Leelanau, Luce, Mackinac, Mason, Muskegon, Presque Isle, and Schoolcraft counties (USFWS, 2010). In Ohio, plovers are present in Ashtabula, Cuyahoga, Erie, Lake, Lorain, Lucas, Ottawa, and Sandusky counties (USFWS, 2010). In Wisconsin, plovers are present in Ashland and Douglas counties (USFWS, 2010).

Numerous censuses of nesting pairs in Atlantic Coast populations taken in the 1980's and 1990's record increasing estimates of piping plover populations, though unevenly distributed, in Maine, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Delaware, Maryland, Virginia, North Carolina, and South Carolina (USFWS, 1996). However, the birds are absent from many of the nesting beaches they once used on the Atlantic Coast (USFWS, 1996). Piping plovers breed successfully at the extreme ends of their historic range, on the southern coast of Newfoundland, the Magdalen Islands, and on Prince Edward Island, and in South Carolina near the North Carolina border at Waites Island, as well as at Holden Beach in North Carolina (USFWS, 1996). Nesting sites are also distributed along the Atlantic Coast from Maine to South Carolina (USFWS, 1996).

In the Northern Great Plains population, plover breeding occurs in Montana on sandflats above the west end of Fort Peck dam in Valley County, on the shore of Big Dry Arm of Fort Peck

Reservoir in Garfield and McCone Counties, and in Sheridan county in saline wetlands near Dagmar and Medicine Lake National Wildlife Refuge (NWR) (USFWS, 1988). In North Dakota, plovers breed in 25 counties located along the Missouri River and in the alkali wetlands located in the center of the state (USFWS, 1988). Plover breeding in South Dakota also occurs on sandbars along the Missouri River, with other isolated nesting sites located in Lake Oahe and saline wetlands in the northeast (USFWS, 1988). In Nebraska, plover breed along the upper Missouri River, the lower Niobrara, and the mid- to lower Platte Rivers, as well as the Middle Loup and Loup Rivers, and Lake McConaughy (USFWS, 1988). Ash ponds along the Missouri River in Woodbury and Pottawattamie counties in Iowa have served as breeding grounds (USFWS, 1988). In Minnesota plovers nest in habitat similar to the Great Lakes and the prairie at Lake of the Woods County, as well as several other sites (USFWS, 1988).

The USFWS Species Profile indicates that the threatened population of plovers, which includes the Atlantic Coast and Northern Great Plains populations, is found statewide in Alabama, Georgia, Indiana, Kentucky, Minnesota, Mississippi, Missouri, North Dakota, Ohio, and Wisconsin as well as in Puerto Rico (USFWS, 2010). The plover is found in Sussex County in Delaware, in Worcester County in Maryland, and in Rockingham County in New Hampshire (USFWS, 2010). In Connecticut, the plover is known to occur in Fairfield, Middlesex, New Haven, and New London counties (USFWS, 2010). The plover is known to occur in Charlotte, Collier, Lee, Martin, Miami-Dade, Monroe, Sarasota, and St. Lucie counties in Florida (USFWS, 2010). In Maine the plover is present in Cumberland, Sagadahoc, and York counties (USFWS, 2010). The plover is present in Barnstable, Bristol, Dukes, Essex, Nantucket, Plymouth, and Suffolk counties in Massachusetts (USFWS, 2010). The plover is found in New Jersey in Atlantic, Cape May, Monmouth, and Ocean counties (USFWS, 2010). The plover is found in Bronx, Nassau, Queens, Suffolk counties in New York (USFWS, 2010). In North Carolina, plovers are present in Brunswick, Carteret, Currituck, Dare, Hyde, New Hanover, Onslow, and Pender counties (USFWS, 2010). Plovers are present in Newport and Washington counties in Rhode Island (USFWS, 2010). In South Carolina, plovers are found in Beaufort, Charleston, Colleton, Georgetown, Horry, Jasper, Bon Homme, Brule, Buffalo, Campbell, Charles Mix, Clay, Corson, Day, Dewey, Gregory, Haakon, Hughes, Kingsbury, Lyman, Potter, Stanley, Sully, Union, Walworth, Yankton, and Ziebach counties (USFWS, 2010). In Virginia, the plover is known to occur in Accomack, Hampton, North Hampton, Portsmouth, and Virginia Beach counties (USFWS, 2010).

In Colorado, the plover is known to occur in Adams, Arapahoe, Bent Boulder, Broomfield, Clear Creek, Crowley, Denver, Douglas, El Paso, Elbert, Gilpin, Jackson, Jefferson, Kiowa, Larimer, Lincoln, Morgan, Otero, Park, Prowers, Sedgwick, Teller, Washington, and Weld counties (USFWS, 2010). In Iowa, the plover occurs in Pottawattamie and Woodbury counties (USFWS, 2010). In Kansas, the plover occurs in Barton, Clark, Pottawattamie, Riley, and Wabaunsee counties (USFWS, 2010). Known plover occurrence is in Cameron, Jefferson, Lafourche, Plaquemines, St. Bernard, St. Mary, Terrebonne, and Vermillion counties in Louisiana (USFWS, 2010). In Montana, the plover is present in Garfield, McCone, Phillips, Pondera, Richland, Roosevelt, Sheridan, and Valley counties (USFWS, 2010). In Nebraska, the plover is found in Boyd, Brown, Buffalo, Butler, Cass, Cedar, Colfax, Cuming, Custer, Dakota, Dawson, Deuel, Dixon, Dodge, Douglass, Gosper, Hall, Hamilton, Holt, Howard, Kearney, Keith, Keya Paha, Knox, Madison, Merrick, Nance, Phelps, Platte, Red Willow, Rock, Sarpy, Saunders, Sheridan,

and Stanton counties (USFWS, 2010). In New Mexico, the plover is found in Colfax and Socorro counties (USFWS, 2010). In Oklahoma, the plover is found in Adair, Alfalfa, Atoka, Beaver, Beckham, Blaine, Bryan, Caddo, Canadian, Carter, Cherokee, Choctaw, Cimarron, Cleveland, Coal, Comanche, Cotton, Craig, Creek, Custer, Delaware, Dewey, Ellis, Garfield, Garvin, Grady, Grant, Greer, Harmon, Harper, Haskell, Hughes, Jackson, Jefferson, Johnston, Kay, Kingfisher, Kiowa, Latimer, Le Flore, Lincoln, Logan, Love, Major, Marshall, Mayes McClain, McCurtain, McIntosh, Murray, Muskogee, Noble, Nowata, Okfuskee, Oklahoma, Okmulgee, Osage, Ottawa, Pawnee, Payne, Pittsburg, Pontotoc, Pottawatomie, Pushmataha, Roger Mills, Rogers, Seminole, Sequoyah, Stephens, Texas, Tillman, Tulsa, Wagoner, Washington, Washita, Woods, and Woodward counties (USFWS, 2010). In Texas, the plover occurs in Aransas, Brazoria, Calhoun, Cameron, Chambers, Dallas, Delta, Denton, Galveston, Grayson, Jefferson, Kenedy, Kleberg, Matagorda, Nueces, Refugio, San Patricio, Throckmorton, and Willacy counties (USFWS, 2010).

The wintering grounds of the three populations of piping plover overlap (USFW, 2003). The winter range of the Great Lakes and Atlantic Coast populations extend from the Atlantic Coast of North Carolina to Florida, and the Gulf Coast of Florida to Texas and Mexico, the West Indies, and the Bahamas (USFES, 1996 and 2003). The Northern Great Plains plovers winter from the Gulf Coast of Florida to northern Mexico (USFWS, 1988).

17.4. USFWS CRITICAL HABITAT

GREAT LAKES POPULATION PRIMARY CONSTITUENT ELEMENTS

"The primary constituent elements for the Great Lakes breeding population of the piping plover are those habitat components that are essential for successful foraging, nesting, rearing of young, intra-specific communication, genetic exchange, roosting, dispersal, or sheltering" (USFWS, 2001). "The primary constituent elements required to sustain the Great Lakes breeding population of the piping plover are found on Great Lakes islands and mainland shorelines that support open, sparsely vegetated sandy habitats, such as sand spits or sand beaches, that are associated with wide, unforested systems of dunes and inter-dune wetlands. In order for habitat to be physically and biologically suitable for piping plovers, it must have a total shoreline length of at least 0.2 km (0.12 mi) of gently sloping, sparsely vegetated (less than 50 percent herbaceous and low woody cover) sand beach with a total beach area of at least 2 hectares (ha) (5 acres (ac) and a low level of disturbance from human activities and from domestic animals. As the nesting season progresses, the level of disturbance tolerated by piping plovers increases. A lower level of disturbance is required at the beginning of the nesting period during nest site selection, egg laying, and incubation. Beach activities that may be associated with a high level of disturbance include, but are not limited to, walking pets off leash, loud noise, driving ATVs, or significantly increased human presence. The level of disturbance is relative to the proximity to the nest, intensity, and frequency of these and other similar activities" (USFWS, 2001).

"Appropriately sized sites must also have areas of at least 50 meters (m) (164 feet (ft)) in length where the beach width is more than 7 m (23 ft), there is protective cover for nests and chicks, and the distance to the treeline (from the normal high water line to where the forest begins) is more than 50 m (164 ft). Beach width is defined as the distance from the normal high water line

to the foredune (a low barrier dune ridge immediately inland from the beach) edge, or to the sand/vegetation boundary in areas where the foredune is absent. The beach width may be narrower than 7 m (23 ft) if appropriate sand and cobble areas of at least 7 m (23 ft) exist between the dune and the treeline. Protective cover for nests and chicks consists of small patches of herbaceous vegetation, cobble (stones larger than 1 cm (0.4 inches (in)) diameter), gravel (stones smaller than 1 cm (0.4 in) in diameter), or debris such as driftwood, wrack, root masses, or dead shrubs" (USFWS, 2001).

"The dynamic ecological processes that create and maintain piping plover habitat are also important primary constituent elements. These geologically dynamic lakeside regions are controlled by processes of erosion, accretion, plant succession, and lake-level fluctuations. The integrity of the habitat components depends upon regular sediment transport processes, as well as episodic, high-magnitude storm events. By their nature, Great Lakes shorelines are in a constant state of change; habitat features may disappear, or be created nearby. The critical habitat boundaries reflect these natural processes and the dynamic character of Great Lakes shorelines" (USFWW, 2001).

GREAT LAKES POPULATION CRITICAL HABITAT

Critical habitat was designated for the Great Lakes population of piping plovers on May 7, 2001 (66 FR 22938-22969) (USFWS, 2001). Thirty-five units of critical habitat were designated in the Great Lakes region (USFWS, 2001). The boundaries of these units extend from the normal high water mark 500 m (1640 feet) inland, though the inland boundary that contains the primary constituent elements (PCE's) varies depending upon how extensive the dune habitat is, which provides foraging and occasionally nesting habitat (USFWS, 2001).

The Michigan critical habitat units include:

Unit MI-1: Whitefish Point to Grand Marais
"This unit encompasses approximately 83.5 km (50 mi) of Lake Superior shoreline on in Chippewa, Luce, and Alger Counties on the Upper Peninsula of Michigan" (USFWS, 2001).

Unit MI-2: Point Aux Chenes
"This unit encompasses approximately 1.7 km (1.1 mi) of Lake Michigan shoreline in Mackinac County on the Upper Peninsula of Michigan" (USFWS, 2001).

Unit MI-3: Port Inland to Hughes Point
"This unit encompasses approximately 3 km (1.8 mi) of Lake Michigan shoreline in western Mackinac and eastern Schoolcraft Counties on the Upper Peninsula of Michigan" (USFWS, 2001).

Unit MI-4: Waugoshance Point to McCort Hill Beach
"This unit encompasses approximately 32 km (19.2 mi) of Lake Michigan shoreline in Emmet County, Michigan, and includes Temperance and Waugoshance Islands" (USFWS, 2001).

Unit MI-5: Sevenmile Point to Thornswift Nature Preserve
"This unit encompasses approximately 7 km (4.3 mi) of Lake Michigan shoreline in Emmet County, Michigan" (USFWS, 2001).

Unit MI-6: Petoskey State Park
"This unit encompasses approximately 2 km (1.2 mi) of Lake Michigan shoreline in Emmet County, Michigan" (USFWS, 2001).

Unit MI-7: North Point
"This unit encompasses approximately 1.1 km (0.7 mi) of Lake Michigan shoreline in Charlevoix County, Michigan" (USFWS, 2001).

Unit MI-8: Fisherman's Island State Park
"This unit encompasses approximately 1.3 km (0.8 mi) of Lake Michigan shoreline in Charlevoix County, Michigan" (USFWS, 2001).

Unit MI-9: Indian Point to McCauley's Point, Beaver Island
"This unit encompasses approximately 5 km (3.1 mi) of Lake Michigan shoreline on Beaver Island in Charlevoix County, Michigan" (USFWS, 2001).

Unit MI-10: Greenes Bay, Beaver Island
"This unit encompasses approximately 0.8 km (0.5 mi) of Lake Michigan shoreline on Beaver Island in Charlevoix County, Michigan" (USFWS, 2001).

Unit MI-11: High Island
"This unit encompasses approximately 1.8 km (1.1 mi) of Lake Michigan shoreline on High Island in Charlevoix County, Michigan" (USFWS, 2001).

Unit MI-12: Cathead Bay to Christmas Cove
"This unit encompasses approximately 5.1 km (3.2 mi) of Lake Michigan shoreline in Leelanau County, Michigan" (USFWS, 2001).

Unit MI-13: South Fox Island
"This unit encompasses approximately 6 km (3.8 mi) of Lake Michigan shoreline on South Fox Island in Leelanau County, Michigan" (USFWS, 2001).

Unit MI-14: North and South Manitou Islands
"This unit encompasses approximately 3.3 km (2.1 mi) of Lake Michigan shoreline on North Manitou Island in Leelanau County, Michigan" (USFWS, 2001).

Unit MI-15: Crystal Run to Empire Beach
"This unit encompasses approximately 18.6 km (11.6 mi) of Lake Michigan shoreline in Leelanau County, Michigan" (USFWS, 2001).

Unit MI-16: Esch Road to Sutter Road and Point Betsie
"This unit encompasses approximately 18.6 km (11.6 mi) of Lake Michigan shoreline in Benzie County, Michigan" (USFWS, 2001).

Unit MI-17: Nordhouse Dunes and Ludington State Park
"This unit encompasses approximately 13.4 km (8.3 mi) of Lake Michigan shoreline in Mason County, Michigan" (USFWS, 2001).

Unit MI-18: Muskegon State Park
"This unit encompasses approximately 2.5 km (1.6 mi) of Lake Michigan shoreline in Muskegon County, Michigan" (USFWS, 2001).

Unit MI-18: Muskegon State Park
"This unit encompasses approximately 2.5 km (1.6 mi) of Lake Michigan shoreline in Muskegon County, Michigan" (USFWS, 2001).

Unit MI-19: Lake Superior State Forest-St. Vital Point
"This unit encompasses approximately 3.0 km (1.9 mi) of Lake Huron shoreline in Chippewa County, Michigan" (USFWS, 2001).

Unit MI-20: Lighthouse Point to Cordwood Point
"This unit encompasses approximately 5.2 km (3.3 mi) of Lake Huron shoreline in Cheboygan County, Michigan" (USFWS, 2001).

