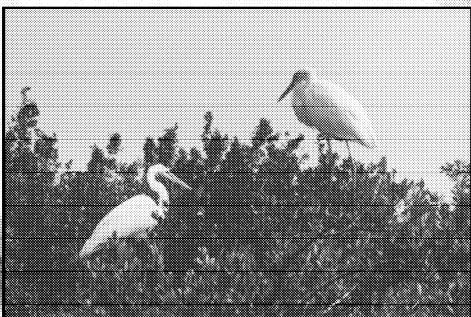


G BIOLOGICAL RESOURCES



BIOLOGICAL RESOURCES

This appendix discusses the methods and results of surveys conducted in 1998 for special-status species on and near former Homestead AFB (**Denton and Godley 1999**, **Mazzotti 1999b**). It provides a list of species with their scientific names that are mentioned in the biological sections of the SEIS (**Table G-1**). It also discusses the federal and state threatened and endangered species, as well as other rare species of concern (referred to as special-status species) occurring on and near former Homestead AFB and in other areas of south Florida, particularly Everglades and Biscayne NPs.

The analysis in this appendix depends heavily on the results of surveys for special-status species on former Homestead AFB, including a 1992–93 survey of flora and fauna (**Hilsenbeck 1993**), sensitive plant surveys (**Argonne National Laboratory 1997**, **PBS&J 1998b**), and other surveys (**Geraghty & Miller 1993**). Information regarding the flora and fauna along the western shoreline of Biscayne Bay and in other areas near former Homestead AFB is from Biscayne NP (**BNP 1998**, **Howitt 1996**), USEPA (**Metro-Dade County 1994b**), field surveys conducted for this assessment (**Denton and Godley 1999**, **Mazzotti 1999b**), and numerous other studies.

G.1 Survey Areas and Methods

Surveys for special-status species were conducted on former Homestead AFB and surrounding areas in the spring and summer of 1998. The species that were included in these surveys were determined during discussions with biologists from various federal and state agencies and from literature reviews.

G.1.1 Plants

A survey for special-status plant species was conducted on July 22, 1998 along the Military Canal and the reservoir at its western end (**Figure G-1**). The survey consisted of walking each canal bank and searching all potential habitat within 50 feet of the canal for species listed by the USFWS or the State of Florida under Section 581.185, Florida Statutes. All special-status species observed were plotted on field maps.

G.1.2 Reptiles

American Crocodile. Surveys for the American crocodile took place on former Homestead AFB (**Figure G-2**), in canals between the former base and Biscayne Bay, and along the western shoreline of Biscayne Bay in June and July 1998 (**Figure G-3**). Crocodile surveys on the former base were concentrated in the larger canals, lakes, and shallow wetlands. Surveys outside the former base took place along 44.1 miles of canals including the Florida City, North, Mowry, Military, C-102, Goulds, and L-31E canals, as well as 6.8 miles along the western shoreline of Biscayne Bay (**Table G-2**). Crocodile surveys began one-half hour after sunset and lasted for three to seven hours. The canals were spot lighted from a vehicle in areas where the canal was clearly visible from the road. A johnboat was used to survey segments of canals that were not visible from the road. The boat was also used to survey along the western shoreline of Biscayne Bay and the mouths of canals (**Mazzotti 1999b**).

APPENDIX G

Table G-1. Scientific Names of Biota

Common Name	Scientific Name	See Note ⁽¹⁾	See Note ⁽²⁾	See Note ⁽³⁾
PLANT SPECIES				
Air potato vine	<i>Dioscorea bulbifera</i>			
Algae	<i>Chara</i> sp.	✓		
Anemia fern	<i>Anemia adiantifolia</i>			
Arrowhead	<i>Sagittaria lancifolia</i>	✓		
Australian pine	<i>Casuarina</i> sp.	✓		
Bahama brake	<i>Pteris bahamensis</i>	✓		
Bahama sachsia	<i>Sachsia polycephala</i>	✓		
Bald cypress	<i>Taxodium distichum</i>			
Beak-rush	<i>Rhynchospora</i> sp.	✓		
Bermuda grass	<i>Cynodon dactylon</i>	✓		
Bischofia	<i>Bischofia javanica</i>			
Black ironwood	<i>Krugiodendron ferreum</i>			
Black mangrove	<i>Avicennia germinans</i>			
Black needlerush	<i>Juncus roemerianus</i>			
Black olive	<i>Bucida buccera</i>			
Blackberry	<i>Rubus cuneifolius</i>			
Blazing star	<i>Liatris</i> sp.			
Blodgett's ironweed	<i>Vernonia blodgettii</i>	✓		
Blodgett's wild mercury	<i>Argythamnia blodgettii</i>			
Blueberry	<i>Vaccinium</i> spp.			
Brazilian pepper	<i>Schinus terebinthifolius</i>	✓		
Broomsedge	<i>Andropogon</i> spp.	✓		
Bulrush	<i>Scirpus</i> sp.			
Burma reed	<i>Neyraudia reynaudiana</i>			
Bushy beardgrass	<i>Andropogon glomeratus</i>	✓		
Bustic	<i>Dipholis salicifolia</i>			
Buttonwood	<i>Conocarpus erecta</i>			
Cabbage palm	<i>Sabal palmetto</i>			
Cactus	<i>Opuntia</i> sp.			
Carpet grass	<i>Axonopus</i> sp.			
Carter's small-flowered flax	<i>Linum carteri</i>	✓		
Castor bean	<i>Ricinus communis</i>	✓		
Cat's claw	<i>Pithecellobium unguis-cati</i>			
Cattail	<i>Typha</i> sp.	✓		
Christmas berry	<i>Crossopetalum ilicifolium</i>	✓		
Coastal plain willow	<i>Salix caroliniana</i>	✓		
Coffee colubrina	<i>Colubrina arborescens</i>			
Coontail	<i>Ceratophyllum demersum</i>	✓		
Deltoid spurge	<i>Chamaesyce deltoidea</i>			
Dog fennel	<i>Eupatorium capillifolium</i>			
Duck potato	NI			
Elderberry	<i>Sambucus canadensis</i>			
Fetterbush	<i>Lyonia lucida</i>			
Fire flag	<i>Thalia geniculata</i>			
Florida elm	<i>Ulmus americana</i> var. <i>floridana</i>			
Florida five-petaled leaf flower	<i>Phyllanthus pentaphyllus</i>	✓		
Florida lantana	<i>Lantana depressa</i>	✓		

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Common Name	Scientific Name	See Note ⁽¹⁾	See Note ⁽²⁾	See Note ⁽³⁾
Florida pinewood privet	<i>Foresteria segregata</i> var. <i>pinetorum</i>	✓		
Florida royal palm	<i>Roystonea elata</i>	✓		
Florida white-top sedge	<i>Dichromena floridensis</i>	✓		
Fox grape	<i>Vitis labrusca</i>			
Foxtail	<i>NI</i>	✓		
Gallberry	<i>Ilex glabra</i>			
Geiger tree	<i>Cordia sebestena</i>			
Giant reed	<i>Phragmites communis</i>	✓		
Giant wild pine	<i>Tillandsia utriculata</i>			
Glasswort	<i>Salicornia</i> sp.			
Goldenrod	<i>Solidago</i> sp.			
Greenbrier	<i>Smilax</i> spp.			
Guara	<i>Psidium guajava</i>			
Guiana-plum	<i>Drypetes lateriflora</i>			
Gumbo limbo	<i>Bursera simaruba</i>			
Indian grass	<i>Sorghastrum</i> sp.			
Inkwood	<i>Exothea paniculata</i>			
American hornbeam	<i>Carpinus caroliniana</i>			
Jamaica dogwood	<i>Piscidia piscipula</i>			
Krug's holly	<i>Ilex krugiana</i>	✓		
Lancewood	<i>Nectandra coriacea</i>			
Lantana	<i>Lantana camara</i>	✓		
Laurel oak	<i>Quercus hemisphaerica</i>			
Lignum vitae	<i>Guaiacum sanctum</i>			
Locustberry	<i>Byrsonima lucida</i>	✓		
Love grass	<i>Eragrostis</i> sp.			
Maiden cane	<i>Panicum hemitomom</i>	✓		
Manatee grass	<i>Syringodium filiforme</i>			
Manchineel	<i>Hippomane mancinella</i>			
Marlberry	<i>Ardisia escallonioides</i>			
Marsh elder	<i>Iva frutescens</i>			
Marsh pink	<i>Sabatia</i> sp.			
Mastic	<i>Mastichodendron foetidissimum</i>			
Melaleuca	<i>Melaleuca quinquenervia</i>			
Milkwort	<i>Polygala</i> sp.			
Mistflower	<i>Eupatorium coelestinum</i>			
Morning-glory	<i>Ipomoea indica</i>	✓		
Muhly grass	<i>Muhlenbergia fitipes</i>			
Musky mint	<i>Hyptis alata</i>			
Napier grass	<i>Pennisetum purpureum</i>	✓		
Oak	<i>Quercus</i> sp.			
One-nerved ernodea	<i>Ernodea cokeri</i>			
Papaya	<i>Carica papaya</i>			
Paradise tree	<i>Simarouba glauca</i>			
Parsely fern	<i>Odontosoria clavata</i>	✓		
Paw paw	<i>Asimina</i> sp.			
Pickerel weed	<i>Pontederia cordata</i>			
Pigeon plum	<i>Coccoloba diversifolia</i>			
Pine	<i>Pinus</i> spp.			
Pineland jacquemontia	<i>Jacquemontia curtissii</i>	✓		

APPENDIX G

Common Name	Scientific Name	See Note ⁽¹⁾	See Note ⁽²⁾	See Note ⁽³⁾
Pineland noseburn	<i>Tragia saxicola</i>	✓		
Pine pink orchid	<i>Bletia purpurea</i>			
Poisonwood	<i>Metopium toxiferum</i>			
Pond cypress	<i>Taxodium ascendens</i>			
Porter's spurge	<i>Chamaesyce porteriana</i>	✓		
Possum grape	<i>Cissus trifoliata</i>	✓		
Prickly ash	<i>Zanthoxylum clava-herculis</i>			
Rabbit tobacco	<i>Pterocaulon pycnostachyum</i>			
Red bay	<i>Persea borbonia</i>			
Red cedar	<i>Juniperus virginiana</i>			
Red mangrove	<i>Rhizophora mangle</i>			
Red maple	<i>Acer rubrum</i>			
Rockland painted-leaf	<i>Poinsettia pinetorum</i>	✓		
Royal palm	<i>Roystonea elata</i>			
Running oak	<i>Quercus pumila</i>			
Saltbush	<i>Baccharis</i> sp.			
Saltgrass	<i>Distichlis spicata</i>			
Saltwort	<i>Batis maritima</i>			
Sand flax	<i>Linum arenicola</i>			
Sand spur	<i>Cenchrus</i> sp.	✓		
Satin leaf	<i>Chrysophyllum oliviforme</i>			
Saw palmetto	<i>Serenoa repens</i>			
Sawgrass	<i>Cladium jamaicense</i>	✓		
Sea grape	<i>Coccoloba uvifera</i>			
Sea lavender	<i>Tournefortia gnaphalodes</i>			
Sea oxeye daisy	<i>Borrichia frutescens</i>			
Shoal grass	<i>Halodule wrightii</i>			
Shortleaf fig	<i>Ficus citrifolia</i>			
Silk tree	<i>Albizia julibrissin</i>			
Silver palm	<i>Coccothrinax argentata</i>	✓		
Slash pine	<i>Pinus elliotii</i>	✓		
Small-leaved melanthera	<i>Melanthera parvifolia</i>	✓		
Small's milkpea	<i>Galactia smallii</i>			
Smartweed	<i>Polygonum</i> sp.	✓		
Smooth cordgrass	<i>Spartina alterniflora</i>			
Soapberry	<i>Sapindus</i> spp.			
Soldierwood	<i>Colubrina elliptica</i>			
Spanish moss	<i>Tillandsia usneoides</i>			
Spanish nettle	<i>Bidens pilosa</i>	✓		
Spikerush	<i>Eleocharis</i> sp.	✓		
St. Augustine grass	<i>Stenotaphrum secundatum</i>	✓		
Staggerbush	<i>Lyonia</i> sp.			
Star rush	<i>Dichromena latifolia</i>			
Strangler fig	<i>Ficus aurea</i>	✓		
Sweetgum	<i>Liquidambar styraciflua</i>			
Tallowwood	<i>Sapium sebiferum</i>			
Tar flower	<i>Befaria racemosa</i>			
Tetrazygia	<i>Tetrazygia bicolor</i>	✓		
Thatch palms	NI			
Three-hole grass	<i>Bothriochloa pertusa</i>	✓		

APPENDIX G

Common Name	Scientific Name	See Note ⁽¹⁾	See Note ⁽²⁾	See Note ⁽³⁾
Tickseed	<i>Coreopsis</i> sp.			
Torchwood	<i>Amyris elemifera</i>			
Torpedo grass	<i>Panicum repens</i>	✓		
Turtle grass	<i>Thalassia testudinum</i>			
Umbrella sedge	<i>Cyperus alternifolius</i>	✓		
Water lily	<i>Nymphaea lanceolata</i>			
Water oak	<i>Quercus nigra</i>			
Water pennywort	<i>Hydrocotyle</i> sp.	✓		
Water shield	<i>Brassenia schreberi</i>			
Wax myrtle	<i>Myrica cerifera</i>			
Wedgelet fern	<i>Sphenomeris clavata</i>	✓		
West Indian mahogany	<i>Swietenia mahogani</i>			
Weeping fig	<i>Ficus benjamina</i>			
White mangrove	<i>Laguncularia racemosa</i>			
White water lily	<i>Nymphaea odorata</i>			
Wild balsam apple	<i>Mormordica charantia</i>	✓		
Wild coffee	<i>Psychotria</i> spp.			
Wild lime	<i>Zanthoxylum fagara</i>			
Wild pine	<i>Tillandsia</i> spp.			
Wild potato morning-glory	<i>Ipomoea microdactyla</i>			
Wild tamarind	<i>Lysiloma bahamense</i>			
Willow	<i>Salix caroliniana</i>			
Wiregrass	<i>Aristida</i> sp.			
ANIMAL SPECIES				
Invertebrates				
Apple snail	<i>Pomacea paludosa</i>			
Blue crab	<i>Callinectes sapidus</i>			
Florida atala butterfly	<i>Eumaeus atala florida</i>			
Sheepswool sponge	<i>Hippiospongia lachne</i>			
Basket sponge	<i>Ircinia campana</i>			
Stone crab	<i>Menippe mercenaria</i>			
Fire coral	<i>Millepora alcicornis</i>			
Spiny lobster	<i>Panulirus argus</i>			
Schaus swallowtail	<i>Papilio aristodemus ponceanus</i>			
Penaeid shrimp	<i>Penaeus</i> sp.			
Finger coral	<i>Porites</i> sp.			
Schaus swallowtail butterfly	<i>Heraclides aristodemus ponceanus</i>			
Starlet coral	<i>Siderastrea siderea</i> , <i>S. radians</i>			
Star coral	<i>Solenastrea</i> sp.			
Loggerhead sponge	<i>Spheciospongia vesparia</i>			
Yellow sponge	<i>Spongia barbara</i>			
Glove sponge	<i>Spongia cheiris</i>			
Grass sponge	<i>Spongia germinia</i>			
Fish				
Angelfish-rock beauty	<i>Holacanthus tricolor</i>			
Barracuda	<i>Sphyraena</i> sp.			
Black grouper	<i>Mycteroperca bonaci</i>			
Blacknose shark	<i>Carcharhinus acronotus</i>			
Bluegill	<i>Lepomis macrochirus</i>	✓		
Bonefish	<i>Albula vulpes</i>			

