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Florida Natural Areas Inventory  
2008 Rare Animals on BRP Inventory

Listed and Rare Animal  
Inventory of Babcock Ranch Preserve

Final Report

May 2008

Florida Natural Areas Inventory  
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## INTRODUCTION

Babcock Ranch Preserve (BRP) is a 73,239-acre property in Charlotte and Lee counties. The majority of BRP is located in southeastern Charlotte County and a smaller portion in northeastern Lee County. Babcock Ranch Preserve is located approximately 17.5 miles east of Punta Gorda, Florida, five miles north of the Caloosahatchee River, and 34.5 miles west of Lake Okeechobee. The western boundary of BRP is separated from the Fred C. Babcock-Cecil M. Webb Wildlife Management Area by State Road 31. The northernmost boundary is delineated by County Road 74 (Bermont Rd.). The eastern boundary extends along the Charlotte and Glades County line. The southernmost boundary lies one half mile north of County Road 78 (North River Rd.). Babcock Ranch Preserve is within the South Florida Water Management District (SFWMD) Caloosahatchee River Watershed.

Florida Natural Areas Inventory (FNAI) conducted a comprehensive survey for rare animal species on Babcock Ranch Preserve during 2007-2008. Thirty-eight rare animals were specifically surveyed for (Table 1). The target list is comprised of rare animal species whose known range overlaps with BRP, the species preferred habitat is present on BRP, and there was potential for the species to be detected with a reasonable amount of survey effort.

Table 1. Rare animals searched for on Babcock Ranch Preserve, 2007-2008.

Scientific name	Common name	Global rank	State rank	Federal status	State status
<b>Amphibia</b>		<b>Amphibians</b>			
<i>Rana capito</i>	gopher frog	G2	S3	N	LS
<b>Reptilia</b>		<b>Reptiles</b>			
<i>Crotalus adamanteus</i>	Eastern diamondback rattlesnake	G4	S3	N	N
<i>Drymarchon couperi</i>	Eastern indigo snake	G4	T3S3	LT	LT
<i>Gopherus polyphemus</i>	Gopher tortoise	G2	S3	N	LS
<i>Lampropeltis calligaster</i>	Mole kingsnake	G5	S2S3	N	N
<i>Lampropeltis getula</i>	Common kingsnake	G5	S2S3	N	N
<i>Pituophis melanoleucus</i>	Florida pine snake	G4	T3S3	N	LS
<i>Sceloporus woodi</i>	Scrub lizard	G3	S3	N	N
<b>Aves</b>		<b>Birds</b>			
<i>Accipiter cooperii</i>	Cooper's Hawk	G5	S3	N	N
<i>Aimophila aestivalis</i>	Bachman's Sparrow	G3	S3	N	N
<i>Ammodramus savannarum floridanus</i>	Florida Grasshopper Sparrow	G5T1	S1	LE	LE
<i>Aphelocoma coerulescens</i>	Florida Scrub-jay	G2	S2	LT	LT
<i>Aramus guaranauna</i>	Limpkin	G5	S3	N	LS
<i>Ardea alba</i>	Great Egret	G5	S4	N	N
<i>Athene cunicularia floridana</i>	Florida Burrowing Owl	G4T3	S3	N	LS
<i>Buteo brachyurus</i>	Short-tailed Hawk	G4G5	S1	N	N
<i>Caracara cheriway</i>	Crested Caracara	G5	S2	LT	LT
<i>Egretta caerulea</i>	Little Blue Heron	G5	S4	N	LS
<i>Egretta thula</i>	Snowy Egret	G5	S3	N	LS
<i>Egretta tricolor</i>	Tricolored Heron	G5	S4	N	LS
<i>Elanoides forficatus</i>	Swallow-tailed Kite	G5	S2	N	N
<i>Eudocimus albus</i>	White Ibis	G5	S4	N	LS
<i>Falco sparverius paulus</i>	Southeastern American Kestrel	G5T4	S3	N	LT
<i>Grus canadensis pratensis</i>	Florida Sandhill Crane	G5T2T3	S2S3	N	LT
<i>Haliaeetus leucocephalus</i>	Bald Eagle	G5	S3	N	N
<i>Ixobrychus exilis</i>	Least Bittern	G5	S4	N	N
<i>Mycteria americana</i>	Wood Stork	G4	S2	LE	LE
<i>Nyctanassa violacea</i>	Yellow-crowned Night-heron	G5	S3	N	N
<i>Nycticorax nycticorax</i>	Black-crowned Night-heron	G5	S3	N	N
<i>Picoides borealis</i>	Red-cockaded Woodpecker	G3	S2	LE	LS
<i>Picoides villosus</i>	Hairy Woodpecker	G5	S3	N	N
<i>Plegadis falcinellus</i>	Glossy Ibis	G5	S3	N	N
<b>Mammalia</b>		<b>Mammals</b>			
<i>Blarina carolinensis shermani</i>	Sherman's short-tailed shrew	G5T1	S1	N	LS
<i>Corynorhinus rafinesquii</i>	Rafinesque's big-eared bat	G3G4	S2	N	N
<i>Eumops floridanus</i>	Florida bonneted bat	G1	S1	N	LE
<i>Neofiber alleni</i>	Round-tailed muskrat	G3	S3	N	N
<i>Podomys floridanus</i>	Florida mouse	G3	S3	N	LS
<i>Sciurus niger shermani</i>	Sherman's fox squirrel	G5T3	S3	N	LS



## METHODS AND RESULTS

FNAI staff conducted a comprehensive inventory for rare animal species at Babcock Ranch Reserve (BRP) covering all seasons and appropriate habitats. Using habitat information from a preliminary landcover map, published literature, the FNAI database, and our expertise, FNAI staff created a list of rare animals that may occur on Babcock Ranch. An initial reconnaissance of the survey area was conducted to confirm the potential habitats and their condition, and thus the site's potential for rare animal species. Survey sites were then identified using ArcGIS by selecting the appropriate habitat polygons in the preliminary landcover map for each rare animal species. The survey plan was developed by using the reconnaissance information, the preliminary landcover map, and the best season of survey for each animal species. These procedures directed the site visits and allowed focus at the appropriate time on the rare species most likely to occur on BRP. All sampling was conducted in accordance with sampling protocol # 0130 reviewed by the FSU Animal Care and Use Committee.

A total of 33 rare animal species were observed on BRP (Table 2), and 26 of the 38 species on the target list were documented during the survey. The location of the rare species observations can be seen in Figure 1. This section is arranged by survey methodology followed by species-specific accounts.

### **Drift Fence Surveys**

Ten sampling arrays were constructed in a variety of natural communities (e.g., mesic flatwoods, scrub, isolated wetland ecotone) in an effort to capture rare insects, amphibians, reptiles, and small mammals. Figure 2 shows the location of each of the sampling arrays within BRP. Six of the drift fence arrays (Curry Lake-wet flatwoods, Curry Lake-hydric hammock, Longleaf-mesic flatwoods, Longleaf-mesic flatwoods/depression marsh, Northwest-wet flatwoods, and Southwest-scrub) had a large (1.2m x 1.2m) box trap (Rudolph et al. 1999) placed in the center of the array with minimum 8 cm wide funnel opening facing one of each of the three 100 ft arms of a "Y" shaped array. The Southwest-scrub array was slightly different in that each arm length was variable (20 ft, 180 ft, and 100 ft). Typically, two single-opening funnel traps were placed at the outer ends of each arm of the box-trap arrays for a total of 6 funnel traps. The Curry Lake-grass strip/hammock array consisted of three 100 ft silt fence sections arranged linearly with a 5-gallon bucket pitfall trap placed at each fence intersection and at each end of the array for a total of four pitfall traps. Double opening funnel traps were placed on each side of all fence lengths at the midway point for a total of six funnel traps. The Southwest-strand swamp/wet flatwoods array consisted of three 100 ft silt fence arms arranged in a "Y" shape. Two single opening funnel traps were placed on either side of each end and a double opening funnel trap was set on both sides of the silt fence arm at the midway point for a total of 12 funnel traps. The Southwest-former cabin site array consisted of two separate 100 ft sections with a 5-gallon pitfall trap at both ends of each section and a double opening funnel trap placed on each side at the midway point for a total of 4 pitfall traps and 4 funnel traps. The Southwest-mesic flatwoods array consisted of two 100 ft fence lengths arranged in an "L" shape with one 5-gallon bucket pitfall trap at one end and 4 single opening and 4 double opening funnel traps placed along the fences. All traps (box, funnel, and pitfall) were covered with cut palmetto fronds to provide shade for any captured organisms. Large scraps of linen sheets were also placed in the box traps to provide additional cover. Traps were set for approximately eight nights within each of the

following months: August, September, October, November, December, March, and April. Traps were checked daily. Captured animals were immediately released and were not marked in any fashion. This was simply a presence/absence survey for rare species. We expected an insufficient number of recaptures for gathering population estimates. The total number of each species captured for all arrays combined can be seen in Table 3 and the number of captures per array as well as trapping effort per array (trap/nights) is shown in Appendix 4.

Table 2. Rare animals observed on Babcock Ranch Preserve, 2007-2008.

Scientific name	Common name	Global rank	State rank	Federal status	State status
<b>Insecta</b>		<b>Insects</b>			
<i>Bolbocerosoma hamatum</i>	Earth boring dung beetle	GNR	S3S4	N	N
<i>Eucanthus alutaceus</i>	Earth boring dung beetle	GNR	S1S3	N	N
<i>Mycotrupes pedester</i>	Earth boring dung beetle	G1G2	S1S2	N	N
<b>Reptilia</b>		<b>Reptiles</b>			
<i>Crotalus adamanteus</i>	Eastern diamondback rattlesnake	G4	S3	N	N
<i>Drymarchon couperi</i>	Eastern indigo snake	G4	T3S3	LT	LT
<i>Gopherus polyphemus</i>	Gopher tortoise	G2	S3	N	LT
<b>Aves</b>		<b>Birds</b>			
<i>Accipiter cooperii</i>	Cooper's Hawk	G5	S3	N	N
<i>Aimophila aestivalis</i>	Bachman's Sparrow	G3	S3	N	N
<i>Ajaia ajaja</i>	Roseate spoonbill	G5	S2	N	LS
<i>Ammodramus henslowii</i>	Henslow's Sparrow	G4	SNRN	N	N
<i>Aramus guarana</i>	Limpkin	G5	S3	N	LS
<i>Ardea alba</i>	Great Egret	G5	S4	N	N
<i>Athene cunicularia floridana</i>	Florida Burrowing Owl	G4T3	S3	N	LS
<i>Buteo brachyurus</i>	Short-tailed Hawk	G4G5	S1	N	N
<i>Caracara cheriway</i>	Crested Caracara	G5	S2	LT	LT
<i>Egretta caerulea</i>	Little Blue Heron	G5	S4	N	LS
<i>Egretta thula</i>	Snowy Egret	G5	S3	N	LS
<i>Egretta tricolor</i>	Tricolored Heron	G5	S4	N	LS
<i>Elanoides forficatus</i>	Swallow-tailed Kite	G5	S2	N	N
<i>Eudocimus albus</i>	White Ibis	G5	S4	N	LS
<i>Falco columbarius</i>	Merlin	G5	S2	N	N
<i>Grus canadensis pratensis</i>	Florida Sandhill Crane	G5T2T3	S2S3	N	LT
<i>Haliaeetus leucocephalus</i>	Bald Eagle	G5	S3	N	N
<i>Ixobrychus exilis</i>	Least Bittern	G5	S4	N	N
<i>Mycteria americana</i>	Wood Stork	G4	S2	LE	LE
<i>Nyctanassa violacea</i>	Yellow-crowned Night-heron	G5	S3	N	N
<i>Nycticorax nycticorax</i>	Black-crowned Night-heron	G5	S3	N	N
<i>Pandion haliaetus</i>	Osprey	G5	S3S4	N	N
<i>Picoides borealis</i>	Red-cockaded Woodpecker	G3	S2	LE	LS
<i>Picoides villosus</i>	Hairy Woodpecker	G5	S3	N	N
<i>Plegadis falcinellus</i>	Glossy Ibis	G5	S3	N	N
<b>Mammalia</b>		<b>Mammals</b>			
<i>Eumops floridanus</i>	Florida bonneted bat	G1	S1	N	LE
<i>Sciurus niger shermani</i>	Sherman's fox squirrel	G5T3	S3	N	LS