Unit MI-21: Hoeft State Park
"This unit encompasses approximately 3.7 km (2.3 mi) of Lake Huron shoreline in Presque Isle County, Michigan" (USFWS, 2001).

Unit MI-22: Thompson's Harbor State Park
"This unit encompasses approximately 2.8 km (1.7 mi) of Lake Huron shoreline in Presque Isle County, Michigan" (USFWS, 2001).

Unit MI-23: Tawas Point State Park
"This unit encompasses approximately 2.0 km (1.2 mi) of Lake Huron shoreline in Iosco County, Michigan" (USFWS, 2001).

The Minnesota/Wisconsin critical habitat units include:

Unit MN/WI-1: Interstate Island
"This unit encompasses approximately 0.6 km (0.4 mi) of Lake Superior shoreline on Interstate Island in St. Louis County, Minnesota and Douglas County, Wisconsin" (USFWS, 2001).

The Wisconsin critical habitat units include:

Unit WI-1: Wisconsin Point

“This unit encompasses approximately 4.0 km (2.5 mi) of Lake Superior shoreline in Douglas County, Wisconsin” (USFWS, 2001).

Unit WI-2: Long Island/Chequamegon Point
“This unit encompasses approximately 25.3 km (15.7 mi) of Lake Superior shoreline in Ashland County, Wisconsin” (USFWS, 2001).

Unit WI-3: Western Michigan Island Beach and Dunes
“This unit encompasses approximately 6.5 km (4 mi) of Lake Superior shoreline on Michigan Island in Ashland County, Wisconsin” (USFWS, 2001).

Unit WI-4: Seagull Bar
“This unit encompasses approximately 1.5 km (0.9 mi) of Lake Michigan shoreline in Marinette County, Wisconsin” (USFWS, 2001).

Unit WI-5: Point Beach State Forest
“This unit encompasses approximately 8 km (5 mi) of Lake Michigan shoreline in Manitowoc County, Wisconsin” (USFWS, 2001).

The Illinois critical habitat units include:

Unit IL-1: Illinois Beach State Park and Nature Preserve to Waukegan Beach
“This unit encompasses approximately 10.2 km (6.3 mi) of Lake Michigan shoreline in Lake County, Illinois” (USFWS, 2001).

The Indiana critical habitat units include:

Unit IN-1: Indiana Dunes National Lakeshore and Indiana Dunes State Park Beaches
“This unit encompasses approximately 7.9 km (4.9 mi) of Lake Michigan shoreline in Porter County, Indiana” (USFWS, 2001).

The Ohio critical habitat units include:

Unit OH-1: Sheldon Marsh
“This unit encompasses approximately 3.2 km (2.0 mi) of Lake Erie shoreline in Erie County, Ohio” (USFWS, 2001).

Unit OH-2: Headland Dunes
“This unit encompasses approximately 0.8 km (0.5 mi) of Lake Erie shoreline in Lake County, Ohio” (USFWS, 2001).

The Pennsylvania critical habitat units include:

Unit PA-1: Gull Point Natural Area, Presque Isle State Park
“This unit encompasses approximately 6.0 km (3.7 mi) of Lake Erie shoreline in Erie County, Pennsylvania” (USFWS, 2001).

The New York critical habitat units include:

Unit NY-1: Salmon River to Stony Point
"This unit encompasses approximately 27.4 km (17 mi) of Lake Ontario shoreline in Jefferson and Oswego Counties, New York" (USFWS, 2001).

GREAT PLAINS POPULATION PRIMARY CONSTITUENT ELEMENTS

"Primary constituent elements for the northern Great Plains population of piping plovers are those habitat components (physical and biological) essential for the biological needs of courtship, nesting, sheltering, broodrearing, foraging, roosting, intraspecific communication, and migration" (USFWS, 2002). "The one overriding primary constituent element (biological) required to sustain the northern Great Plains breeding population of piping plovers that must be present at all sites is the dynamic ecological processes that create and maintain piping plover habitat. Without this biological process the physical components of the primary constituent elements would not be able to develop. These processes develop a mosaic of habitats on the landscape that provide the essential combination of prey, forage, nesting, brooding and chick-rearing areas. The annual, seasonal, daily, and even hourly availability of the habitat patches is dependent on local weather, hydrological conditions and cycles, and geological processes. The biological primary constituent element, *i.e.*, dynamic ecological processes, creates different physical primary constituent elements on the landscape. These physical primary constituent elements exist on different habitat types found in the northern Great Plains, including mixosaline to hypersaline wetlands" "rivers, reservoirs, and inland lakes. These habitat types or physical primary constituent elements that sustain the northern Great Plains breeding population of piping plovers are described as follows:" (USFWS, 2002).

"i. On prairie alkali lakes and wetlands, the physical primary constituent elements include—(1) shallow, seasonally to permanently flooded, mixosaline to hypersaline wetlands with sandy to gravelly, sparsely vegetated beaches, salt-encrusted mud flats, and/or gravelly salt flats; (2) springs and fens along edges of alkali lakes and wetlands; and (3) adjacent uplands 200 ft (61 m) above the high water mark of the alkali lake or wetland" (USFWS, 2002).
"ii. On rivers the physical primary constituent elements include—sparsely vegetated channel sandbars, sand and gravel beaches on islands, temporary pools on sandbars and islands, and the interface with the river" (USFWS, 2002).
"iii. On reservoirs the physical primary constituent elements include—sparsely vegetated shoreline beaches, peninsulas, islands composed of sand, gravel, or shale, and their interface with the water bodies" (USFWS, 2002).
"iv. On inland lakes (Lake of the Woods) the physical primary constituent elements include—sparsely vegetated and windswept sandy to gravelly islands, beaches, and peninsulas, and their interface with the water body" (USFWS, 2002).

GREAT PLAINS POPULATION CRITICAL HABITAT

Minnesota
Unit MN–1, Rocky Point, Pine and Curry Island, and Morris Point

"This unit includes approximately 235.2 ac (95.1 ha) of unique habitat, including sparsely vegetated windswept islands, peninsulas, and sandy points or spits that interface with Lake of the Woods in Lake of the Woods County" (USFWS, 2002).

Montana
Unit MT–1, Sheridan County
"This unit includes approximately 19,222.9 ac (7,779.4 ha) of 20 alkali lakes and wetlands in Sheridan County, located in the extreme northeast corner of Montana" (USFWS, 2002).

Unit MT–4, Bowdoin National Wildlife Refuge
"This unit encompasses approximately 3,294.5 ac (1,333.2 ha) on Bowdoin National Wildlife Refuge with sparsely vegetated shoreline beaches, peninsulas, and islands composed of sand gravel, or shale that interface with these water bodies. The site is located in east-central Phillips County, approximately 170.8 mi (275 km) west of the North Dakota border and 37.3 mi (60 km) south of Canada" (USFWS, 2002).

Nebraska
Unit NE–1, Platte, Loup, and Niobrara Rivers
"This unit encompasses approximately 440 mi (707.9 km) of river. The river habitat includes sparsely vegetated channel sandbars, sand and gravel beaches on islands within the high bank for nesting, temporary pools on sandbars and islands, and the interface of sand and river where plovers forage. All three of these rivers are occupied by and provide essential habitat for the piping plover" (USFWS, 2002).

North Dakota
Unit ND–1
"This unit encompasses approximately 7,456.9 ac (3,017.7 ha) of 13 alkali lakes and wetlands in Divide and Williams Counties, located in the extreme northwestern corner of North Dakota" (USFWS, 2002).

Unit ND–2
"This unit encompasses approximately 20,683.8 ac (8,370.6 ha) of 14 alkali lakes and wetlands in Burke, Renville, and Mountrail Counties, in northwestern North Dakota" (USFWS, 2002).

Unit ND–3
"This unit encompasses approximately 2,524.5 ac (1,021.6 ha) of 11 alkali lakes and wetlands in Mountrail and Ward Counties in northwestern North Dakota" (USFWS, 2002).

Unit ND–4
"This unit encompasses approximately 5,150.7 ac (2,084.4 ha) of eight alkali lakes and wetlands in McLean County in north-central North Dakota" (USFWS, 2002).

Unit ND–5
"This unit encompasses approximately 3,925.6 ac (1,588.7 ha) of 10 alkali lakes and wetlands in McHenry and Sheridan Counties in north-central and central North Dakota" (USFWS, 2002).

Unit ND–6
"This unit encompasses approximately 6,075.2 ac (2,458.6 ha) of 11 alkali lakes and wetlands in Benson and Pierce Counties, in northeastern North Dakota" (USFWS, 2002).

Unit ND–7
"This unit encompasses approximately 30,125.7 ac (12,191.7 ha) of nine alkali lakes and wetlands in Burleigh and Kidder Counties, in south-central North Dakota" (USFWS, 2002). Production Areas owned and managed by the Service.

Unit ND–8
"This unit encompasses approximately 4,056.7 ac (1,641.7 ha) of three alkali lakes and wetlands in Stutsman County, in south-central North Dakota" (USFWS, 2002).

Unit ND–9
"This unit encompasses approximately 2,658 ac (1,075.6 ha) of six alkali lakes and wetlands in Logan and McIntosh Counties in south-central North Dakota" (USFWS, 2002).

Unit ND–10
"This unit encompasses approximately 641.6 ac (259.6 ha) of one alkali lake in Eddy County in northeastern North Dakota" (USFWS, 2002).

Missouri River Units
"Missouri River Units—Missouri River units consist of riverine and reservoir (Fort Peck Lake, Lake Sakakawea and Lake Audubon, Lake Oahe, and Lewis and Clark Lake) reaches" (USFWS, 2002).

Montana
Unit MT–2
"This unit encompasses approximately 125.4 mi (201.8 km) from just west of Wolf Point, McCone County, Montana, at RM 1712.0 downstream to the Montana/North Dakota border, Richland County, Montana, and McKenzie County, North Dakota, at RM 1586.6" (USFWS, 2002).

Unit MT–3, Fort Peck Reservoir
"This unit encompasses approximately 77,370 ac (31,311 ha) of Fort Peck Reservoir, located entirely within the Charles M. Russell National Wildlife Refuge which is in Federal ownership, managed by the Service" (USFWS, 2002).

North Dakota
Unit ND–11, Missouri River
"Approximately 354.6 mi (570.6 km) from the Montana/North Dakota border just west of Williston, McKenzie County, North Dakota, at RM 1586.6 downstream to the North Dakota/South Dakota border in Sioux and Emmons Counties, North Dakota, and Corson and Campbell Counties, South Dakota, at RM 1232.0" (USFWS, 2002).

South Dakota
Unit SD–1 Missouri River
"Approximately 159.7 mi (257 km) from the North Dakota/South Dakota border northeast of McLaughlin, Corson County, South Dakota, at RM 1232.0 downstream to RM 1072.3, just north of Oahe Dam (Oahe Reservoir)" (USFWS, 2002).

Unit SD–2, Missouri River
"Approximately 127.8 mi (204.4 km) from RM 880.0, at Fort Randall Dam, Bon Homme and Charles Mix Counties, South Dakota, downstream to RM 752.2 near Ponca, Dixon County, Nebraska" (USFWS, 2002).

WINTERING POPULATION PRIMARY CONSTITUENT ELEMENTS

The primary constituent elements (PCEs) that support foraging, roosting, and sheltering habitat components for the wintering piping plover are:

(1) "Intertidal sand beaches (including sand flats) or mud flats (between the MLLW [mean lower low water] and annual high tide) with no, or very sparse, emergent vegetation for feeding. In some cases, these flats may be covered or partially covered by a mat of blue-green algae.
(2) Unvegetated or sparsely vegetated sand, mud, or algal flats above annual high tide for roosting. Such sites may have debris or detritus and may have micro-topographic relief (less than 20 in (50 cm) above substrate surface) offering refuge from high winds and cold weather.
(3) Surf-cast algae for feeding.
(4) Sparsely vegetated backbeach, which is the beach area above mean high tide seaward of the dune line, or in cases where no dunes exist, seaward of a delineating feature such as a vegetation line, structure, or road. Backbeach is used by plovers for roosting and refuge during storms.
(5) Spits, especially sand, running into water used for foraging and roosting.
(6) Salterns, or bare sand flats in the center of mangrove ecosystems that are found above mean high water and are only irregularly flushed with sea water.
(7) Unvegetated washover areas with little or no topographic relief for feeding and roosting. Washover areas are formed and maintained by the action of hurricanes, storm surges, or other extreme wave actions.
(8) Natural conditions of sparse vegetation and little or no topographic relief mimicked in artificial habitat types (e.g. dredge spoil sites)." (USFWS, 2009)

WINTERING POPULATION CRITICAL HABITAT

Unit TX–3: Padre Island
"Subunit TX–3A: South Padre Island – Gulf of Mexico Shoreline. This subunit consists of 2,891 ac (1170 ha) in Cameron and Willacy Counties, Texas" (USFWS, 2009).

"Subunit TX–3B: South Padre Island –Laguna Madre side. This bayside subunit consists of 44,137 ac (17,862 ha) in Cameron and Willacy Counties, Texas" (USFWS, 2002).

"Subunit TX–3C: North Padre Island – Laguna Madre side. This bayside unit consists of 50,897 ac (20,597 ha) in Kenedy and Kleberg Counties, Texas" (USFWS, 2009).

“Subunit TX–3D: North Padre Island – Gulf of Mexico. This gulfside subunit consists of 270 ac (109 ha) of beach in Kleberg County, Texas” (USFWS, 2009).

“Subunit TX–3E: North Padre Island – Mesquite Rincon. This triangular bayside subunit of 9,6238 acres (3,894 hectares) lies on the western shore of the lower Laguna Madre in Kenedy County, Texas” (USFWS, 2009).

“*Unit TX–4: Lower Laguna Madre Mainland* This bayside unit consists of 17,223 ac (6,970 ha) in Cameron and Willacy Counties, Texas, and lies along the western shoreline of the Lower Laguna Madre” (USFWS, 2009).

“*Unit TX–7: Newport Pass/Corpus Christi Pass Beach* This unit consists of 294 ac (119 ha) in Nueces County, Texas” (USFWS, 2009).

“*Unit TX–8: Mustang Island Beach* This unit consists of 623 ac (252 ha) in Nueces County, Texas” (USFWS, 2009).

“*Unit TX–9: Fish Pass Lagoons* This bayside unit consists of 168 ac (68 ha) in Nueces County, Texas” (USFWS, 2009).

Unit TX–10: Shamrock Island and Adjacent Mustang Island Flats
“Subunit TX–10A: Shamrock Island. This 12-ac (5-ha) island in Nueces County, Texas, was a peninsula extending off of Mustang Island in Corpus Christi Bay until erosion separated the island from the mainland” (USFWS, 2009).

“Subunit TX–10B: Mustang Island: Unnamed sand flat. This 2-ac (1-ha) subunit in Nueces County, Texas, is a small, unnamed sand flat near the north edge of the mouth of Wilson’s Cut in Corpus Christi Bay” (USFWS, 2009).