APPENDIX G

Common Name	Scientific Name	See Note ⁽¹⁾	See Note ⁽²⁾	See Note ⁽³⁾
Bonnethead shark	<i>Sphyrna tiburo</i>			
Common snook	<i>Centropomus undecimalis</i>			
Conchfish	<i>Astrapogon stellatus</i>			
Florida gar	<i>Lepisosteus platyrhincus</i>			
Foureye butterflyfish	<i>Chaetodon capistratus</i>			
Gizzard shad	<i>Dorosoma cepedianum</i>			
Goby	Gobiidae			
Hogfish	<i>Lachnolaimus maximus</i>			
Ladyfish	<i>Elops saurus</i>			
Largemouth bass	<i>Micropterus salmoides</i>	✓		
Lemon shark	<i>Negaprion brevirostris</i>			
Midas cichlid	<i>Cichlasoma citrinellum</i>			
Mollie	<i>Poecilia latipinna</i>	✓		
Mosquito fish	<i>Gambusia affinis</i>			
Mullet	<i>Mugil cephalus</i>	✓		
Nassau grouper	<i>Epinephelus striatus</i>			
Oscar	<i>Astronotus ocellatus</i>			
Pearlfish	<i>Carapus bermudensis</i>			
Permit	<i>Trachinotus falcatus</i>			
Pompano	<i>Trachinotus</i> sp.			
Red drum	<i>Sciaenops ocellata</i>			
Red grouper	<i>Epinephelus morio</i>			
Sailfin catfish	<i>Pterygoplichthys multiradiatus</i>			
Sharpnose shark	<i>Rhizoprionodon terraenovae</i>			
Silver perch	<i>Bairdiella batabana</i>			
Snapper	NI			
Spanish mackerel	<i>Scomberomorus maculatus</i>			
Spotted seatrout	<i>Cynoscion nebulosus</i>			
Spotted tilapia	<i>Tilapia mariae</i>			
Tarpon	<i>Megalops atlanticus</i>			
Toadfish	<i>Opsanus tau</i>			
Walking catfish	<i>Clarias batrachus</i>			
Warmouth	<i>Lepomis gulosus</i>			
Amphibians				
Bullfrog	<i>Rana catesbeiana</i>	✓		
Cuban treefrog	<i>Osteopilus septentrionalis</i>			✓
Florida chorus frog	<i>Pseudacris</i> sp.			
Giant Toad	<i>Bufo marinus</i>	✓		
Salamander	NI	✓		
Tree frog	NI	✓		
Reptiles				
American alligator	<i>Alligator mississippiensis</i>	✓	✓	✓
American crocodile	<i>Crocodylus acutus</i>	✓	✓	
Atlantic ridley sea turtle	<i>Lepidochelys kemp</i>			
Basilisk lizard	<i>Basiliscus vittatus</i>			✓
Brown anole	<i>Anolis sagrei</i>			✓
Corn snake	<i>Elaphe guttata guttata</i>	✓		
Diamondback terrapin	<i>Malaclemys terrapin</i>			
Dusky pygmy rattlesnake	<i>Sistrurus miliarius barbouri</i>			
Eastern indigo snake	<i>Drymarchon corais couperi</i>	✓		

APPENDIX G

Common Name	Scientific Name	See Note ⁽¹⁾	See Note ⁽²⁾	See Note ⁽³⁾
Florida redbelly turtle	<i>Pseudemys nelsoni</i>			✓
Florida softshell turtle	<i>Apalone ferox</i>			
Gopher tortoise	<i>Gopherus polyphemus</i>		✓	
Green anole	<i>Anolis carolinensis</i>			✓
Green iguana	<i>Iguana iguana</i>			✓
Green sea turtle	<i>Chelonia mydas mydas</i>			
Hawksbill sea turtle	<i>Eretmochelys imbricata</i>			
Leatherback sea turtle	<i>Dermochelys coriacea</i>			
Loggerhead sea turtle	<i>Caretta caretta</i>			
Mangrove saltmarsh terrapin	<i>Malaclemys terrapin rhizophorarum</i>			
Mole skink	<i>Eumeces egregius</i>		✓	
Peninsula cooter	<i>Pseudemys nelsoni</i>			✓
Pine snake	<i>Pituophis melanoleucus</i>		✓	
Rat snake	<i>Elaphe obsoleta</i>	✓		
Rattlesnake	<i>NI</i>		✓	
Rim rock crowned snake	<i>Tantilla oolitica</i>		✓	
Ringneck snake	<i>Diadophis punctatus</i>			
Rough green snake	<i>Opheodrys aestivus</i>	✓		
Snapping turtle	<i>Chelydra serpentina</i>	✓		
Southeastern five-lined skink	<i>Eumeces inexpectatus</i>			
Spectacled caiman	<i>Caiman crocodilus</i>			
Birds				
Acadian flycatcher	<i>Empidonax virescens</i>			
American coot	<i>Fulica americana</i>	✓		✓
American crow	<i>Corvus brachyrhynchos</i>			✓
American goldfinch	<i>Carduelis tristis</i>	✓		
American oystercatcher	<i>Haematopus palliatus</i>			
American redstart	<i>Setophaga ruticilla</i>	✓		
American robin	<i>Turdus migratorius</i>			✓
Anhinga	<i>Anhinga anhinga</i>	✓		✓
Antillean nighthawk	<i>Chordeiles gundlachii</i>		✓	
Artic peregrine falcon	<i>Falco peregrinus tundrius</i>		✓	
Audubon's shearwater	<i>Puffinus iherrminieri</i>			✓
Bald eagle	<i>Haliaeetus leucocephalus</i>	✓		
Bank swallow	<i>Riparia riparia</i>			✓
Barn swallow	<i>Hirundo rustica</i>			✓
Barred owl	<i>Strix varia</i>	✓		
Bell's vireo	<i>Vireo bellii</i>			✓
Belted kingfisher	<i>Ceryle alcyon</i>			✓
Black-and-white warbler	<i>Mniotilta varia</i>			
Black-crowned night-heron	<i>Nycticorax nycticorax</i>	✓	✓	
Black-necked stilt	<i>Himantopus mexicanus</i>	✓		
Black rail	<i>Laterallus jamaicensis</i>		✓	
Black scoter	<i>Melanitta nigra</i>			✓
Black shouldered kite	<i>Elanus caeruleus</i>		✓	
Black skimmer	<i>Pynchops niger</i>			✓
Black-throated blue warbler	<i>Dendroica caerulescens</i>	✓		
Black-throated gray warbler	<i>Dendroica nigrescens</i>			✓
Black-throated green warbler	<i>Dendroica virens</i>			✓
Black vulture	<i>Coragyps atratus</i>	✓		

APPENDIX G

Common Name	Scientific Name	See Note ⁽¹⁾	See Note ⁽²⁾	See Note ⁽³⁾
Black-whiskered vireo	<i>Vireo altiloquus</i>		✓	
Blackpoll warbler	<i>Dendroica striata</i>			✓
Blue grosbeak	<i>Guiraca caerulea</i>	✓		
Blue jay	<i>Cyanocitta cristata</i>	✓		
Blue-gray gnatcatcher	<i>Polioptila caerulea</i>	✓		
Blue-winged teal	<i>Anas discors</i>			✓
Boat-tailed grackle	<i>Quiscalus major</i>	✓		✓
Bobolink	<i>Dolichonyx oryzivorus</i>			✓
Bonaparte's gull	<i>Larus philadelphia</i>			✓
Broad-winged hawk	<i>Buteo platypterus</i>	✓		
Brown booby	<i>Sula leucogaster</i>			✓
Brown-headed cowbird	<i>Molothus ater</i>			✓
Brown pelican	<i>Pelecanus occidentalis</i>		✓	✓
Canada warbler	<i>Wilsonia canadensis</i>			✓
Canary-winged parakeet	<i>Brotogeris versicolurus</i>			✓
Cape May warbler	<i>Dendroica tigrina</i>			✓
Cape Sable Seaside sparrow	<i>Ammodramus maritimus mirabilis</i>			
Caspian tern	<i>Sterna caspia</i>			
Carolina wren	<i>Thryothorus ludovicianus</i>	✓		✓
Cattle egret	<i>Bubulcus ibis</i>	✓		✓
Cedar waxwing	<i>Bombycilla cedrorum</i>	✓		
Chimney swift	<i>Chaetura pelagica</i>			✓
Chipping sparrow	<i>Spizella passerina</i>			✓
Chuck-will's widow	<i>Caprimulgus carolinensis</i>			✓
Clapper rail	<i>Rallus longirostris</i>			
Common ground dove	<i>Columbina passerina</i>			✓
Common grackle	<i>Quiscalus quiscula</i>	✓		✓
Common gallinule	<i>Gallinula chloropus</i>	✓		✓
Common loon	<i>Gavia immer</i>			✓
Common nighthawk	<i>Chordeiles minor</i>	✓		
Common snipe	<i>Gallinago gallinago</i>			✓
Common tern	<i>Sterna hirundo</i>			✓
Common yellowthroat	<i>Geothlypis trichas</i>	✓		
Connecticut warbler	<i>Oporornis agilis</i>			✓
Cooper's hawk	<i>Accipiter cooperii</i>	✓		
Crested caracara	<i>Caracara plancus</i>			
Cuban yellow warbler	<i>Dendroica petechia gundlachi</i>			✓
Dickcissel	<i>Spiza americana</i>			✓
Double-crested cormorant	<i>Phalacrocorax auritus</i>	✓		
Downy woodpecker	<i>Picoides pubescens</i>			✓
Dunlin	<i>Calidris alpina</i>			✓
Eastern bluebird	<i>Sialia sialis</i>			
Eastern kingbird	<i>Tyrannus tyrannus</i>	✓		✓
Eastern meadowlark	<i>Sturnella magna</i>			✓
Eastern phoebe	<i>Sayornis phoebe</i>	✓		
Eastern screech-owl	<i>Otus asio</i>	✓		
Eastern towhee	<i>Pipilo erythrophthalmus</i>	✓		
Eastern wood pewee	<i>Contopus virens</i>			✓
Eurasian-collared dove	<i>Streptopelia dacocto</i>			✓
European starling	<i>Sturnus vulgaris</i>	✓		

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Common Name	Scientific Name	See Note ⁽¹⁾	See Note ⁽²⁾	See Note ⁽³⁾
Fish crow	<i>Corvus ossifragus</i>	✓		
Florida burrowing owl	<i>Speotyto cunicularia</i>	✓		✓
Florida prairie warbler	<i>Dendroica discolor paludicola</i>			✓
Forster's tern	<i>Sterna forsteri</i>			✓
Franklin's gull	<i>Larus pipixcan</i>			✓
Fulvous whistling duck	<i>Dendrocygn bicolor</i>			✓
Glossy ibis	<i>Plegadis falcinellus</i>		✓	
Grasshopper sparrow	<i>Ammodramus savannarum</i>	✓		
Gray catbird	<i>Dumetella carolinensis</i>	✓		✓
Gray-cheeked thrush	<i>Catharus minimus</i>			
Gray kingbird	<i>Tyrannus dominicensis</i>	✓		
Gray plover	<i>Pluvialis squatarola</i>			✓
Great black-backed gull	<i>Larus marinus</i>			✓
Great blue heron	<i>Ardea herodias</i>	✓		✓
Great-crested flycatcher	<i>Myiarchus crinitus</i>			
Great egret	<i>Casmerodius albus</i>	✓	✓	✓
Great white heron	<i>Ardea herodia occidentalis</i>			
Greater yellowlegs	<i>Tringa melanoleuca</i>			✓
Green heron	<i>Butorides virescens</i>	✓		✓
Hairy woodpecker	<i>Picoides villosus</i>			✓
Herring gull	<i>Larus argentatus</i>			✓
Hill myna bird	<i>Gracula religiosa</i>			
Hooded warbler	<i>Wilsonia citrina</i>			✓
Horned grebe	<i>Podiceps auritus</i>			✓
House sparrow	<i>Passer domesticus</i>	✓		
House wren	<i>Troglodytes aedon</i>			✓
Indigo bunting	<i>Passerina cyanea</i>	✓		
Jager sp.				✓
Killdeer	<i>Charadrius vociferus</i>	✓		✓
Laughing gull	<i>Larus atricilla</i>			✓
Least bittern	<i>Lxobrychus exilis</i>	✓	✓	
Least flycatcher	<i>Empidonax minimus</i>			✓
Least sandpiper	<i>Calidris minutilla</i>			✓
Least tern	<i>Sterna antillarum</i>		✓	
Lesser black-backed gull	<i>Larus fuscus</i>			✓
Limpkin	<i>Aramus guarauna</i>		✓	
Little blue heron	<i>Egretta caerulea</i>	✓	✓	✓
Loggerhead shrike	<i>Lanius ludovicianus</i>	✓		
Louisiana waterthrush	<i>Seiurus motacilla</i>			✓
Magnificent frigatebird	<i>Fregata magnificens</i>		✓	
Magnolia warbler	<i>Dendroica magnolia</i>	✓		
Mangrove cuckoo	<i>Coccyzus minor</i>		✓	
Marsh wren	<i>Cistothorus palustris</i>			✓
Merlin	<i>Falco columbarius</i>			✓
Mississippi kite	<i>Ictinia mississippiensis</i>			✓
Monk parakeet	<i>Myiopsitta monachus</i>			✓
Mottled duck	<i>Anas fuligula</i>			✓
Mourning dove	<i>Zenaida macroura</i>	✓		✓
Muscoy duck	<i>Cairina moschata</i>			✓
Myrtle warbler	<i>Dendroica coronata</i>	✓		

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Common Name	Scientific Name	See Note ⁽¹⁾	See Note ⁽²⁾	See Note ⁽³⁾
Nashville warbler	<i>Vermivora ruficapilla</i>			✓
Northern bobwhite	<i>Colinus virginianus</i>			
Northern cardinal	<i>Cardinalis cardinalis</i>	✓		✓
Northern flicker	<i>Colaptes auratus</i>			✓
Northern gannet	<i>Morus bassanus</i>			✓
Northern harrier	<i>Circus cyaneus</i>			✓
Northern mockingbird	<i>Mimus polyglottos</i>	✓		✓
Northern oriole	<i>Icterus galbula</i>			✓
Northern parula	<i>Parula americana</i>	✓		
Northern pintail	<i>Anas acuta</i>			✓
Northern rough-winged swallow	<i>Stelgidopteryx serripennis</i>			✓
Northern waterthrush	<i>Seiurus noveboracensis</i>			✓
Orange-crowned warbler	<i>Vermivora celata</i>			✓
Osprey	<i>Pandion haliaetus</i>	✓	✓	✓
Ovenbird	<i>Seiurus aurocapillus</i>			✓
Painted bunting	<i>Passerina ciris</i>			✓
Palm warbler	<i>Dendroica palmarum</i>	✓		
Pied-billed grebe	<i>Podilymbus podiceps</i>			✓
Pileated woodpecker	<i>Dryocopus pileated</i>			
Pine warbler	<i>Dendroica pinus</i>			✓
Piping plover	<i>Charadrius melodus</i>			✓
Pomarine jaeger	<i>Stercorarius pomarinus</i>			✓
Prothonotary warbler	<i>Protonotaria citrea</i>			✓
Purple gallinule	<i>Porphyrio martinica</i>	✓		
Purple martin	<i>Progne subis</i>			✓
Purple sandpiper	<i>Calidris maritima</i>			✓
Red-bellied woodpecker	<i>Melanerpes carolinus</i>	✓		✓
Red-breasted merganser	<i>Mergus serrator</i>	✓		
Reddish egret	<i>Egretta rufescens</i>	✓		
Red-eyed vireo	<i>Vireo olivaceus</i>			✓
Red knot	<i>Calidris canutus</i>			✓
Red phalarope	<i>Phalaropus fulicaria</i>			✓
Red-shouldered hawk	<i>Buteo lineatus</i>			✓
Red-tailed hawk	<i>Buteo jamaicensis</i>	✓		✓
Red-winged blackbird	<i>Agelaius phoeniceus</i>	✓		✓
Ring-billed gull	<i>Larus delawarensis</i>			✓
Ringed turtle dove	<i>Streptopelia risoria</i>			✓
Rock dove	<i>Columba livia</i>	✓		✓
Roseate spoonbill	<i>Ajaia ajaja</i>	✓		
Roseate tern	<i>Sterna dougallii</i>			
Rose-breasted grosbeak	<i>Pheucticus ludovicianus</i>	✓		
Royal tern	<i>Sterna maxima</i>			
Ruby-crowned kinglet	<i>Regulus calendula</i>			✓
Ruby-throated hummingbird	<i>Archilochus colubris</i>			✓
Ruddy turnstone	<i>Arenaria interpres</i>			✓
Rufous hummingbird	<i>Selasphorus rufus</i>			✓
Sanderling	<i>Calidris alba</i>			✓
Sandhill crane	<i>Grus canadensis</i>			
Sandwich tern	<i>Sterna sandvicensis</i>			
Savannah sparrow	<i>Passerculus sandwichensis</i>	✓		