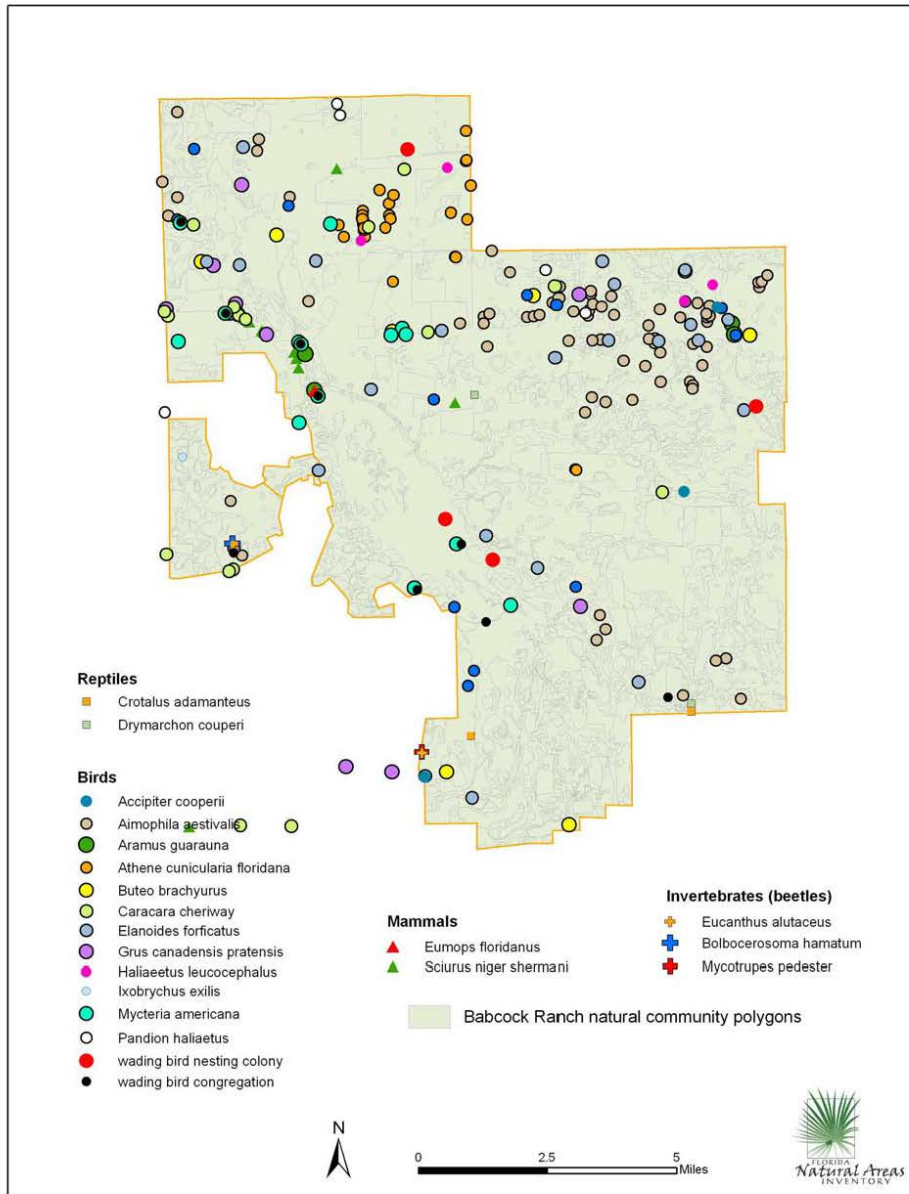


Figure 1. Babcock Ranch Preserve rare animal species observations. (gopher tortoise and red-cockaded woodpecker locations are shown in separate figures).

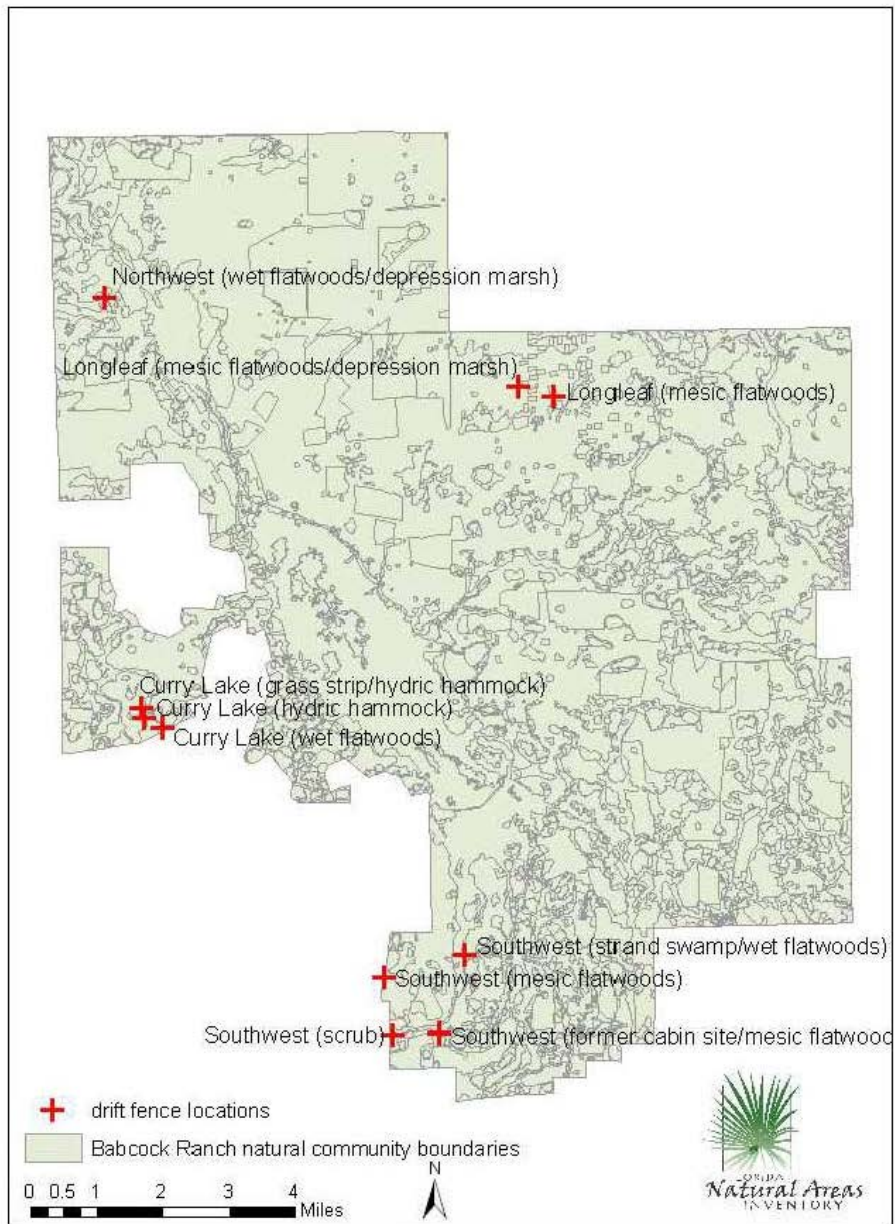


Figure 2. Babcock Ranch Preserve drift fence locations.

Table 3. Total drift fence captures by species at Babcock Ranch Preserve 2007-2008.

Common Name	Scientific Name	Captures	
black racer	<i>Coluber constrictor</i>	32	
black swamp snake	<i>Seminatrix pygaea</i>	1	
brown anole	<i>Anolis sagraei</i>	44	
corn snake	<i>Elaphe guttata</i>	5	
cotton mouse	<i>Peromyscus gossypinus</i>	4	
cotton rat	<i>Sigmodon hispidus</i>	16	
Cuban treefrog	<i>Osteopilus septentrionalis</i>	7	
dusky pigmy rattlesnake	<i>Sistrurus miliarius</i>	7	
earth boring dung beetle	<i>Bolbocerosoma hamatum</i> **	1	
earth boring dung beetle	<i>Eucanthus alutaceus</i> **	1	
earth boring dung beetle	<i>Mycotrupes pedester</i> **	2	
eastern coachwhip	<i>Masticophis flagellum</i>	2	
eastern coral snake	<i>Micrurus fulvius</i>	1	
eastern cottontail rabbit	<i>Sylvilagus floridanus</i>	1	
eastern diamondback rattlesnake	<i>Crotalus adamanteus</i> *	1	
eastern harvest mouse	<i>Reithrodontomys humulis</i>	1	
eastern narrow-mouthed toad	<i>Gastrophryne carolinensis</i>	743	
Florida brown snake	<i>Storeria dekayi</i>	10	
Florida chicken turtle	<i>Deirochelys reticularia</i>	2	
Florida cottonmouth	<i>Agkistrodon piscivorus</i>	1	
Florida water snake	<i>Nerodia fasciata</i>	2	
garter snake	<i>Thamnophis sirtalis</i>	14	
green anole	<i>Anolis caroliniana</i>	33	
green treefrog	<i>Hyla cinerea</i>	27	
greenhouse frog	<i>Eleutherodactylus planirostris</i>	339	
ground skink	<i>Scincella lateralis</i>	10	
house mouse	<i>Mus musculus</i>	1	
least shrew	<i>Cryptotis parva</i>	2	
leopard frog	<i>Rana sphenocephala</i>	33	
oak toad	<i>Bufo quercicus</i>	40	
opossum	<i>Didelphis marsupialis</i>	5	
pig frog	<i>Rana gryllo</i>	3	
raccoon	<i>Procyon lotor</i>	1	
ribbon snake	<i>Thamnophis sauritus</i>	15	
scarlet kingsnake	<i>Lampropeltis triangulum</i>	1	
scarlet snake	<i>Cemophora coccinea</i>	5	
six-lined racerunner	<i>Cnemidophorus sexlineatus</i>	10	
southeastern five-line skink	<i>Eumeces inexpectatus</i>	6	
southern cricket frog	<i>Acris gryllus</i>	8	
southern ringneck snake	<i>Diadophis punctatus</i>	5	
southern toad	<i>Bufo terrestris</i>	70	
spotted skunk	<i>Spilogale putorius</i>	1	
squirrel treefrog	<i>Hyla squirella</i>	10	
striped mud turtle	<i>Kinosternon bawrii</i>	13	*=rare vertebrate
yellow rat snake	<i>Elaphe obsoleta</i>	3	**=rare insect

### **Aerial Surveys**

FNAI conducted two aerial surveys of BRP in an effort to locate wading bird nesting colonies, sandhill crane nests, bald eagle nests, short-tailed hawk nests, swallow-tailed kite nests and round-tailed muskrat lodges. The first survey was completed on March 11, 2008 from a fixed wing Cessna 172 airplane. Transects were flown in an east-west direction with one observer searching from each side of the plane. Transects were spaced 1km apart and flown from an elevation of 183 m. Any areas suspected to have nesting species were circled from the air for closer inspection. The second survey was conducted on April 29, 2008 from a Robinson R44 helicopter. Transects were flown in an east-west direction with one observer searching from each side of the helicopter. Transects were spaced 700 m apart and flown from an elevation of 152 m. The elevation was decreased to approximately 80 m to inspect areas thought to contain nesting species. Both surveys concentrated on the strand swamps associated with Telegraph Swamp and Jack's Branch. However, other wetland areas were also surveyed (e.g., basin swamps, depression marshes, Curry Lake). During both aerial surveys, upon completion of the east-west transects, north-south oriented flights were also conducted over Telegraph Swamp and Jack's Branch.

No nesting species were observed during the March 11<sup>th</sup> survey. Four wading bird nesting colonies (see figure 10), one bald eagle nest, and one sandhill crane nest were documented during the April 29<sup>th</sup> aerial survey. One of the wading bird nesting colonies was located in Telegraph swamp and contained more than 30 great egrets, 30 cattle egrets, and approximately 25 little blue herons. Another small colony of only two nesting great blue herons was also observed in Telegraph Swamp. The largest nesting wading bird colony on BRP was located in Jack's Branch and contained at a minimum 240 cattle egrets, 25 great egrets, 15 little blue herons, 5 snowy egrets, one tricolored heron, one glossy ibis, one anhinga, and one yellow-crowned night heron. The fourth wading bird nesting colony was located in a small wetland embedded within improved pasture in the northern portion of BRP and contained two great egret nests. Also, in the same general area was a bald eagle nest with a fledgling in the vicinity. A Florida sandhill crane was observed sitting on a nest located in a basin marsh within the central portion of BRP.

### **Sherman Live Trap Small Mammal Surveys**

The primary goal of the small mammal surveys was to document the presence of Florida mice on BRP and possibly Sherman's short-tailed shrew. Patches of scrub and scrubby flatwoods were surveyed using Sherman live traps baited with oats. Figure 3 shows the location of the small mammal trap sampling sites within BRP. Traps were set in grids or transects with 10-m spacing for a minimum of two consecutive nights per survey area. Traps were set within three hours of sunset and checked (completion) within three hours of sunrise each subsequent day. Traps were closed during the day to prevent inadvertent capture of animals and only set when nighttime temperatures were predicted to remain above 65 degrees Fahrenheit. Captured animals were immediately released, without marking.

No Florida mice or Sherman's short-tailed shrews were captured on BRP. The small mammals that were captured and the survey effort (trap/nights) can be found in Table 4.

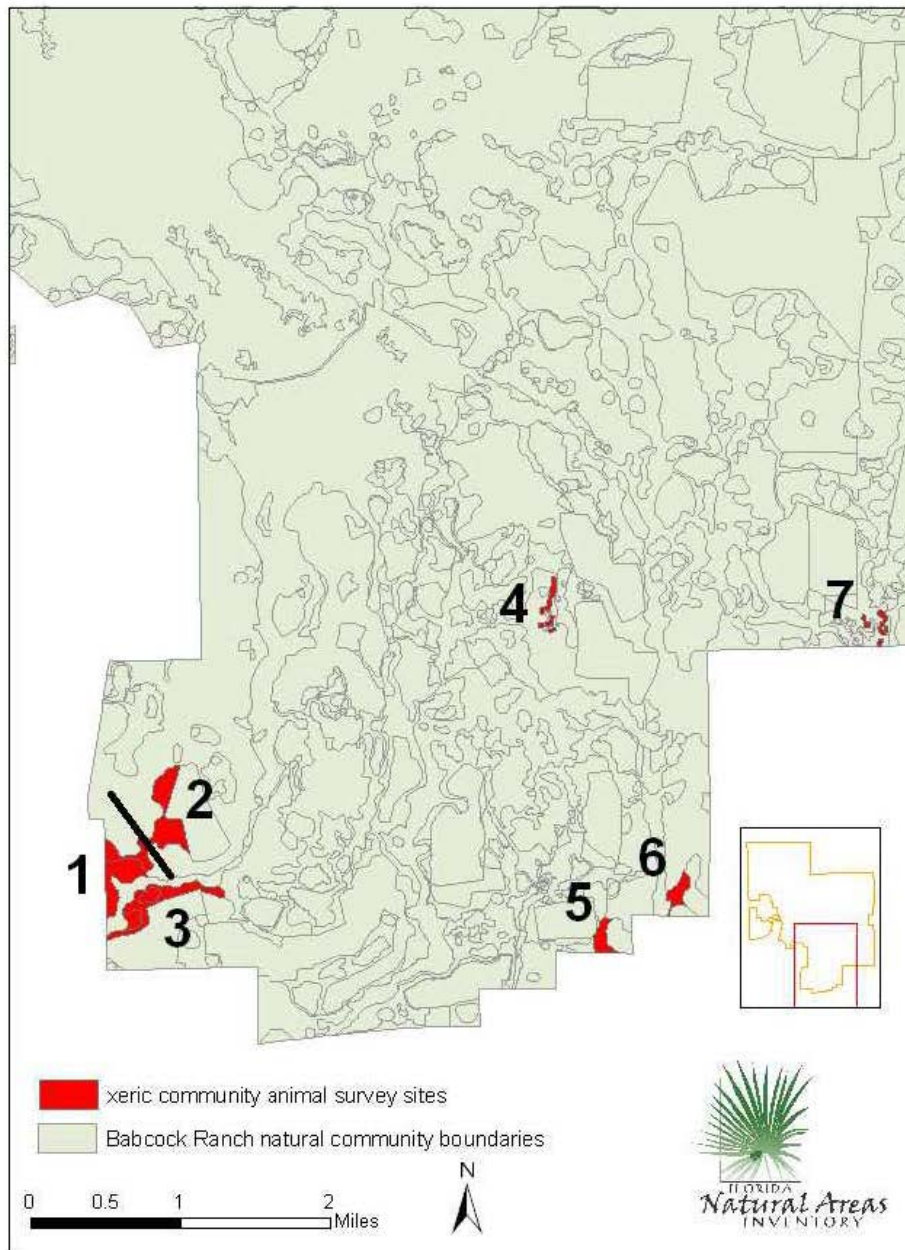


Figure 3. Babcock Ranch Preserve xeric communities systematically surveyed for gopher tortoises and rodents. Numbers correspond to data presented in Table 4 and Table 5.