“Subunit TX–10C: Mustang Island: Lagoon Complex. This 331-ac (134-ha) subunit in Nueces County, Texas, is an extensive lagoon complex that consists of 11 polygons within a larger polygon that extends 2.2 mi (3.5 km) south of Wilson’s Cut in Corpus Christi Bay” (USFWS, 2009).

“*Unit TX–14: East Flats* This bayside unit consists of 591 ac (239 ha) in Nueces County, Texas” (USFWS, 2009)..

“*Unit TX–15: North Pass* This bayside unit consists of 805 ac (326 ha) in Aransas County, Texas” (USFWS, 2009).

“*Unit TX–16: San Jose Beach* This unit consists of 1,378 ac (558 ha) in Aransas County, Texas” (USFWS, 2009).

“*Unit TX–18: Cedar Bayou/Vinson Slough* This bayside unit consists of 2,465 ac (998 ha) in Aransas County, Texas” (USFWS, 2009).

"*Unit TX–19: Matagorda Island Beach* This unit consists of 2,413 ac (976 ha) in Calhoun County, Texas" (USFWS, 2009).

"*Unit TX–22: Decros Point* This unit consists of 544 ac (220 ha) at the Matagorda/Calhoun County line, in Texas" (USFWS, 2009).

"*Unit TX–23: West Matagorda Peninsula Beach* This unit consists of 1,808 ac (732 ha) of shoreline in Matagorda County, Texas" (USFWS, 2009).

"*Unit TX–27: East Matagorda Bay/ Matagorda Peninsula Beach West* This unit consists of 905 ac (366 ha) of shoreline in Matagorda County, Texas" (USFWS, 2009).

"*Unit TX–28: East Matagorda Bay/Matagorda Peninsula Beach East* This gulfside unit consists of 481 ac (194 ha) in Matagorda County, Texas" (USFWS, 2009).

"*Unit TX–31: San Bernard NWR Beach* This gulfside unit consists of 401 ac (162 ha) in Matagorda and Brazoria Counties, Texas" (USFWS, 2009).

"*Unit TX–32: Gulf Beach Between Brazos and San Bernard Rivers* This gulfside unit consists of 556 ac (225 ha) of shoreline in Brazoria County, Texas" (USFWS, 2009).

"*Unit TX–33: Bryan Beach and Adjacent Beach* This unit consists of 211 ac (85 ha) in Brazoria County, Texas" (USFWS, 2009).

WINTERING POPULATION CRITICAL HABITAT

The designated critical habitat is divided into 142 critical habitat units listed below (USFWS, 2001).

North Carolina

"Unit NC–1: Oregon Inlet. 404 ha (997 ac) in Dare County" (USFWS, 2001)

"Unit NC–2: Cape Hatteras Point. 465 ha (1149 ac) in Dare County" (USFWS, 2001).

"Unit NC–4: Hatteras Inlet. 516 ha (1273 ac) in Dare and Hyde Counties" (USFWS, 2001).

"Unit NC–5: Ocracoke Island. 80 ha (197 ac) in Hyde County" (USFWS, 2001).

South Carolina

"Unit SC–1: Waites Island-North. 75 ha (186 ac) in Horry County" (USFWS, 2001).

"Unit SC–2: Waites Island-South. 58 ha (142 ac) in Horry County" (USFWS, 2001).

"Unit SC–3: Murrells Inlet/Huntington Beach. 135 ha (334 ac) in Georgetown County" (USFWS, 2001).

“Unit SC–4: Litchfield. 11 ha (28 ac) in Georgetown County” (USFWS, 2001).

“Unit SC–5: North Inlet. 99 ha (245 ac) in Georgetown County” (USFWS, 2001).

“Unit SC–6: North Santee Bay Inlet. 305 ha (753 ac) in Georgetown County” (USFWS, 2001).

“Unit SC–7: Cape Romain. 315 ha (777 ac) in Charleston County” (USFWS, 2001).

“Unit SC–8: Bull Island. 134 ha (332 ac) in Charleston County” (USFWS, 2001).

“Unit SC–9: Stono Inlet. 495 ha (1223 ac) in Charleston County” (USFWS, 2001).

“Unit SC–10: Seabrook Island. 117 ha (290 ac) in Charleston County” (USFWS, 2001).

“Unit SC–11: Deveaux Bank. 130 ha (322 ac) in Charleston County” (USFWS, 2001).

“Unit SC–12: Otter Island. 68 ha (169 ac) in Colleton County” (USFWS, 2001).

“Unit SC–13: Harbor Island. 50 ha (122 ac) in Beaufort County” (USFWS, 2001).

“Unit SC–14: Caper’s Island. 238 ha (589 ac) in Beaufort County” (USFWS, 2001).

“Unit SC–15: Hilton Head. 43 ha (106 ac) in Beaufort County” (USFWS, 2001).

Georgia

“Unit GA–1: Tybee Island. 37 ha (91 ac) in Chatham County” (USFWS, 2001).

“Unit GA–2: Little Tybee Island. 719 ha (1776 ac) in Chatham County” (USFWS, 2001).

“Unit GA–3: North Wassaw Island. 108 ha (267 ac) in Chatham County” (USFWS, 2001).

“Unit GA–4: South Wassaw Island. 61 ha (151 ac) in Chatham County” (USFWS, 2001).

“Unit GA–5: Ossabaw Island. 434 ha (1072 ac) in Chatham County” (USFWS, 2001).

“Unit GA–6: St. Catherine’s Island Bar. 54 ha (135 ac) in Liberty County” (USFWS, 2001).

“Unit GA–7: McQueen’s Inlet. 215 ha (532 ac) in Liberty County” (USFWS, 2001).

“Unit GA–8: St. Catherine’s Island. 60 ha (147 ac) in Liberty County” (USFWS, 2001).

“Unit GA–9: Blackbeard Island. 129 ha (319 ac) in McIntosh County” (USFWS, 2001).

“Unit GA–10: Sapelo Island. 85 ha (210 ac) in McIntosh County” (USFWS, 2001).

“Unit GA–11: Wolf Island. 238 ha (590 ac) in McIntosh County” (USFWS, 2001).

“Unit GA–12: Egg Island Bar. 61 ha (151 ac) in McIntosh County” (USFWS, 2001).

“Unit GA–13: Little St. Simon’s Island. 609 ha (1505 ac) in Glynn County” (USFWS, 2001).

“Unit GA–14: Sea/St. Simon’s Island. 191 ha (471 ac) in Glynn County” (USFWS, 2001).

“Unit GA–15: Jekyll Island. 49 ha (121 ac) in Glynn County” (USFWS, 2001).

“Unit GA–16: Cumberland Island. 1454 ha (3591 ac) in Camden County” (USFWS, 2001).

Florida
“Unit FL–1: Big Lagoon. 8 ha (19 ac) in Escambia County” (USFWS, 2001).

“Unit FL–2: Big Sabine. 182 ha (450 ac) in Escambia County” (USFWS, 2001).

“Unit FL–3: Navarre Beach. 48 ha (118 ac) in Escambia and Santa Rosa Counties” (USFWS, 2001).

“Unit FL–5: Shell/Crooked Islands. 1789 ha (4419 ac) in Bay County” (USFWS, 2001).

“Unit FL–6: Upper St. Joe Peninsula. 182 ha (449 ac) in Gulf County” (USFWS, 2001).

“Unit FL–7: Cape San Blas. 158 ha (390 ac) in Gulf County” (USFWS, 2001).

“Unit FL–8: St. Vincent Island. 146 ha (361 ac) in Franklin County” (USFWS, 2001).

“Unit FL–9: East St. George Island. 1433 ha (3540 ac) in Franklin County” (USFWS, 2001).

“Unit FL–10: Yent Bayou. 153 ha (378 ac) in Franklin County” (USFWS, 2001).

“Unit FL–11: Carabelle Beach. 56 ha (139 ac) in Franklin County” (USFWS, 2001).

“Unit FL–12: Lanark Reef. 260 ha (643 ac) in Franklin County” (USFWS, 2001).

“Unit FL–13: Phipps Preserve. 42 ha (104 ac) in Franklin County” (USFWS, 2001).

“Unit FL–14: Hagens Cove. 486 ha (1200 ac) in Taylor County” (USFWS, 2001).

“Unit FL–15: Anclote Key and North Anclote Bar. 146 ha (360 ac) in Pasco and Pinellas Counties” (USFWS, 2001).

“Unit FL–16: Three Rooker Bar Island. 76 ha (188 ac) in Pinellas County” (USFWS, 2001).

“Unit FL–17: North Honeymoon Island. 45 ha (112 ac) in Pinellas County” (USFWS, 2001).

“Unit FL–18: South Honeymoon Island. 28 ha (70 ac) in Pinellas County” (USFWS, 2001).

“Unit FL–19: Caladesi Island. 120 ha (296 ac) in Pinellas County” (USFWS, 2001).

“Unit FL–20: Shell Key and Mullet Key. 190 ha (470 ac) in Pinellas County” (USFWS, 2001).

“Unit FL–21: Egmont Key. 153 ha (377 ac) Hillsborough County” (USFWS, 2001).

“Unit FL–22: Cayo Costa. 175 ha (432 ac) in Lee County” (USFWS, 2001).

“Unit FL–23: North Captiva Island. 36 ha (88 ac) in Lee County” (USFWS, 2001).

“Unit FL–25: Bunche Beach. 187 ha (461 ac) in Lee County” (USFWS, 2001).

“Unit FL–26: Estero Island. 86 ha (211 ac) in Lee County” (USFWS, 2001).

“Unit FL–27: Marco Island. 245 ha (606 ac) in Collier County” (USFWS, 2001).

“Unit FL–28: Marquesas Keys. 2,937 ha (7,256 ac) in Monroe County” (USFWS, 2001).

“Unit FL–29: Boca Grande/Woman/Ballast Keys. 56 ha (138 ac) in Monroe County” (USFWS, 2001).

“Unit FL–30: Bahia Honda/Ohio Keys. 372 ha (918 ac) in Monroe County” (USFWS, 2001).

“Unit FL–31: Lower Matecumbe Key. 19 ha (48 ac) in Monroe County” (USFWS, 2001).

“Unit FL–32: Sandy Key/Carl Ross Key. 67 ha (165 ac) in Monroe County” (USFWS, 2001).

“Unit FL–33: St. Lucie Inlet. 114 ha (282 ac) in Martin County” (USFWS, 2001).

”Unit FL–34: Ponce de Leon Inlet. 68 ha (168 ac) in Volusia County” (USFWS, 2001).

“Unit FL–35: Nassau Sound-Huguenot. 950 ha (2347 ac) in Duval County” (USFWS, 2001).

“Unit FL–36: Tiger Islands. 53 ha (130 ac) in Nassau County” (USFWS, 2001).

Alabama
”Unit AL–1: Isle Aux Herbes. 227 ha (561 ac) in Mobile County” (USFWS, 2001).

“Unit AL–2: Dauphin, Little Dauphin, and Pelican Islands. 880 ha (2,174 ac) in Mobile County” (USFWS, 2001).

“Unit AL–3: Fort Morgan. 67 ha (166 ac) in Baldwin County” (USFWS, 2001).

Mississippi

“Unit MS–1: Lakeshore through Bay St. Louis. 41 ha (101 ac) in Hancock County” (USFWS, 2001).

“Unit MS–2: Henderson Point. 34 ha (84 ac) in Harrison County” (USFWS, 2001).

“Unit MS–3: Pass Christian. 77 ha (190 ac) in Harrison County” (USFWS, 2001).

“Unit MS–4: Long Beach. 38 ha (94 ac) in Harrison County” (USFWS, 2001).

“Unit MS–5: Gulfport. 39 ha (96 ac) in Harrison County” (USFWS, 2001).

“Unit MS–6: Mississippi City. 62 ha (153 ac) in Harrison County” (USFWS, 2001).

“Unit MS–10: Ocean Springs West. 11 ha (27 ac) in Jackson County” (USFWS, 2001).

“Unit MS–11: Ocean Springs East. 7 ha (17 ac) in Jackson County” (USFWS, 2001).

“Unit MS–12: Deer Island. 194 ha (479 ac) in Harrison County” (USFWS, 2001).

“Unit MS–13: Round Island. 27 ha (67 ac) in Jackson County” (USFWS, 2001).

“Unit MS–14: Mississippi Barrier Islands. 3,168 ha (7,828 ac) in Harrison and Jackson Counties” (USFWS, 2001).

“Unit MS–15: North and South Rigolets. 159 ha (393 ac) in Jackson County, MS, and 12 ha (30 ac) in Mobile County, AL” (USFWS, 2001).

Louisiana
“Unit LA–1: Texas/Louisiana border to Cheniere au Tigre. 2,650 ha (6,548 ac) in Cameron and Vermilion Parishes” (USFWS, 2001).

“Unit LA–2: Atchafalaya River Delta. 921 ha (2,276 ac) in St. Mary Parish, LA” (USFWS, 2001).

“Unit LA–3: Point Au Fer Island. 195 ha (482 ac) in Terrebonne Parish” (USFWS, 2001).

“Unit LA–4: Isles Dernieres. 795 ha (1,964 ac) in Terrebonne Parish” (USFWS, 2001).

“Unit LA–5: Timbalier Island to East Grand Terre Island. 2,321 ha (5,735 ac) in Terrebonne, Lafourche, Jefferson, and Plaquemines Parishes” (USFWS, 2001).

“Unit LA–6: Mississippi River Delta. 105 ha (259 ac) in Plaquemines Parish, LA” (USFWS, 2001).

“Unit LA–7: Breton Islands and Chandeleur Island Chain. 3,116 ha (7,700 ac) in Plaquemines and St. Bernard Parishes, LA” (USFWS, 2001).

17.5. HABITAT

Habitat for wintering piping plovers on the Atlantic Coast consists of "accreting ends of barrier islands, along sandy peninsulas, and near coastal inlets. Plovers appear to prefer sandflats adjacent to inlets or passes, sandy mudflats along prograding spits, and overwash areas as foraging habitats" (USFWS, 1996). "Roosting plovers [on the Atlantic Coast] are generally found along inlet and adjacent ocean and estuarine shorelines and their associated berms (with wrack and other debris often used as wind-shields), and on nearby exposed tidal flats" (USFWS, 1996).

"In north-central North America, Piping Plovers nest on barren sand and gravel Great Lakes shorelines, and along sand and gravel shores of rivers and lakes in the Great Plains" (USFWS, 1988). Piping plovers nesting on the Atlantic Coast situate their nests "above the high tide line on coastal beaches, sandflats at the end of sand spits and barrier islands, gently sloping foredunes, blowout areas behind primary dunes, and washover areas cut into or between dunes" (USFWS, 1996). Lake habitat generally consists of "[w]ide beaches (>20 m) with less than 5% vegetative cover, with highly clumped vegetation and/or with extensive gravel" (USFWS, 1988). Lake habitat may vary from these conditions when unavailable in a given shoreline area (USFWS. 1988). "Piping Plovers nesting on the Missouri, Platte, Niobrara, and other rivers use beaches and dry, barren sandbars located midstream in wide, open channel beds. Vegetative cover on nesting islands is usually less than 25%" (USFWS, 1988).