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Common Name	Scientific Name	See Note ⁽¹⁾	See Note ⁽²⁾	See Note ⁽³⁾
Scarlet tanager	<i>Piranga olivacea</i>			✓
Scissor-tailed flycatcher	<i>Tyrannus forficata</i>			✓
Sedge wren	<i>Cistothorus platensis</i>			✓
Semipalmated plover	<i>Charadrius semipalmatus</i>			✓
Sharp-shinned hawk	<i>Accipiter striatus</i>	✓		
Sharp-tailed sparrow	<i>Ammodramus caudacutus</i>			
Short-billed dowitcher	<i>Limnodromus griseus</i>			✓
Short-eared owl	<i>Asio flammeus</i>	✓		
Short-tailed hawk	<i>Buteo brachyurus</i>		✓	✓
Snail kite	<i>Rostrhamus sociabilis plumbeus</i>	✓	✓	
Snowy egret	<i>Egretta thula</i>	✓	✓	
Solitary vireo	<i>Vireo solitarius</i>			✓
Sora rail	<i>Porzana carolina</i>			✓
Southeastern American kestrel	<i>Falco sparverius paulus</i>			
Spotted sandpiper	<i>Tringa macularia</i>			✓
Summer tanager	<i>Piranga rubra</i>			✓
Swainson's hawk	<i>Buteo swainsoni</i>		✓	
Swainson's thrush	<i>Catharus ustulatus</i>			✓
Swainson's warbler	<i>Limnothlypis swainsonii</i>			✓
Swallowtail kite	<i>Elanoides forficatus</i>			✓
Swamp sparrow	<i>Melospiza georgiana</i>	✓		
Tennessee warbler	<i>Vermivora peregrina</i>	✓		
Tree swallow	<i>Iridoprocne bicolor</i>			
Tricolored heron	<i>Egretta tricolor</i>	✓	✓	✓
Turkey vulture	<i>Cathartes aura</i>	✓		✓
Veery	<i>Catharus fuscescens</i>			✓
Western kingbird	<i>Tyrannus verticalis</i>	✓		
Western sandpiper	<i>Calidris mauri</i>			✓
Whimbrel	<i>Neumenius phaeopus</i>			✓
Whip-poor-will	<i>Caprimulgus vociferus</i>			✓
White-crowned pigeon	<i>Columba leucocephala</i>		✓	
White-eyed vireo	<i>Vireo griseus</i>	✓		
White ibis	<i>Eudocimus albus</i>	✓	✓	
White pelican	<i>Pelecanus erythrorhynchos</i>			✓
White-winged dove	<i>Zenaida asiatica</i>	✓		
Wild turkey	<i>Meleagris gallopavo</i>		✓	
Willet	<i>Catoptropho semipalmatus</i>			✓
Wilson's plover	<i>Charadrius wilsonia</i>		✓	
Wood stork	<i>Mycteria americana</i>	✓		
Woodcock	<i>Scolopax minor</i>			
Worm-eating warbler	<i>Helmitheros vermivorus</i>			✓
Yellow-bellied sapsucker	<i>Sphyrapicus varius</i>			✓
Yellow-billed cuckoo	<i>Coccyzus americanus</i>			✓
Yellow-breasted chat	<i>Icteria virens</i>			✓
Yellow-crowned night-heron	<i>Nyctanassa violacea</i>	✓	✓	
Yellow-throated vireo	<i>Vireo flavifrons</i>	✓		
Yellow-throated warbler	<i>Dendroica dominica</i>	✓		
Mammals				
Black bear	<i>Ursus americanus</i>		✓	
Bobcat	<i>Lynx rufus</i>	✓	✓	

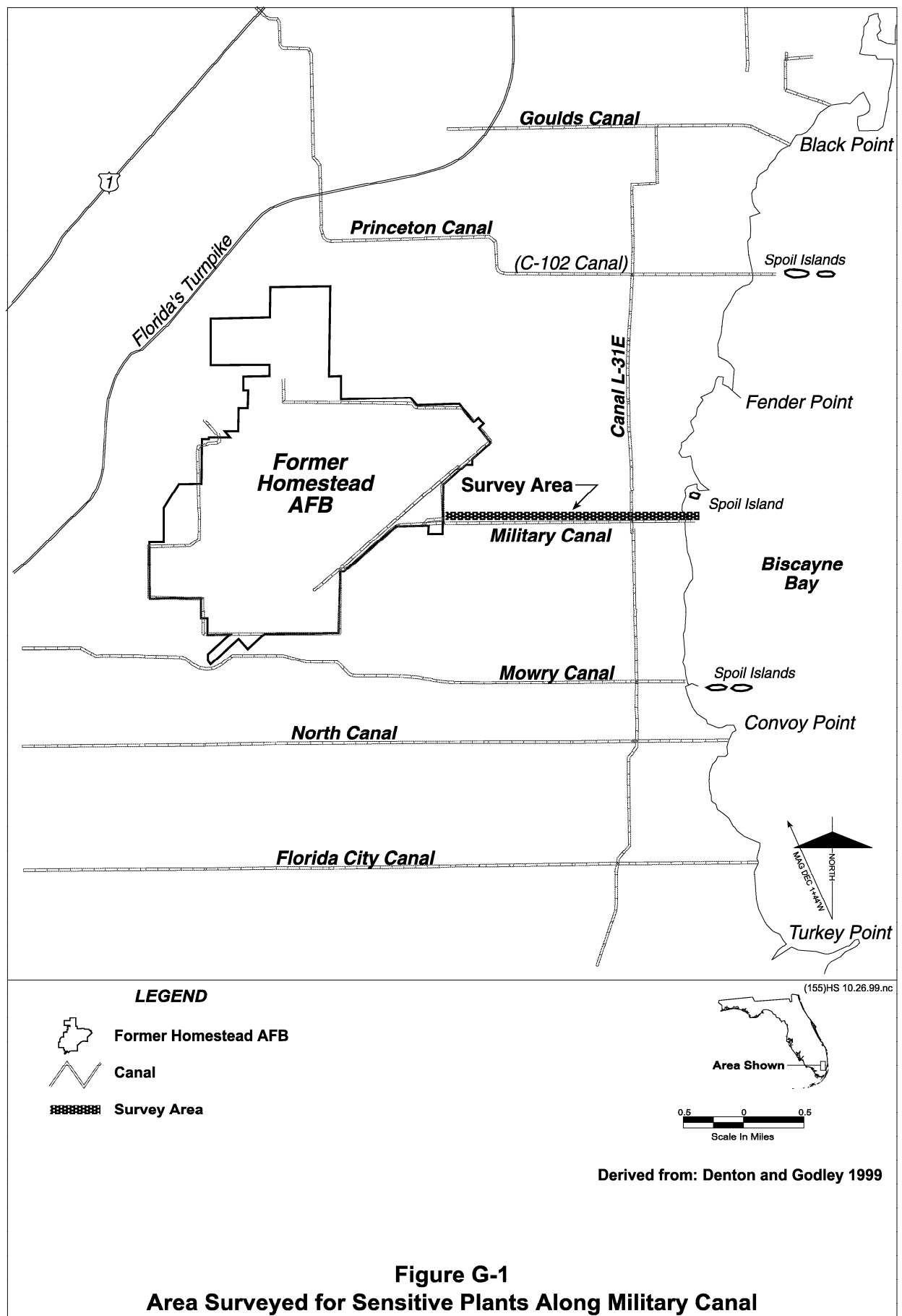
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Common Name	Scientific Name	See Note ⁽¹⁾	See Note ⁽²⁾	See Note ⁽³⁾
Bottlenose dolphin	<i>Tursiops truncatus</i>			✓
Brazilian free-tailed bat	<i>Tadarida brasiliensis</i>		✓	
Cotton mouse	<i>Peromyscus gossypinus</i>			
Eastern yellow bat	<i>Lasiurus intermedius</i>			
Evening bat	<i>Nycticeius humeralis</i>			
Feral cat	NI			
Feral dog	NI			
Florida panther	<i>Felis concolor coryi</i>			
Gray fox	<i>Urocyon cinereoargenteus</i>	✓		
Gray squirrel	<i>Sciurus carolinensis</i>	✓		
Harvest mouse	<i>Reithrodontomys humulis</i>			
Hispid cotton rat	<i>Sigmodon hispidus</i>			
Key Largo cotton mouse	<i>Peromyscus gossypinus allapaticola</i>			
Key Largo woodrat	<i>Neotoma floridana smalli</i>			
Least shrew	<i>Cryptotis parva</i>			
Marsh rabbit	<i>Sylvilagus palustris</i>	✓		
Mastiff bat	<i>Eumops glaucinus</i>			
Mink	<i>Mustela vison</i>		✓	
Mole	NI			
Muskrat	<i>Ondatra zibethicus</i>		✓	
Opossum	<i>Didelphis virginiana</i>	✓		
Raccoon	<i>Procyon lotor</i>	✓		✓
Spotted skunk	<i>Spilogale putorius</i>			
Striped skunk	<i>Mephitis mephitis</i>	✓		
West Indian manatee	<i>Trichechus manatus latirostris</i>	✓		
White-tailed deer	<i>Odocoileus virginianus</i>			
Woodrat	<i>Neotoma floridana</i>			

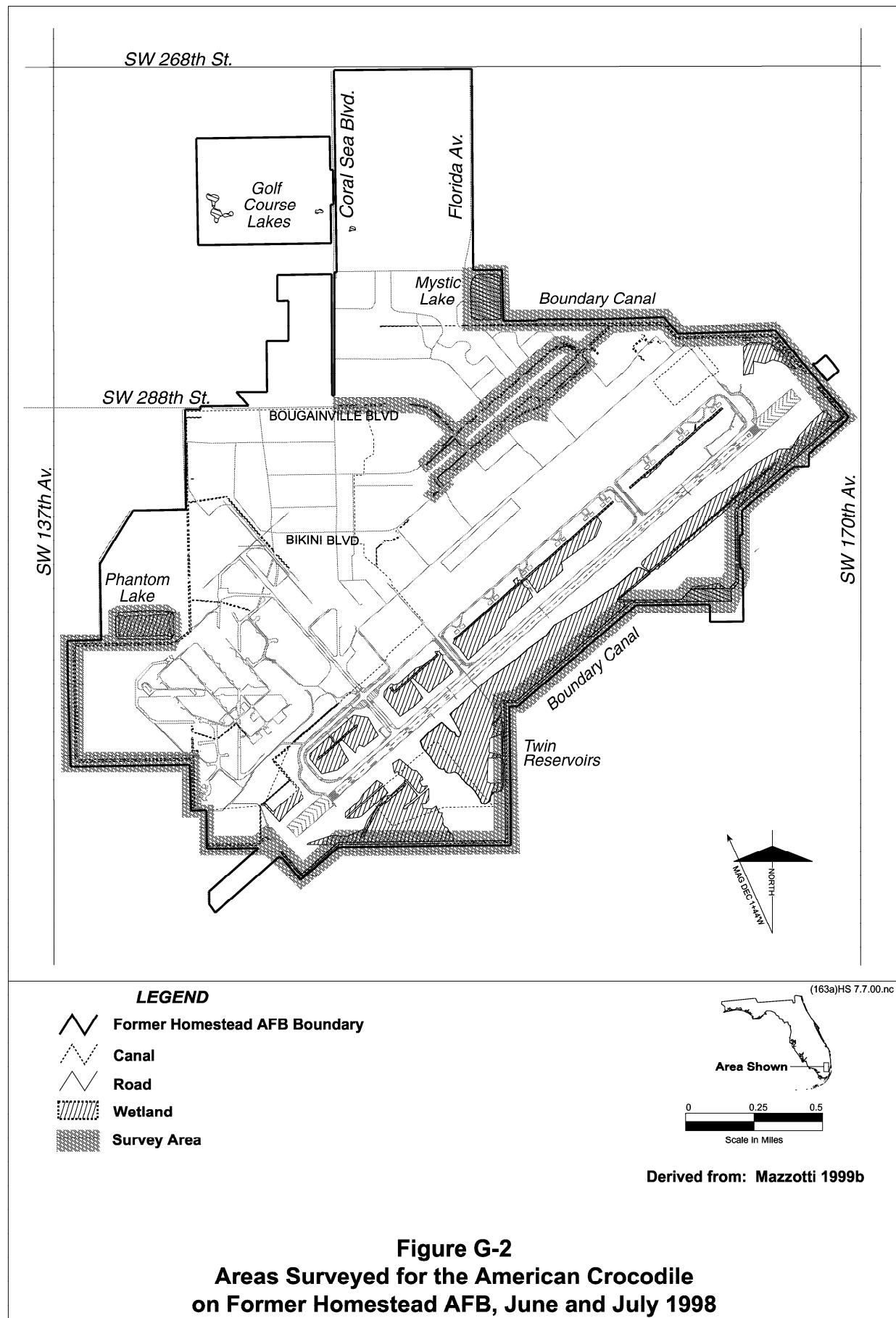
Source: SEA 1996, Florida Game and Fresh Water Fish Commission 1998a, Geraghty & Miller 1993, BNP 1998, Denton and Godley 1999, Mazzotti 1999b.

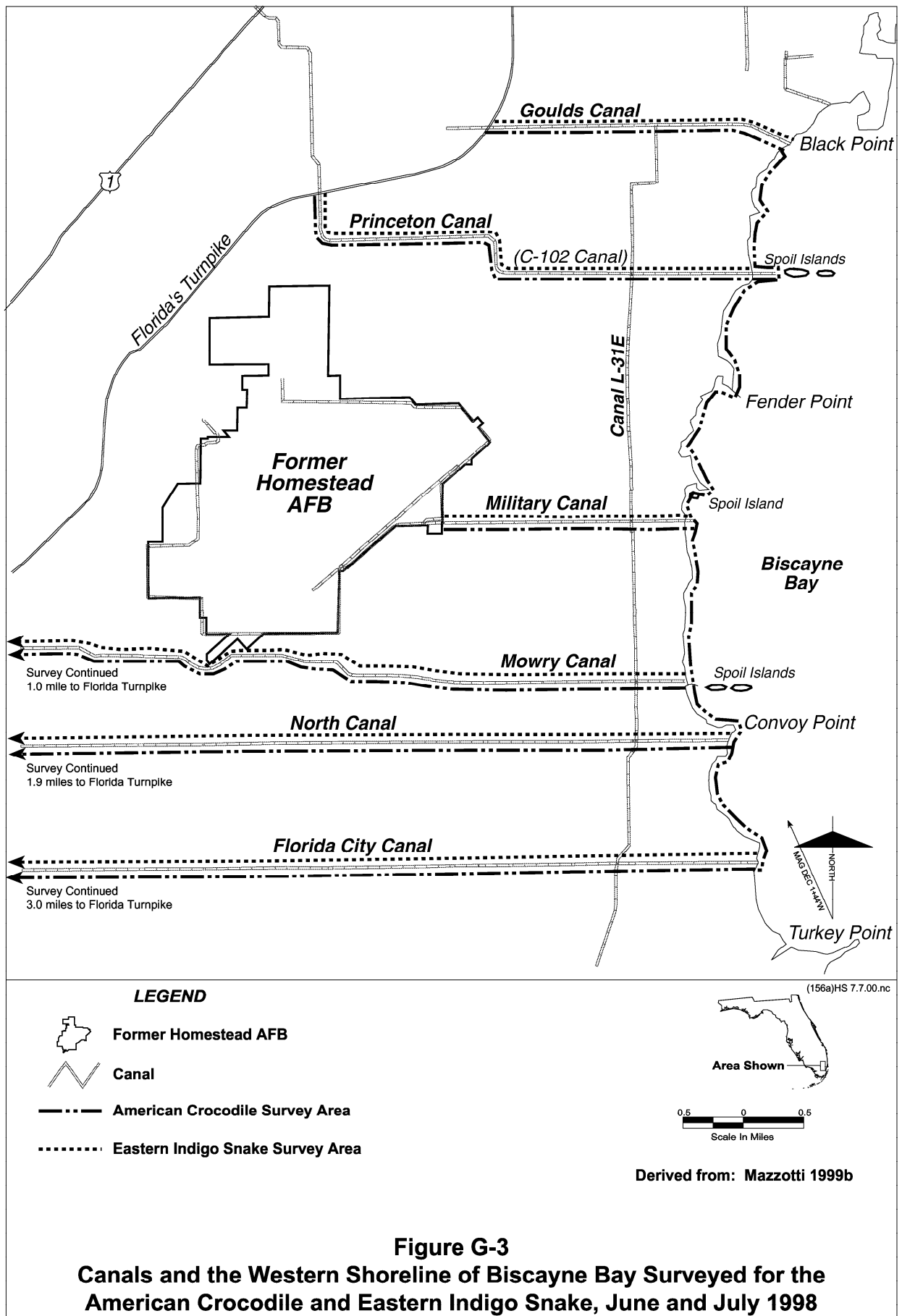
- Notes: ¹ Species commonly found on and in the vicinity of Homestead ARS, Florida, as identified in Appendix D of the Final Integrated Natural Resources Management Plan (INRMP) (SEA 1996).
² Species recorded or with potential habitat in the vicinity of former Homestead AFB as identified in data provided by Florida Game and Fresh Water Fish Commission (Florida Game and Fresh Water Fish Commission 1998a).
³ Observed during site-specific surveys on and in the area of the former Homestead AFB (Geraghty & Miller 1993, Denton and Godley 1999, Mazzotti 1999b) or at Biscayne National Park (BNP 1998).