Table 4. Rodent captures within scrub and scrubby flatwoods natural communities on Babcock Ranch Preserve. The geographical location of the survey sites can be seen in Figure 3.

	Site #1	Site #2	Site #3	Site #4	Site #5	Site #6	Site #7
<i>Peromyscus gossypinus</i>	1	1	0	2	na	na	24
<i>Sigmodon hispidus</i>	0	1	0	2	na	na	0
Sherman Trap/nights	262	128	72	80	na	na	80

## SPECIES ACCOUNTS

### Amphibians

#### Gopher frog (*Rana capito*)

Gopher frog (*Rana capito*) was the only rare amphibian species likely to have been encountered on Babcock Ranch. Typically gopher frogs are found in sandhill and scrub communities located within 1.7km of isolated wetlands. Three survey methods were employed in an effort to locate gopher frogs on the ranch. First, isolated wetlands located near xeric habitats or mesic flatwoods were visited at night to listen for breeding gopher frog calls. Second, a sub-sample of gopher tortoise burrows in xeric communities within 1km of isolated wetlands was scoped with a video camera during the daytime hours. Finally, gopher frogs could potentially be trapped in funnel traps in conjunction with drift fence surveys (Enge and Wood 2001).

Gopher frogs were not observed on BRP during the 2007-2008 survey.

Management activities that enhance gopher tortoise population may also benefit gopher frogs. Allow fires to burn through wetland basins. Fill ditches and canals that connect isolated wetlands to sources of predatory fish. Avoid stocking ephemeral wetlands with fish.

### Reptiles

#### Large Snakes

FNAI conducted surveys targeting five rare, relatively large, snake species [Eastern indigo snake (*Drymarchon couperi*), Florida pine snake (*Pituophis melanoleucus mugitus*), eastern diamondback rattlesnake (*Crotalus adamanteus*), mole kingsnake (*Lampropeltis calligaster occipitolineata*), and common kingsnake (*Lampropeltis getula*)]. All five species have been documented in a wide variety of habitats and are capable of far ranging movements (Hipes et al. 2001, Natureserve 2006). Thus, several techniques were utilized in an effort to document these species, and included, drift fence surveys (Enge 1997), visual encounter searches (Diemer and Speake 1981), road cruising (Dalrymple et al. 1991, Enge and Wood 2002), and video camera scoping of burrows and other potential refugia.

There was one opportunistic sighting of a large eastern indigo snake in the central portion of BRP within mesic flatwoods. A second observation consisted of a shed eastern indigo snake



skin found outside of a gopher tortoise burrow within a small patch of scrub (site number 7 in Figure 3) in the southeastern portion of BRP. Eastern diamondback rattlesnakes were opportunistically observed on four separate occasions within hydric hammock, mesic hammock, mesic flatwoods, and scrub habitats. Additionally, two diamondback specimens were captured in traps associated with drift fence arrays. An adult was captured in a box trap at the Curry Lake-hydric hammock array and a juvenile was captured in a funnel trap at the Southwest-strand swamp/wet flatwoods array. The Florida pine snake, common kingsnake, and mole kingsnake were not observed on BRP during the 2007-2008 survey.

In order to help protect large snakes limit activities that disturb the groundlayer, particularly in xeric habitats, mesic flatwoods, hammocks, and swamps. Large stumps, large downed logs, and gopher tortoise burrows are important refugia, and should be maintained. Prohibit the wanton killing and collection of snakes. Eggs and/or young may be susceptible to feral hog predation, control feral hog populations.

**Gopher tortoise (*Gopherus polyphemus*)**

Gopher tortoises were systematically surveyed by locating and recording the coordinates of active and inactive burrows within all scrub and scrubby flatwoods communities found on BRP (see Figure 3). Surveyors walked 250m transects through the scrub and scrubby flatwoods patches recording all inactive and active burrows within 8m of either side of the transect (250m x 16m = 1 acre surveyed); a minimum of 5% of each habitat patch was surveyed in this manor (FFWCC 2007). The positions of tortoise populations in all other habitats were opportunistically recorded while conducting surveys for other species.

Figure 4 shows the location of 775 gopher tortoise observations of which 750 are inactive or active burrows. A large proportion of the recorded tortoise burrows were located in the northeastern portion of BRP within the longleaf pine (*Pinus palustris*) mesic flatwoods and were documented in conjunction with the surveys targeting red-cockaded woodpeckers. The results of the systematic gopher tortoise surveys within scrub and scrubby flatwoods showed tortoise density varied from <1 burrow per acre to as many as 12 burrows per acre between the different habitat patches (Table 5). A total of 32 tortoise burrows (inactive and active) were scoped with a video camera at Site #4 and Site #7 revealing a tortoise occupancy rate of approximately 30% for each site.

Gopher tortoises require upland sandy sites that have adequate drainage, low growing forage plants, and exposed soil patches for nesting. Limit activities that disturb the groundlayer, particularly in xeric habitats. Growing season prescribed fire will aid in maintaining low growing forage and open sunny areas for nesting.

Table 5. Tortoise burrow densities within scrub and scrubby flatwoods natural communities on Babcock Ranch Preserve. The geographical location of the survey sites can be seen in Figure 3.

	Site #1	Site #2	Site #3	Site #4	Site #5	Site #6	Site #7
burrows/acre	6	2	2	10	2	<1	12
total acres	42	52	29	9	12	12	6

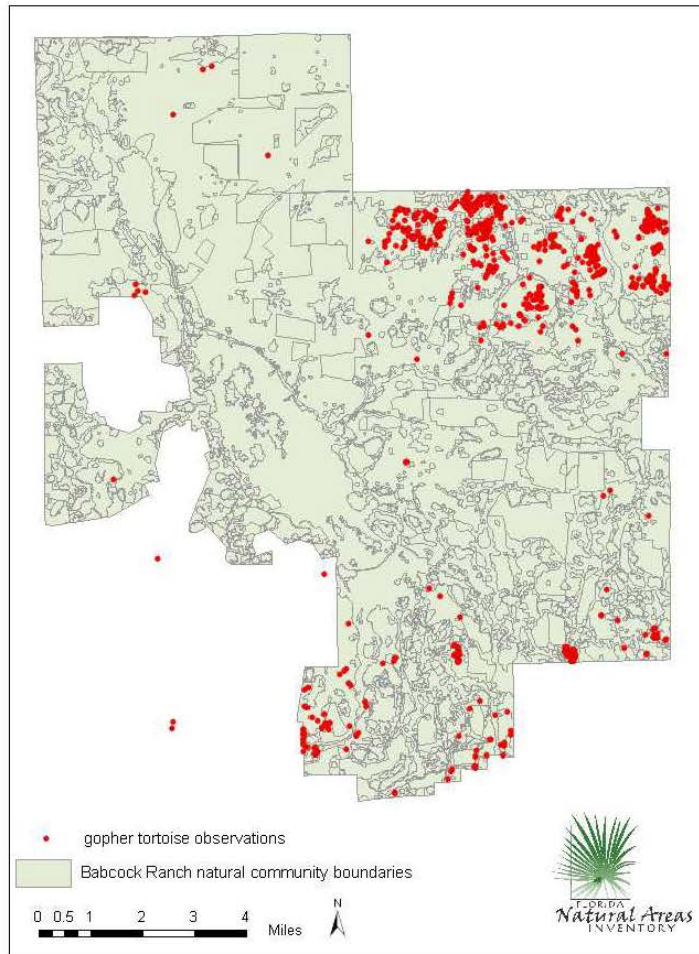


Figure 4. Babcock Ranch Preserve gopher tortoise observations.

**Scrub lizard (*Sceloporus woodi*)**

There are FNAI records of scrub lizards approximately 31km northeast and 42km southwest of BRP. All scrub communities were visited several times throughout the year in an effort to visually confirm the presence of scrub lizards.

Scrub lizards were not observed on BRP during the 2007-2008 survey.

Preserve essential scrub habitat.

## Birds

### **Red-cockaded Woodpecker (*Picoides borealis*)**

Approximately 37,120 acres (50%) of BRP is comprised of mesic and wet flatwoods (FNAI natural community mapping data 2008). Of this, about 5,626 acres (15%; or 8% of the Ranch) consists of very open flatwoods, dominated by longleaf pine (*Pinus palustris*) in the northeastern portion of BRP. The average basal area in the longleaf pine flatwoods is 12 ft<sup>2</sup>/ac (n = 43, range 0-50, median = 10); FNAI mesic flatwoods natural community data points 2008 within the acreage dominated by longleaf pine). The remainder of the flatwoods on BRP is dominated by south Florida slash pine (*Pinus elliottii* var. *densa*) and lesser densities of off-site slash pine (*Pinus elliottii* var. *elliottii*). After an initial site visit and review of aerial photography and preliminary natural community delineation, approximately 19,850 acres were identified as potential red-cockaded woodpecker habitat (Figure 5).

Suitable nesting habitat for red-cockaded woodpeckers on BRP was surveyed following the protocol outlined in the recovery plan (USFWS 2003). Observers walked parallel line transects approximately 91 meters (100 yards) apart through potential habitat (Figure 5) to locate woodpecker cavity trees. Transects were most often oriented north-south to take advantage of a tendency toward west-facing cavities. Mature and older mature flat-top pines were visually inspected for evidence of cavity excavation by red-cockaded woodpeckers. The majority of the area that was targeted for transect surveys consisted of very open longleaf pinelands where 91 m spacing between transects was sufficient. Spacing was reduced in a few areas that had a dense midstory (usually consisting of abundant pine regeneration) that interfered with viewing trees, or where pine density was higher than usual and required closer inspection. Conversely, areas that didn't contain potential cavity trees were avoided. Potential cavity trees were inspected individually in areas where they were at very low stocking densities. Surveys that did not use the 91-m transect method were principally in areas of south Florida slash pine and off-site slash pine that had undergone intensive logging and stumping operations in 2007-08. A combination of driving and walking was used to inspect older pines and flat-tops left standing from these operations.

We also acquired information from Pandion Systems, Inc. showing locations of red-cockaded woodpecker cavity trees from a survey undertaken by Johnson Engineering, Inc. in 2006. As no other information was supplied, we gathered data on the cavity trees from the Johnson Engineering, Inc. survey and recorded that they had been marked with painted white bands.