"Feeding areas include intertidal portions of ocean beaches, washover areas, mudflats, sandflats, wrack lines, and shorelines of coastal ponds, lagoons, or salt marshes" (USFWS, 1996). "During courtship, nesting, and brood-rearing, feeding territories are generally contiguous to nesting territories", though separation of these areas occurs regularly (USFWS, 1996). Adults concentrate their foraging efforts within five meters of the water's edge while chicks are more likely to feed on firmer sand at further distances from the shoreline than adults (USFWS, 1988).

17.6. DIET

The diet of the piping plover consists of invertebrates such as marine worms, fly larvae, beetles, crustaceans, and mollusks (USFWS, 1996). Marine worms consumed have average lengths of 2.5 to 7.5 cm (USFWS, 1988). Core samples taken from intertidal areas indicate that plovers feed in areas with higher densities of polychaete worms (USFWS, 1996).

17.7. LIFE HISTORY AND REPRODUCTION

Piping plovers "spend approximately 3-4 months on northern U.S. and southern Canadian breeding sites" (USFWS, 1988). Plovers arrive at breeding sites in the Great Plains between mid-April and mid-May (USFWS, 1988). Arrival in Virginia has been observed as early as February 24, March 11 in New York and March 15 in Massachusetts (USFWS, 1996). Courtship behavior consists of "aerial flights, digging of several nest scrapes and a ritualized stone-tossing behavior" (USFWS, 1988). "Finished nest cups, frequently lined with small pebbles or shell fragments, are shallow depressions approximately two cm deep and six cm in diameter" (USFWS, 1988). The nest site and surrounding territory is "actively defended" by both adults (USFWS, 1988). Nests are usually spaced 200 feet between adjacent pairs (USFWS, 1996). Territories are defended by performing "horizontal threat, parallel run and aerial displays"

(USFWS, 1996). "Parallel runs may cover distances up to 100 meters, while aerial displays may be performed from just above ground level up to approximately 35 m and are generally accompanied by continuous vocalization" (USFWS, 1996). Egg laying begins the second or third week of May in the Great Plains or mid-April on the Atlantic Coast and continues until a four-egg clutch is laid (USFWS, 1988 and 1996). Incubation lasts for 25-31 days and both adults incubate the egg (USFWS, 1988). Hatching begins in late May and extends to mid-June (USFWS, 1988). Chicks hatch within 12 to 24 hours apart and "are able to feed themselves within hours" (USFWS, 1988). "Brooding duties are shared by males and females" (USFWS, 1988). "Broods generally remain on nesting territories but may expand their movements as they mature or are disturbed" (USFWS, 1988). Chicks fledge between 21 days after hatching in Manitoba to 30-35 days on Long Island in New York (USFWS, 1988). Adults migrate from breeding grounds beginning in mid-July and ending in early August (USFWS, 1988). Juveniles often depart as late as late August and breeding males are sometimes reported to depart with their young (USFWS, 1988). Plovers are known to begin breeding at one year of age (USFWS, 1996). Pairs are predominantly monogamous during a single breeding season but different pairs may be formed each breeding season regardless of previous reproductive success (USFWS, 1988).

17.8. REFERENCES

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18. PREBLE'S MEADOW JUMPING MOUSE

18.1. SPECIES LISTING STATUS

The Preble's meadow jumping mouse (*Zapus hudsonius preblei*) was listed as a threatened species on March 13, 1998 within its range in Colorado and Wyoming (63 FR 26517) by the U.S. Fish and Wildlife Service (USFWS, 1998 and 2008). A Recovery Team for the Preble's meadow jumping mouse (PMJM) was established in June 2000 (USFWS, 2003). However, recovery planning stopped in December 2003 with the receipt of two petitions to delist the PMJM from the Federal List of Endangered and Threatened Wildlife, based upon research suggesting that it was not a separate subspecies (USFWS, 2008). The USFWS proposed a rule to delist the PMJM on February 12, 2005 (70 FR 5404) (USFWS, 2005 and 2008). Genetic analysis of the PMJM and four neighboring subspecies was conducted by the U.S. Geological Survey (USGS), who found that the PMJM should remain a separate subspecies (USFWS, 2008). The USFWS final rule issued on July 10, 2008 determined that the PMJM is a separate subspecies that should not be delisted, and further specified that it is threatened only in its current range in Colorado, and not threatened in Wyoming (73 FR 39789) (USFWS, 2008). The Colorado portion of the PMJM range represents a Significant Portion of the Range (SPR), where it is likely to become endangered in the foreseeable future (USFWS, 2008). Critical habitat that had been previously designated by the USFWS on June 23, 2003 (68 FR 37275) was amended by this final rule, eliminating critical habitat designated in Wyoming (USFWS, 2003 and 2008). Revised critical habitat for the PMJM that will include additional areas within the Colorado SPR was proposed by the USFWS on October 8, 2009 (74 FR 52065-52107) (USFWS, 2009). Additionally, a 5-year review of the species was initiated by the USFWS on March 31, 2004 in conjunction with the 90-day finding for the petition to delist the PMJM (69 FR 16944) and was approved on February 2, 2008 (USFWS, 2008). The Recovery Team was reconvened in 2009 to review and update the Preliminary Draft Recovery Plan of 2003 (USFWS, 2009).

18.2. DESCRIPTION

The PMJM is one of 12 subspecies of the meadow jumping mouse *(Zapus hudsonius)* in the family Zapodidae (USFWS, 1998). These mice are small to medium sized with long feet and tails adapted for jumping (USFWS, 1998). The PMJM has coarse gray to orange-brown hair on its dorsal side with a distinct dark stripe down the middle of the back from head to tail, with finer white fur on its underside (USFWS, 2003). Adult PMJM are 187 mm to 255 mm long, with a tail 108 mm to 155 mm long (USFWS, 2008). Juvenile meadow jumping mice weigh less than 13 g, sub-adults weigh 13-14 g, and adults weigh 15 g or more (USFWS, 2003). PMJM gain weight during late August to mid-September before hibernation and reach up to 25 g to 34 g (USFWS, 2003). Some have been measured at 38 g during this time (USFWS, 2003). When PMJM emerge from hibernation in May they can weigh as little as 14 g (USFWS, 2003). A sample of PMJM captured during the summer before June 18th weighed 18 ± 2 g (n=78) for adult males and 18.2 ± 2.8 g (n=47) for adult females (USFWS, 2003). However, ten females were pregnant (USFWS, 2003). Pregnant females can reach weights of 28 g (USFWS, 2003).

18.3. DISTRIBUTION

Historical Range

There is little information on the historical distribution or abundance of the PMJM (USFWS, 2009). The PMJM is likely a relic of the Ice Age, restricted to moist riparian corridors of semi-arid eastern Colorado and southeastern Wyoming (USFWS, 2003). The western boundary of the PMJM range is determined by elevation (USFWS, 2003, 2008 and 2009). A similar subspecies, the western meadow jumping mouse (*Zapus princeps*), is located at higher elevations than the PMJM and further to the west, though their ranges do overlap in areas (USFWS, 2003, 2008, and 2009). To the east, the PMJM's range is restricted by the semiarid climate and defined by the dry shortgrass prairie (USFWS, 2003, 2008, and 2009). The PMJM has not been found east of Cheyenne Wyoming or on the far eastern plains of Colorado (USFWS, 2003 and 2008).

At the time of its listing in 1998 (63 FR 26517), the historic range of the PMJM was thought to be in Adams, Arapahoe, Boulder, Denver, Douglas, El Paso, Elbert, Jefferson, Larimer, and Weld counties in Colorado, and in the counties of Albany, Laramie, Platte, Goshen, and Converse in Wyoming (USFWS, 1998 and 2008). When the PMJM was originally listed, it was also assumed to be primarily located in Colorado and to be less abundant in Wyoming (USFWS, 2008). The PMJM current range at the time of the 1998 USFWS listing, based on 1992 records, was thought to include seven counties in Colorado, including Boulder, Jefferson, Douglas, El Paso, Weld, Larimer, and Elbert (USFWS, 1998). The PMJM had not been found since 1991 in Denver, Arapahoe, and Adams counties in Colorado, formerly part of its range (USFWS, 2003 and 2009). The range in Wyoming was only known to include two counties, based upon surveys performed in 1995 that found only two locations of PMJM, in Laramie and Albany counties (USFWS, 1998).

The PMJM Draft Recovery Plan of 2003 indicated that the PMJM range generally extended from southeastern Wyoming in the North and South Platte River basins, from the eastern side of the Laramie Mountains and the Laramie Plains to the south along the eastern side of the Front Range in Colorado, to the headwaters of the Arkansas River Basin near Colorado Springs, Colorado in El Paso County (USFWS, 2003).

Current Distribution

Since the USFWS listing in 1998 (63 FR 26517), increased trapping efforts have expanded knowledge of the range of the PMJM (USFWS, 2008). The PMJM is more widespread in Wyoming than previously thought, especially in the North Platte River Basin (USFWS, 2008). In contrast, trapping efforts in 2007 found that the PMJM is rare or extirpated from much of its former range in Colorado, in general along the eastern extent of its historical range (USFWS, 2008). As of the 2008 USFWS final rule (73 FR 39789) that amended the PMJM listing to include only its Colorado SPR, confirmed PMJM trapping locations were in Albany, Laramie, Platte, and Converse counties in Wyoming, and Boulder, Douglas, El Paso, Elbert, Jefferson, Larimer, and Weld counties in Colorado (USFWS, 2008). Trapping and habitat modeling indicate that the PMJM does not occur in Goshen, Niobrara, and eastern Laramie counties in Wyoming (USFWS, 2008). The northernmost confirmed PMJM location is at the North Platte River near Douglas, Wyoming and the southernmost is in Colorado Springs, Colorado (USFWS, 2008).

While trapping confirms the presence of the PMJM, it is one of many factors used to estimate the actual range of the PMJM (USFWS, 2008). The current USFWS species profile indicates that

the PMJM occurs in Adams, Arapahoe, Boulder, Bromfield, Denver, Douglas, El Paso, Elbert, Jefferson, Larimer, Morgan, Teller and Weld counties in Colorado, and statewide in Wyoming (USFWS, 2010). The 5 potential threat analysis factors used by the USFWS in issuing the July 10, 2008 final rule (73 FR 39789) to determine whether the PMJM was threatened or endangered over all or part of its range found that the Wyoming population is self sustaining, with an absence of significant threats to its conservation status (USFWS, 2008). The SPR defined in the 2008 final rule is located only in Colorado, west of 103 degrees 40 minutes West, north of 38 degrees 30 minutes North, and east of 105 degrees 50 minutes West (USFWS, 2008).

18.4. USFWS CRITICAL HABITAT

Critical habitat was designated for the PMJM on June 23, 2003 (68 FR 37275) (USFWS, 2003 and 2009). This critical habitat was revised with the July 10, 2008 final rule (73 FR 39789) listing the PMJM as threatened only in the SPR in Colorado, removing all critical habitat previously designated in Wyoming which had included Cottonwood Creek, Chugwater Creek, and Lodgepole Creek including Upper Middle Lodgepole Creek, an area 10,542 acres in size with 125.1 miles of rivers and streams (USFWS, 2003, 2008 and 2009). Existing critical habitat is within the SPR as defined in the July 10, 2008 final rule (73 FR 39789) and includes the North Fork of the Cache la Poudre River, the Cache la Poudre River, Buckhorn Creek, Ralston Creek and the Upper South Platte River, for a total of 20,680 acres and 234 miles of rivers and streams (USFWS, 2009).

The 2009 proposed revised critical habitat includes Boulder, Bromfield, Douglas, El Paso, Jefferson, Larimer, and Teller counties in Colorado (74 FR 52065) (USFWS, 2009). These proposed boundaries would add 18,462 acres and 184 miles of rivers and streams to the existing critical habitat designation, by including Cedar Creek, South Boulder Creek, Rocky Flats National Wildlife Refuge, Cherry Creek, West Plum Creek, and Monument Creek, all of which were previously proposed but not adopted in the 2003 critical habitat final rule (USFWS, 2009). A final rule regarding critical habitat must be published in the Federal Register by September 2010 to comply with a settlement with the City of Greeley, Colorado (USFWS, 2009).

Primary Constituent Elements (PCEs) are physical and biological features that are essential to the conservation of the species. PCEs were established for the PMJM in 2003 (68 FR 37275) (USFWS, 2003). PCEs proposed by the USFWS in 2009 (74 FR 52065) as part of the revised critical habitat proposed rule are essentially the same as those designated in 2003. These PCEs include “riparian corridors formed and maintained by normal, dynamic, geomorphological, and hydrologic processes that create and maintain river and stream channels, floodplains, and floodplain benches and promote patterns of vegetation favorable” to the PMJM, “containing dense, riparian vegetation consisting of grasses, forbs, and shrubs, or any combination thereof, in areas along rivers and streams, that normally provide open water” through the PMJM active season (USFWS, 2009). The riparian areas must also include “specific movement corridors that provide connectivity between and within populations” (USFWS, 2009). These could be riparian corridors with less vegetative cover, or include human disturbances such as erosion control, travel ways under bridges, along ditches and canals, and through culverts (USFWS, 2009). Also included are adjacent areas of low disturbance in floodplains and uplands, such as hayed fields, grazed pasture, and other unplowed agricultural fields, restored mine lands, recreational trail areas and “urban-wildland interfaces” (USFWS, 2009).

18.5. HABITAT

The PMJM is found in well developed riparian vegetation, with a water source nearby that can range in size from a river to a small drainage only 1 m to 3 m wide, next to undisturbed grassland (USFWS, 2008). The upper limit of PMJM habitat is at approximately 2,360 m (7,750 ft) in elevation in Colorado, and in southeastern Wyoming is at 2,317 m (7,600 feet) (USFWS, 2009). Flood events that occur commonly every 5 to 20 years in the Platte and Arkansas River Basins promote PMJM habitat by stimulating willow re-sprouting and depositing soil for forbs and grasses (USFWS, 2003). Seasonal streams, low moist areas, dry gulches, agricultural ditches, wet meadows, and seeps near streams also provide habitat for the PMJM (USFWS, 2003). Areas located along intermittent streams, wet meadows and seeps are important in dry periods (USFWS, 1998). Trees, tall shrubs, short shrubs, an herbaceous layer and ground cover have been noted as necessary components for PMJM habitat (USFWS, 1998). PMJM habitat vegetation is multistoried with an understory of grasses, forbs, or a combination, and the shrub layer is often composed of willow (*Salix* spp.) (USFWS, 2008). The shrub and tree canopy can include snowberry (*Symphoricarpus* sp.), chokeberry (*Prunus virginiana*), hawthorn (*Crataegus* sp.), Gambell's oak (*Quercus gambelli*), alder (*Alnus incana*), river birch (*Betula fontinalis*), skunkbrush (*Rhus trilobata*), wild plum (*Prunus americana*), lead plant (*Amorpha fruticosa*), dogwood (*Cornus sericea*), and others (USFWS, 2003). Dense vegetation provides burrowing or nesting opportunities (USFWS, 1998). In a range-wide comparison study of existing habitat data in Colorado, meadow jumping mice were present, especially in areas 15 m to 25 m from streams, in locations with higher sub-shrub cover and higher plant species richness (USFWS, 2003). However, in a study comparing two capture sites, the site with lower species richness had more PMJM, indicating that abundance and density of riparian vegetation and not species richness alone is important to determining PMJM density (USFWS, 2003).