NI species not identified



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Table G-2. Number of Miles of Canals and Western Shoreline of Biscayne Bay Surveyed for the American Crocodile and Eastern Indigo Snake in June and July 1998

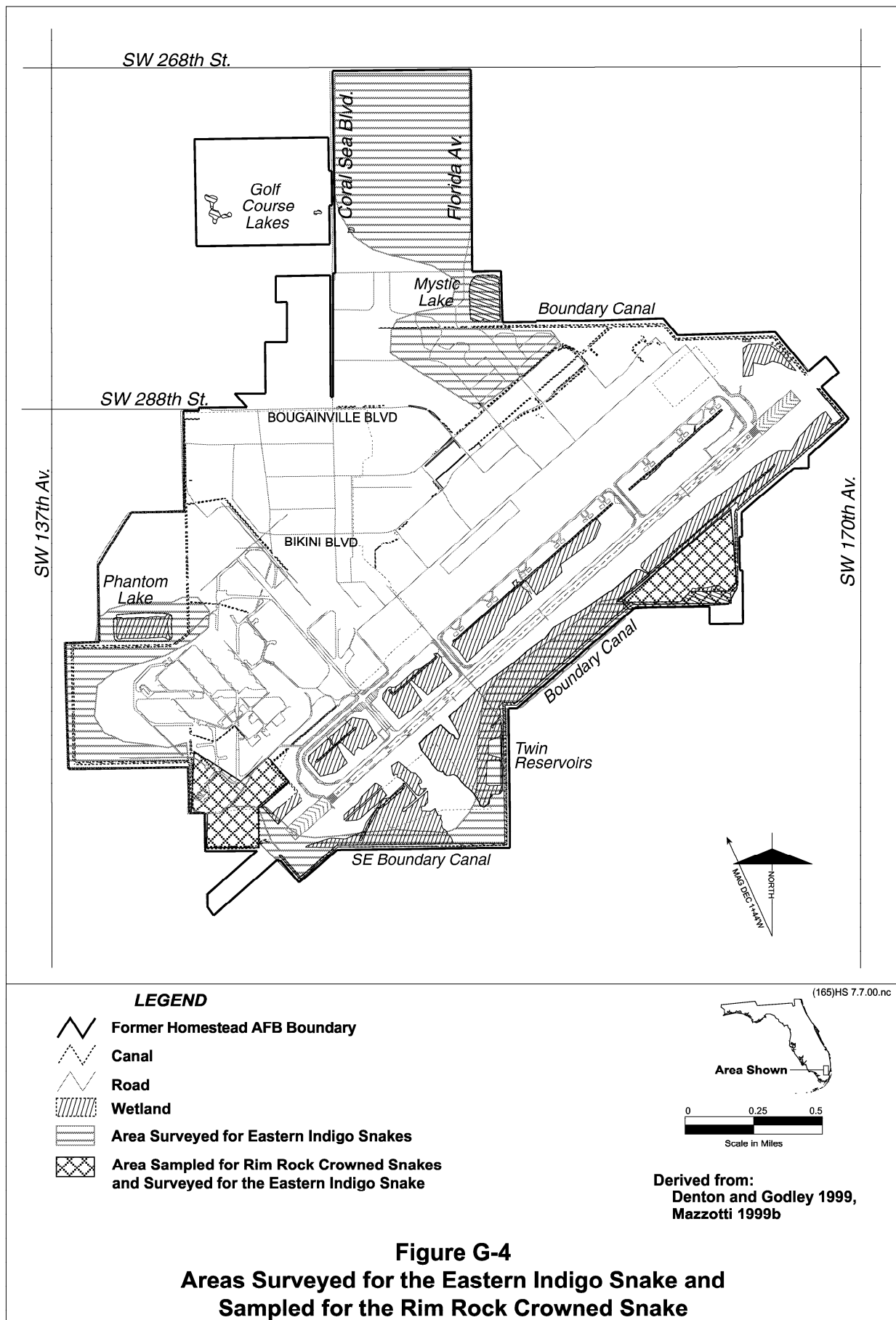
Canal ¹	Species	
	American Crocodile	Eastern Indigo Snake
Florida City Canal	8.9	8.9
North Canal	7.6	7.6
Mowry Canal	6.4	6.4
Military Canal	2.0	2.0
Canal C-102	3.6	3.6
Goulds Canal	2.5	2.5
Canal L-31E	6.3	6.3
Biscayne Bay shoreline	6.8	0.0
Total Miles	44.1	37.3

Note: ¹ See Figure G-3 for locations of survey routes.

Eastern Indigo Snake. Surveys for the eastern indigo snake took place on former Homestead AFB (Figure G-4), as well as along canals between the former base and Biscayne Bay (see Figure G-3). Surveys on the former base centered on the vacant land and roads in the Mystic Lake area and areas south of the runway. Approximately 37.3 miles of canals outside the former base, including Florida City, North, Mowry, Military, C-102, Goulds, and L-31E canals were surveyed (see Table G-2). Two observers surveyed the canal from a vehicle that drove slowly along the canal access roads. The surveys began at sunrise and ended within four hours; all wildlife observed were recorded. In addition, biologists conducting other wildlife surveys were instructed to look for the eastern indigo snake.

Rim Rock Crowned Snake. Surveys for the rim rock crowned snake were conducted in appropriate habitat on former Homestead AFB. This small fossorial snake is relatively cryptic in behavior and localized in distribution within a limited range. Specimens have been taken from sandy and rocky soils in slash pine flatwoods, tropical hardwood hammocks, and vacant lots and pastures with shrubby growth and scattered slash pines (Moler 1992).

Field surveys for the rim rock crowned snake were conducted consistent with the Florida Game and Fresh Water Fish Commission recommendations for fossorial herpetofauna although specific guidelines for rim rock crowned snake have not been established. A series of two meter long drift fences with small funnel traps were established in the two remaining patches of second growth, unmowed uplands on former Homestead AFB (see Figure G-4). A third upland site was investigated but consisted largely of concrete, so it was not possible to install drift fences in that area. The drift fences were installed in June 1998 and checked daily for four weeks in June and July 1998. Five drift fences were installed in a small remnant hardwood area along the southwestern portion of the runway, and 10 were installed in the larger hardwood area along the northeast portion of the runway. The drift fences were open for 336 nights. Searches for this snake were also conducted by overturning trash, logs, and other debris in the two study areas.



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G.1.3 Birds

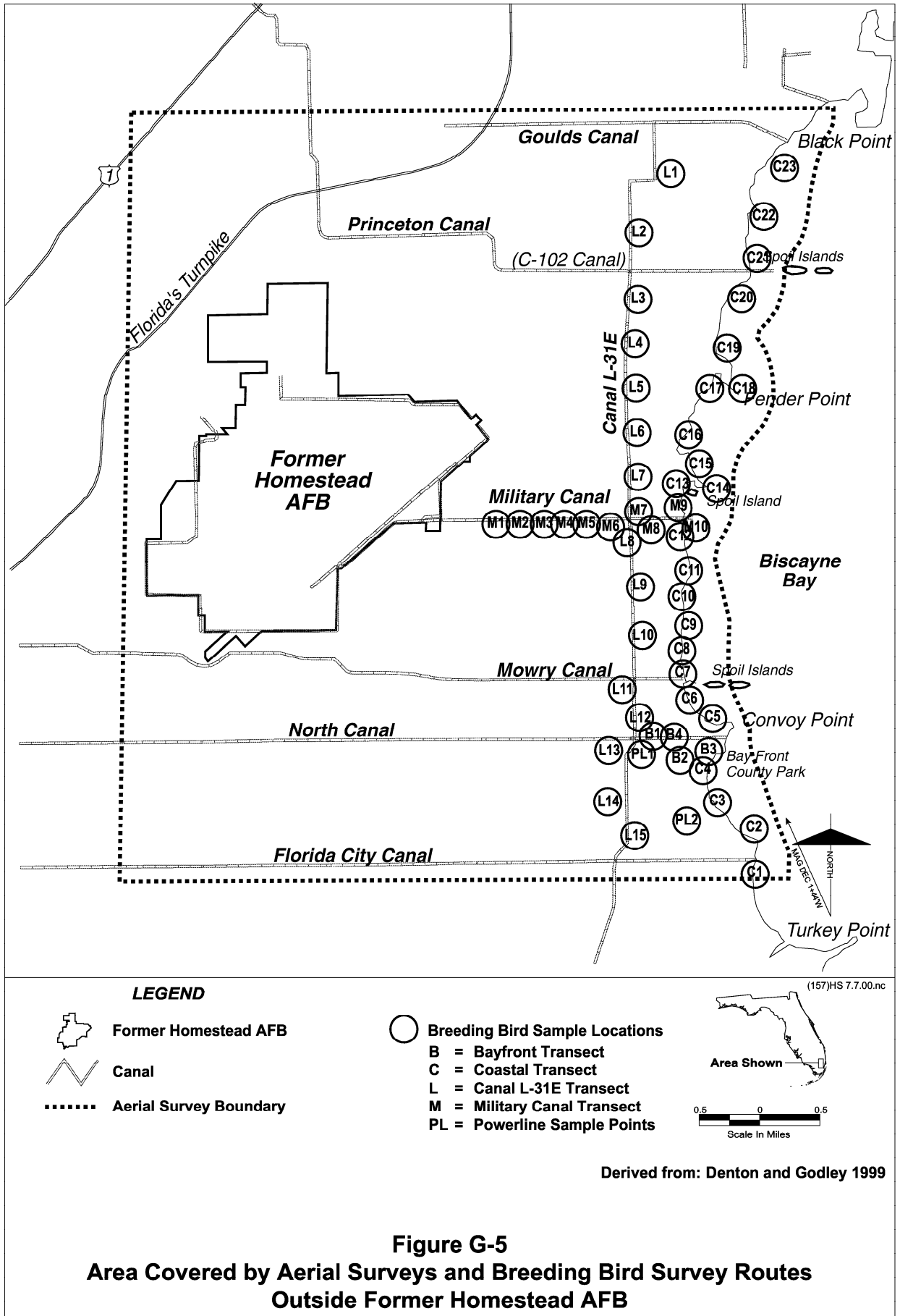
Wood Stork and State-Listed Wading Birds. Helicopter surveys were conducted on June 2 and 26 and July 14, 1998 for the wood stork and state-listed wading birds on former Homestead AFB, and in an area between the former base and the Biscayne Bay coastline (**Figure G-5**). The species, number, and location of all listed wading birds were recorded along with any other special-status species that were observed. In addition, all wading birds observed were recorded during other biological surveys, which included ground surveys on former Homestead AFB and the canals and wetlands between the former base during the crocodile and indigo snake surveys, the neotropical migrant landbird surveys, and the burrowing owl and American kestrel surveys.

Southeastern American Kestrel. Surveys for the southeastern American kestrel were conducted in accordance with the *Wildlife Methodology Guidelines* recommended by the Florida Game and Fresh Water Fish Commission (**Denton and Godley 1999**). Ground surveys took place on former Homestead AFB in habitats that appeared to have the potential to support this species. Five surveys were conducted during the morning and afternoon in June and July 1998. The surveys were conducted from vehicles that moved slowly along roads in open habitat on the former base (**Figure G-6**). Researchers carefully scanned all features such as fence posts, trees, and telephone poles and lines. Biologists were instructed to look for this species while conducting other field surveys, and also during the aerial survey for wading birds. The agricultural lands near the former base were scanned for flying or perched kestrels.

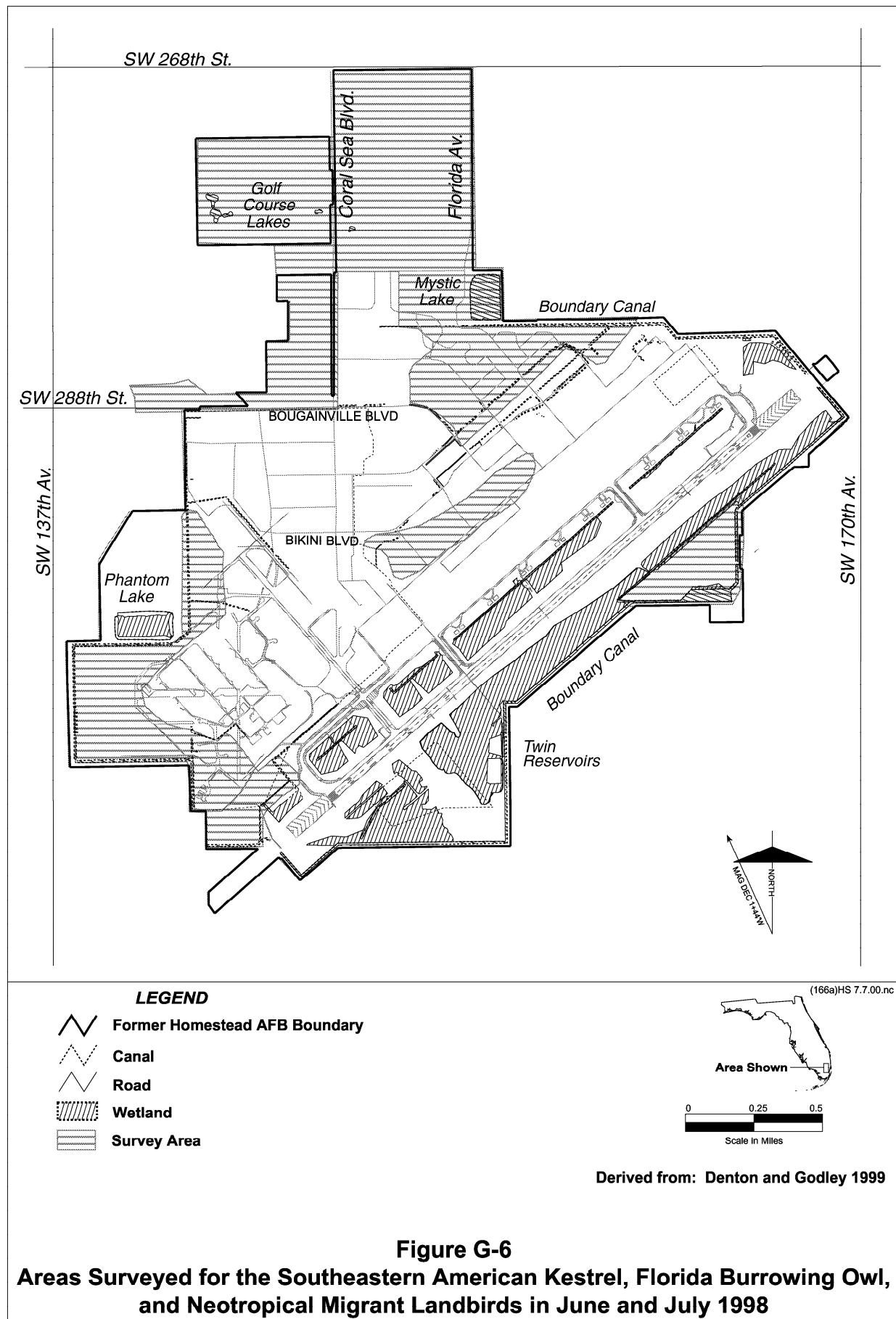
Florida Burrowing Owl. Surveys for the Florida burrowing owl were conducted during the Southeastern American kestrel surveys (see **Figure G-6**). Areas that appeared suitable for burrow construction, and areas where owls had previously been reported were searched. All sightings of the burrowing owl were recorded and plotted on base maps.

Neotropical Migrant Landbirds. Surveys for mangrove cuckoo, black-whiskered vireo, Cuban yellow warbler, and Florida prairie warbler were conducted in overgrown areas on former Homestead AFB (see **Figure G-6**), in the coastal mangrove forests between Florida City Canal and Goulds Canal, and along the Military Canal and Canal L-31E (see **Figure G-5**). Based on the preliminary survey, it was apparent that all vegetated areas on former Homestead AFB had been cleared of native vegetation many years ago and are now dominated by exotic nuisance species such as Brazilian pepper, Australian pine, and papaya. On-site investigation revealed that the vegetated areas on the former base were too small to establish transects, so point surveys were conducted during June and July 1998. All species either heard or observed were recorded during a fixed time period at each sample point. During the initial three minutes, no methods of coaxing birds were used (i.e., no spishing or playback tapes). Thereafter, a continuous loop tape recording of breeding calls of the four target species was played for three minutes. All birds detected between stops were also recorded.