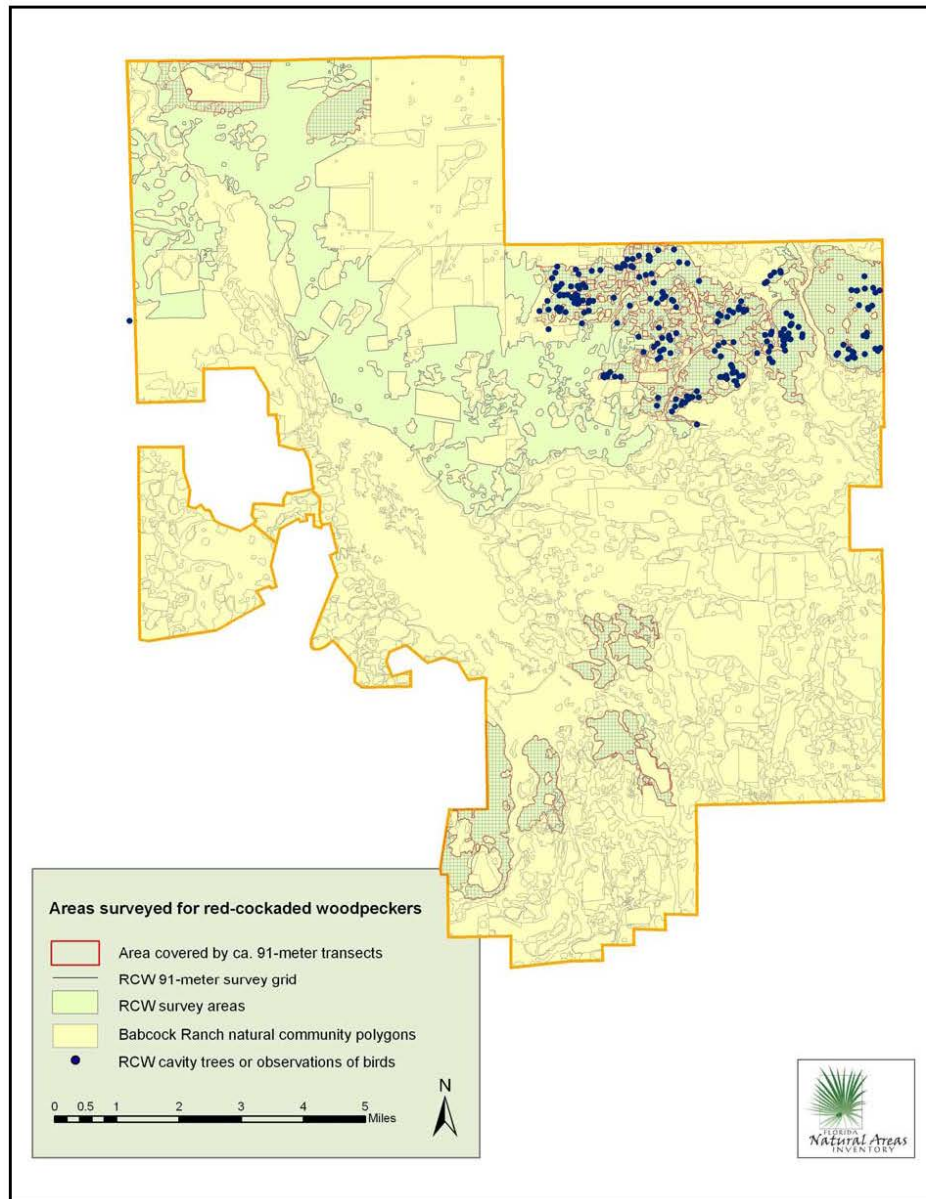


Figure 5. Areas surveyed for red-cockaded woodpeckers and area covered by 91-meter transects at Babcock Ranch Preserve.

The data collected for each cavity tree included location, date, surveyor, cavity status (Jackson 1977, Hooper et al. 1980, J. Cox pers. com., see Table 6), tree status (marked with a painted white band or unmarked), cavity characteristics (e.g., resin wells, sap flow, orientation), and tree characteristics [e.g., species, size - diameter breast height (dbh)] and were geo-referenced and recorded using a GPS datalogger. Data were also taken when birds were encountered.

Cavity-tree Survey

Data were collected on a total of 176 cavity trees, including 163 (93%) living cavity trees and 13 (7%) dead or dying cavity trees (Table 6, Figure 6). Of the living cavity trees, 61 (37%) were considered active, including 18 (10%) active start holes. There were 102 cavity trees classified as inactive that included 27 (15%) enlarged cavities and 14 (8%) inactive start holes. All cavity trees were longleaf pine except two that were south Florida slash pine. Fifteen living cavity trees or 9% had more than one cavity (or 1.12 cavities/tree). Mean dbh of cavity trees was 13.6 in (n = 125, SD = 1.95, range = 9-19, median = 13.0). Sixty-eight percent of the cavities were oriented in a westerly direction (NW 15%, W 29%, SW 24%), 11% in an easterly direction (NE 1%, E 7%, SE 3%) and 5% and 16% approximately due north and south, respectively. Numerous detections of birds (some undoubtedly the same bird) were also recorded (Figure 6).

Table 6. Cavity status of red-cockaded woodpecker trees at Babcock Ranch Preserve.

cavity status	count	%
active	43	24
inactive	61	36
inactive - enlarged	27	15
start - active	18	10
start - inactive	14	8
other*	13	7
<b>total</b>	<b>176</b>	<b>100</b>
*RCW cavities in dead or dying trees, usually resulting from fire		

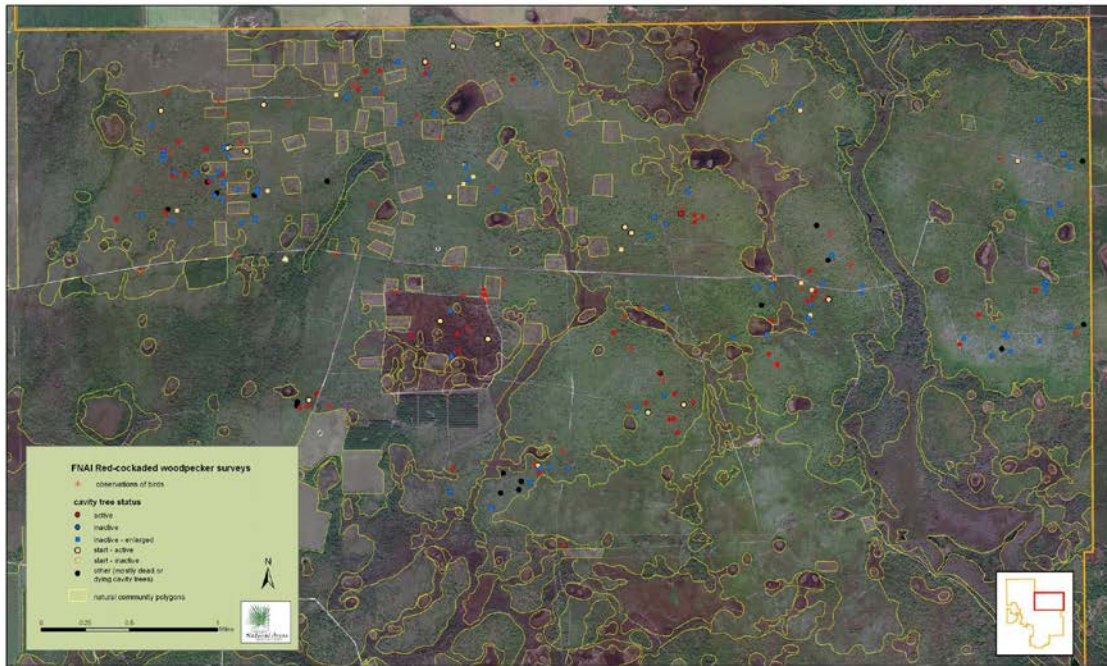


Figure 6. Location and status of red-cockaded woodpecker cavity trees at Babcock Ranch Preserve.

### Cluster Status

One-hundred thirty-five living cavity trees were grouped conservatively into 10 active clusters (Figure 7). Twenty-four cavity trees were aggregated in three areas and presumed to be three inactive clusters, and four cavity trees were not in any cluster group. The assignment of clusters was course and relied on little to no knowledge about nesting pairs of red-cockaded woodpeckers (K. NeSmith, J. Kappes, R. Costa pers. comm.). Determining cluster numbers by using the circular scale technique (Harlow et al. 1983) increases the number of groups substantially over our conservative estimate. Accurate estimates of group numbers will require more extensive monitoring of breeding activities.

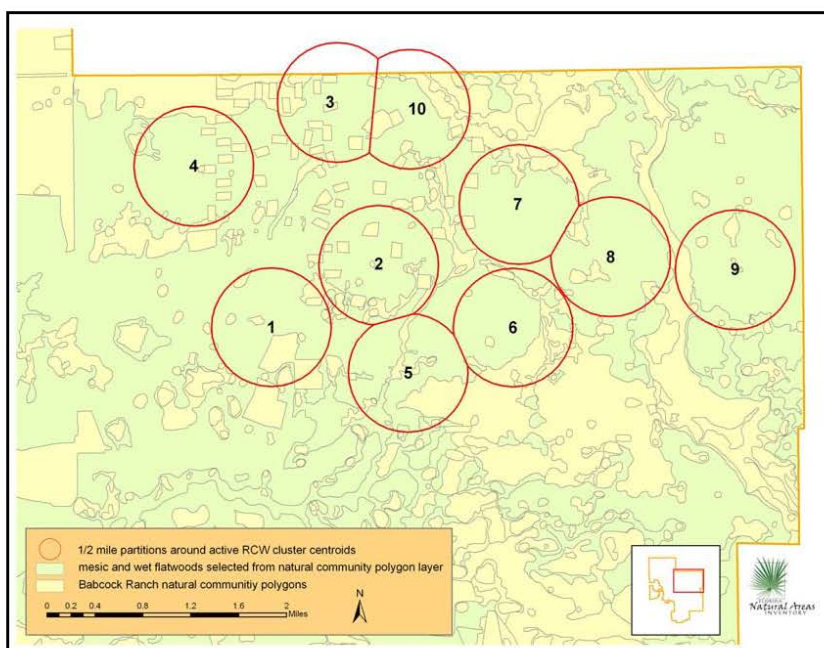


Figure 7. Distribution of red-cockaded cavity-tree clusters at Babcock Ranch Preserve.

South Florida slash pine flatwoods on BRP could become suitable over time, but currently these habitats contain small pockets of older mature trees suitable for woodpeckers, and are widely scattered. The lower basal area also provides lower quality foraging areas. The BRP red-cockaded woodpecker management plan (Kappes and Costa 2008) provides detailed management guidelines for the Ranch, that is applicable to additional species as well (e.g., Bachman's sparrow, gopher tortoise, game species).

### **Bachman's Sparrow (*Aimophila aestivalis*)**

Bachman's sparrows may be especially abundant in areas that are suitable for red-cockaded woodpeckers (Dunning 1993). Singing males were recorded in conjunction with other surveys in mesic flatwoods and dry prairie. Locations of sparrows from aural and/or visual detection were

geo-referenced using a GPS datalogger. Most locations reflect singing males (Figure 8), which are most detectable in late winter, spring, and summer. We consider the Bachman's sparrow abundant at BRP.

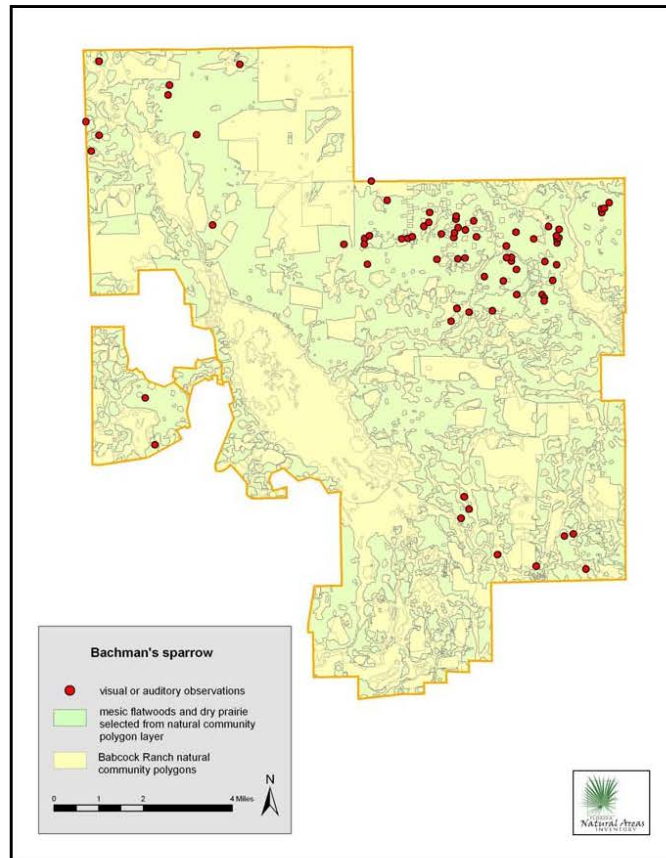


Figure 8. Locations of Bachman's sparrow occurrences at Babcock Ranch Preserve.

The absence of sparrows does not necessarily mean birds do not occupy these areas. Surveys that occurred in the fall and early winter, a time when Bachman's sparrows are usually silent, are less likely to have yielded Bachman's sparrow observations. Also, rare animal surveys were undertaken at all times of the day and sparrows are more reticent during the mid portion of the day.

Management recommendations for Bachman's sparrow are similar to those for red-cockaded woodpeckers. This includes the use of regular prescribed fire (preferably May-June) to maintain low shrub cover and abundant herbaceous ground cover.



**Florida Grasshopper Sparrow (*Ammodramus savannarum floridanus*)**

The nearest recent records are 10-20 km to the east near the southern boundary of Fisheating Creek Wildlife Management Area (Delany and Cox 1986); the location has since been converted to improved pasture. Although Florida grasshopper sparrows were not expected to occur at BRP, there were three areas of high quality dry prairie in the northeastern portion (ca. 243 and 895 acres) and southeastern portion (ca. 100 acres) that we felt merited surveys.

We walked transects approximately 50-m apart (Delany and Cox 1986) through the highest quality dry prairie sites in June 2007 and May 2008. No Florida grasshopper sparrows were detected. The more common overwintering subspecies *pratensis*, also was not observed during the non-breeding months. One Henslow's sparrow (*Ammodramus henslowii*), an uncommon wintering species was flushed from a wet prairie in January.

Implementing frequent fire regimes (1-3 years), preferably during the growing season, in dry prairie habitat are actions that would benefit the sparrow and the dry prairie natural community.

**Southeastern American Kestrel (*Falco sparverius paulus*)**

BRP has a fairly extensive road system that passes through habitats preferred by kestrels for foraging and nesting. These areas include improved and semi-improved pastures with scattered pines, dry prairie, agricultural fields, and open areas with low numbers of residential and maintenance structures in former flatwoods.

Kestrels were observed regularly as late as the last week in March but not in subsequent field trips. They were consistently seen foraging in improved and semi-improved areas as well as in open mesic flatwoods. All observations of kestrels were attributed to northern migrants.

Suitable cavity trees are a key habitat feature necessary for breeding. Protection of dead tree snags and nest-box programs used to augment nest sites are important management tools for the kestrel, as well as protection large blocks of natural habitat (Stys 1993, Wood et al. 1988). The open fields and pastures at BRP provide foraging habitat.