The PMJM use uplands for feeding and resting at least as far out as 100 meters from the 100-year floodplain (USFWS, 2003 and 2008). Uplands close to streams are also used for hibernacula (USFWS, 1998 and 2003). In a 24-hour period, the PMJM has been recorded to move over 1 km along streams, but the mouse does not appear to cross uplands to reach other drainages (USFWS, 1998 and 2003). Uplands used vary from open grassland to Ponderosa pine (*Pinus ponderosa*) woodlands, with Douglas fir (*Pseudostuga menziesii*), spruce (*Picea pungens*), and sometimes aspen (*Populus tremuloides*) (USFWS, 2003). Clumps of shrubs set back from the drainage, downed wood, and occasionally hayfields are also used (USFWS, 2003).

18.6. DIET

PMJM eat primarily arthropods and fungus when they emerge from hibernation, shifting to fungus, moss and pollen in July through August, and then consuming arthropods again in September (USFWS, 2003). Also present in scat samples were lamb's quarters (*Chenopodium* sp.), Russian thistle (*Salsola* sp.), sunflower (*Helianthu*s sp.), sedge (*Carex* sp.), mullein (*Verbascum* sp.), grasses (*Poa*, *Agropyron*, *Festuca*, *Bromus*, and *Sporobolus* spp.), bladderpod (*Lesquerella* sp.), rushes (*Equisetum* sp.), and seeds (USFWS, 2003). Willows (*Salix* sp.) were also found in Larimer county scats (USFWS, 2003). Fecal analysis, however, under-represents the more digestible parts of the diet, such as some vegetation (USFWS, 2003).

18.7. LIFE HISTORY AND REPRODUCTION

The PMJM may be active during the day but is primarily nocturnal or crepuscular (USFWS, 2008). They hibernate from September or October until May (USFWS, 2008). Adults accumulate fat stores earlier and so enter hibernation by the third week of August, while the young of the year wait until September or October (USFWS, 2003). Meadow jumping mice hibernate alone and dig their own hibernation burrows close to a stream, though they may be located close to the burrows of other mice (USFWS, 2003). Surveys have found hibernacula within 100 m of the 100-year floodplain of a main stream, but distances range from 0.6 m from the edge of the water to 76 m from the creek bed, while at other locations, burrows have been located between 1 m and 78 m, with one at 750 m, away from the creek (USFWS, 2003). Summer survival rates are lower than for winter, when the PMJM is hibernating (USFWS, 2003). Between June and August or October, survival is 9% to 37%, and from August or October to May or June is 9% to 76% (USFWS, 2003).

Little research has been conducted on the reproduction of PMJM mice but it is assumed to be similar to that of other subspecies of jumping mice (USFWS, 2003). Meadow jumping mice have 2 to 3 litters per year of 2 to 8 young each, with 5 on average (USFWS, 2003). The young mature in 4 weeks to adult size (USFWS, 2003). Mice born in June may reproduce at 2 months of age and mice born later in the summer reproduce the following year (USFWS, 2003).

Little is known about the behavior of meadow jumping mice (USFWS, 2003). Meadow jumping mice are not antagonistic towards each other, but do compete with meadow voles (USFWS, 2003). However, some social interactions have been observed. E.A. Preble noted two PMJM in a single aboveground nest, and several PMJM have been observed jumping in the air and squeaking close to each other (USFWS, 2003). Three radio collared PMJM were observed to travel from three separate nests to meet at a location for the month that their collars were active in 1999 and 2000 (USFWS, 2003). PMJM construct day nests under debris at the base of shrubs and trees or in open grasslands, made of grasses, forbs, sedges, rushes, and other plant material (USFWS, 2003). The nests are usually above ground but can be underground, are globular shapes or mats of litter, and are abandoned after a week (USFWS ,2003). Several nests can be used at the same time by one mouse at locations in both riparian and grassland communities (USFWS, 2003).

18.8. REFERENCES

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19. SALT CREEK TIGER BEETLE

19.1. SPECIES LISTING STATUS

The Salt Creek tiger beetle (*Cicindela nevadica lincolniana*) was listed as endangered on November 7, 2005 (50 FR 58335) by the U.S. Fish and Wildlife Service (USFWS) (USFWS, 2005 b). There is a recovery outline for the Salt Creek tiger beetle but no approved recovery plan (USFWS, 2010). Critical habitat was designated by the USFWS for the Salt Creek tiger beetle on April 6, 2010 (75 FR 17465) (USFWS, 2010).

19.2. DESCRIPTION

"Eighty-five species and more than 200 subspecies of tiger beetles of the genus *Cicindela* are known from the United States" (USFWS, 2005 a). "The Salt Creek tiger beetle is 1 of 32 species and subspecies of tiger beetles that have been recorded in Nebraska" (USFWS, 2005 a). The Salt Creek tiger beetle was originally described as a separate species, *C. lincolniana*. It was later identified as a subspecies of *C. nevadica*, *C. n. lincolniana*. "This is the currently accepted taxonomic classification" (USFWS, 2005 a).

"The Salt Creek tiger beetle is metallic brown to dark olive green above, with a metallic dark green underside, and measures 1.3 centimeters (cm) (0.5 inch (in.)) in total length. It is distinguished from other tiger beetles by its distinctive form and the color pattern on its dorsal and ventral surfaces. The elytra (wing covers) are metallic brown or dark olive green, and the head and pronotum (body segment behind the head) are dark brown" (USFWS, 2005 a and 2009 a).

19.3. DISTRIBUTION

"The Salt Creek tiger beetle has one of the most restricted ranges of any insect in the United States" "and the habitat currently occupied by the subspecies is highly limited and isolated" (USFWS, 2005 a and b; 2009 a; and 2010). It "is endemic to the saline wetlands of eastern Nebraska and associated streams in the northern third of Lancaster County and southern margin of Saunders County in Nebraska" (USFWS, 2005 a and b). "Intensive visual surveys conducted by" University of Nebraska-Lincoln (UNL) "entomologists since 1991 have documented Salt Creek tiger beetles at 13 sites in northern Lancaster County and the southern margin of Saunders County; although beetles were not found, nor were surveys conducted, at all sites in all years" (USFWS, 2005 a and 2009 a). It was "determined these 13 sites can be grouped into 6 discrete populations of Salt Creek tiger beetles" (USFWS, 2009 a). "Half of these populations have been extirpated since annual surveys began in 1991 (a population is considered extirpated after 2 consecutive years of negative survey results)" (USFWS, 2005 a and 2009 a). The following text describes each of the 6 populations in order of abundance.

1) "Little Salt Creek-Arbor Lake Population: The Little Salt Creek-Arbor Lake population contains the largest number of Salt Creek tiger beetles. This population occurs across a large, relatively intact saline wetland complex. The Little Salt Creek-Arbor Lake population is located approximately 1.6 kilometers (km) (1 mile (mi)) north of the Interstate 80 and North 27th Street Interchange on the northern city limits of Lincoln, Nebraska. It exists along the saline stream

edge of Little Salt Creek and on the barren salt flats of an adjacent saline wetland" (USFWS, 2009 a).

2) "Little Salt Creek-Roper Population: The Little Salt Creek-Roper population is the second largest remaining population of Salt Creek tiger beetles. This population is located immediately south of the Interstate 80 and North 27th Street Interchange, and approximately 1.6 km (1 mi) downstream of the Little Salt Creek-Arbor Lake population. Similar to the Little Salt Creek-Arbor Lake population, this population is associated with a saline wetland and stream complex located along Little Salt Creek" (USFWS, 2009 a).

3) "Upper Little Salt Creek-North Population: The Upper Little Salt Creek-North population is the third and last extant (i.e., existing) population of Salt Creek tiger beetles. This population is located approximately 7.2 km (4.5 mi) upstream from the Little Salt Creek-Arbor Lake population, and exists only on the saline stream edges of Little Salt Creek. Although former saline wetlands (i.e., barren salt flats) exist adjacent to this population, these wetlands are degraded (drained because of the incisement of Little Salt Creek) and no longer provide suitable habitat for the Salt Creek tiger beetle" (USFWS, 2009 a).

4) "Upper Little Salt Creek-South Population: The Upper Little Salt Creek-South population was located approximately 5 km (3 mi) upstream from the Little Salt Creek-Arbor Lake population. Degraded and non-functioning saline wetlands exist adjacent to Little Salt Creek. Although this site was once devoid of vegetation, saline stream edge habitats here are now vegetated. This population was surveyed at its only known site. The Upper Little Salt Creek-South population is considered to be extirpated; no Salt Creek tiger beetles have been found there since 1995" (USFWS, 2005 b and 2009 a).

5) "Jack Sinn Wildlife Management Area Population: This population was made up of one survey site located on Rock Creek in southern Saunders and northern Lancaster Counties, approximately 20 km (10 mi) northeast of the Little Salt Creek-Arbor Lake population. This population of Salt Creek tiger beetles was on property owned by the Nebraska Game and Parks Commission (NGPC). The Jack Sinn Wildlife Management Area Population is considered to be extirpated; no Salt Creek tiger beetles have been found there since 1998. Loss and fragmentation of barren salt flats and stream habitats likely resulted in the loss of this population" (USFWS, 2005 b and 2009 a)

6) "Capitol Beach Population: Capitol Beach was once one of the largest saline wetland tracts in eastern Nebraska, with a size of approximately 162 hectares (ha) (400 acres (ac))" (USFWS, 2009 a). "Although we do not have historic population estimates from this site, historic records indicate that Capitol Beach (i.e., Salt Basin) was once home to a large, sustainable population of Salt Creek tiger beetles. All that remains of suitable habitat at Capitol Beach now is a 10- to 20-meter (m) (40- to 50-foot (ft)) wide ditch that parallels Interstate 80 for approximately 0.8 km (0.5 mi), southwest of the Interstate 80 and Airport Interchange. No individuals have been found at Capitol Beach since 1998" leading to the conclusions "that this population is now extirpated" (USFWS, 2009 a).

Historical range
"All known Salt Creek tiger beetle specimens were collected in areas identified as either Salt Basin or Salt Lake (and now known as Capital Beach) or the City of Lincoln, Nebraska" (USFWS, 2005 a). "As recently as 1994, six populations of Salt Creek tiger beetles were distributed along Oak, Little Salt, and Rock Creeks" (USFWS, 2010). "Larvae have been found only on moist salt flats and salt-encrusted banks of Little Salt Creek in northern Lancaster County" "and saline wetlands associated with Rock Creek in the southern margin of Saunders County" (USFWS, 2009 a). "Since 1994, half of these populations have been extirpated and the remaining three extant populations are all located along a single waterway: Little Salt Creek" (USFWS, 2010).

Current range
Currently, the three extant populations of the Salt Creek tiger beetle only occur "along limited segments of Little Salt Creek and adjacent remnant salt marshes in Lancaster County, Nebraska" (USFWS, 2005 b and 2009 c). "The Salt Creek tiger beetle is currently restricted to" "approximately 6 ha (15 ac) of not highly degraded barren salt flats and saline stream edge habitats contained within the eastern Nebraska saline wetlands and associated saline streams (i.e., Little Salt Creek). Eighty-nine percent of all remaining Salt Creek tiger beetles are located approximately 1.6 km (1 mi) apart" (USFWS, 2005 b). Ninety-nine "percent of the remaining Salt Creek tiger beetles are located within a 1.6 km (1-mi) radius of the Interstate 80 and North 27th Street Interchange" (USFWS, 2009 a). "Although tiger beetles are mobile and can fly, the lack of suitable habitat along little Salt Creek within movement limits for the Salt Creek tiger beetle (distances of less than 805 m (2,640 ft)) prohibits recolonization of other suitable habitats on other stream segments" (USFWS, 2009 a).

19.4. USFWS CRITICAL HABITAT

Critical habitat was designated by the USFWS for the Salt Creek tiger beetle on April 6, 2010 (75 FR 17465) (USFWS, 2010). "In total, approximately 1,933 acres (ac) (782 hectares (ha)) located in Lancaster and Saunders Counties, Nebraska, fall within the boundaries of the critical habitat designation" (USFWS, 2009 b and 2010). The USFWS has designated the following primary constituent elements (PCEs) for the Salt Creek tiger beetle:

1) "Non-vegetated streambanks and mid-channel areas, located adjacent to and between saline stream edges and barren salt flats in saline and freshwater wetlands, in assemblages that are within 4 mi (6 km) of one another" (USFWS, 2010).

2) "Moist, barren salt flats with:
(a) Salmo and Saltillo soils or Lamo, Gibbon-Saltine, Obert, and Zoe soils with Salmo and Saltillo inclusions;
(b) Soil electroconductivity ranging from 2,016.0 mS/m to 2,992.2 mS/m;
(c) Soil moisture ranging from 43.5 percent to 51.7 percent; and
(d) Differential hydraulic pressures that create evaporation and result in exposed salt on soil surfaces" (USFWS, 201).

3) “A natural hydrologic regime resulting in annual high flows in saline streams in the early spring and summer, and natural elevation changes in groundwater levels to hydrate saline wetlands located on the floodplain” (USFWS, 2010).

4) “The presence of abundant and diverse flying and non-flying invertebrate prey species belonging to the orders Coleoptera, Orthoptera, Hemiptera, Hymenoptera, Odonata, Diptera, or Lepidoptera” (USFWS, 2010).

The “final designation of critical habitat includes four units – three occupied by the subspecies at the time of listing in 2005 (and currently occupied) and that contain the PCEs in the appropriate quantity and spatial arrangement essential to the conservation of the subspecies, and one area outside of the geographical area occupied at the time of listing (but known to be occupied as recently as 1998)” (USFWS, 2010). “The four areas designated as critical habitat are: (1) Upper Little Salt Creek North, (2) Little Salt Creek-Arbor Lake, (3) Little Salt Creek-Roper, and (4) Jack Sinn-Rock Creek” (USFWS, 2010).

Unit 1 – Upper Little Salt Creek North, Lancaster County, Nebraska

“Unit 1 consists of 327 ac (132 ha) of occupied Salt Creek tiger beetle habitat located approximately 5.5 mi (8.8 km) north of the Interstate 80 and North 27th Street interchange in Lincoln, Nebraska. It is 4.5 mi (7.2 km) upstream from Unit 2 (Little Salt Creek-Arbor Lake). The unit includes 3.1 mi (4.9 km) of Little Salt Creek, and consists of a saline stream and wetland complex extending along the floodplain of Little Salt Creek” (USFWS, 2010). This “unit provides habitat for the third largest existing population of the subspecies” (USFWS, 2010).

Unit 2 – Little Salt Creek-Arbor Lake, Lancaster County, Nebraska

“Unit 2 consists of 232 ac (94 ha) of occupied Salt Creek tiger beetle habitat located approximately 1 mi (1.6 km) north of the Interstate 80 and North 27th Street interchange on the northern city limits of Lincoln, Nebraska. The unit includes 1.53 mi (2.5 km) of Little Salt Creek, and has a large, relatively intact saline wetland and stream complex located within the Little Salt Creek floodplain” (USFWS, 2010). “This unit provides habitat for the largest population of Salt Creek tiger beetles” (USFWS, 2010).