Parts of Military, L-31E, and Mowry canals were surveyed in accordance with the National Biological Services *Breeding Bird Survey* guidelines (see **Figure G-5**). Surveys along Military Canal consisted of slowly walking along the canal from Allapattah Road to Biscayne Bay, and stopping at approximate 300 foot intervals to record all birds detected. All species either heard or observed were recorded during a fixed time period at each sample point. During the initial three minutes, no methods of coaxing birds were used (i.e., no spishing or playback tapes). Thereafter, a continuous loop tape recording of breeding calls of the four target species was played for three minutes. All birds detected between stops were recorded. Surveys also were made along the edges of the reservoir at the head of the canal. Surveys along the L-31E Canal from the Florida City Canal to the C-102 Canal (4.9 miles) consisted of point counts every half mile using the same methods described above for Military Canal. All surveys started early in the morning, between 6:00 a.m. and 7:00 a.m.



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A helicopter survey was conducted to determine the most appropriate survey locations for neotropical migrant land birds along the west shore of Biscayne Bay. The tallest stands of red and black mangrove forests and any tropical hardwood hammocks were considered the most appropriate habitats because they are known to be preferred by mangrove cuckoo, black-whiskered vireo, Cuban yellow warbler, and Florida pine warbler. One hammock-like area was located near Bayfront County Park (see Figure G-5) and one transect with four stops approximately 300 feet apart was established. The helicopter flight revealed that the remainder of the shoreline along Biscayne Bay would be most appropriately surveyed by boat, as tall stands of mangroves were generally limited to within 150 to 225 feet of the shoreline. Numerous small tidal channels provide boat access to this shoreline zone. Boat surveys along the 6.8 miles of mangrove fringe from the Florida City Canal to Goulds Canal were conducted from a shallow draft motor boat at 0.5 mile intervals. Survey methods at each point were the same as used along the canals. During all nesting neotropical migrant bird surveys, all wildlife observations and signs were recorded, including wading birds and indigo snakes. Nesting neotropical migrant bird surveys were conducted in June and July 1998.

G.2 Special-Status Species

A total of 76 special-status species are known to occur on former Homestead AFB and/or the surrounding ROI (see Section 3.11 for definition of the ROI); 2 species have the potential to occur, and 2 species are unlikely to occur. These 80 species include 1 federally listed and 28 state listed plant species that have been observed on former Homestead AFB (27 species) or along Military Canal (2 species) and one federally listed species with the potential to occur on the former base. One species of butterfly occurs on the keys of Biscayne NP but not in the area of the former base. Six species of reptiles occur or have the potential to occur including three marine turtles, the American crocodile, and two species of snakes. Of the 39 special-status bird species, 36 are known to occur in the area, 1 has the potential to occur, and 2 are unlikely to occur in the area. The West Indian manatee and Florida panther are the only listed mammal species known to occur in the area. The Key Largo cotton mouse and woodrat occur farther away on Key Largo.

G.2.1 Plants

Surveys for plant species of concern were conducted on former Homestead AFB in 1992/93, 1996/97, and 1997, and along Military Canal in 1998. One federally and state endangered plant species and 28 state listed and sensitive plant species were observed (see Tables 3.11-3, 3.11-4, and 3.11-6). Twenty-three of the state species are endangered, two are threatened, and four are species of special concern. The federally listed deltoid spurge is included in this section although it has not been observed on the former base. This species occurs in pine rocklands elsewhere in Miami-Dade County.

The 1992/93 plant surveys covered all of former Homestead AFB (3,245 acres); the 1996/97 surveys covered only the Homestead ARS (937 acres); the 1997 survey covered the disposal portion of former Homestead AFB, and the 1998 survey covered all of Military Canal. The 1992/1993 surveys occurred between December 1992 and October 1993. The 1996/97 surveys occurred in November 1996 and January 1997, the 1997 surveys occurred in November 1997, and the survey along Military Canal took place in June 1998 (**Hilsenbeck 1993, Argonne National Laboratory 1997, PBS&J 1998b, Denton and Godley 1999**). A total of 26 locations were surveyed on former Homestead AFB (**Figure G-7**), and a brief description of those locations is provided in **Table G-3**. These plant surveys were conducted on Homestead AFB just after Hurricane Andrew, and again about five years after the hurricane.

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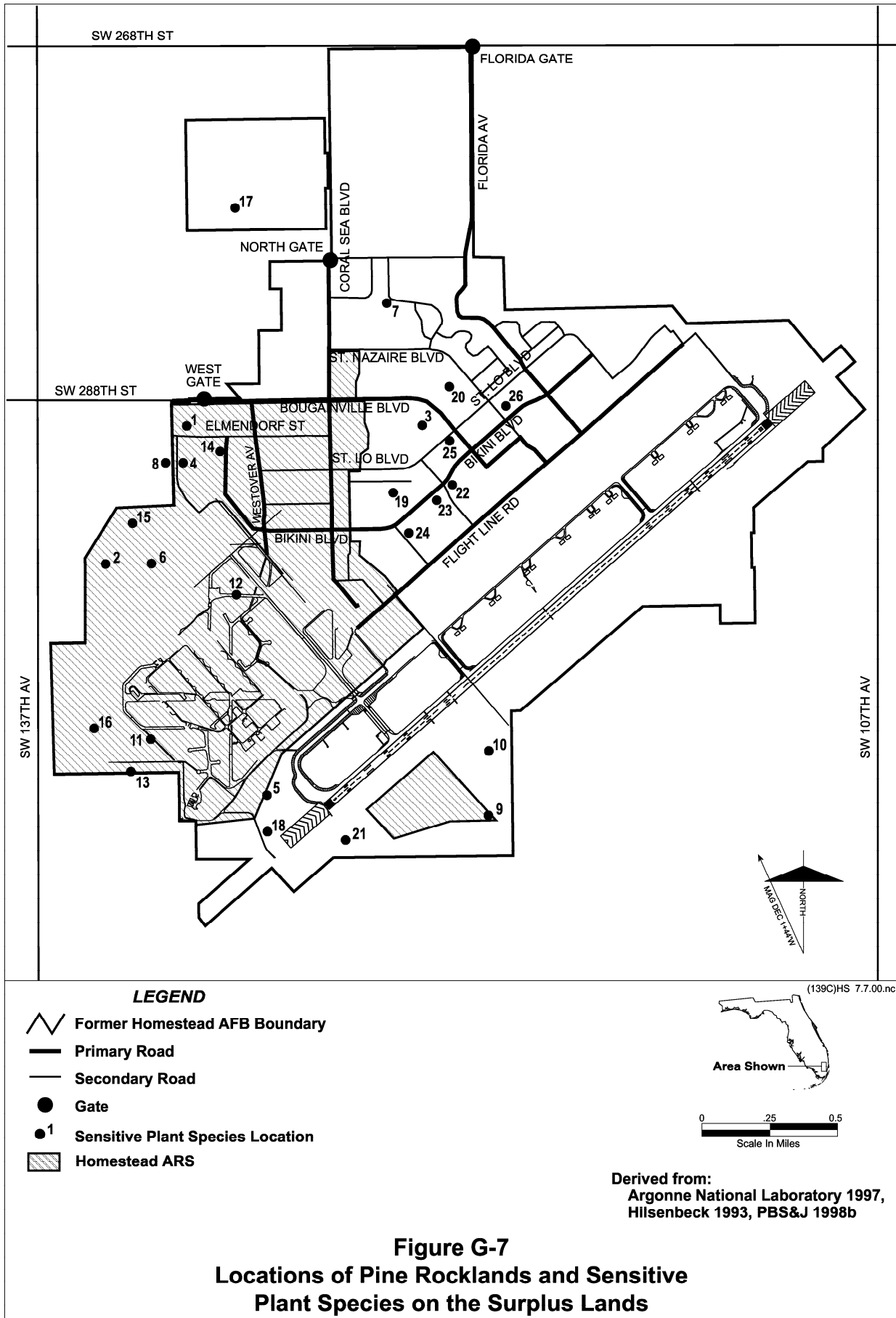


Table G-3. Locations Surveyed for Sensitive Plants on Former Homestead AFB

Number ¹	Name	Survey Dates		Description
		Disposal Land	Homestead ARS	
1	Pine rockland remnant		92/93, 96/97	Area (4.2 acres) had extensive hurricane damage. Plant community significantly degraded but contains some elements of the rare pine rockland type. Eight mature slash pine remain and some young pines were noted. Non-native species well established. Fourteen species of concern were observed during the 1992/93 survey and 13 species during the 1996/97 survey.
2	Southwest Easement		92/93, 96/97	Pine rockland and prairie types. There are many solution holes and a deep layer of litter. Diverse grass and forb species with a few Australian pine. Twelve species of concern were recorded during both the 1992/93 and 1996/97 surveys.
3	Bikini Boulevard	92/93		Site is frequently mowed with an almost continuous cover of exotic grass. There are some scattered limestone outcrops that support a rich pine rockland flora; 11 species of concern at this site.
4	West Boundary Canal		92/93, 96/97	4.2 acres were surveyed along this canal and patches of native and non-native trees and shrubs bordered canal. Much of the inside of the canal was obstructed deadfall Australian pine. Ten sensitive plant species were observed in and along this canal during the 1992/93 survey. Fourteen species were recorded during the 1996/97 survey.
5	South runway	92/93		A frequently mowed area with scattered limestone outcrops. Native flora along a canal and at limestone outcrops. There were 10 species of concern at this site
6	Southeast easement		92/93, 96/97	Former pine rockland that is dominated by Australian pine and Brazilian pepper. There are numerous limestone solution holes that support native pine rockland flora; nine species of concern were observed during both the 1992/93 and 1996/97 surveys.
7	VITA Course	92/93		This site is a frequently mowed treeless area rich in native flora along a canal that traverses the area; seven species of concern were observed during the 1992/93 survey.
8	West Boundary Canal Inner Wall		92/93, 96/97	Site consists of sheer inner walls of a deep canal constructed in the 1950s. Vegetation typical of unshaded sinkholes in south Florida; five species of concern observed during the 1992/93 survey. It was combined with location 4 during 1996/97 survey and 14 species were recorded.

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Number ¹	Name	Survey Dates		Description
		Disposal Land	Homestead ARS	
9	Jet Test Site	92/93		Two acre site supports largely native flora dominated by grass. Soil shallow and limestone exposed. Five species of concern recorded during the 1992/93 survey.
10	East Borrow Area	92/93		Site consists of two deep borrow pits with steep sides filled with water. Limited native flora here and five species of concern were noted during the 1992/93 survey.
11	South of Magazine		92/93, 96/97	This a mesic prairie with numerous exposed limestone outcrops. Several areas of sawgrass in deeper depressions and many native species in the shallow depressions. Five species of concern recorded during the survey of 1992/93 and 11 during the 1996/97 survey.
12	Northeast of Magazine		92/93, 96/97	A frequently mowed site with an almost continuous cover of exotic grass. A very small remnant pine rockland forest. Four species of concern were observed during the 1992/93 survey and eight during the 1996/97 survey.
13	Southwest Boundary Canal		92/93, 96/97	This site is an inner wall of a narrow deep canal with vegetation typical of unshaded sinkholes in south Florida. There is limited native flora and only two species of concern were observed during the 1992/93 survey. Nine species were recorded during the 1996/97 survey.
14	North of Customs		96/97	Area covers 21.2 acres and supports mostly disturbed habitat. Site is bisected by a number of small canals bordered by native and nonnative trees and shrubs. Twelve species of concern occur in this area.
15	North Easement Tract		96/97	45.4 acre area has diverse mixture of mostly native hardwood shrubs and trees as well as open grasslands. Several slash pines and old stumps indicate that this area may support a pine rockland type. Ten species of concern were observed.
16	Grenade Range Prairie		96/97	30.8 acre open old field dominated by grass and forbs. The largest grassland community aside from area 15 on Homestead ARS. Site contains little soil and is underlain by limestone that is frequently exposed on the surface. Seven species of concern were recorded.
17	Golf Course/ Housing Area	97		125 acres at former golf course and housing area that is now covered with non-native vegetation. Four species of concern were observed.

Number ¹	Name	Survey Dates		Description
		Disposal Land	Homestead ARS	
18	Pine Rocklands SW of Runway	97		13.7 acre pine rockland remnant southwest of runway. Much of the area is mowed; unmowed areas overgrown with exotics. Mowed rocklands support 15 species of concern.
19	Pine Rocklands Next to Old Wing Head-quarters	97		12.8 acre remnant pine rockland that supports a few relic slash pine and has exposed rock in many areas which supports relatively diverse rockland flora. Sixteen species of concern were recorded from this site.
20	Pine Rocklands on Old Officers Club Road	97		2.6 acre remnant pine rockland that is somewhat open and was likely mowed routinely before Hurricane Andrew. Ten species of concern remain especially around old stumps.
21	Pine Rocklands South of Runway	97		0.4 acre remnant pine rockland south of runway that has considerable evidence of disturbance. Six species of concern were noted at this site.
22	Pine Rocklands South of Hangar	97		0.5 acre remnant pine rockland west of water tower has a relatively diverse rockland flora considering it is adjacent to aircraft pads and human activity. Eleven species of concern recorded from this site.
23	Pine Rocklands 100 Yards South of Water Tower	97		0.2 acre remnant pine rockland south of the water tower. Six species of concern were observed at this location.
24	Pine Rockland 200 Yards South of Water Tower	97		0.2 acre remnant pine rockland south of the water tower. It contains a relatively diverse rockland flora and 11 species of concern were recorded.
25	Pine Rockland North of Building 624	97		0.1 acre pine rockland remnant that has been subject to considerable disturbance; five species of concern were recorded.
26	Pine Rockland West of Building 757	97		0.3 acre remnant pine rockland site that has sustained considerable disturbance; five species of concern were recorded.

Source: **Argonne National Laboratory 1997, Hilsenbeck 1993, PBS&J 1998b.**

Note: ¹ Refers to location numbers shown on Figure G-7.

Fifteen of the listed and sensitive plant species of concern were recorded on both disposal land and Homestead ARS, seven species were observed only on disposal land, and four species were observed only on Homestead ARS. Small's milkpea was only observed on the disposal land and was the only federally listed species recorded.

The following is a brief description of the plant species of concern recorded on former Homestead AFB. The locations referenced in these sections appear in Figure G-7 and are listed in **Table G-4**.

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Table G-4. Locations of Special-Status Plant Species on the Disposal Property and Homestead ARS

Species	Surveys				Locations
	Disposal Land		Homestead ARS		
	92/93	97	92/93	96/97	
Pine pink orchid	—	✓	—	—	18
Locustberry	✓	✓	✓	✓	1,2,3,4,5,6,8,11,13,14,15,16,18, 19,20,22,24
Porter’s spurge	✓	✓	✓	✓	1,2,3,4,5,6,7,8,9,10,11,12,18,19
Silver palm	✓	✓	✓	✓	3,4,8,14,18,19,20,23,24
Christmas berry	✓	✓	✓	✓	1,2,3,4,5,6,7,8,9,11,12,13,14,15,16,18,19,20, 21,22,24,25,
One-nerved ernodea	—	✓	—	—	19,22,
Small’s milkpea	—	✓	—	—	19,22,24
Krug’s holly	—	—	✓	✓	2,4,6,8,11,15
Wild-potato morning-glory	✓	✓	—	—	3,18,19,20, 21,22,24,26
Pineland jacquemontia	✓	✓	✓	✓	1,2,3,4,5,6,7,8,9,11,13,14, 18,19,20,22,23,24,26
Florida lantana	—	✓	✓	✓	1,12,15,18, 19
Sand flax	—	✓	—	—	18,19,20,22,24,25
Carter’s small flowered flax	✓	—	—	—	5,7
Small-leaved melanthera	✓	✓	✓	✓	1,2,3,4,5,8,9,10,11,12,13,14,15,16,18,19,20, 21,22,23,24,26
Rockland painted-leaf	—	✓	✓	✓	1,18
Bahama break	✓	✓	✓	✓	1,2,3,4,5,6,7,8,10,11,12,13,14,15,16,17,18, 19,21,22,23,24,25,26
Royal palm	—	✓	—	—	17
Bahama sachsia	✓	—	✓	—	1,2,3
Wedgelet fern	—	—	✓	✓	2,4,6,8,13,14
West Indian mahogany	—	✓	—	✓	1,11,14,17,19,20
Tetrazygia	—	✓	✓	✓	1,2,4,6,8,11,12,13,14,15,18,19
Giant wild pine	—	✓	—	—	17
Pineland noseburn	—	—	✓	—	1
Florida white-topped sedge	✓	✓	✓	✓	1,2,3,4,5,6,7,8,10,11,12,13,14,15,16,18,19, 20,21,22,23,24,25
Florida pinewood privet	—	—	✓	✓	1,2,4,8,14,15
Florida five-petaled leaf flower	✓	✓	✓	✓	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,18, 19,20,21,22,23,24,25,26
Blodgett’s ironweed	✓	—	✓	✓	1,4,5,11,16

Source: Hilsenbeck 1993, Argonne National Laboratory 1997, PBS&J 1998b.