**Crested Caracara (*Caracara cheriway*)**

BRP provides the large expanses of contiguous wetland (depression marsh, dome swamp) and open habitat including pastures, prairie, and hammocks that caracaras require. Their preferred nest trees are cabbage palms (*Sabal palmetto*), but occasionally use oak and cypress trees (Morrison 2001).

Crested caracara use of BRP appears to span many years. Active territory/breeding pair locations from 1978 (FNAI occurrences derived from J. N. Layne pers. comm. 1983), shown by a centroid marking the estimated center of a territory with a 1.9-mile radius (Morrison 2001) in Figure 9, indicate several territories around BRP. Caracaras are highly territorial and may continuously maintain and occupy territories as long as nesting and foraging conditions remain stable (Layne 1996, Morrison 2001).

We documented 16 occurrences of caracaras from 30 March 2007 to 1 May 2008 (Figure 9). One to four birds at a time were observed throughout the year on nine occasions in the northwestern part of the Ranch (Figure 9). No nests were found, although we suspect a nesting territory that encompasses the observations made in October and November 2007, and 1 May 2008. The 1 May 2008 observation near the western boundary was of four birds (probably included juveniles) perched in a snag. In 2001, three birds (2 adults, 1 immature) were observed flying across a pasture; ranch personnel mentioned seeing seven birds on the ranch at the time.

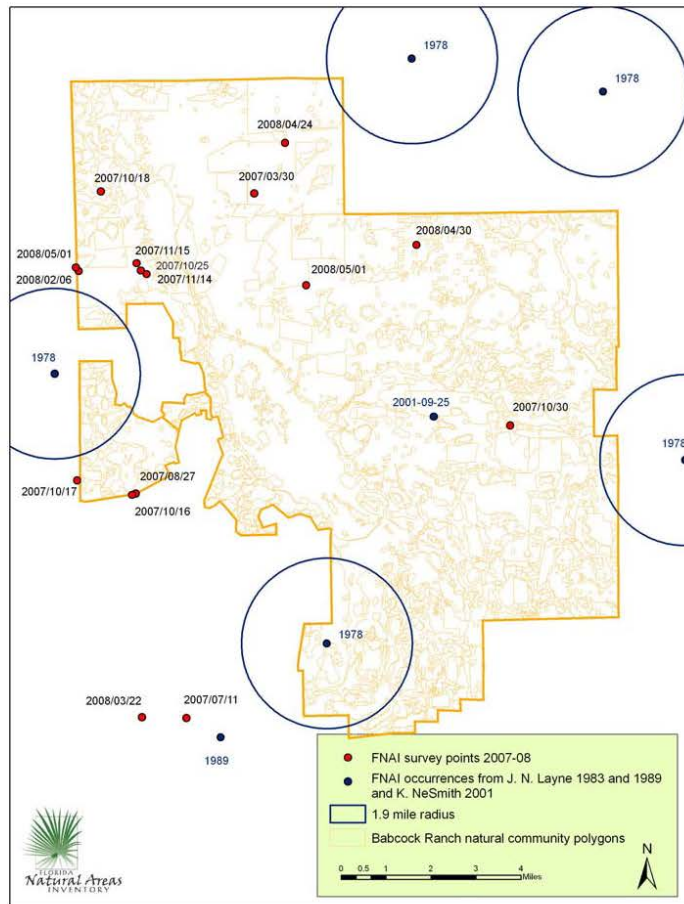


Figure 9. FNAI 2007-08 crested caracara locations and FNAI occurrence records from Layne 1983 and 1989 and NeSmith 2001. Circles represent approximate home range.

Retaining cabbage palms, a preferred nest tree, and dead trees and snags, which are used for perching and roosting is beneficial to caracaras. It is also important to minimize disturbance to ground vegetation in nest areas as this provides cover for fledgling caracaras. Morrison (2001)

gives additional succinct and relevant recommended management practices for caracaras, and is especially applicable to BRP as a working ranch.

#### **Cooper's Hawk (*Accipiter cooperii*)**

Babcock Ranch is near the southern limit of the Cooper's hawk's breeding range in Florida. There appear to be no confirmed breeding records in Charlotte County (Stevenson and Anderson 1994). Data from the Florida Breeding Bird Atlas project (FBBA; Kale et al. 1992, <http://myfwc.com/bba/species.htm>) show only three records for Charlotte County, all categorized as possible (lowest category of confirmation - presence of species in appropriate breeding habitat during the breeding season).

Taped vocalizations, including the alarm call, were played along suitable habitat during the breeding season to try and elicit responses from hawks (Rosenfield et al.). We recorded two occurrences of Cooper's hawks on the Ranch, all incidental sightings. One observation was of a single bird foraging in wet flatwoods in October 2007 and a male and female were observed flying overhead in April of 2008. The latter occurrence could potentially be a breeding pair although no nests were confirmed. A third individual was seen near Jack's Branch during the breeding season.

Protecting Jack's Branch and Telegraph Swamp and their associated forested hammocks from logging would help maintain suitable nesting habitat for Cooper's hawks.

#### **Florida Scrub-Jay (*Aphelocoma coerulescens*)**

Twelve patches of scrub and scrubby flatwoods, comprising a total of 182 acres, occur on BRP (FNAI natural community polygons 2008). All are located in the southern portion of the ranch, with the largest being 60 acres. There are no known jay records for BRP and the closest jays remaining in the area appear to be south of the southern boundary of the Ranch, approximately 5 km from the nearest scrub patch (Fitzpatrick et al. 1994; Cox 1987, Johnson Engineering, Inc. 2006 survey, D. Ceilley pers. comm.).

A recording of scrub-jay territorial scold calls and the female "hiccup" call was used to solicit responses from jays while walking and driving through the scrubby areas. We were also in these areas in conjunction with other surveys (e.g., drift fence arrays, gopher tortoise) and no jays were detected.

Although no Florida scrub-jays occur on BRP there are occurrences nearby. In the event that the property to the west of the southwestern portion of BRP is developed, it is important to maintain suitable jay habitat on the BRP. Minimizing disturbances from cattle grazing would be beneficial. Prescribed fire that burns patchily in scrub habitat is optimal. Frequent fire may be necessary to restore these areas to a more open condition where short shrubs are the dominant strata.

### **Wading birds**

**Glossy Ibis** (*Plegadis falcinellus*)  
**Great Egret** (*Ardea alba*)  
**Little Blue Heron** (*Egretta caerulea*)  
**Snowy Egret** (*Egretta thula*)  
**Tricolored Heron** (*Egretta tricolor*)  
**White Ibis** (*Eudocimus albus*)  
**Roseate Spoonbill** (*Platalea ajaja*)  
**Wood Stork** (*Mycteria americana*)  
**Yellow-crowned Night-Heron** (*Nyctanassa violacea*)  
**Black-crowned Night-Heron** (*Nycticorax nycticorax*)

Telegraph Swamp and Jacks Branch are two cypress dominated strand swamps on Babcock Ranch that provide prime nesting and roosting habitat. Portions of Telegraph Swamp have been recently logged, which detracts from the quality of the swamp for all wading birds, as well as for short-tailed hawks and swallow-tailed kites.

Congregations of wading birds were recorded when encountered on the ground. Large numbers of wading birds were regularly seen foraging in the swamp along the main east-west spillway across Telegraph Swamp, including roseate spoonbills, black-crowned night-herons, great egrets, and white ibis. A night roost that included approximately 90 wood storks and one roseate spoonbill as well as little blue herons, great egrets, tricolored herons, and white ibises was observed off the eastern end of the spillway (Figure 10; southernmost blue dot). Another night roost is located just south of the Oil Well Grade wooden bridge and included over 200 white ibis when initially observed in March 2007 (Figure 10; northernmost blue dot). Later observations included wood storks and great egrets; turkey and black vultures also roosted in the area. The shallow canals and impounded area in the pasture north of Tram Road Grade where the Cutoff Road intersects is also an area where waders, especially black-crowned night-heron, great egret, wood stork, snowy egret, and tri-colored heron were regularly seen.

Two aerial surveys as described in the Rare Animal Survey methods section, were conducted to search for wading bird nesting colonies. Two nesting colonies were documented during the helicopter survey on 29 April 2008 (Figure 10). The Telegraph Swamp colony was located on

29 April 2008 in a relatively small opening in the strand swamp with scattered cypress (*Taxodium distichum*), willow (*Salix caroliniana*), and pond apple (*Annona glabra*) (Figure 10). A conservative estimate of 30 great egrets, 30 cattle egrets, and 25 little blue herons was made while trying to minimize disturbance to the colony. There was a small congregation of wading birds observed in this same area on 11 March 2008, during a fixed-wing survey flight, but no evidence of nesting was noted. No evidence of nesting wading birds was found at two old colony locations within the swamp (Nesbitt et al. 1982). The Jack's Branch colony was in a large open slough of willow and buttonbush (*Cephalanthus occidentalis*) within the swamp (Figure 10). The nesting colony consisted of approximately 240 cattle egrets, 25 great egrets (with chicks and eggs), at least one tricolored heron and yellow-crowned night-heron and low estimates of 15 little blue herons, 5 snowy egrets, and one anhinga and glossy ibis.

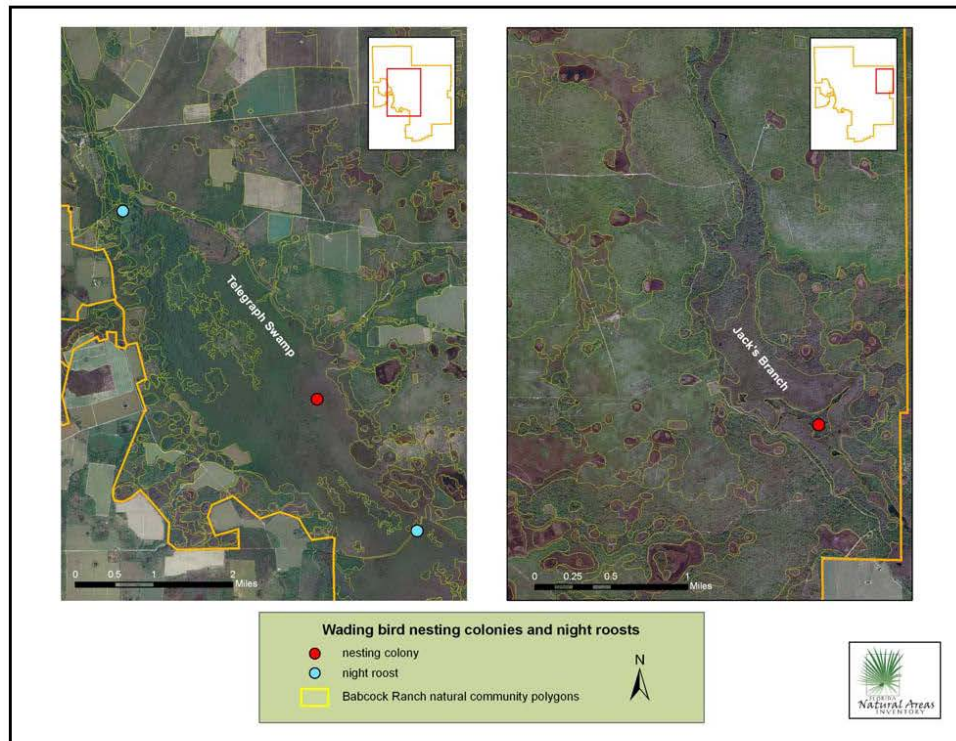


Figure 10. Location of wading bird nesting colonies and night roosts at Babcock Ranch Preserve

Protecting Jack's Branch and Telegraph Swamp from degradation is essential to maintaining these swamps in suitable condition for waders. It is important to monitor water quality, and manage hydrologic patterns that consider the needs of the wood stork, which is very sensitive to manipulation of water regimes. Survey colony sites and important feeding areas regularly. The Florida Fish and Wildlife Conservation Commission and Department of Environmental Protection have developed setback distances around wading bird colonies of 330 ft. (100 m) to prevent human disturbance to nesting birds (Rogers and Smith 1995).

#### **Short-Tailed Hawk (*Buteo brachyurus*)**

Telegraph Swamp and Jack's Branch and surrounding prairies, marshes, and pinelands provide suitable habitat for short-tailed hawks. Surveys for hawks from the ground started in early March (Millsap et al. 1996) and were concentrated along the east and west sides of Telegraph Swamp and Jack's Branch, the two largest strand swamps. Locations of hawk activity were recorded and used to aid in nest finding during an aerial survey later in the nesting season. Millsap et al. (1996) recommends low-elevation helicopter surveys over suitable habitat during

early morning hours to search for nesting pairs. Locations for hawks were also recorded during other surveys.

Short-tailed hawks were observed on eight separate occasions on BRP, however no nests were located. Six of the sightings were scattered throughout the northern third of BRP and the remaining two were observed in the extreme southern portion of BRP. The observations consisted of four white phase and four dark phase individuals. In most cases the birds were observed soaring high over mesic flatwoods, improved pasture, and/or strand swamp. On three occasions individuals were observed foraging (hovering) or carrying prey adjacent to strand swamps. There is one additional record in the FNAI database of an observation along a strand swamp in the southwestern portion BRP in 1991 by Florida Fish and Wildlife Conservation Commission personnel.

Protecting Jack's Branch and Telegraph Swamp and their associated forested hammocks from logging would help maintain suitable nesting habitat for short-tailed hawks.

#### **Swallow-Tailed Kite (*Elanoides forficatus*)**

The general matrix of habitats described for short-tailed hawks is also applicable to swallow-tailed kites on BRP. Surveys for kites from the ground were started in mid-March, when they arrive to search for nest sites (Meyer and Collopy 1995). The east and west sides of Telegraph Swamp and Jack's Branch were searched for nesting activity during early morning hours. As with short-tailed hawks, locations of kite activity were recorded and used to aid in locating nests during an aerial survey. Kites preferentially nest in tall pine and cypress trees that are taller than the surrounding canopy in relatively open stands (Meyer and Collopy 1996). Locations for kites were also recorded during other surveys.