Unit 3 – Little Salt Creek-Roper, Lancaster County, Nebraska

“Unit 3 consists of 346 ac (140 ha) of occupied Salt Creek tiger beetle habitat located immediately south of the Interstate 80 and North 27th Street interchange, north of the confluence of Little Salt and Salt Creeks, and approximately 1 mi (1.6 km) downstream of Unit 2 (Little Salt Creek-Arbor Lake). The unit includes 2.8 mi (4.5 km) of Little Salt Creek, and consists of a saline stream and wetland complex along the floodplain of Little Salt Creek” (USFWS, 2010).

Unit 4 – Jack Sinn-Rock Creek, Lancaster and Saunders Counties, Nebraska

"To reduce the risk of extinction of the Salt Creek tiger beetle" the USFWS "included an additional critical habitat area along Rock Creek, an area where the Salt Creek tiger beetle has been extirpated" (USFWS, 2010). "Unit 4 consists of 1,028 ac (416 ha) of unoccupied Salt Creek tiger beetle habitat located approximately 3 mi (5 km) southeast of the City of Ceresco, Nebraska, and east of Highway 77. It is 8.5 mi (13.7 km) upstream from the confluence of Rock and Salt Creeks" (USFWS, 2010). "Unit 4 includes 10.62 mi (17.1 km) of Rock Creek, and consists of a saline stream and wetland complex along the floodplain of Rock Creek" (USFWS, 2010).

19.5. HABITAT

The Salt Creek tiger beetle is an inhabitant of an extremely limited habitat type which includes "barren salt flats and saline stream edges of the saline wetlands and associated streams of eastern Nebraska" (USFWS, 2005 a). "The Salt Creek tiger beetle has very specific habitat requirements and occurs in saline wetlands – on exposed saline mud flats or along mud banks of streams and seeps that contain salt deposits and are sparsely vegetated" (USFWS, 2005 a and b; and 2009 a). "The Salt Creek tiger beetle is adapted to brief periods of high water inundation and highly saline conditions" (USFWS, 2005 b and 2009 a).

"Saline wetlands in eastern Nebraska occur in swales and depressions within the floodplain of Salt Creek and its tributaries in northern Lancaster and southern Saunders counties" (USFWS, 2005 a). At one time saline wetland "represented approximately 65,065 acres (ac) (26,342 hectares (ha)) within the floodplain of Salt Creek and its tributaries" (USFWS, 2010). It has been suggested that "the saline wetlands of eastern Nebraska receive their salinity from groundwater passing through an underground rock formation containing salt deposited by an ancient sea that once covered Nebraska" (USFWS, 2005 a and b). Saline wetlands of eastern Nebraska are characterized by saline soils and halophytes (plants adapted to saline conditions) and are often associated with a saline stream within the Salt Creek basin" (USFWS, 2005 a and b; and 2010). "Saline wetlands usually have a central area that is devoid of vegetation, and when dry, exhibit salt encrusted mudflats (barren salt flats)" (USFWS, 2005 a and b; and 2010). "This is the area used by the Salt Creek tiger beetle and numerous other saline-adapted insects" (USFWS, 2005 a and b).

"Salmo and Saltillo soils or Lamo, Gibbo-Saltine, Obert, and Zoe soils with Salmo and Saltillo inclusions provide salt in sufficient content to result in creation of salt barrens" (USFWS, 2010). "The Salt Creek tiger beetle is found in association with Salmo soils" "and probably is also found in association with Saltillo soils when barren salt flats are present" (USFWS, 2010). These soils "must have electroconductivity within the range of 2,016.0 mS/m to 2,992.2. mS/m to be used by the Salt Creek tiger beetle" because "Salt Creek tiger beetles were found using areas with a mean soil electroconductivity of 2,504.1" mS/m (USFS, 2010). "Salt Creek tiger beetles prefer mean soil moistures of 47.6 percent" (USFWS, 2010). "In addition, the process of evaporation also must occur to create exposed salt on the soil surface, resulting in the formation of barren salt flats" (USFWS, 201).

"Salt Creek tiger beetles require water to prevent larval desiccation, to maintain moist conditions at larval burrows for breeding and foraging activities, and for drinking" (USFWS, 2010). "Adult Salt Creek tiger beetles are confined to moist, muddy areas within a few meters of wetlands and stream edges, and larval burrows are only found in association with hydrated salt flats located along saline stream edges and saline wetlands" (USFWS, 2010). "The density of larval burrows decreases as vegetative cover increases" (USFWS, 2005 a and b). "The earliest emerging adults sometimes move from creek banks to the salt flats, presumably for early prey. However, a week or two into emergence, this behavior stops and adults are found almost exclusively in wetter areas, like creek edges or seeps along the creek" (USFWS, 2005 b). "During peak emergence, adults often wander from their emergence sites, presumably looking for new areas to colonize or search for prey" (USFWS, 2005 b). "It is during this time that adults often appear on sand or gravel bars, or on less saline soils along the stream" (USFWS, 2005 b).

Salt Creek tiger beetles require moist, open, barren salt flat areas for construction of larval burrows, thermoregulation, reproduction, foraging, and as dispersal corridors (USFWS, 2005 a and b; 2009 a; and 2010). "Salt Creek tiger beetles require non-vegetated stream banks and mid-channel areas, located adjacent to and between saline stream edges and barren salt flats in saline and freshwater wetlands, to allow movement for thermoregulation, hunting, and dispersal" (USFWS, 2010). "Salt Creek tiger beetles move between habitats consisting of saline wetlands and streams" "but open salt flats must be separated by a reasonable dispersal distance for the subspecies" (USFWS, 2010). "Two Salt Creek tiger beetles were documented moving distances of 1,509 and 1,198 feet (ft) (460 and 365 meters (m)), respectively, between a saline stream and saline wetland, through a small assemblage of saline banks, presumably to meet the life requirements described above" (USFWS, 2010). "Salt Creek tiger beetles also have been observed moving among salt flats and seeps along saline streams edges, using barren mid-channel and scoured bank habitats" (USFWS, 2010). "Mid-channel habitats and scoured bank lines are created through natural hydrological processes in streams with sufficient flow to cause sediment scour, transport, and redeposition. Salt Creek tiger beetles can disperse from one mid-channel bar to the next, which enables them to move up and down stream courses in response to habitat changes. These short-range movement corridors are necessary to repopulate areas extirpated due to habitat loss or extreme weather events" (USFWS, 2010).

"The Salt Creek tiger beetle probably has some long-range dispersal capability, an adaptation that has been documented in other tiger beetle species and is thought to enable colonization of transient or well-separated habitat that may be important for long-term species survival" (USFWS, 2010). Although there are "no data on long-range dispersal distances, the approximately 14-mi (22-km) separation between previously occupied habitats on Oak and Rock Creeks suggests that the Salt Creek tiger beetle may be capable of some level of aerial dispersal" (USFWS, 2010).

19.6. DIET

"The Salt Creek tiger beetle is an active, ground-dwelling, predatory insect that captures smaller or similar-sized arthropods in a "tiger-like" manner by grasping prey with its mandibles (mouthparts). Salt Creek tiger beetle larvae live in permanent burrows in the ground and are voracious predators, fastening themselves by means of abdominal hooks to the tops of their burrows and rapidly extending outward to seize passing prey" (USFWS, 2005 a and b). "The

small larva waits at the top of its burrow and ambushes prey that passes too near the burrow entrance. Once it has captured its prey, the larva pulls it into the burrow with the aid of three hooks on the dorsum of the fifth abdominal segment. These hooks also function to prevent the larva from being pulled from its burrow by larger prey or predators" (USFWS, 2005 a).

"Salt Creek tiger beetles require an abundant and diverse prey base consisting of flying and non-flying invertebrates. Tiger beetles have been observed to eat insects from many orders and families" (USFWS, 2010). "Most common are prey belonging to the orders Coleoptera, Orthoptera, Hemiptera, Hymenoptera, Odonata, Diptera, and Lepidoptera. Ants (Formicidae) are the most commonly observed prey of adult Salt Creek tiger beetles in the field" (USFWS, 2010). "Although adults can prey on a greater diversity of available prey than larvae, both adults and larvae are predators of similar-sized insects. Adults can capture flying insects; larval prey consists only of insects and arthropods living on the soil surface that wander within striking distance of their burrows" (USFWS, 2010). Typical prey of larval tiger beetles includes dragonflies, millipedes, earthworms, and amphibians" (USFWS, 2010).

19.7. LIFE HISTORY AND REPRODUCTION

"Adults are first observed as early as the end of May or as late as mid-June. Their numbers peak about 2 weeks after the first individuals appear and begin to feed and mate. After mating, the male rides atop the female, presumably preventing her from re-mating (a phenomenon known as mate-guarding). Females lay their eggs along sloping banks of creeks in areas where the salt layer is exposed in the soil horizon, on barren salt flats of saline wetlands, or along saline stream edges that are found in close association with water, near a seep or stream. It is believed that, during the night, female Salt Creek tiger beetles lay about 50 eggs" (USFWS, 2005 a and 2009 a). "After the egg hatches, the young larva digs a burrow and uses its head to scoop out soil. The larva takes these small mud clods to the burrow entrance and flips them outside the hole. Larval burrows occur within a few inches of the water's edge" (USFWS, 2005 a). "The larva will plug its burrow and retreat inside during periods of high water, very hot weather, or very dry conditions. As the larva grows, it molts to a larger instar (a life stage between molts), enlarging and lengthening its burrow. For the most part, a Salt Creek tiger beetle larva will remain active until cold weather, and then it plugs its burrow and hibernates. The Salt Creek tiger beetle has three instars. It probably overwinters as a third instar, pupates in May, and emerges as an adult. Before pupation, the larva seals its burrow entrance and digs a side chamber about 5 to 8 cm (2 to 3 in) below the soil surface. After the adult emerges from the pupa, it remains in the chamber until its cuticle hardens" (USFWS, 2005 a and b). It is speculated "that adult Salt Creek tiger beetles live for approximately 6 weeks" (USFWS, 2005 a). "The adult populations begin to disappear in late July, and by August, almost all of the adults have died" (USFWS, 2005 a and b; and 2009 a). "The Salt Creek tiger beetle has a 2-year life cycle" which is "not uncommon for tiger beetles" (USFWS, 2005 a and b; and 2009 a).

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20. SONORA TIGER SALAMANDER

20.1. SPECIES LISTING STATUS

The Sonora tiger salamander (*Ambystoma tigrinum stebbinsi*) was listed as endangered on January 6, 1997 (62 FR 665) by the U.S. Fish and Wildlife Service (USFWS) (USFWS, 1997). The recovery plan for the Sonora tiger salamander was approved on September 24, 2002 and published in October 2002 (USFWS, 2002). No critical habitat has been designated by the USFWS for the Sonora tiger salamander (USFWS, 2001 and 2002).

20.2. DESCRIPTION

The Sonora tiger salamander was described in 1954, "and subsequent field surveys and genetic analyses in the 1980's and 1990's reinforced the status of the Sonora tiger salamander as a distinct subspecies" (USFWS, 2002). Sonora tiger salamanders "are one of three subspecies of tiger salamander found in Arizona; the other two subspecies are Arizona tiger salamanders, *A. t. nebulosum*, and barred tiger salamanders, *A. t. mavortium*" (USFWS, 2002). There is evidence that suggests that the Sonora tiger salamander "is an endemic subspecies that evolved 'naturally,' and not as a result of human introductions of Arizona and barred tiger salamanders" (USFWS, 2002).

Sonora tiger salamanders begin their life "as jelly-coated eggs laid in water. They hatch and grow as aquatic larvae with gills, and then either mature as gilled aquatic adults called branchiate adults, neotenes, or paedomorphs, or metamorphose into terrestrial salamanders without gills" (USFWS, 2002). The larval stage of the Sonora tiger salamander is "aquatic with plume-like gills and well developed tail fins" (USFWS, 1997 and 2001). "Larvae are gray on the dorsum, head, and tail, with little pigment on the ventral surface" (USFWS, 2002). "They have external gills and hatch without legs, but grow hind and fore-limbs early in development" (USFWS, 2002). "Branchiate adults are gray to olive on the dorsum, head, and tail, and off-white to yellow on the ventral side" (USFWS, 2002). "They have three external gills on each side of their head, and measure between 65 and 165 mm SVL" (USFWS, 2002). The metamorphosed terrestrial Sonora tiger salamander is described as "a large salamander with light-colored blotches or reticulations on a dark background" (USFWS, 1997 and 2001). They "have a color pattern ranging from 'a reticulate pattern with an irregular network of light coloration, often coupled with light spots, on a dark background color', to a pattern of large, well-defined light or yellow spots or transverse bars, some of which encroach on the dark venter" (USFWS, 1997 and 2002). The snout-to-vent length (SVL) of metamorphosed individuals is 4.5-15.0 cm (1.8-5.9 inches) (USFWS, 2001 and 2002). The related California tiger salamander (*Ambystoma tigrinum californiense*) weighs 50 grams (The Sacramento Zoological Society, 2003).

20.3. DISTRIBUTION

Historical range

"Because so few sites were sampled prior to the 1980's, it is impossible to determine the historical distribution of Sonora tiger salamanders" (USFWS, 2002). "However, based on collections and observations of salamanders and the distribution of the plains grassland and adjacent Madrean evergreen woodlands" "in which the salamander has been found, the range of

the subspecies and its occupied and potentially occupied habitat is thought to extend from the crest of the Huachuca Mountains west to the crest of the Patagonia Mountains, including the" San Rafael Valley (SRV) "and adjacent foothills from its origins in Sonora north to the Canelo Hills" (USFWS, 2002). The Sonora tiger salamander "probably inhabited springs, streams, backwaters, and cienegas containing a permanent or nearly permanent water source in the area of San Rafael Valley, Arizona and Sonora, Mexico" (USFWS, 2001).

Current range

The Sonora tiger salamander was initially found "in ponds in the SRV, where most known Sonora tiger salamander populations exist" (USFWS, 2002). "The SRV lies between the Huachuca and Patagonia mountains, is bordered by the Canelo Hills to the north, and extends from Santa Cruz County in Arizona south for approximately 30 km into Sonora, Mexico" (USFWS, 2002). The Sonora tiger salamander "breeds at about 50 sites located within a 31 km (19 mile) radius of Lochiel, Arizona. All sites are within the headwaters of the Santa Cruz and San Pedro rivers. These include sites in San Rafael Valley, and the foothills of the Patagonia and Huachuca mountains, located in Santa Cruz and Cochise counties, Arizona, and Sonora, Mexico" (USFWS, 1997 and 2001).

As of 2002, this subspecies had "been found in 53 ponds in the San Rafael Valley of Arizona" (USFWS, 2002). About half of the 53 Sonora tiger salamander populations were discovered between 1999 and 2002, and only within this time period "were ponds with salamanders sampled consistently, making it difficult to determine trends in the proportion of ponds occupied by salamanders and suitability of those ponds for salamander breeding habitat" (USFWS, 2002). More data on the ecology of Sonora tiger salamanders are needed to make definitive statements about the long-term viability of Sonora tiger salamanders in the SRV (USFWS, 2002).