G.2.1.1 Federally Listed Species

Small's Milkpea. This is the only federally listed endangered species observed on former Homestead AFB. It is a small legume with purple flowers and a prostrate habit and is endemic to pine rocklands in Miami-Dade County. Small's milkpea was listed as endangered by the federal government in 1985, and the elimination of 98 to 99 percent of the pine rockland habitat in Miami-Dade County was the principal reason for its listing (USFWS 1998a). This species was recorded only on disposal land, and observed in three remnant pine rockland areas that ranged in size from 0.2 to 12.8 acres. Small's milkpea does not do well in areas being invaded by non-native species (USFWS 1998a).

Deltoid Spurge. The deltoid spurge is a federal and state endangered species. It is a prostrate plant that forms small mats. Its leaves are deltoid to oval in shape and are a few millimeters long. It is restricted to pine rocklands in Miami-Dade County and tends to grow in areas of open shrub canopy, often in sandy areas with sparse ground cover. This species was listed as endangered in 1985 as a result of the elimination of 98 to 99 percent of the pine rocklands in Miami-Dade County. The deltoid spurge is known from 31 locations, including small remnant pine rocklands. Fire suppression, with the resulting buildup of organic matter, and invasion of tropical hammock and exotic species are the major threats to this species' continued survival (USFWS 1998a). This species currently occurs in the Homestead area, but was not observed during sensitive plant species surveys on former Homestead AFB or along Military Canal.

G.2.1.2 State Listed Species on Former Homestead AFB

Locustberry. This is a medium-sized shrub typically found in areas with other native hardwood shrubs and occurs in pine rocklands and hardwood hammocks (Florida Natural Areas Inventory 1997). This species was observed in numerous locations on former Homestead AFB during all surveys. Twenty plants were recorded at locations 3 and 5 in 1992/93; the number of plants was not reported in 1997. Two hundred plants were observed on Homestead ARS in 1996/97, approximately the same number observed at the same location in 1992/93. There was a large decline in numbers, however, in the southwest easement area (location 2), possibly due to successional changes or invasion of non-native species such as Australian pine and Brazilian pepper.

Porter's Spurge. This state endangered species is a low-growing forb that colonizes areas of low vegetation density and exposed rock, particularly along road edges. It is found in pine rocklands, hardwood hammocks, and beach dunes on limestone soil (Florida Natural Areas Inventory 1997). This species was recorded from many areas on former Homestead AFB. Over 530 individuals were recorded on disposal land at locations 3, 5, 7, and 9 in 1992/93 on the disposal land. In 1997, this species was recorded at locations 18 and 19 on the disposal land, but the number of plants observed was not available. One hundred plants were observed in 1996/97 on Homestead ARS, fewer than the approximately 900 plants observed in 1992/93. This species was observed at five locations on Homestead ARS during the 1996/97 survey and was missing from two locations where it was recorded in 1992/93. These changes were probably due to natural succession.

Silver Palm. This state endangered species is found in pine rocklands and hardwood hammocks (Florida Natural Areas Inventory 1997). It was recorded from nine locations in small numbers during all surveys. One individual was observed at location 3 on disposal land in 1992/93, while it was found at five locations during the 1997 survey. This species has also apparently increased on Homestead ARS: one plant was observed in 1992/93, while in 1996/97 one plant with fruit was observed at location 4, and nine seedlings were noted at location 14. The seedlings were in a grassy field where they could be damaged or killed by mowing.

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Christmas Berry. This state endangered species is found in pine rocklands, hardwood hammocks, and the edge of sinkholes (**Florida Natural Areas Inventory 1997**). It occurs in numerous locations on former Homestead AFB. This woody species forms low, dense mats and has conspicuous red berries. It was found in grassy areas with little shade. Over 100 plants were recorded in 1992/93 on disposal land; it was observed at seven sites in 1997. In 1996/97, it occurred in all areas on Homestead ARS except location 6. Approximately 300 plants were observed, an increase over the 60 plants found in 1992/93.

One-Nerved Ernodea. This state endangered species was recorded at locations 19 and 22 on disposal land in 1997. This species was not found in 1992/92 nor was it recorded on Homestead ARS during the 1996/97 survey.

Pine Pink Orchid. This plant was observed in only one location on disposal land in 1997. It was found growing on the limestone walls of small canals at location 18.

Krug's Holly. This state endangered species was observed at only six locations on Homestead ARS. It is a small tree that grows in scattered, almost pure stands, sometimes inter-mixed with other trees and shrubs in pine rocklands, hardwood hammocks, and disturbed ground (**Florida Natural Areas Inventory 1997**). In 1996/97, it was found on Homestead ARS in moderate to high densities at locations 2, 6, and 15 (about 500 plants observed). More plants were observed in 1996/97 on Homestead ARS than in 1992/93, and most plants recorded in 1996/97 were at location 15, which was not surveyed in 1992/93.

Wild Potato Morning-Glory. This is a state endangered species that occurs in pine rocklands but has also been observed in vacant lots (**Florida Natural Areas Inventory 1997**). It was observed only on disposal land in 1992/93 and 1997. This species was only observed at location 3 during 1992/93, while it was recorded at seven locations in 1997.

Pineland Jacquemontia. This state endangered species was found in many locations on both disposal lands and Homestead ARS. It is a small vine with conspicuous white flowers, found in association with tall grasses and forbs or at the edge of shrubby areas in pine rocklands. It also occurs on spoil banks and in vacant lots on limestone (**Florida Natural Areas Inventory 1997**). Over 100 plants were observed at four locations on disposal land during the 1992/93 survey. During the 1997 survey, it was observed at seven locations with approximately 150 plants, essentially the same number found in 1992/93. This species occurs in many unmowed grassy areas on Homestead ARS. It appears to be most vulnerable to natural succession, invasion by non-native plant species, and frequent mowing; however, occasional high mowing may provide some benefit by reducing shading.

Florida Lantana. This state endangered species was recorded at five locations on both disposal land and Homestead ARS. Lantana was generally found in open, unmowed grassy areas, near the border of shrubby thickets in pine rocklands, and beach dunes (**Florida Natural Areas Inventory 1997**). It was not observed on disposal land in 1992/93, but was seen at locations 18 and 19 on disposal land in 1997. Florida lantana was observed at locations 1 and 12 on Homestead ARS in 1992/93; approximately 45 plants were tallied. Lantana was also recorded on Homestead ARS during the 1996/97 survey, but none of the plants observed could be conclusively identified as Florida lantana. This species hybridizes with the closely related, non-native *Lantana camara*, and this hybridization is considered the most significant threat to the continued existence of the Florida lantana.

Sand Flax. This is a state endangered species endemic to pine rocklands in south Florida (**Florida Natural Areas Inventory 1997**). This species was not recorded in 1992/93 or on Homestead ARS in 1996/97. It was, however, recorded at six locations on disposal land in 1997.

Carter's Small-Flowered Flax. This is a state endangered species observed only on disposal land at locations 5 and 7 in 1992/93. It is endemic to pine rockland habitat in south Florida and can also be found on disturbed ground (**Florida Natural Areas Inventory 1997**). Approximately 55 individuals were observed at the two locations. The plants occurred along banks of small canals that traverse mowed remnant pine rockland habitat. Plants were observed in flower and fruit. This species was not observed on disposal land in 1997.

Small-Leaved Melanthera. This state endangered species was observed in numerous areas on both disposal lands and Homestead ARS. This fairly large, white-flowering forb is typically found in open, unmowed areas, in pine rocklands and on disturbed ground (**Florida Natural Areas Inventory 1997**). In 1992/93, over 380 plants were observed at locations 3, 5, 9, and 10. In 1997, this species was recorded on disposal land in eight areas. Small-leaved melanthera was observed at four locations in 1992/93 and in all areas except location 6 in 1996/97. Approximately 1,000 plants were observed on Homestead ARS in 1996/97, similar to the number observed on Homestead ARS in 1992/93. Threats to the continued existence of this species appear to be natural succession, invasion of non-native plants, and frequent mowing. However, occasional mowing may provide some benefit by reducing shading.

Rockland Painted-Leaf. This is a state endangered species that is endemic to pine rocklands in south Florida (**Florida Natural Areas Inventory 1997**). It occurs on one area of disposal land and one area of Homestead ARS. This small forb was not observed on disposal land in 1992/93, but was observed in 1997 at location 18, which is remnant pine rockland habitat that supports a fairly diverse flora. It was observed only at location 1 in an open area with sparse vegetation on Homestead ARS. Three individuals were observed in 1996/97, while five plants were reported in this same area in 1992/93. The plants observed in 1996/97 had seed capsules, but no young plants were observed. The immediate threat to this species appears to be invasion of non-native plant species such as silk reed and Australian pine, which grow in close proximity to these plants.

Bahama Brake. This state endangered species occurs in many locations on disposal land and Homestead ARS. This small fern was usually observed in open areas near exposed limestone and solution holes in pine rocklands and sinkholes (**Florida Natural Areas Inventory 1997**). During surveys on disposal land, approximately 475 individuals were recorded in 1992/93 at locations 3, 5, 7 and 10; and recorded at nine locations in 1997. Approximately 3,000 plants were observed in all locations surveyed on Homestead ARS in 1996/97 and all areas but locations 9 and 12 in 1992/93. Relatively high numbers were also observed during the 1992/93 survey. The plants observed on Homestead ARS in 1996/97 were in excellent condition.

Royal Palm. Only one of this state endangered species was observed on disposal land at location 17 in 1997. Location 17 includes the golf course and housing development of former Homestead AFB, which are now overgrown with non-native species and turf grass. It is not known if the one plant recorded is native or from nursery-grown stock. This species is typically found in hardwood hammocks (**Florida Natural Areas Inventory 1997**).

Bahama Sachisa. This state endangered species was observed at locations 1, 2, and 3 and only in 1992/93. This species is endemic to pine rocklands in south Florida (**Florida Natural Areas Inventory 1997**) and occurred in small pine-rockland remnants in areas on and near exposed limestone outcrops. A total of 10 plants were observed on disposal land at location 3, and 75 individuals were observed on Homestead ARS at locations 1 and 2. This species was not recorded during resurveys of these areas in 1996 or 1997.

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Wedgelet Fern. This is a state endangered species that was observed in six areas on Homestead ARS; it was not recorded on disposal land. This small fern is endemic to pine rocklands in south Florida (**Florida Natural Areas Inventory 1997**) and forms dense clumps on the exposed limestone of shaded canal walls and, to a lesser extent, in limestone solution holes. In 1996/97, the largest populations were observed on Homestead ARS on the walls of canals at locations 4, 8, and 13, and in smaller canals at location 14. Over 2,000 plants were observed in 1996/97, substantially more than were recorded in 1992/93. The populations of this species appear to be increasing, but future threats include the colonization of canal walls by Australian pine and Brazilian pepper and the accumulation of litter and branches of these species in the canals.

West Indian Mahogany. This state endangered species was observed at locations 1, 11, and 14 on Homestead ARS in 1997, and at locations 17, 19, and 20 on disposal land in 1996/97. It was not observed in 1992/93. Five trees were found on Homestead ARS in 1996/97. This tree is typically found in hardwood hammocks and may be colonizing areas on base because of the long-term absence of fire. None showed signs of reproducing, and they may be too young to reproduce. Threats to their continued existence on Homestead ARS are invasion of non-native species, fire, and manual clearing.

Tetrazygia. This state threatened species was observed at 12 locations on disposal land and Homestead ARS. This species is a large shrub or small tree, typically a component of the hardwood shrub community, pine rocklands, and hardwood hammocks, as well as disturbed ground (**Florida Natural Areas Inventory 1997**). It was not observed on disposal land in 1992/93, but was recorded at locations 18 and 19 during the 1997 survey. It was observed in fairly large numbers at several locations on Homestead ARS in 1996/97, and was also seen in several locations in 1992/93. In addition many young individuals were observed, indicating this species is increasing on Homestead ARS. Many individuals observed at locations 2 and 15 during the 1996/97 survey had died back but were resprouting. The reason for the dieback is not known.

Giant Wild Pine. This state endangered species was only observed on disposal land in 1997 and only one individual was recorded at location 17, which is the site of the former golf course and housing area. The land is now overgrown with non-native plant species.

Pineland Noseburn. This is a state endangered species that occurs in pine rocklands and is confirmed only from Miami-Dade and Monroe counties (**Florida Natural Areas Inventory 1997**). It was only observed at location 1 on Homestead ARS in 1992/93, but not in 1996/97. Ten plants were observed at location 1, which is a pine rockland remnant. The plants were confined to several small limestone outcrops near the base of several large pines.

Florida White-Topped Sedge. This is a state sensitive species that was observed in numerous areas on disposal land and Homestead ARS. It is a small, grass-like sedge that occurs in open areas with little or no shade. This species was recorded at four locations on disposal land in 1992/93 and eight locations in 1997. Over 260 clumps or individual plants were observed during the 1992/93 survey on disposal land. Over 8,000 individuals of this species were observed in all areas surveyed on Homestead ARS in 1996/97; numbers of this species have increased substantially in all areas surveyed since the 1992/93 survey.

Florida Pinewood Privet. This state sensitive species was observed at six locations on Homestead ARS but not on disposal land. It is a small- to medium-sized shrub that grows with other shrubs and trees, and occurs in pine rocklands and on shallow mounds in mixed hardwoods (**Florida Natural Areas Inventory 1997**). The total number of plants observed during the 1996/97 survey on Homestead ARS was 135, with the largest populations at locations 2 and 15. Although the number observed on

Homestead ARS during the 1996/97 survey was higher than the 1992/93 survey, most of the additional plants were recorded in areas not surveyed in 1992/93. Colonization of non-native plants is a potential threat to this species.

Florida Five-Petaled Leaf Flower. This is a state sensitive species that was observed in numerous locations on disposal land and Homestead ARS. It is a small, low-growing forb and was most common in areas with little vegetation cover, especially along edges of exposed limestone in pine rocklands and on roadside edges (**Florida Natural Areas Inventory 1997**). This species was observed in five areas during the 1992/93 survey and nine areas during the 1997 surveys on disposal land. The estimated number of plants observed was over 1,500 during the 1992/93 survey. This species was observed at all locations surveyed on Homestead ARS in 1996/97, and over 2,000 individual plants were recorded, which is similar to the number observed in 1992/93. The invasion of non-native species may pose a threat to this species. It can tolerate and may even benefit from occasional mowing.

Blodgett's Ironweed. This state sensitive species is a small forb that occurs in a variety of habitats, including pine rocklands, flatwoods, dry prairie and marl prairie (**Florida Natural Areas Inventory 1997**). It was recorded at five locations on disposal land and Homestead ARS. This species occurs in small numbers, with 12 individuals recorded at location 5 on disposal land in 1992/93. Only 11 individuals were observed at locations 1, 4, 11, and 16 on Homestead ARS in 1996/97. The number of plants observed on Homestead ARS in 1992/93 was similar to 1996/97 numbers, but all plants recorded in the earlier survey were at location 1. Natural succession and the invasion of non-native plant species may pose threats to the continued existence of this species on former Homestead AFB.

G.2.1.3 State Listed Species Along Military Canal

Blodgett's Wild-Mercury. This state endangered species is endemic to pine rocklands and hardwood hammocks in Miami-Dade County and the Florida Keys. It is typically found in wet margins of hardwood hammocks (**Florida Natural Areas Inventory 1997**). One population of four plants was observed about halfway between the salinity control structure and the eastern tip of Military Canal.

Sea-Lavender. This state endangered species is a shoreline shrub that occurs from Florida Keys north to Brevard County. It commonly grows on coastal dunes or on the outer edge of salt flats. Two large plants of this species were observed at the eastern tip of Military Canal. One plant on the northern tip of the canal had partly died back due to competition with the exotic plant, *Scaevola sericea*, while the plant on the southern tip was healthy.

G.2.2 Invertebrates

Schaus Swallowtail Butterfly. Schaus swallowtail butterfly is a federally listed endangered species and is the only sensitive invertebrate known to occur in the area of former Homestead AFB. It is a large blackish-brown butterfly that occurs in undisturbed tropical hardwood hammocks mostly from Elliott Key in Biscayne NP south to northern Key Largo. Recently, its range was extended via reintroductions on Lower Matecumbe Key in the Florida Keys and at the Charles Deering Estate County Park north of Biscayne NP. The Schaus swallowtail butterfly was listed as a threatened species in 1976 due to population declines associated with the destruction of tropical hardwood hammock habitat, spraying for mosquitoes, and over harvesting by collectors. It was listed as endangered in 1984 due to dramatic population declines after the initial listing. The largest population is centered on Elliott Key and the surrounding keys. From 1985 to 1990, the estimated population size ranged from 600 to 1,000 adults on Elliott Key, with 50 to 100 individuals on nearby keys. The population was reduced to an estimated 58 individuals after Hurricane Andrew, but increased to over 600 by 1994 and has remained stable since (**USFWS 1998a**).