There were more than 23 observations of swallow-tailed kites scattered throughout BRP. Although no nests were found during the 2007-2008 survey soaring juveniles were observed both years following the nesting season and a pair of swallow-tailed kites was observed mating in the southern portion BRP. This evidence suggests swallow-tailed kites nest on BRP. FNAI has one record for a nesting swallow-tailed kite from 1991 (M. Robson, FWC Wildobs database) in strand swamp on the southern boundary of the ranch.

Protection of BRP's mosaic of natural communities and preventing degradation to Jack's Branch and Telegraph Swamp and the forested hammocks associated with them are important in maintaining suitable nesting and foraging habitat for swallow-tailed kites.

#### **Burrowing Owl (*Athene cunicularia floridana*)**

Burrowing owls were not documented on Babcock Ranch Preserve during a state-wide survey (Bowen 2001), although it was recorded as a probable breeder during the 1986-1991 Breeding Bird Atlas (Kale et al. 1992). During FNAI's initial site visit, we located several owls after Babcock Ranch personnel indicated they knew owls to be in the northeastern pasture area of the ranch.

Surveys for owls were conducted in the northwestern pasture areas and a pasture on the south side of Oil Well Grade in the north-central part of the Ranch (Figure 11). We walked transects spaced approximately 160 m apart (Bowen 2001) in a large central pasture where owls were known to occur. A combination of vehicle and walking was used in pastures outside the main core area.

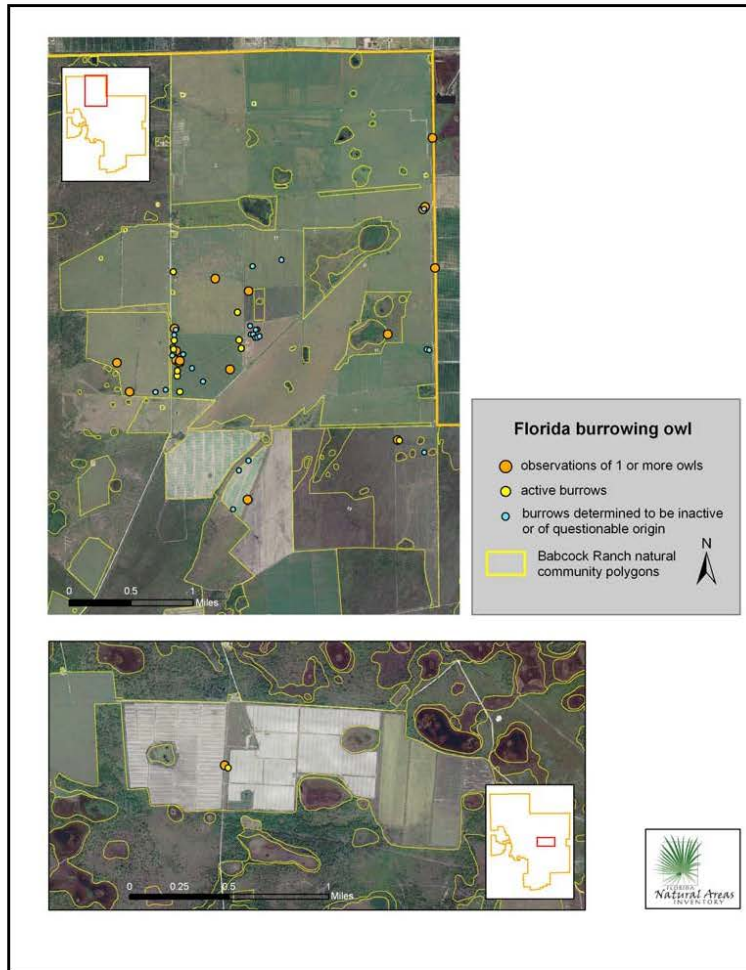


Figure 11. Locations of Florida burrowing owls at Babcock Ranch Preserve.

We recorded 26 burrowing owls at 19 locations in the north pasture area (Figure 11; top aerial picture), seven of which were not associated with burrows. One pair of owls and two burrows

were observed in the pasture south of Oil Well Grade (Figure 11; bottom aerial picture). We noted 23 burrows that appeared active and numerous that were thought to be inactive or of questionable origin.

In order protect burrowing owls limit harassment by humans through education and controlled viewing opportunities. Maintaining pastures and old fields with a low herbaceous cover through mowing, grazing, or burning would benefit the owl (Millsap 1996). Conversion of these areas to row crops would reduce the available habitat for burrowing owls.

#### **Florida Sandhill Crane (*Grus canadensis pratensis*)**

Florida sandhill cranes frequent open pasture and prairie habitat and depression/basin marshes dominated by pickerelweed (*Pontedaria cordata*) and maidencane (*Panicum hemitomon*) (Nesbitt 1996; Walkinshaw 1982). Transition zones between these and forested habitats are also favored. Herbaceous wetlands are common on BRP and many are suitable for nesting sandhill cranes.

Searches for nesting sandhill cranes started in spring and summer of 2007 and again from January through mid-May of 2008 (Stys 1997). Searches for nests were also conducted in conjunction with aerial surveys (Walkinshaw 1982, Nesbitt and Williams 1990, Bishop et al. 1991).

No crane nests were found while searching suitable marshes from the ground. An adult crane and possible juvenile crane were noted 1 June 2007 in the pasture south of the staff entrance road into BRP, near S.R. 31, and two adult cranes with two small young were observed in the pasture area south of the same road but farther east 21 April 2008. Pairs of cranes were also observed near depression marshes in the northwestern and northeastern part of the Ranch on 13 June 2007 and 11 March 2008, respectively, but no confirmed nesting was documented. We found one crane sitting on a nest during a helicopter survey on 29 April 2008. It was located in a 33-acre basin marsh located in the southern part of the Ranch, east of Telegraph Swamp.

In order to sustain crane populations on Babcock Ranch Preserve it is important to maintain open rangeland, wet prairie, and dry prairie and prevent conversion to row crops. Periodic fire is important to retard woody encroachment into the shallow freshwater marshes favored by cranes (Nesbitt 1996). Protection of uplands adjacent to these shallow wetlands is also important in maintaining suitable hydrological conditions.

#### **Least Bittern (*Ixobrychus exilis*)**

Least bitterns inhabit large, >10 ha (24.5 ac), shallow depression or basin marshes with dense growth of *Typha*, *Carex*, *Scirpus*, *Sagittaria* and clumps of woody vegetation over water (Gibbs et al. 1992). Most nesting occurs in mid to late May. Marshes surveyed for least bitterns were selected based on the presence of dense vegetation using aerial photography, aerial flights, and information gathered during the natural community survey. Least bitterns are most readily observed early in the morning when feeding (Frederick 1996). During the breeding season they emit a distinctive dovelike call, and vocalizations have been used to determine reproductive



densities (Frederick 1996). Marshes targeted for surveys were visited in conjunction with other surveys (e.g., sandhill crane, natural community). The highest quality marshes were visually scanned while listening for calls and in some instances taped bittern calls were broadcast with the intention of provoking a response.

There was one observation of a least bittern from a basin marsh in the northern portion of the Curry Lake area of BRP. The record is from late October of 2007 and may have been a migrant or winter resident. Subsequent visits to the location during the mating season failed to document the presence of least bitterns.

Protecting the larger basin marshes at BRP from drainage and direct disturbance (e.g., vehicles, cattle) would benefit the least bittern.

#### **Limpkin (*Aramus guarauna*)**

Visual and aural searches were used in an attempt to document limpkins on BRP. The searches were concentrated in strand swamps associated with Telegraph Swamp and Jack's Branch.

There were two recorded observations of limpkins within Telegraph Swamp and two within swamp forest associated with Jack's Branch. During high water periods an individual was frequently observed foraging in the right-of-way along highway 31 in the extreme Northwest portion of BRP. The relatively dry conditions throughout course of the survey may have decreased the suitability of many areas of BRP to limpkins as well as many other water oriented species.

Protecting Jack's Branch and Telegraph Swamp from degradation would help maintain suitable nesting and foraging habitat for limpkins. Monitoring limpkins and apple snails at BRP may be important in assessing the health of water conditions.

#### **Hairy Woodpecker (*Picooides villosus*)**

The mature pinelands and forested wetlands on BRP may provide abundant suitable habitat for hairy woodpeckers. In Florida, hairy woodpeckers commonly nest in dead pines, but also live pond cypress (*Taxodium ascendens*) (Taylor 1996). There were no specific surveys conducted for hairy woodpeckers. All observations were recorded in conjunction with the pineland and riparian oriented surveys.

Hairy woodpeckers were documented on BRP on twelve occasions. Eight of the sightings occurred in flatwoods and the remaining were within strand swamp. On at least three occasions birds were utilizing dead standing pines in areas that had recently experienced a catastrophic fire. No nests were found during the 2007-2008 survey.

Maintaining the mesic and wet flatwoods and mature forests along the swamps in good condition and keeping dead trees and snags standing will be beneficial to the woodpecker.

**Bald Eagle (*Haliaeetus leucocephalus*)**

There were no known nest locations for bald eagles on BRP prior to the FNAI survey. We had occasional sightings of immature and adult bald eagles during the 2007-08 survey period. All sightings were made in the northwestern pasture area or in the northeastern corner of the Ranch, west of, but near Jack's Branch. A nest was located 24 April 2008 in a small patch of tall pines on the edge of a small basin marsh in the middle of the northeastern pasture area (Figure 12). A juvenile eagle was perched in a snag nearby. We flew over the nest on 29 April 2008 and observed the interior of the nest scattered with bleached bones. No other nests were found on the ranch.



Figure 12. Location of active bald eagle nest at Babcock Ranch Preserve.

Preserving the remaining patches of flatwoods and dry prairie in the pasture area would be beneficial to the eagles. Row crop agriculture is generally incompatible with bald eagle nesting success.

## Mammals

### **Sherman's short-tailed shrew (*Blarina carolinensis shermani*)**

Sherman's short-tailed shrew has only been documented during one capture event (27 captures in 4,000 snap trap nights) (Hamilton 1955). Several different researches tallying more than 1,300 trap nights in the vicinity of the original captures have failed to relocate Sherman's short-tailed shrew (Layne 1992). Most of the area surrounding the type locality has been developed, but the southern portion BRP is within 22 km of the original record and is largely undeveloped. Drift fence arrays with pitfall and wire mesh funnel traps were constructed in the southern portion and elsewhere in BRP in an effort to collect Sherman's short-tailed shrew. Sherman's short-tailed shrews were captured in drainage ditches and runways of the eastern mole (*Scalopus aquaticus*) (Hamilton 1955). The similar, southern short-tailed shrew (*Blarina carolinensis*) has been collected in mesic areas with abundant grasses and forbs (Layne 1992). Thus, several drift fence arrays were constructed along grassy ecotones of depression marshes, in mesic flatwoods, and other natural communities that have the potential to harbor populations of Sherman's short-tailed shrews.

Sherman's short-tailed shrews were not observed on BRP during the 2007-2008 survey.

### **Rafinesque's big-eared bat (*Corynorhinus rafinesquii*) and Florida bonneted bat (*Eumops floridanus*)**

Several methods were utilized in an attempt to locate Rafinesque's big-eared bat and Florida bonneted bat on BRP. Hollow trees, tree cavities, and abandoned buildings were searched for sign of roosting bats throughout BRP. FNAI in collaboration with George and Cyndi Marks of the Florida Bat Conservancy conducted surveys for both species on three separate nights on BRP (June 12<sup>th</sup> and 13<sup>th</sup>, 2007 and April 29<sup>th</sup>, 2008). An Anabat II bat detector was used to process ultrasonic bat calls to aid in species detection and identification. In addition, mist nets were set-up along a bridge across Telegraph Swamp, across Jack's Branch, and along the spillway in the southern portion of Telegraph Swamp.

Florida bonneted bats were documented on BRP within Telegraph Swamp. Of the 404 bat calls recorded on June 12, 2007, eleven were identified as Florida bonneted bat. Florida bonneted bats were not encountered during the remaining two surveys. Other bat species recorded and/or mist-netted on BRP included Brazilian free-tailed bats (*Tadarida brasiliensis*), evening bats (*Nycticeius humeralis*), northern yellow bats (*Lasiurus intermedius*), eastern pipistrelles (*Perimyotis subflavus*), and Seminole bats (*Lasiurus seminolus*). Rafinesque's big-eared bat was not observed on BRP during the 2007-2008 survey.

Both bat species utilize old buildings within forests, snags, and cavities in live trees for roosting and nursery sites. Maintaining these sites is important in the management for these and other bats species. Pesticide use in foraging areas is detrimental to bat populations.

**Round tailed muskrat (*Neofiber alleni*)**

Round-tailed muskrats are rarely encountered, however dens (houses) and feeding platforms constructed of grasses and forbs allow for relatively easy detection within depression and basin marshes (Schooley and Branch 2005). More than 95% of the approximately 456 depression marshes and 83 basin marshes found on Babcock ranch were visited and searched for sign of round-tailed muskrats. Additionally, sign of round-tailed muskrats was searched for in a sub-set of the depression marshes and basin marshes on BRP during the April 29<sup>th</sup> helicopter survey.

Round-tailed muskrats were not observed on BRP during the 2007-2008 survey.

Growing season prescribed fire in depression marshes and basin marshes will inhibit woody species encroachment and aid in maintaining forage species. Cattle may reduce the forage available to round-tailed muskrats and trampling may destroy muskrat lodges. Maintain natural hydrology of wetland communities.