The Arizona Game and Fish Department (AGFD) "reported salamanders at Kunde Tank in the Redrock Canyon area north of the San Rafael Valley, which have tentatively been identified as *Ambystoma tigrinum stebbinsi* using genetic markers" (USFWS, 2007). "This finding would represent a range extension of approximately 6.8 miles north of the nearest known locality. Whether the subspecies dispersed to or was purposely introduced to this locality is unknown" (USFWS, 2007). The 5-year review states that this extension is unconfirmed (USFWS, 2007). It further states that, "the subspecies may be precluded from habitats at the southern portion of its range (Rancho Los Fresnos) by introduced, non-native predators" (USFWS, 2007).

"Surveys conducted by AGFD demonstrate that Sonora tiger salamanders are found at relatively few sites (37 of 139 stock tanks sampled during 2001-2006), consistent with the findings of the recovery plan. As described in the recovery plan, these sites are all impoundments created as livestock waters" (USFWS, 2007). "The historical habitats of the subspecies have either disappeared or are occupied by non-native fishes with which the Sonora tiger salamander cannot coexist" (USFWS, 2007).

20.4. USFWS CRITICAL HABITAT

No critical habitat designation has been made for the Sonora tiger salamander (USFWS, 1997 and 2002).

20.5. HABITAT

"Historically, the Sonora tiger salamander probably inhabited springs, cienegas, and possibly backwater pools where permanent or nearly permanent water allowed survival of mature branchiates" (USFWS, 1997). "The most important habitat requirement for Sonora tiger salamanders is the availability of standing water for breeding from January through June" (USFWS, 2002 and 2010). "This gives the salamanders enough time to breed, grow as larvae, and metamorphose before the pond dries" (USFWS, 2002). "Permanent bodies of water can be good breeding sites, except they often contain introduced fish and bullfrogs" which prey on salamanders (USFWS, 2002). "Erosion and arroyo cutting in the late 19th and early 20th centuries caused the SRV to dry and natural standing water habitats to disappear" (USFWS, 2002). "As a result, ponds created by ranchers for watering their cattle are now almost the only suitable breeding sites remaining" (USFWS, 1997, 2001, 2002, and 2010). "Aquatic and bank-line vegetation is missing from many ponds with salamanders, suggesting that these factors, although beneficial, are not necessary for the persistence of Sonora tiger salamanders" (USFWS, 2002). "Sonora tiger salamanders are tolerant of a wide range of temperatures, with temperatures in ponds varying from less than 5°C at the beginning of the year up to 30°C during the summer" (USFWS, 2002).

"Aquatic breeding habitats are used by all life stages; however, upland habitats are also used by terrestrial adults when not at the breeding ponds" (USFWS, 2002). "Adult metamorphosed salamanders inhabit adjacent grassland and oak woodland terrestrial habitat when not in ponds" (USFWS, 2002 and 2010). "The SRV is a broad, open valley that forms the headwaters of the Santa Cruz and San Pedro rivers. The dominant terrestrial plant community in the SRV is plains grassland" (USFWS, 2002). "Typical grasses include, among others, plains lovegrass, *Eragrostis intermedia*, side-oats grama, *Bouteloua curtipendula*, and curly mesquite, *Hilaria belangeri*. Within the grasslands, stringers or groves of cottonwoods and other wetland plants grow along some drainages and at ponds and springs. Upslope, at the edges of the SRV, juniper and several species of oaks form patchy woodlands or savannas that gradually give way to pine-oak woodlands at higher elevation" (USFWS, 2002). "Typical habitat ranges in elevation from 1,219 to 1,920 m (4,000 to 6,300 ft)" (USFWS, 2001). "Mammal burrows or loosened soils outside the pond likely provide refugia for metamorphosed salamanders in the terrestrial environment, enabling them to burrow underground to avoid extreme environmental conditions" (USFWS, 2002 and 2010). "Temperatures in the terrestrial environment range from below freezing to over 35°C" (USFWS, 2002). The terrestrial life stage of the Sonora tiger salamander likely "spends much of the year in rodent burrows, rotted logs, and other moist cover sites" (USFWS, 2001).

20.6. DIET

"Small tiger salamander larvae feed primarily on zooplankton (daphnids, copepods, bosminids, ostracods, etc.), but incorporate larger aquatic macroinvertebrates (chironomids, trichopterans, molluscs, zygopterans, etc.) into their diet as they grow" (USFWS, 2002 and 2010). "Branchiate adult tiger salamanders prey on zooplankton and a variety of macroinvertebrates, and eat salamander eggs and larvae during the breeding season" (USFWS, 2002 and 2010). "Outside the pond, metamorphosed tiger salamanders consume terrestrial insects and other macroinverterbates" (USFWS, 2002 and 2010). "In the pond, metamorphosed individuals eat aquatic macroinvertebrates and terrestrial insects that fall in the water" (USFWS, 2002).

20.7. LIFE HISTORY AND REPRODUCTION

Sonora tiger salamanders "begin breeding as early as January, and eggs can be found in ponds as late as May" (USFWS, 2002 and 2010). "Breeding after monsoon rains in July and August is rare" (USFWS, 2002 and 2010). "Terrestrial adults, which are often outside the pond during the rest of the year, return to ponds to breed, and branchiate adults in the pond also breed" (USFWS, 2002 and 2010). "Although there is little data on breeding site fidelity for Sonora tiger salamanders, other *Ambystoma* species usually return to breed in the ponds where they were born" (USFWS, 2002 and 2010). "After fertilization, female tiger salamanders lay 200 to 2000" jelly-coated eggs in water, "attaching them to aquatic vegetation, sticks, rocks, or substrate individually or in clumps of up to 50" (USFWS, 2002 and 2010). "Eggs take from 2-4 weeks to hatch; the colder the water, the longer the eggs take to develop" (USFWS, 2002 and 2010). "Transition probabilities from one life history stage to the next (e.g., likelihood of an egg becoming a larva or a larva becoming an adult) have not been determined for Sonora tiger salamanders in the field" (USFWS, 2002).

"Following hatching, Sonora tiger salamander larvae can develop to the minimum size necessary to metamorphose in as little as two months. However, because many SRV sites with salamanders hold water all year, larvae often remain in the water longer before metamorphosing, or develop into branchiate adults instead of metamorphosing" (USFWS, 2002 and 2010). "Salamander larvae in permanent water often develop into branchiate adults that stay in the pond throughout their lives" (USFWS, 2002). "SRV ponds that do not dry support up to several hundred branchiates" (USFWS, 2002). "Branchiate adults can sometimes metamorphose into the terrestrial form in response to stressful events such as pond drying, but branchiates are often unable to complete metamorphosis or even die during the process" (USFWS, 2002). "The lifespan of branchiate adult Sonora tiger salamanders in the field is not known, but Arizona tiger salamanders have survived as branchiates for up to 8 years in captivity" (USFWS, 2002). "The reason that branchiates have not been kept longer is that they eventually metamorphose, even after years as branchiates" (USFWS, 2002).

"When larvae are large enough (>45 mm SVL), they can metamorphose into terrestrial salamanders" (USFWS, 2002). "The proportion of larvae that metamorphose depends heavily on pond permanence" (USFWS, 2002). "In ponds that dry, all larvae that are large enough metamorphose" (USFWS, 2002). "In ponds that do not dry, approximately 17 percent of larvae that are large enough metamorphose" (USFWS, 2002). "The number of metamorphs in each population is difficult to estimate because most metamorphosed salamanders leave the pond after breeding, and" it is not known "what fraction of salamanders in the terrestrial environment return each year to breed" (USFWS, 2002). Metamorphs are "the only life history stage that can disperse from pond to pond and establish new populations" (USFWS, 2002). "Metamorphs often re-populate ponds following drying or disease outbreaks that kill most branchiate adults and larvae" (USFWS, 2002).

"The ecology of Sonora tiger salamanders outside of ponds has been little studied, but other *Ambystoma* species spend much of their time in mammal burrows or buried in soft earth to avoid environmental extremes common on land" (USFWS, 2002). "The dispersal patterns of Sonora tiger salamanders, which are critical for determining metapopulation dynamics, are also

unknown" (USFWS, 2002 and 2010). "Radio-tracking of other *Ambystoma* species has shown that they frequently move up to 250 m from their breeding ponds" (USFWS, 2002 and 2010). However, *Ambystoma* occasionally disperse longer distances" and have been "found in ponds 1.5 to 2.0 km from their natal pond, and 3-4 km from the nearest likely natal site" (USFWS, 2002 and 2010). The 5-year review stated that new research was available on "upland use by terrestrial adult California tiger salamanders (*Ambystoma californiense*)" (USFWS, 2007). This related species "may provide some implications for management of upland sites as habitat for terrestrial Sonora tiger salamanders" (USFWS, 2007). Research performed in 2005 on California tiger salamanders "excavated burrows and found tiger salamanders at a mean distance of 356 m, but as far away as 510 m, from the nearest breeding pond in gopher burrows, riprap, and in rocks associated with gopher burrows" (USFWS, 2007). This research suggested that "upland habitat should be protected and managed for healthy small mammal populations within 500 m of breeding sites" (USFWS, 2007). "The lifespan of metamorphosed Sonora tiger salamanders in the wild is not known, but metamorphosed Arizona tiger salamanders have survived 17 years in captivity" (USFWS, 2002).

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21. WHOOPING CRANE

21.1. SPECIES LISTING STATUS

The whooping crane (*Grus americana*) was listed as an endangered species on March 11, 1967 (32 FR 4001) by the U.S. Fish and Wildlife Service (USFWS) (USFWS, 1967). In Canada, the species was listed in 1978 by the Committee on the Status of Endangered Wildlife (COSEWIC) (Canadian Wildlife Service (CWS) and USFWS, 2007). A recovery plan for the whooping crane was approved by the USFWS on January 23, 1980, the first revision was approved on December 23, 1986, and the second revision was approved on February 11, 1994 (CWS and USFWS, 2007). The third and current revision, the International Recovery Plan for the Whooping Crane, is a combined effort of the USFWS and the Canadian Wildlife Service dated May 27, 2007 (CWS and USFWS, 2007). Critical habitat for the whooping crane was designated by the USFWS in 1978 (43 FR 20938) (USFWS, 1978). A 5-year review of the species was initiated by the USFWS on March 29, 2010 (75 FR 15454) (USFWS, 2010).

21.2. DESCRIPTION

The whooping crane is in the family *Gruidae* (CWS and USFWS, 2007). The common name likely originated from the loud, single note call of alarmed cranes (WDNR, 2006). The whooping crane is the tallest bird in North America. Males reach 1.5 meters (5 ft) and captive bird weight averages 7.3 kg (16 lbs), while females are shorter and captive bird weight averages 6.4 kg (14 lbs) (CWS and USFWS, 2007). Maximum weights are observed in December and January and minimum weights are observed in July and August (CWS and USFWS, 2007). Crane species generally weigh between 100 and 230 grams at birth (Ellis, et al., 1996) Weights of captive whooping crane chicks have been observed at 100 to 150 grams at birth, after which they experience rapid growth, reaching 1,750-2,500 grams at 40 days, 4,300-4,950 grams at 100 days, and are near adult size of 5,700-6,700 grams at 250 days (Lewis, 1995). Wild chicks weigh 6 to 10% more than captive chicks (Lewis, 1995). Whooping cranes are sexually monomorphic and are predominantly white with black primary feathers on the wing tips and red post occipital skin on the head, while chicks are mottled cinnamon to rust in color (White, 2001). The crane has long legs and a long sinuous neck, with a wingspan of 7.5 feet (USFWS, 1983). The guard and unison calls are distinct between the sexes (CWS and USFWS, 2007). The whooping crane can live from 35 to 40 years in captivity, and are estimated to live 30 years in the wild (CWS and USFWS, 2007).

21.3. DISTRIBUTION

Historical Range

The historical range of the whooping crane extended from the Arctic coast down to central Mexico and from Utah east to New Jersey, South Carolina, Georgia, and Florida (CWS and USFWS, 2007). Whooping crane fossils from the Pleistocene era found in California, Kansas, and Florida indicate that the range may have been even wider (CWS and USFWS, 2007). It is estimated, based upon current densities and the known historical distribution, that there could have been 10,000 whooping cranes in North America prior to European settlement, although they may never have formed large flocks and thus reports of sightings were infrequent (CWS and

USFWS, 2007). Historically, there have been migrating and non-migrating populations of whooping cranes (Lewis, 1995). In the 19th and 20th centuries, the nesting area extended from central Illinois to northwestern Iowa and Minnesota, to northeastern North Dakota to southwestern Manitoba, southern Saskatchewan, and east central Alberta (CWS and USFWS, 2007). Wintering grounds were tall grass prairies in southwestern Louisiana, the Gulf coast and interior tablelands of Texas, and the Rio Grande Delta and central high plateaus of Mexico (CWS and USFWS, 2007). Two distinct migration routes began in these wintering grounds, one from Louisiana to Iowa, Illinois, Minnesota, North Dakota, and Manitoba, and the other from Texas and the Rio Grande Delta to North Dakota, the Northwest Territories, and Canadian Provinces (CWS and USFWS, 2007). Additionally, cranes nested in the Hudson Bay area of Canada, migrated across the Appalachians, and wintered on the Atlantic Coast of the United States in Cape May and Great Egg Bay in New Jersey, the Waccamaw River in South Carolina, the Savannah and Altamaha river deltas and St. Simon's Island in Georgia, and St. Augustine Florida, as well as in Mobile Bay, Alabama and Bay St. Louis, Mississippi (CWS and USFWS, 2007). There are records of crane sightings from inland areas of southeastern states including Arkansas, Alabama, Missouri, and Kentucky, although it is not clear whether these birds were wintering, non-migratory remnants, or wandering (CWS and USFWS, 2007).

Current Distribution

By the 1890's the crane was extirpated from its historic breeding range in the north central United States and by 1944 a total of only 21 cranes were left between two populations, three birds in the non-migratory southwestern Louisiana population and 18 birds in the migratory Aransas Wood Buffalo Population (AWBP) (CWS and USFWS, 2007). Currently, three populations of whooping cranes exist in the wild, and include the AWBP, the only self sustaining wild population, the introduced Florida Population (FP), and the introduced Eastern Migratory Population (EMP) (CWS and USFWS, 2007). The Florida Population (FP) is designated experimental non-essential by the USFWS (58 FR 5647-5658) (USFWS, 1993 and CWS and USFWS, 2007). The EMP is also designated experimental non-essential by the USFWS (66 FR 33903-33917) (USFWS, 2001 and WDNR, 2006). Additionally, as of 2006, there were 135 cranes in captive populations in nine locations in the United States and Canada (CWS and USFWS, 2007).

The AWBP nests in the Wood Buffalo National Park (WBNP) located in the Northwest Territories of Canada and in Alberta, Canada (CWS and USFWS, 2007). This population migrates south to a stop over location in Saskatchewan, before heading south through eastern Montana, North Dakota, South Dakota, Nebraska, Kansas, Oklahoma, and Texas to the winter grounds of Aransas National Wildlife Refuge (ANWR) on the Gulf Coast of Texas (CWS and USFWS, 2007). The ANWR is a marshy estuarine area 48-56 km long with bays and tidal flats extending from San Jose Island and Lamar Peninsula to the south up to Welder Point and Matagorda Island to the north (CWS and USFWS, 2007). As of February 2006, there were 215 individuals in this population (CWS and USFWS, 2007). In October 2009 there were 247 birds in the AWBP (USFWS, 2009).