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Schaus swallowtail butterfly occurs in mature and well-drained tropical hardwood hammocks with some natural or man-made openings such as narrow trails. Adults live about two weeks and may be found near openings feeding on nectar of such plants as wild coffee and guava. Eggs are deposited on torchwood or wild lime, which provide food for emerging young (USFWS 1998a). This species has not been observed on former Homestead AFB and would not be expected to occur there due to lack of appropriate habitat. It would not be expected to occur in the freshwater and mangrove wetlands between the former base and Biscayne Bay.

G.2.3 Reptiles

Six species of special-status reptiles are known to occur in the Homestead area (see Tables 3.11-3 and 3.11-4). Three species are marine turtles that occur in Biscayne Bay. Information regarding these species was derived from data supplied by Biscayne NP and other sources. As indicated in Section G.1.2, surveys for the American crocodile, eastern indigo snake, and rim rock crowned snake were conducted for this SEIS.

G.2.3.1 Federally Listed Species

American Crocodile. The American crocodile was listed as a federally endangered species in 1975. Its critical habitat was designated in 1979 (USFWS 1998a) and is south of Turkey Point and Elliott Key in Biscayne Bay (see Figure 3.11-5). This species is found in coastal habitat in extreme southern Florida, as well as the Caribbean, Mexico, Central America, and northern South America. In south Florida, it once occurred as far north as Lake Worth in Palm Beach County and Tampa Bay, and as far south as Key West. The current distribution includes coastal areas of Dade, Monroe, Collier, and Lee counties (USFWS 1998a). Until very recently, the range of the crocodile in the Homestead area was in the mangrove habitat on North Key Largo and near Turkey Point (Alleman 1995). There is also a population about 20 miles south of the former base in Florida Bay. Except for scattered reports, this species had not been reported from the mangrove habitat along the west shoreline of Biscayne Bay north of Turkey Point. However, detailed surveys in 1997 and 1998 revealed that the crocodile has apparently expanded its range north of Turkey Point up to Chapman Field Park and apparently to Matheson Hammock County Park (Denton and Godley 1999, Dalrymple 1998, Mazzotti 1999b, Mazzotti and Cherkiss 1998).

The American crocodile is found primarily in mangrove swamps and along low-energy mangrove lined bays and creeks (Kushlan and Mazzotti 1989). At Turkey Point, adult crocodiles were found most frequently in the low saline and fresh water canals and ditches, subadults were in all areas, and juveniles in the most saline ditches. Other studies have also shown that adult crocodiles prefer less saline water (Kushlan and Mazzotti 1989) and exclude the juveniles from these preferred areas. Adult females at Turkey Point use higher saline water for nesting since the only good nesting habitat is adjacent to higher saline water (Brandt et al. 1995).

Male American crocodiles typically begin to establish breeding territories in late February. Territorial defense takes the form of vocalization, body posturing, and aggression. Following courtship and mating, females search for a nest site which, under natural conditions, includes sites with sandy shorelines or raised creek beds next to water (USFWS 1998a). Nesting at the north end of Key Largo and Turkey Point takes place on levees and spoil banks associated with canals (Brandt et al. 1995, Moler 1991), while nesting at Chapman Field Park takes place next to a borrow pit (Dalrymple 1998). There are no known crocodile nest sites in natural habitats in the Biscayne Bay-Key Largo area (Mazzotti 1999a). Nesting takes place from late April into early May. Incubation lasts about 86 days, during which time the female periodically visits the nest. In Florida, crocodiles are not known to regularly defend their nests against humans (Kushlan and Mazzotti 1989). The female must excavate the young from the nest after hatching because they cannot dig themselves out. Hatchlings stay in close proximity to the nest site for

four to five weeks and then disperse. Most go only a short distance, but some may move 5 to 6 miles within three months of hatching (**Moler 1991**).

An estimated 1,000 to 2,000 crocodiles may have existed early in the 20th Century and by the mid-1970s, numbers of non-hatchling crocodiles were estimated at 100 to 400. The decline was due to habitat loss, collection, and hunting as well as human encroachment into estuarine habitats. The American crocodile population in south Florida has increased substantially over the last 20 years and this is best indicated by the increase in nesting crocodiles from 20 in the late 1970s to about 48 nests in 1995 (**USFWS 1998a**).

The closest nesting population of American crocodiles to the Homestead area is at Turkey Point. The cooling water canal system at Turkey Point was completed in 1974. Adult crocodiles were first observed at this site in 1976 and the first nest was discovered in 1978. The estimated non-hatchling population size was 17 to 19 from 1978 to 1981 (**Gaby et al. 1985**), and 24 to 30 from 1984 to 1993 (**Brandt et al. 1995**). The number of crocodiles at Turkey Point appears to be leveling off and the site may be reaching carrying capacity (**Brandt et al. 1995**).

Another American crocodile population occurs about 20 miles south of former Homestead AFB in Florida Bay in Everglades National Park. This population is centered in the crocodile sanctuary in northern Florida Bay in the area of Little Madeira and Joe Bays. The sanctuary was established in 1980 and covers 8,143 acres. Boat traffic and other recreation were originally prohibited throughout this area, but in 1992, some areas not frequented by crocodiles were reopened to boat traffic. Critical locations, such as areas used for nesting, are still off limits to all users (**Snow 1992**).

As indicated above, until recently, the American crocodile had not reoccupied its historic habitat along the western shoreline of Biscayne Bay north of Turkey Point (**Alleman 1995**). However, surveys in 1997 and 1998 revealed the presence of the American crocodile in that area (**Mazzotti and Cherkiss 1998**). Hatchlings were observed in September 1997 in a borrow pit at Chapman Field County Park about 14 miles north of Turkey Point and 11 miles north of Military Canal (**Dalrymple 1998, Mazzotti and Cherkiss 1998**). A total of 25 hatchlings were captured in the borrow pit, as well as several juvenile crocodiles up to 50 inches long (**Dalrymple 1998**).

Crocodile surveys were conducted in 1998 on former Homestead AFB, along 37 miles of canals near the former base, and along about 7 miles of the west shoreline of Biscayne Bay (see Table G-2, Figures G-2 and G-3). Each location was surveyed three times from June 7 through July 22, 1998. No crocodiles were observed at former Homestead AFB, but the spectacled caiman was common and a few American alligators were also observed (**Figure G-8**). The caiman was recorded 30 times, with the largest number observed during the second survey (**Table G-5**). It is assumed that at least 30 adult caiman reside on the former base based on the second survey, where 16 caiman and 14 unidentified crocodilians (assumed to be mostly caiman) were recorded. The crocodile was recorded twice in Florida Canal and twice in Goulds Canal (**Figure G-9**). The crocodiles were the same size and in the same location each time, so it is assumed that this represents two crocodiles. The alligator was common throughout the canal system and only one caiman was detected in the canals (**Figure G-10**). The maximum number of alligators detected was 19 during the second survey and, assuming the 11 unidentified crocodilians recorded during this survey were alligators, then at least 30 adult alligators resided in the 37 miles of canals surveyed or about one adult alligator per mile of canal (**Table G-6**). The crocodile was detected twice during wading bird surveys in June and July 1998: one at the mouth of Military Canal and the other in the Black Point area. These and other recent surveys have resulted in 11 crocodile observations from the Florida City Canal to Black Point in 1997 and 1998.

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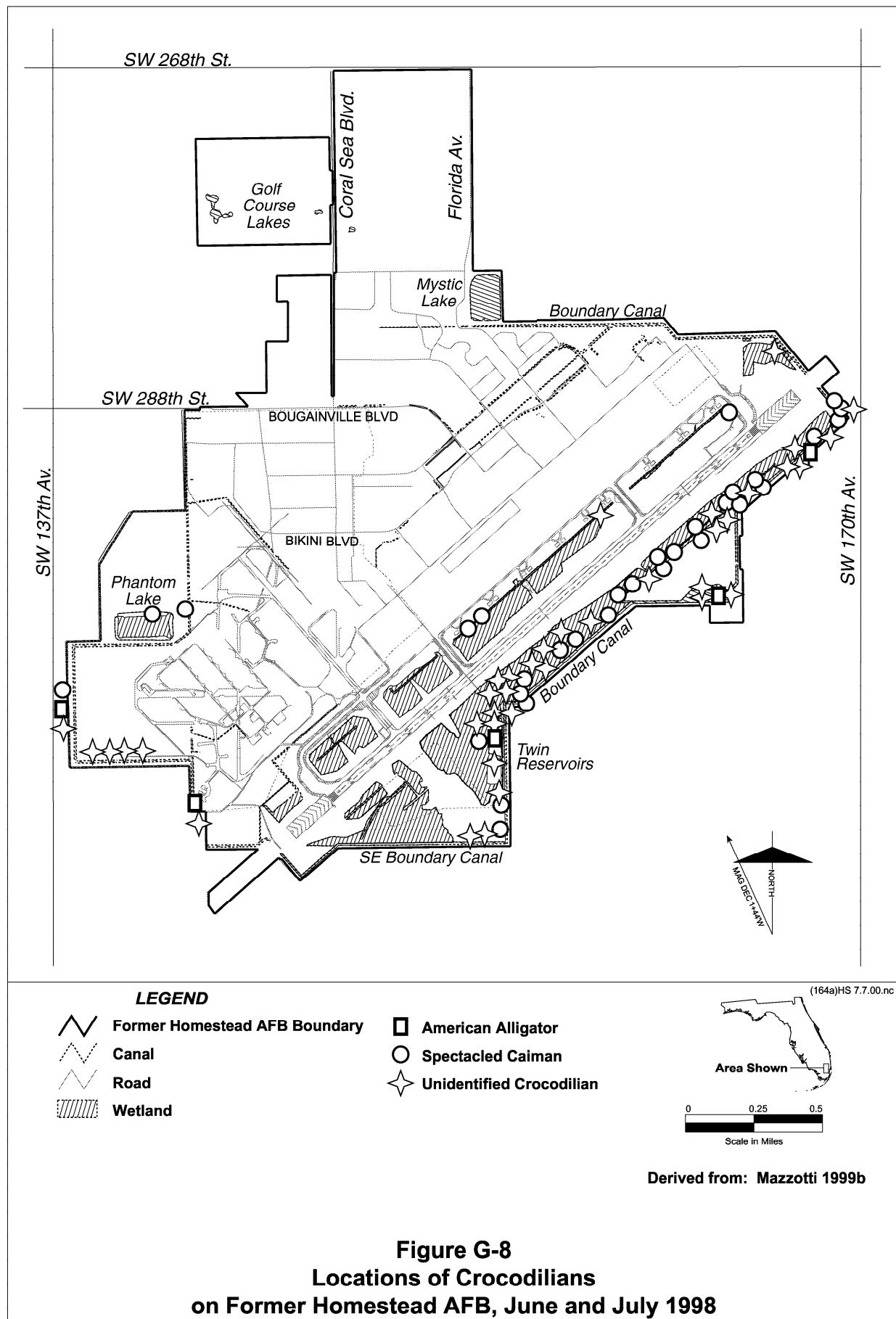


Table G-5. Alligator, Caiman, and Unidentified Crocodilian Observed on Former Homestead AFB, June and July

Species	Boundary Canal			Marsh	Reservoir	Twine Reservoirs	Canal North of Runway	Total
	South	West	East					
Alligator								
S1	2	0	0	0	1	0	0	3
S2	0	0	0	0	0	0	0	0
S3	0	2	0	0	0	0	0	2
Caiman								
S1	3	0	0	2	0	0	0	5
S2	1	1	2	12	0	0	0	16
S3	1	1	1	3	0	0	3	9
Crocodilian sp.								
S1	0	2	1	3	0	0	0	6
S2	1	0	0	12	0	1	0	14
S3	4	4	1	3	3	0	1	16
Total								
S1	5	2	1	5	1	0	0	14
S2	2	1	2	24	0	1	0	30
S3	5	7	2	6	3	0	4	27
Grand Total	12	10	5	35	4	1	4	71

Source: **Mazzotti 1999b.**

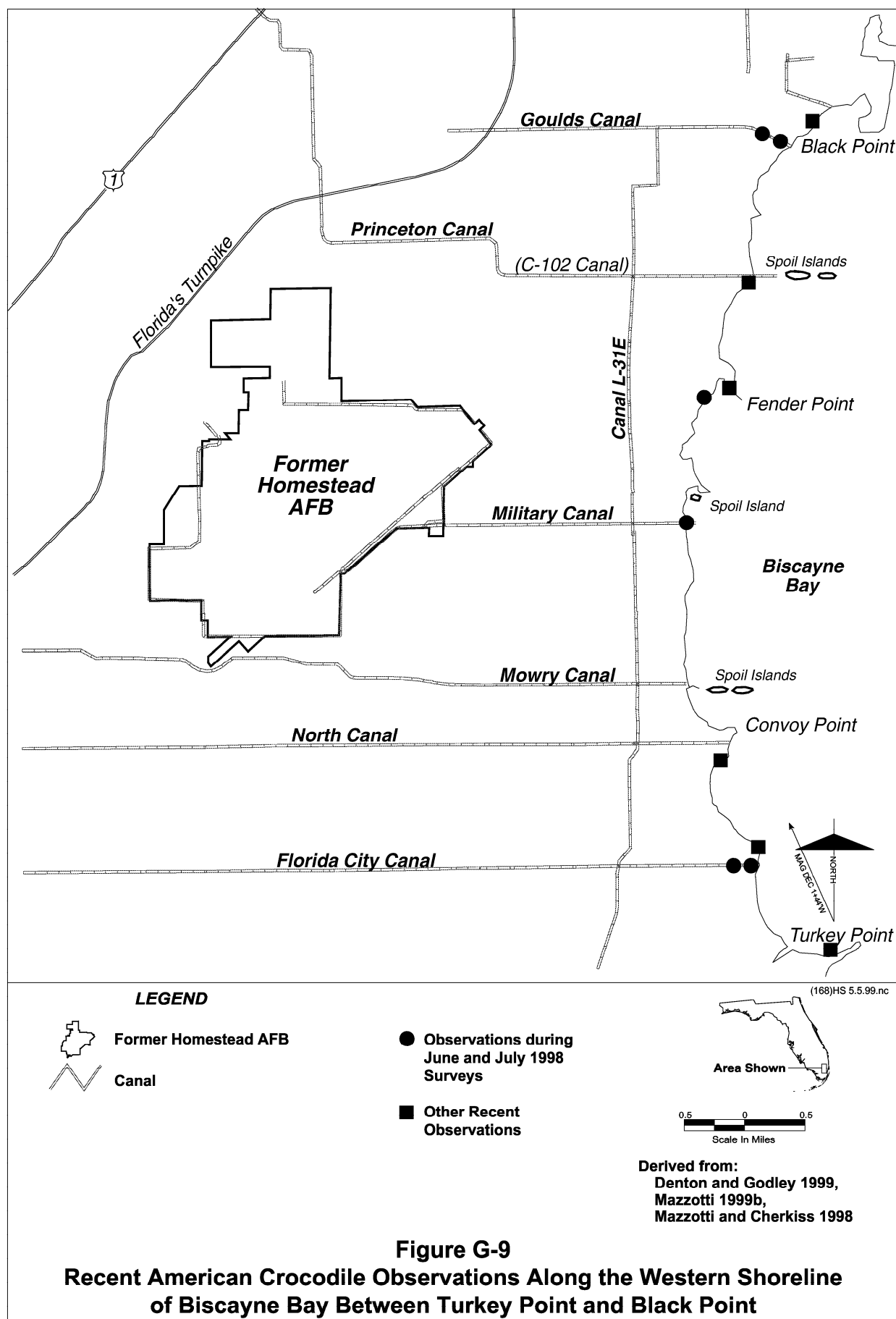
Note: S1 took place on June 7, 1998, S2 on June 28 and 29, 1998, and S3 on July 17 and 18, 1998.