**Florida mouse (*Podomys floridanus*)**

Florida mice are typically found in scrub, sandhill, scrubby flatwoods, xeric ruderal areas and to a lesser extent in drier mesic flatwoods (Hipes et al. 2001). There is less than 182 acres (69 acres of scrub and 113 acres of scrubby flatwoods) of what might be considered optimal Florida mouse habitat remaining on BRP. Patches of scrub and scrubby flatwoods were surveyed using Sherman live-traps baited with oats (see Figure 3 and Table 4). Additionally, gopher tortoise burrows encountered in xeric habitats were opportunistically scoped with a video camera in an effort to locate Florida mice.

Florida mice were not observed on BRP during the 2007-2008 survey.

Protecting gopher tortoise populations and maintaining scrub and scrubby flatwood habitats is necessary for managing Florida mouse populations. Prescribed fire is an important part of this management.

**Sherman's fox squirrel (*Sciurus niger shermani*)**

To locate populations of Sherman's fox squirrels on BRP all of the woodland pasture, unimproved pasture, pine plantation, mesic flatwoods, and scrubby flatwoods habitats were visited (Conner and Godbois 2003).

There were 12 sightings of Sherman's fox squirrels on BRP. All observations were in the western half of BRP within mesic flatwoods (four sightings) or improved and semi-improved pasture (eight sightings).

Open habitat are important for Sherman's fox squirrel. Its habitat can be maintained with growing season prescribed fire every two to five years. Prevent woody encroachment in pastures by mowing or burning.

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Appendix 1.  
Florida Natural Areas Inventory rank and status explanations

GLOBAL AND STATE RANKS

Florida Natural Areas Inventory (FNAI) defines an **element** as any rare or exemplary component of the natural environment, such as a species, natural community, bird rookery, spring, sinkhole, cave, or other ecological feature. FNAI assigns two ranks to each element found in Florida: the **global rank**, which is based on an element's worldwide status, and the **state rank**, which is based on the status of the element within Florida. Element ranks are based on many factors, including estimated number of occurrences, estimated abundance (for species and populations) or area (for natural communities), estimated number of adequately protected occurrences, range, threats, and ecological fragility.

GLOBAL RANK DEFINITIONS

- G1 Critically imperiled globally because of extreme rarity (5 or fewer occurrences or less than 1000 individuals) or because of extreme vulnerability to extinction due to some natural or human factor.
- G2 Imperiled globally because of rarity (6 to 20 occurrences or less than 3000 individuals) or because of vulnerability to extinction due to some natural or human factor.
- G3 Either very rare and local throughout its range (21-100 occurrences or less than 10,000 individuals), or found locally in a restricted range, or vulnerable to extinction from other factors.
- G4 Apparently secure globally (may be rare in parts of range).
- G5 Demonstrably secure globally.
- GH Occurred historically throughout its range, but has not been observed for many years.
- GX Believed to be extinct throughout range.
- GXC Extirpated from the wild but still known from captivity or cultivation.
- G#? Rank uncertain (e.g., G2?).
- G#G# Range of rank; insufficient data to assign specific global rank (e.g., G2G3)
- G#T# Rank of a taxonomic subgroup such as a subspecies or variety; the G portion of the rank refers to the entire species, and the T portion refers to the subgroup; T# has same definition as G#.
- G#Q Ranked as species but there is some question as to whether it is a valid species.
- G#T#Q Same as above, but validity as subspecies or variety is questioned.
- GU Global rank unknown; due to lack of information, no rank or range can be assigned.
- G? Temporarily not ranked.

STATE RANK DEFINITIONS

State ranks (S#) follow the same system and have the same definitions as global ranks, except they apply only to Florida, with the following additions:

- SA Accidental in Florida and not part of the established biota.
- SE Exotic species established in Florida (may be native elsewhere in North America).
- SX Believed to be extirpated from state.

## FEDERAL AND STATE LEGAL STATUSES

Provided by FNAI for information only.

For official definitions and lists of protected species, consult the relevant state or federal agency.

### FEDERAL LEGAL STATUS

Definitions derived from U.S. Endangered Species Act of 1973, Sec. 3. Note that the federal status given by FNAI refers only to Florida populations and that federal status may differ elsewhere.

- LE Endangered: species in danger of extinction throughout all or a significant portion of its range.
- LT Threatened: species likely to become Endangered within the foreseeable future throughout all or a significant portion of its range.
- E(S/A) Endangered due to similarity of appearance to a species which is federally listed such that enforcement personnel have difficulty in attempting to differentiate between the listed and unlisted species.
- T(S/A) Threatened due to similarity of appearance (see above).
- PE Proposed for listing as Endangered species.
- PT Proposed for listing as Threatened species.
- C Candidate species for which federal listing agencies have sufficient information on biological vulnerability and threats to support proposing to list the species as Endangered or Threatened.
- XN Non-essential experimental population.
- MC Not currently listed, but of management concern to USFWS.
- N Not currently listed, nor currently being considered for listing as Endangered or Threatened.

### FLORIDA LEGAL STATUSES

**Animals:** Definitions derived from "Florida's Endangered Species and Species of Special Concern, Official Lists" published by Florida Fish and Wildlife Conservation Commission, 1 August 1997, and subsequent updates.

- LE Endangered: species, subspecies, or isolated population so few or depleted in number or so restricted in range that it is in imminent danger of extinction.
- LT Threatened: species, subspecies, or isolated population facing a very high risk of extinction in the future.
- LS Species of Special Concern is a species, subspecies, or isolated population which is facing a moderate risk of extinction in the future.
- PE Proposed for listing as Endangered.
- PT Proposed for listing as Threatened.
- PS Proposed for listing as Species of Special Concern.
- N Not currently listed, nor currently being considered for listing.

**Plants:** Definitions derived from Sections 581.011 and 581.185(2), Florida Statutes, and the Preservation of Native Flora of Florida Act, 5B-40.001. FNAI does not track all state-regulated plant species; for a complete list of state-regulated plant species, call Florida Division of Plant Industry, 352-372-3505.

- LE Endangered: species of plants native to Florida that are in imminent danger of extinction within the state, the survival of which is unlikely if the causes of a decline in the number of plants continue; includes all species determined to be endangered or threatened pursuant to the U.S. Endangered Species Act.
- LT Threatened: species native to the state that are in rapid decline in the number of plants within the state, but which have not so decreased in number as to cause them to be Endangered.
- PE Proposed for listing as Endangered.

- PT Proposed for listing as Threatened.
- N Not currently listed, nor currently being considered for listing.

Appendix 2.  
 DATA ATTRIBUTES, DEFINITIONS, AND VALUES FOR  
 FNAI-TRACKED RARE ANIMAL POINTS

<u>ATTRIBUTES</u>	<u>VALUES</u>
SITE	Name of the wildlife management area.
DATE	Date of data collection.
SURVEYOR	Name of the FNAI field surveyor
FIELD_ID	Number assigned to this point by the FNAI scientist during field work; not necessarily unique.
POINT_ID	Unique number assigned to each point.
SPECIES	Scientific name of rare animal occurring at that point.
COM_NAME	Common name of rare animals occurring at that point.
COUNT	Estimated number of individuals observed. Count values may be an integer or number range.

AREA\_OCCUP Estimated area that the population occupies in hectares or square meters. Area occupied values are:

- <1 square meter
- 1 - 10 square meters
- 11 - 100 square meters
- 101 - 1000 square meters (0.03 acre - 0.25 acre)
- 1001 - 2500 square meters (1/4 hectare)
- 1/4 - 1/2 ha (0.62 acre - 1.2 acre)
- >1/2 - 1 ha (1.2 acre - 2.5 acres)
- >1 - 10 ha
- >10 - 100 ha
- >100 ha

EO\_TYPE Describes the activity of the rare animal. If the animal is doing more than one thing, the secondary activity is described in OTH\_EODATA. Values for EO\_Type are:

- burrow
- calling
- cavity tree
- commuting
- foraging
- loafing
- nesting
- roosting
- singing

other (described in Oth\_Eodata)

OTH\_EODATA Other element occurrence (EO) data including any observations on the status, management needs, and viability of the population.

FNAI\_NC Type of natural community, using the FNAI classification system plus: "pine plantation," "pasture- improved," "pasture- semi-improved," and "ruderal". Customize data dictionary for each project using the menu from the natural community data dictionary.

DISTURB\_1 Describes the primary disturbance in the vicinity of the rare animal population. If there is more than one type of disturbance, the most prevalent form of disturbance is entered here and the lesser disturbance is entered in Disturb\_2. Disturbance values are:

not evident  
agriculture  
cattle disturbance  
clearing (includes dove fields, old fields, and food plots that are less than 0.5 acre, i.e. that are not delineated as ruderal polygons)  
ditch/canal  
exotics  
firebreaks  
fire suppression  
forestry operations (e.g., logging, loading areas, bedding, equipment rutting, slash piles, and other mechanical disturbances; does not include burning.)  
hog digging  
impoundment (e.g. artificial ponds and lakes, borrow pits, dams, dikes)  
natural  
ORV trail  
road  
trash dumping  
woody encroachment  
cause unknown  
other (details provided in the COMMENTS field)

DISTURB\_2 Describes the secondary disturbance, if any, in the vicinity of the rare animal population. Disturbance values are the same as DISTURB\_1.

DISTURB\_SEV Severity of the disturbance(s). Disturbance severity values are:  
none  
light  
moderate  
heavy  
severe

FNAIGLOBAL Global rank of the rare animal element assigned by FNAI.\*

FNAISTATE State rank of the rare animal element assigned by FNAI.\*

FEDERAL Federal legal status.\*

STATE State legal status.\*

*\*NOTE: See appendix 1 for definitions of FNAI global rank, FNAI state rank, federal legal status and state legal status.*

COMMENTS Comments is an optional field used by the surveyor to provide additional information about the rare animal population.

Appendix 3

ArcView shapefiles for rare plants and animals observed  
during 2002-2003 surveys at Babcock Ranch Preserve

(see CD containing this text

Appendix 4.

<b>Northwest (wet flatwoods/marsh)</b>	<b>captures</b>	<b>Longleaf (mesic flatwoods/marsh)</b>	<b>captures</b>
<i>Acris gryllus</i>	3	<i>Agkistrodon piscivorus</i>	1
<i>Anolis caroliniana</i>	3	<i>Anolis caroliniana</i>	4
<i>Bufo quercicus</i>	1	<i>Coluber constrictor</i>	1
<i>Bufo terrestris</i>	10	<i>Didelphis marsupialis</i>	1
<i>Cemophora coccinea</i>	5	<i>Elaphe guttata</i>	1
<i>Coluber constrictor</i>	5	<i>Gastrophryne carolinensis</i>	9
<i>Didelphis marsupialis</i>	2	<i>Rana sphenocephala</i>	3
<i>Elaphe obsoleta</i>	1	<i>Scincella lateralis</i>	1
<i>Eleutherodactylus planirostris</i>	11	<i>Sigmodon hispidus</i>	1
<i>Gastrophryne carolinensis</i>	8	<i>Storeria dekayi</i>	1
<i>Hyla cinerea</i>	3	<i>Thamnophis sirtalis</i>	2
<i>Hyla squirella (tadpoles)</i>	5	108 funnel trap nights and 34 box trap nights	
<i>Kinosternon baurii</i>	1		
<i>Nerodia fasciata</i>	2		
<i>Rana grylio</i>	2		
<i>Rana sphenocephala</i>	9		
<i>Seminatrix pygaea</i>	1		
<i>Sistrurus miliarius</i>	1		
<i>Storeria dekayi</i>	1		
<i>Thamnophis sauritus</i>	5		
<i>Thamnophis sirtalis</i>	5		
264 funnel trap nights and 52 box trap nights			

<b>Longleaf (mesic flatwoods)</b>	<b>captures</b>
<i>Anolis caroliniana</i>	1
<i>Bufo terrestris</i>	1
<i>Coluber constrictor</i>	6
<i>Diadophis punctatus</i>	1
<i>Elaphe guttata</i>	1
<i>Gastrophryne carolinensis</i>	5
<i>Scincella lateralis</i>	1
<i>Sigmodon hispidus</i>	9
<i>Storeria dekayi</i>	5
<i>Thamnophis sirtalis</i>	7
186 funnel trap nights and 47 box trap nights	

Compilation of sampling efforts conducted within August, October, November, December of 2007 and March and April of 2008. Two weeks of September, 2007 data has been omitted. The Longleaf (mesic flatwoods/depression marsh) array was destroyed in a prescribed fire in February of 2008.



Appendix 4 continued.

Curry Lake (wet flatwoods)	captures
<i>Anolis caroliniana</i>	2
<i>Anolis sagraei</i>	1
<i>Bufo quercicus</i>	11
<i>Bufo terrestris</i>	7
<i>Coluber constrictor</i>	2
<i>Deirochelys reticularia</i>	1
<i>Didelphis marsupialis</i>	1
<i>Eleutherodactylus planirostris</i>	10
<i>Eumeces inexpectatus</i>	1
<i>Gastrophryne carolinensis</i>	51
<i>Hyla cinerea</i>	1
<i>Hyla squirella</i>	1
<i>Kinosternon baurii</i>	1
<i>Rana grylio</i>	1
<i>Rana sphenoccephala</i>	6
<i>Sigmodon hispidus</i>	1
<i>Sistrurus miliarius</i>	2
<i>Storeria dekayi</i>	1
<i>Sylvilagus floridanus</i>	1
<i>Thamnophis sauritus</i>	1

246 funnel trap nights and 50 box trap nights

Curry Lake (hydric hammock)	captures
<i>Anolis sagraei</i>	2
<i>Bufo terrestris</i>	5
<i>Crotalus adamanteus*</i>	1
<i>Didelphis marsupialis</i>	1
<i>Elaphe obsoleta</i>	1
<i>Eleutherodactylus planirostris</i>	46
<i>Gastrophryne carolinensis</i>	108
<i>Hyla cinerea</i>	8
<i>Kinosternon baurii</i>	3
<i>Rana sphenoccephala</i>	2
<i>Scincella lateralis</i>	1
<i>Sigmodon hispidus</i>	2
<i>Sistrurus miliarius</i>	4
<i>Thamnophis sauritus</i>	3

258 funnel trap nights and 50 box trap nights

Curry Lake (grass strip/hammock)	captures
<i>Acris gryllus</i>	1
<i>Anolis caroliniana</i>	1
<i>Anolis sagraei</i>	10
<i>Bufo quercicus</i>	14
<i>Bufo terrestris</i>	7
<i>Bolbocerosoma hamatum**</i>	1
<i>Coluber constrictor</i>	2
<i>Deirochelys reticularia</i>	1
<i>Eleutherodactylus planirostris</i>	136
<i>Gastrophryne carolinensis</i>	305
<i>Hyla cinerea</i>	15
<i>Hyla squirella</i>	3
<i>Kinosternon baurii</i>	8
<i>Rana sphenoccephala</i>	4
<i>Scincella lateralis</i>	2
<i>Thamnophis sauritus</i>	3

252 funnel trap nights and 152 pitfall trap nights

Compilation of sampling efforts conducted within August, October, November, December of 2007 and March and April of 2008. Two weeks of September, 2007 data has been omitted.