The FP is non-migratory and located on the Kissimmee Prairie, an area of predominantly freshwater marsh and open grassland, located south of Orlando in Osceola and Polk counties (CWS and USFWS, 2007). As of February 2006, there were 59 captive raised individuals in this

population (CWS and USFWS, 2007). In October 2009, the population had declined to 29 individual birds (USFWS, 2009).

The EMP was reintroduced to the Necedah National Wildlife Refuge (NWR) in Wisconsin with captive birds trained by ultra-light aircraft to migrate to Chassahowitzka National Wildlife Refuge on the Gulf Coast of Florida (CWS and USFWS, 2007). As of February 2006, there were 64 captive raised individuals in this population (CWS and USFWS, 2007). In October 2009, there were 106 birds in this population (USFWS, 2009).

An experimental non-essential migratory population of Rocky Mountain Whooping cranes was introduced by placing whooping crane eggs into sandhill crane nests in a cross fostering program (62 FR 38932-38939) (USFWS, 1997). The cranes used summer grounds in Idaho, Wyoming, Montana, and Utah, with a stop-over at Monte Vista N W R in Colorado, and wintering grounds in New Mexico (CWS and USFWS, 2007). No Rocky Mountain whooping cranes survived from the introduction attempts and the last one disappeared in 2002 (CWS and USFWS, 2007).

In addition, as of February 2006 there were 135 whooping cranes in captivity in nine locations in North America, including the Patuxent Wildlife Research Center (PWRC) in Laurel, Maryland, the International Crane Foundation (ICF) in Baraboo, Wisconsin, the Audubon Species Survival Center (SSC), in Belle Chase, Louisiana, the Devonian Wildlife Conservation Center and the Calgary Zoo, in Alberta, Canada, the San Antonio Zoo (SAZ) in San Antonio, Texas, the New Orleans Zoo in New Orleans, Louisiana, the Lowry Park Zoo in Tampa, Florida, and the Homosassa Springs State Wildlife Refuge, in Homosassa, Florida (CWS and USFWS, 2007).

21.4. USFWS CRITICAL HABITAT

As summarized in the 2007 International Recovery Plan for the Whooping Crane, critical habitat is defined by the U.S. Endangered Species Act as "habitat that contains those physical or biological features, essential to the conservation of the species, which may require special management considerations or protection (CWS and USFWS, 2007)." Critical habitat was designated in 1978 (43 FR 20938), originally in nine areas in seven states which had included Monte Vista NWR and Alamosa NWR in Colorado, Grays Lake NWR and vicinity in Idaho, and Bosque del Apache NWR in New Mexico (USFWS, 1978). These four critical habitat designations were removed with the failure of the Rocky Mountain population reintroduction (62 FR 38932) (USFWS, 1997). Critical habitat is currently in effect in five areas in four states in the U.S. and include the crane's only wintering grounds at ANWR in Texas, migration stopovers at Cheyenne Bottoms State Waterfowl Management Area and Quivira NWR in Kansas, Platte River Bottoms between Lexington and Denman, Nebraska, and Salt Plains NWR in Oklahoma (CWS and USFWS, 2007). Additional habitat was proposed in 1979 (44 FR 12382) but was withdrawn (CWS and USFWS, 2007).

The USFWS considers five requirements for survival and recovery of the species when designating critical habitat. These requirements generally include space for individual and population growth, nutritional and physiological requirements, shelter, sites for reproduction, and habitats protected from disturbance or representative of the species' geographic distribution (USFWS, 1978). Whooping cranes are territorial; pairs require hundreds of acres of undisturbed wetland habitat and unmated birds require undefended territory in ANWR (USFWS, 1978). The

refuges in Idaho, Colorado, and New Mexico were originally designated as part of the critical habitat to add space for a growing new flock (USFWS, 1978). However, these refuges were later removed from the critical habitat designation due to the failure of whooping crane reintroduction in these areas (USFWS, 1997). All of the designated critical habitat areas provide for the nutritional and physiological needs of the cranes (USFWS, 1978). This includes the tidal flats and marshes of Aransas that provide crustaceans and mollusks, the spring migration marshes that provide frogs, fish, crayfish, and other small animals, and the fall migration stopover locations where cranes feed primarily on waste grains and insects (USFWS, 1978). Whooping cranes require open spaces, primarily sand and gravel bars in rivers and lakes, for nightly roosting (USFWS, 1978). These features appear to be one of the major factors in the selection of habitat by cranes (USFWS, 1978). With regard to breeding, the Grays Lake NWR in Idaho was previously designated as critical habitat in order to provide additional nesting habitat (USFWS, 1978). However, all of the designated critical habitat provides areas essential to rearing young (USFWS, 1978). Cranes also require undisturbed wetland roosting sites and do not tolerate disturbance to themselves or their habitat (USFWS, 1978).

Critical habitat in Canada will be designated upon publication of a final Canadian Species at Risk Act (SARA) Recovery Strategy or Action Plan on the SARA Public Registry, and may include the marshes of the WBNP breeding grounds located in the northeast corner of the park and adjacent marshes, as well as potential reintroduction marsh areas in other locations (CWS and USFWS, 2007). The breeding habitat in the WBNP is already protected by the Canada National Parks Act and by designations as a Wetland of International Importance by the Ramsar Convention and Important Bird Area by Birdlife International (CWS and USFWS, 2007).

21.5. HABITAT

The whooping crane depends upon different habitats for nesting, migrating, and for wintering grounds. For the AWBP cranes, nesting habitat once included wetlands in prairies and aspen parkland, but currently the cranes nest primarily in the Wood Buffalo National Park located in the Northwest Territories and Alberta, Canada (CWS and USFWS, 2007). The cranes nest between the headwaters of four rivers, the Nyarling, Sass, Klewi, and Little Buffalo, which is a poorly drained area of potholes interspersed with ridges covered in lichen and sphagnum moss that supports trees and shrubs such as tamarack (*Larix laricina*), white spruce (*Picea alauca*), black spruce (*Picea mariana*), willow (*Salix* spp.), dwarf birch (*Betula glandulosa*), Labrador tea (*Ledum groenlandicum*), and bearberry (*Arctosta phylos uva-ursi*) (CWS and USFWS, 2007). Nest sites are predominantly located in shallow ponds as well as potholes, which vary in size and depth and are filled with emergent vegetation dominated by bulrush (*Scirpus validus*) (CWS and USFWS, 2007).

While AWBP cranes migrate, they stop frequently in wetland mosaic areas (except in Nebraska) to feed in croplands and emergent wetlands and to roost in seasonally and semipermanently flooded palustrine wetlands that vary in average size from less than 0.5 ha to 508 ha, and are within 1 km away from a feeding site (CWS and USFWS, 2007). Families choose more vegetated wetlands where they also feed, but non-families choose less vegetated wetlands and feed in croplands (CWS and USFWS, 2007). These areas are found in Quivira NWR and Cheyenne Bottoms State Wildlife Refuge in Kansas, Salt Plains NWR in Oklahoma, Last Mountain Lake NWA in Saskatchewan, and the edges of reservoirs in the Dakotas (CWS and

USFWS, 2007). Riverine areas used in Nebraska include the Platte, North and Middle Loup, and Niobrara Rivers, in addition to the South Saskatchewan River in Saskatchewan, the Missouri River and North Dakota and the Red River in Texas, which all provide wide channels with submerged sandbars (CWS and USFWS, 2007).

The salt flats of the Aransas National Wildlife Refuge on the Gulf Coast of Texas provide the majority of AWBP wintering habitat (CWS and USFWS, 2007). The marshes and inland grasslands are used by the cranes (CWS and USFWS, 2007). Dominant marsh species include salt grass (*Distichlis spicata*), saltwort (*Batis maritima*), smooth cordgrass (*Spartina alterniflora*), and sea ox-eye (*Borrichia frutescens*), while the grasslands are intermixed with swales, ponds, and Oak Savanna that include live oak (*Quercus virginiana*), redbay (*Persea borbonia*), and bluestem (*Andropogon* spp) (CWS and USFWS, 2007).

The EMP has been observed to nest in diverse wetland habitats in Wisconsin, Minnesota, northeastern Iowa, Illinois, and Michigan (CWS and USFWS, 2007). In Wisconsin, cranes are found mainly in the lower two-thirds of the state, and suitable habitat has been observed to include any wetland with minimal disturbance, even small isolated ones, as well as lacustrine marshes, riverine wetlands, sloughs, and oxbow lakes (CWS and USFWS, 2007). At the Necedah NWR, the cranes use shallow waters and emergent wetlands on the borders of impoundments as well as palustrine and upland scrub-shrub areas associated with the marshes; some cranes also use the sedge meadows (WDNR, 2006). In late spring and early summer following prescribed burns that expose invertebrates the cranes will use oak savannahs, and in midsummer they forage in upland scrub areas for blueberries and sarsaparilla (WDNR, 2006). Cranes have also been introduced into nesting habitat in other parks and refuges in Wisconsin (WDNR, 2006).

The EMP cranes stop opportunistically at wetlands at the end of the day during migration, including natural or managed palustrine, lacustrine, and riverine wetlands including river sandbars, as well as man-made features such as farm ponds, reservoirs, reclaimed surface mines, catfish farms, and flooded agricultural fields (WDNR, 2006). If whooping cranes associate with sandhill cranes, they stop at Jasper-Pulaski State Fish and Wildlife Area in Indiana and at Hiwassee State Wildlife Refuge in Tennessee (WDNR, 2006). The cranes feed in nearby harvested grain fields (WDNR, 2006).

The EMP was trained to winter in the salt marshes of the Chassahowitzka National Wildlife Refuge on the Gulf Coast of Florida (CWS and USFWS, 2007). However, tidal and other habitat conditions have prevented territory establishment by returning birds, and the cranes have moved inland to use freshwater habitat, while some have been observed to winter over in South Carolina, North Carolina, and Tennessee (WDNR, 2006). The cranes choose smaller highland or flatwood marshes adjacent to cattle pastures where they forage (WDNR, 2006). The most important aspect of wetland choice is shallow water for roosting, whether it's a flag marsh, saw grass marsh, cattail marsh, or wet prairie (WDNR, 2006).

The non-migratory FP cranes on the Kissimmee Prairie live in saw palmetto (*Serenoa repens*) grassland which is interspersed with shallow wetlands and lakes (Lewis, 1995). Much of the prairie is improved livestock pasture used by the cranes for foraging (CWS, USFWS, 2007).

They also forage in harvested corn and peanut fields (WDNR, 2006). The Florida cranes are upland grassland and wetland dwellers, feeding in uplands at the margins of open grasslands with low growth vegetation on mast crops such as dewberries (*Rhus* spp.) and acorns (*Quercus* spp.) (WDNR, 2006). The cranes roost in emergent palustrine wetlands dominated with pickerelweed (*Pontederia cordata*) and maidencane (*Panicum hemitomon*) with firm, shallow bottoms and surrounded by denser vegetation (WDNR, 2006). The marshes are also used to forage with the young chicks in the mix of open shallow water and vegetation that allows for movement and feeding (WDNR, 2006).

21.6. DIET

Whooping cranes are omnivorous and forage mainly in brackish bays, marshes, and salt flats for larval and nymphal insects, frogs, rodents, berries, small birds and minnows in summer and blue crabs (*Callinectes sapidus*), numerous species of clams, and wolfberry (*Lycium carolinianum*) in the winter (CWS and USFWS, 2007). When water levels are low in late winter due to the tides or drought, the cranes move from feeding on blue crabs and wolfberry in the flooded tidal flats to the shallow bays to feed on clams (CWS and USFWS, 2007). During migration, cranes eat mainly waste agricultural grains like barely, but also frogs, fish, insects, tubers, and crayfish (CWS and USFWS, 2007). Cranes will forage on occasion in uplands for fresh water, acorns, snails, crayfish, and insects, particularly when they are flooded, open due to burning, or when there is less food available in the salt flats and marshes (CWS and USFWS, 2007).

Chicks beg for food and are initially fed earthworms and insects by their parents (Lewis, 1995). As the chick grows, the size and variety of food increases (Lewis, 1995).

21.7. LIFE HISTORY AND REPRODUCTION

Whooping cranes nest at the average age of 5 years, although 3 year olds have been observed to nest (CWS and USFWS, 2007). The cranes are monogamous and form pairs in sub-adult flocks on wintering grounds, during spring migration, or at the breeding grounds in a bonding process that can be lengthy or occur quickly (CWS and USFWS, 2007). The cranes have courtship rituals that include calling, flapping wings, head bowing, and leaping in the air (USFWS, 1983). The crane is a territorial nester and returns to the same area each year, which in WBNP averages 4.1 km^2 (2.5 mi^2) in size (CWS and USFWS, 2007). Most clutches contain 2 eggs laid from April to mid-May at breeding grounds located in WBNP or in Wisconsin, Minnesota, northeastern Iowa, Illinois, and Michigan (CWS and USFWS, 2007). Incubation lasts for a month and begins when the first egg is laid, and the second egg, laid 48-60 hours later, only hatches if the first egg does not hatch or the new hatchling dies (CWS and USFWS, 2007). The parents and young return to the nest at night for 3 to 4 days after hatching, and venture out to within an average of 1.8 km away from the nest site for the first twenty days (CWS and USFWS, 2007). Juveniles and sub-adults stay in the general area of the nest site at the breeding grounds for the remainder of the summer either alone, in pairs, or in small groups (CWS and USFWS, 2007). Pairs with young are among the last to leave at the end of the summer for the autumn migration to the crane's wintering grounds (CWS and USFWS, 2007).

The molt takes place after the offspring fledge, and before fall migration in the summer months for 2 to 3 year old birds, during which time they loose their primary and secondary feathers and are unable to fly for four to six weeks (WDNR, 2006). The cranes become reclusive during this

time and stay in marshes and lake edges (WDNR, 2006). A molt of contour plumage occurs every summer and early fall for all cranes (WDNR, 2006).

AWBP cranes migrate in the fall during a period beginning in mid-September and ending by mid November to winter at the Aransas National Wildlife Refuge (ANWR) (CWS and USFWS, 2007). The EMP cranes migrate from late October to early December (WDNR, 2006). Migration is not an innate behavior, but learned from following parents and other birds (Lewis, 1995). Prior to the migration, the restless cranes run, leap into the air, bow their heads, fly, and call in unison (CWS and USFWS, 2007). Cranes migrate alone, in pairs, or small groups during the day and stop over to feed and rest (CWS and USFWS, 2007).

The AWBP cranes stop in northwest Saskatchewan or northeast Alberta, Canada, where they stay for two to four weeks to forage on waste grain in agricultural fields and roost in wetlands before completing the rest of the trip in a week, depending upon weather (CWS and USFWS, 2007). At ANWR, cranes occupy territories comprised of pairs and family groups (CWS and USFWS, 2007). In spring, the migration begins between March 25 and April 15 takes and less time than the fall migration (between two to four weeks) and there is no known stop over location (CWS and USFWS, 2007). The EMP cranes leave their wintering grounds between the end of February and mid-April (WDNR, 2006). Young from the previous year are separated from their parents during the migration or soon after reaching the breeding grounds (CWS and USFWS, 2007).

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