\*=rare vertebrate; \*\*=rare insect

Appendix 4 continued.

Southwest (former cabin site)	captures
<i>Anolis caroliniana</i>	2
<i>Anolis sagraei</i>	27
<i>Bufo quercicus</i>	1
<i>Bufo terrestris</i>	14
<i>Coluber constrictor</i>	1
<i>Cryptotis parva</i>	2
<i>Diadophis punctatus</i>	2
<i>Eleutherodactylus planirostris</i>	18
<i>Eumeces inexpectatus</i>	3
<i>Gastrophryne carolinensis</i>	23
<i>Micrurus fulvius</i>	1
<i>Mus musculus</i>	1
<i>Osteopilus septentrionalis</i>	1
<i>Peromyscus gossypinus</i>	3
<i>Reithrodontomys humulis</i>	1
<i>Thamnophis sauritus</i>	1

172 funnel trap nights and 172 pitfall trap nights

Southwest (strand/wet flatwoods)	captures
<i>Acris gryllus</i>	4
<i>Anolis caroliniana</i>	12
<i>Bufo quercicus</i>	4
<i>Bufo terrestris</i>	23
<i>Coluber constrictor</i>	2
<i>Diadophis punctatus</i>	1
<i>Elaphe guttata</i>	1
<i>Elaphe obsoleta</i>	1
<i>Eleutherodactylus planirostris</i>	50
<i>Gastrophryne carolinensis</i>	92
<i>Hyla squirella</i>	1
<i>Osteopilus septentrionalis</i>	5
<i>Rana sphenoccephala</i>	2
<i>Scincella lateralis</i>	4
<i>Storeria dekayi</i>	2
<i>Thamnophis sauritus</i>	2

516 funnel trap nights

Southwest (mesic flatwoods)	captures
<i>Anolis caroliniana</i>	6
<i>Bufo quercicus</i>	9
<i>Bufo terrestris</i>	2
<i>Cnemidophorus sexlineatus</i>	6
<i>Coluber constrictor</i>	5
<i>Diadophis punctatus</i>	1
<i>Eleutherodactylus planirostris</i>	9
<i>Eucanthus alutaceus**</i>	1
<i>Eumeces inexpectatus</i>	2
<i>Gastrophryne carolinensis</i>	136
<i>Lampropeltis triangulum</i>	1
<i>Masticophis flagellum</i>	1
<i>Mycotrupes pedester**</i>	2
<i>Rana sphenoccephala</i>	4
<i>Scincella lateralis</i>	1

306 funnel trap nights and 34 pitfall trap nights

Southwest (scrub)	captures
<i>Anolis caroliniana</i>	2
<i>Anolis sagraei</i>	4
<i>Bufo terrestris</i>	1
<i>Cnemidophorus sexlineatus</i>	4
<i>Coluber constrictor</i>	8
<i>Elaphe guttata</i>	2
<i>Eleutherodactylus planirostris</i>	59
<i>Gastrophryne carolinensis</i>	6
<i>Masticophis flagellum</i>	1
<i>Osteopilus septentrionalis</i>	1
<i>Peromyscus gossypinus</i>	1
<i>Procyon lotor</i>	1
<i>Rana sphenoccephala</i>	3
<i>Sigmodon hispidus</i>	3
<i>Spilogale putorius</i>	1

336 funnel trap nights and 49 box trap nights

Compilation of sampling efforts conducted within August, October, November, December of 2007 and March and April of 2008. Two weeks of September, 2007 data has been omitted.

\*\*=rare insect

Appendix 5. All bird species observed at Babcock Ranch Preserve, 2007-2008.

Common Name	Scientific Name	Frequency	State Status	Fed Status	FNAI	Decreasing	Neotropical	Nonnative
American bittern	<i>Botaurus lentiginosus</i>	i						
American coot	<i>Fulica Americana</i>	i						
American crow	<i>Corvus brachyrhynchos</i>	a						
American goldfinch	<i>Carduelis tristis</i>	i						
American kestrel	<i>Falco sparverius</i>	c						
American robin	<i>Turdus migratorius</i>	i						
American swallow-tailed kite	<i>Elanoides forficatus</i>	c					x	
Anhinga	<i>Anhinga anhinga</i>	c						
Bachman's sparrow	<i>Aimophila aestivalis</i>	a			x	x		
Bald eagle	<i>Haliaeetus leucocephalus</i>	i			x			
Barn owl	<i>Tyto alba</i>	i				x		
Barn swallow	<i>Hirundo rustica</i>	i					x	
Barred owl	<i>Strix varia</i>	a						
Belted kingfisher	<i>Ceryle alcyon</i>	c						
Black vulture	<i>Coragyps atratus</i>	a						
Black-bellied whistling duck	<i>Dendrocygna autumnalis</i>	i						x
Black-crowned night heron	<i>Nycticorax nycticorax</i>	c			x			
Blackpoll warbler	<i>Dendroica striata</i>	i					x	
Blue jay	<i>Cyanocitta cristata</i>	a				x		
Blue-gray gnatcatcher	<i>Poliopitila caerulea</i>	a						
Boat-tailed grackle	<i>Quiscalus major</i>	c						
Bobolink	<i>Dolichonyx oryzivorus</i>	i					x	
Brown thrasher	<i>Toxostoma rufum</i>	c						
Brown-headed cowbird	<i>Molothrus ater</i>	a						
Brown-headed nuthatch	<i>Sitta pusilla</i>	a				x		
Burrowing owl	<i>Athene cucularia</i>	i	SSC		x			
Carolina wren	<i>Thryothorus ludovicianus</i>	a						
Cattle egret	<i>Bubulcus ibis</i>	a				x		
Chuck-will's-widow	<i>Caprimulgus carolinensis</i>	c				x	x	
Common grackle	<i>Quiscalus quiscula</i>	a				x		
Common ground dove	<i>Columbina passerina</i>	a				x		
Common moorhen	<i>Gallinula chloropus</i>	i						
Common nighthawk	<i>Chordeiles minor</i>	c				x	x	
Common snipe	<i>Gallinago gallinago</i>	c						
Common yellowthroat	<i>Geothlypis trichas</i>	a				x		
Cooper's hawk	<i>Accipiter cooperii</i>	i			x			
Crested caracara	<i>Caracara plancus</i>	i	T	T	x			
Double-crested cormorant	<i>Phalacrocorax auritus</i>	i						
Downy woodpecker	<i>Picoides pubescens</i>	a						
Eastern bluebird	<i>Sialia sialis</i>	c						
Eastern kingbird	<i>Tyrannus tyrannus</i>	c				x	x	

Appendix 5. Continued.

Common Name	Scientific Name	Frequency	State Status	Fed Status	FNAI	Decreasing	Neotropical	Nonnative
Eastern meadowlark	<i>Sturnella magna</i>	a				x		
Eastern phoebe	<i>Sayornis phoebe</i>	c						
Eastern screech owl	<i>Otus asio</i>	c						
Eurasian collared dove	<i>Streptopelia decaocto</i>	i						x
European starling	<i>Sturnus vulgaris</i>	i						x
Field sparrow	<i>Spizella pusilla</i>	i						
Fish crow	<i>Corvus ossifragus</i>	i						
Glossy ibis	<i>Plegadis falcinellus</i>	i			x			
Gray catbird	<i>Dumetella carolinensis</i>	c						
Great blue heron	<i>Ardea herodias</i>	c						
Great crested flycatcher	<i>Myiarchus crinitus</i>	a					x	
Great egret	<i>Casmerodius albus</i>	a			x			
Great horned owl	<i>Bubo virginianus</i>	c						
Greater yellowlegs	<i>Tringa melanoleuca</i>	i						
Green-backed heron	<i>Butorides striatus</i>	c				x		
Hairy woodpecker	<i>Picoides villosus</i>	i			x			
Henslow's sparrow	<i>Ammodramus henslowii</i>	i						
Hermit thrush	<i>Catharus guttatus</i>	i						
House wren	<i>Troglodytes aedon</i>	c						
Killdeer	<i>Charadrius vociferus</i>	c				x		
Least bittern	<i>Ixobrychus exilis</i>	i			x			
Least sandpiper	<i>Calidris minutilla</i>	i						
Limpkin	<i>Aramus guarauna</i>	i	SSC		x			
Little blue heron	<i>Egretta caerulea</i>	a	SSC		x	x		
Loggerhead shrike	<i>Lanius ludovicianus</i>	a				x		
Merlin	<i>Falco columbarius</i>	i			x			
Mottled duck	<i>Anas fulvigula</i>	i						
Mourning dove	<i>Zenaida macroura</i>	a						
Northern bobwhite	<i>Colinus virginianus</i>	i				x		
Northern cardinal	<i>Cardinalis cardinalis</i>	a						
Northern flicker	<i>Colaptes auratus</i>	a				x		
Northern harrier	<i>Circus cyaneus</i>	i						
Northern mockingbird	<i>Mimus polyglottos</i>	a				x		
Northern parula	<i>Parula americana</i>	a					x	
Northern waterthrush	<i>Seiurus noveboracensis</i>	i					x	
Osprey	<i>Pandion haliaetus</i>	i			x			
Ovenbird	<i>Seiurus aurocapillus</i>	i						
Palm warbler	<i>Dendroica palmarum</i>	a						
Pied-billed grebe	<i>Podilymbus podiceps</i>	i				x		
Pileated woodpecker	<i>Dryocopus pileatus</i>	c						
Pine warbler	<i>Dendroica pinus</i>	a				x		

Appendix 5. Continued.

Common Name	Scientific Name	Frequency	State Status	Fed Status	FNAI	Decreasing	Neotropical	Nonnative
Prairie warbler	<i>Dendroica discolor</i>	i					x	
Purple martin	<i>Progne subis</i>	c				x	x	
Red-bellied woodpecker	<i>Melanerpes carolinus</i>	a						
Red-cockaded woodpecker	<i>Picoides borealis</i>	i	SSC	E	x			
Red-shouldered hawk	<i>Buteo lineatus</i>	a						
Red-tailed hawk	<i>Buteo jamaicensis</i>	i						
Red-winged blackbird	<i>Agelaius phoeniceus</i>	c				x		
Roseate spoonbill	<i>Ajaia ajaja</i>	i	SSC		x			
Ruby-throated hummingbird	<i>Archilochus colubris</i>	i					x	
Rufous-sided towhee	<i>Pipilo erythrophthalmus</i>	a				x		
Sandhill crane	<i>Grus canadensis</i>	c	T		x			
Savannah sparrow	<i>Passerculus sandwichensis</i>	i						
Sharp-shinned hawk	<i>Accipiter striatus</i>	i						
Short-tailed hawk	<i>Buteo brachyurus</i>	i			x			
Snowy egret	<i>Egretta thula</i>	c	SSC		x			
Solitary sandpiper	<i>Tringa solitaria</i>	i						
Solitary vireo	<i>Vireo solitarius</i>	i						
Summer tanager	<i>Pirangra rubra</i>	i					x	
Tree swallow	<i>Tachycineta bicolor</i>	c						
Tricolored heron	<i>Egretta tricolor</i>	i	SSC		x	x		
Tufted titmouse	<i>Parus bicolor</i>	c				x		
Turkey vulture	<i>Cathartes aura</i>	a						
White ibis	<i>Eudocimus albus</i>	c	SSC		x			
White-eyed vireo	<i>Vireo griseus</i>	a						
White-winged dove	<i>Zenaida asiatica</i>	i						x
Wild turkey	<i>Meleagris gallopavo</i>	c						
Wood stork	<i>Mycteria americana</i>	c	E	E	x			
Yellow-crowned night heron	<i>Nycticorax violacea</i>	i			x			
Yellow-bellied sapsucker	<i>Sphyrapicus varius</i>	c						
Yellow-billed cuckoo	<i>Coccyzus americanus</i>	i				x	x	
Yellow-rumped warbler	<i>Dendroica coronata</i>	i						
Yellow-throated warbler	<i>Dendroica dominica</i>	i					x	

**Frequency** = relative number of observations in the appropriate habitat and during the appropriate season (a=abundant, c=common, i=infrequent).

**State and Federal Status** = (E=endangered, T=threatened, SSC=species of special concern).

**FNAI** = species considered rare by Florida Natural Areas Inventory.

**Decreasing** = species that have experienced significant (p<0.1) population decreases in Florida between 1966 and 2006 according to the Breeding Bird Survey data. Saur et al. 2007

**Neotropical** = species that migrate to Neotropical regions.

**Nonnative** = species that have established breeding populations in Florida as a result of human introductions.