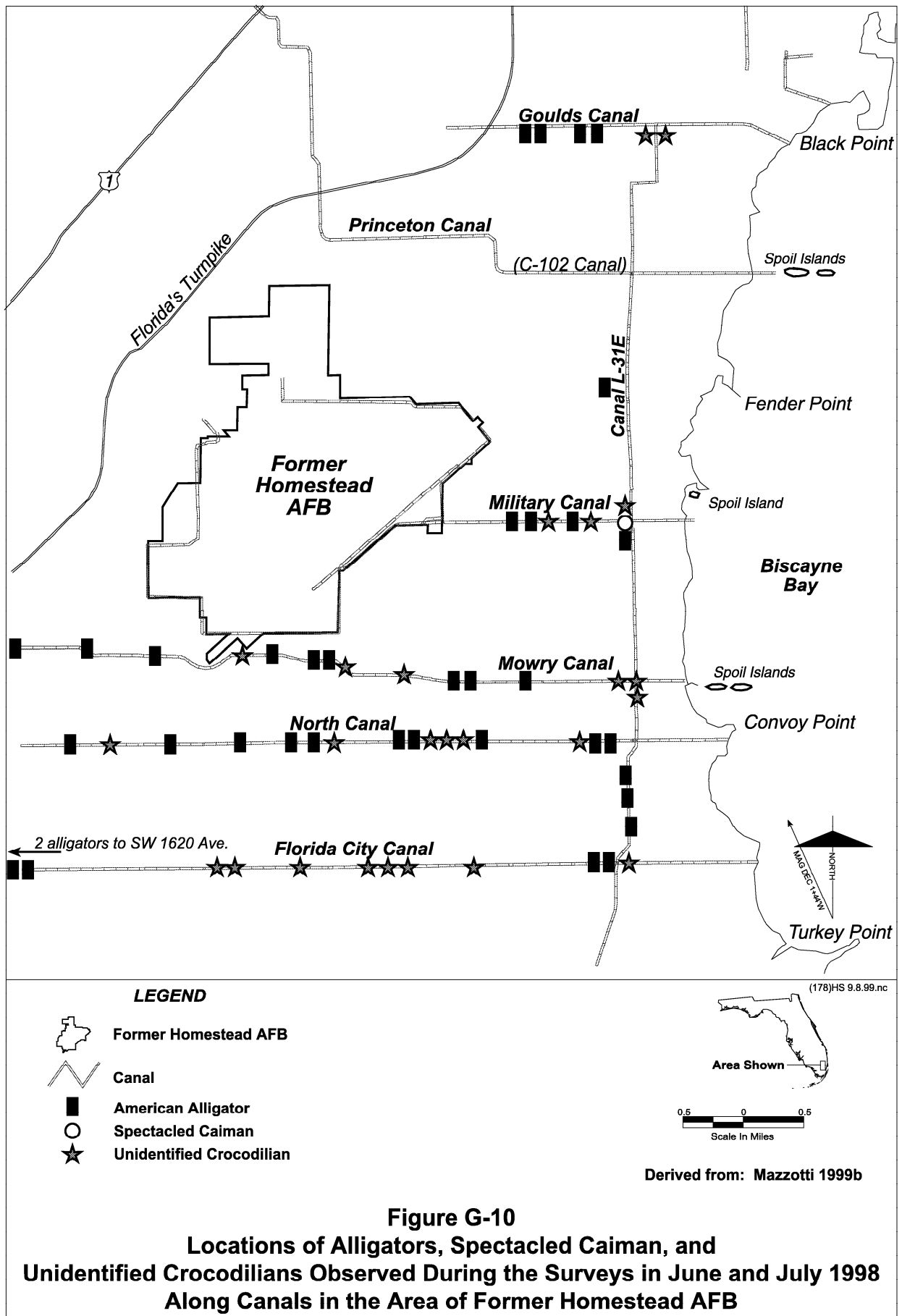
Green Sea Turtle. In July 1978, the green sea turtle was listed as a federally endangered species in Florida and along the Pacific Coast of Mexico and is threatened in the remainder of its range. It can be found world wide, mostly in tropical and subtropical waters. It occurs around the U.S. Virgin Islands, Puerto Rico, and along the continental United States from Texas to Massachusetts. Areas known to be important feeding areas for the green sea turtle in Florida include Indian River Lagoon, Florida Keys, Florida Bay, and Cedar Key (**USFWS 1998a**).

In Florida, the green sea turtle nesting season is from June through September. Female green turtles emerge from the ocean at night to deposit their eggs, and from one to seven clutches can be deposited over the course of the nesting season; the average number of eggs per clutch is 136. Females typically do not breed every year; two to more than four years may pass before a female will produce eggs again. The age at sexual maturity for the green sea turtle ranges from 20 to 50 years (**USFWS 1998a**).

The number of nests in Florida ranged from 455 to 2,509 during 1988 to 1992. An increase in green turtle nests in Florida has been observed, but the reason for this increase is unknown. It could represent an actual increase in nesting or be the result of increased monitoring (**USFWS 1998a, Meylan et al. 1995**). In south Florida, the largest number of nests per year from 1985 through 1995 were observed in Palm Beach (301) and Martin counties (163); the average number of nests in Miami-Dade (4.5) and Monroe (6.5) counties was lower (**USFWS 1998a**).

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Table G-6. Alligator, Caiman, Crocodile, and Unidentified Crocodilian Observed in the Canals in the Area of Former Homestead AFB, June and July 1998

Species	Canals							Total
	Goulds	Military	North	C-102	Fl. City	Mowry	L-31E	
Alligator								
S1	2	1	1	0	0	0	0	4
S2	1	3	6	1	3	4	1	19
S3	1	0	4	0	0	4	2	11
Caiman								
S1	0	1	0	0	0	0	0	1
S2	0	0	0	0	0	0	0	0
S3	0	0	0	0	0	0	0	0
Crocodile								
S1	1	0	0	0	0	0	0	1
S2	0	0	0	0	1	0	0	1
S3	1	0	0	0	1	0	0	2
Crocodilian sp.								
S1	0	1	4	0	0	0	0	5
S2	0	2	1	1	5	1	1	11
S3	1	0	1	0	3	3	3	11
Total								
S1	3	3	5	0	0	0	0	11
S2	1	5	7	2	9	5	2	31
S3	3	0	5	0	4	7	5	24
Grand Total	7	8	17	2	13	12	7	66

Source: **Mazzotti 1999b.**

Note: Refer to Figure G-3 for location of surveys. S1 took place on June 8 and 9, 1998, S2 on June 27 and 30, 1998, and S3 on July 20 and 23, 1998.

Except during migration, the green sea turtle is generally found in fairly shallow waters inside reefs, inlets, and bays. They are attracted to shallow water areas that have an abundance of marine plant life. The green sea turtle has not been recorded as a nesting species on the beaches of the keys in Biscayne NP. The closest known nesting sites are beaches in Miami-Dade County north of the park (**Mansfield 1996, USFWS 1998a**). This species has been frequently observed on the reef and in the sea grass beds in Biscayne Bay and uses the bay for foraging (**Alleman et al. 1995, Mansfield 1996**). The green sea turtle would be expected to forage along the western shoreline of Biscayne NP and in the salt water portion of Military Canal. Seventeen green sea turtle strandings were reported from Biscayne NP from 1995 through 1998; most of these turtles died or were dead (**BNP 1995, Mansfield 1996, Moulding and Lockwood 1997, Lockwood et al. 1999**).

Eastern Indigo Snake. This snake is a state and federally threatened species. It is the longest snake in North America, reaching lengths of over 8.5 feet. Historically, it occurred in the southern United States, including all of Florida and the coastal plains of Georgia, Alabama, and Mississippi. Georgia and Florida currently support the remaining populations of the eastern indigo snake, although it could still occur in Alabama. This species is thought to be widely distributed in Florida (**Moler 1985**). In south Florida, it occurs in pinelands, tropical hardwood hammocks, and mangrove forests. They seem to prefer hammocks

and pine forests, since most observations occurred in these habitats (**Steiner et al. 1983**). The indigo snake also frequents canal banks in south Florida and may enter the water or crab holes along canal banks to escape (**Lawler 1977**). Eastern indigo snakes also make use of agricultural lands and various types of wetlands (**USFWS 1998a**).

Information regarding the reproductive cycle of the eastern indigo snake in south-central Florida indicates that breeding takes place from June to January, and egg laying from April to July, with hatching occurring from mid-summer to early fall. The indigo snake is an active, terrestrial predator. Their diet includes fish, amphibians, reptiles, birds, and mammals. These wide-ranging snakes utilize a large area of land; the average home range size for males in south-central Florida was 138 acres and females 47 acres. The male's maximum home range was almost 500 acres; the maximum female home range was 120 acres (**USFWS 1998a**).

The eastern indigo snake was listed as a threatened species because of a reduction in numbers due to habitat loss, collecting for the pet trade, and gassing gopher tortoise burrows for rattlesnakes. At the time of listing (1978), the main factor causing the decline of this snake was collecting for the pet trade. Pressures from pet collecting have been reduced due to effective law enforcement. Presently, the main cause for this species decline is habitat loss (**USFWS 1998a**). As noted above, this species has a large home range making it vulnerable to habitat loss, fragmentation, and degradation. Habitat is being destroyed by residential, commercial, and agricultural development, as well as by timber harvesting. Low-density housing is also a threat to this snake due to mortality caused by land owners and pets, as well as increased mortality along newly constructed roads. At present, there is no quantitative data to determine long-term trends of the indigo snake populations in south Florida. The indigo snake will probably persist where large sections of habitat (1,000 to 10,000 acres) remain. Preliminary estimates of the amount of land needed to protect the indigo snake are about 10,000 acres of unaltered habitat. However, population modeling will need to be completed to determine if a population of eastern indigo snakes could persist on this amount of land (**USFWS 1998a**).

Eight museum specimens collected between 1929 and 1967 from the Homestead and Florida City areas indicate this species inhabited this area historically. More recently, 13 observations of the eastern indigo snake were recorded from Biscayne NP; three at Convoy Point and the remainder on Sands, Elliott, and Old Rhodes Keys. Based on over 100 observations, freshwater marsh, mangrove forest, and abandoned farmland are considered marginal habitat for the eastern indigo snake. Only five sightings of this species occurred in mangrove swamps (6 percent of the total); of these, three were along canal berms and two were in wading bird colonies (**Steiner et al. 1983**).

Prior to Hurricane Andrew, Homestead AFB was in full operation and there would have been essentially no potential eastern indigo snake habitat on most of the base given the high degree of development and human activity. Some potential habitat likely existed south of the runway in wetlands and other undeveloped lands. Currently, much of former Homestead AFB outside of the Homestead ARS consists of abandoned land with much less human activity, and this area may now provide habitat for the eastern indigo snake. Biological surveys were conducted on the disposal lands in 1992, 1993, and 1997 and the indigo snake was not observed (**Hilsenbeck 1993, Geraghty & Miller 1993, PBS&J 1998b**). Surveys specifically for this species were conducted in much of the disposal property during the summer of 1998 (see Figure G-4 for survey area) and this species was not observed. In addition, the eastern indigo snake was not observed on the former base during other intensive wildlife surveys in 1998, including surveys for the American crocodile, rim rock crowned snake, neotropical migrant breeding birds, wading birds, Southeastern American kestrel, and burrowing owl. The eastern indigo snake was said to occur on the Homestead ARS (**SEA 1996**); however, this observation was not confirmed (**Mitchell 1999**). Homestead ARS is highly developed so it is doubtful the snake inhabits that area. It may occur

occasionally along the canals and other water bodies near the base boundary that are adjacent to open land. It was also listed as a confirmed species on former Homestead AFB in a recent species account (**Hallam et al. 1998**). However, it was determined that the eastern indigo snake was not actually observed on the former base but was assumed to occur because of historical observations in the area and availability of potential habitat (**Moler 1999**).

There have been recent reports of the eastern indigo snake on lands between the former base and Biscayne Bay. An indigo snake was recently observed on disturbed land during a recent USEPA study (**Metro-Dade County 1994b**). The location of this observation was not provided. It and its shed skin have also been observed along Florida City Canal in recent years (**Moler 1999**). An adult indigo snake was observed along the berm of Military Canal on July 13, 1998. This indicates that the mangrove fringe forest, exotic dominated freshwater wetlands, canals, and abandoned lands east of former Homestead AFB are eastern indigo snake habitat. This would also include the agricultural land next to the above habitats and along the canals but not agricultural lands well away from the preferred habitat. The freshwater wetlands and mangrove forests, as well as agricultural lands near these habitats may represent marginal habitat for this species (**Steiner et al. 1983**).

Hawksbill Sea Turtle. The hawksbill sea turtle was listed as an endangered species by the federal government in 1970; it is also a State of Florida endangered species. Critical habitat for this species has been designated in Puerto Rico. This species occurs primarily in tropical and subtropical seas of the Atlantic, Pacific, and Indian Oceans. In U.S. jurisdictional waters, it is most common in Puerto Rico and the U.S. Virgin Islands. It also occurs along all the Gulf of Mexico states and along the Atlantic Ocean as far north as Massachusetts, but sightings north of Florida are rare (**USFWS 1998a**).

The hawksbill sea turtle is observed with some regularity in the waters off the Florida Keys and the reefs off Palm Beach County. Coral reefs are important foraging areas for this species because it feeds on sponges and other organisms that need a hard substrate to grow (**USFWS 1998a**). However, Hawksbills are also known to inhabit mangrove fringed bays and estuaries where coral reefs are absent (**Carr 1952**).

Nesting occurs July to October at low- to high-energy beaches, and the female typically emerges from the water at night and lays an average of 140 eggs. As with the green sea turtle, the female may lay eggs more than once during the nesting season, and then not reproduce again for a number of years. Within the continental United States, nesting occurs along the southeastern coast of Florida, including Miami-Dade and Monroe counties.

The hawksbill sea turtle has been recorded as nesting on one of the keys in Biscayne NP; two nests were observed in 1981 and two in 1990. The outcome of these nesting attempts is not known (**Moulding and Lockwood 1997**). Strandings of this species have also been reported from Biscayne NP, one each in 1995, 1996, and 1997 and zero in 1998 (**BNP 1995, Mansfield 1996, Moulding and Lockwood 1997, Lockwood et al. 1999**). The hawksbill sea turtle is less common in Biscayne Bay than the green and loggerhead sea turtles (**Alleman et al. 1995**), likely due to its preference for feeding on sponges that occur on coral reefs. This species may occur occasionally in waters near the mangrove fringe along the western shoreline of Biscayne NP and the salt water portion of Military Canal.

Loggerhead Sea Turtle. This turtle was designated as a federal threatened species in 1978 and is a State of Florida threatened species. It is distributed in temperate and tropical waters and inhabits the continental shelves and estuarine environments of the Atlantic, Pacific, and Indian oceans. The loggerhead sea turtle nests along the coast of the continental United States from Louisiana to Virginia. Major nesting areas are found on the coastal islands of North Carolina, South Carolina, and Georgia, as well as along the Atlantic and Gulf coast of Florida. This species nests in all coastal counties in south

Florida; the majority occur along the east coast in counties north of Miami-Dade County (USFWS 1998a).

Habitat used by the loggerhead sea turtle varies with age. Hatchlings apparently head to the open ocean after hatching and live in the pelagic drift lines for several years. Subadults then apparently move to the nearshore environment and live in estuarine waters near the coasts. Adults are also found in the nearshore environment. The primary food of subadult and adult loggerheads is invertebrates such as gastropods, mollusks, and crustaceans (USFWS 1998a).

In the southeastern United States, loggerheads begin nesting as early as mid-March and continue into September, with the peak months being June and July. Mean clutch size in the southeastern U. S varies from 100 to 126 and, as with other sea turtles, the female may nest multiple times during the nesting season. Incubation in Florida averages 53 to 55 days, and natural hatching success rates of 55.7 percent have been reported for Florida (USFWS 1998a).

The estimated number of loggerheads nesting in the southeastern United States in the 1980s was about 14,150 and, assuming 4.1 nests per female, these females accounted for about 58,000 nests. More recent data since 1990 indicates that the number of loggerhead nests in the southeastern United States is currently 60,000 to 70,000 (Meylan et al. 1995). These totals are believed to constitute 35 to 40 percent of the loggerhead turtles worldwide. From a global perspective, the southeastern United States nesting populations of the loggerhead sea turtle is second in size to the nesting aggregations of the islands in the Arabian Sea and is of paramount importance to the survival of the species (USFWS 1998a).

Data from 1989 to 1995 showed that the number of loggerhead nests in Florida ranged from about 39,200 to 59,400, with the largest number of nests in Brevard County. The average number of loggerhead nests in south Florida from 1985 to 1995 was about 29,400, and an average of 347 nests (1.2 percent of the total) were in Miami-Dade County (USFWS 1998a).

The loggerhead sea turtle nests on the keys in Biscayne NP, and detailed nesting studies have been conducted since 1995. Fifteen nests were discovered in 1995, and although the nesting species was not determined, they were all likely loggerhead nests. Eleven of the 15 nests were preyed on by raccoons (BNP 1995). In 1996, 19 nests were found and all were loggerhead nests. Twelve nests were preyed on by raccoons, including four that were totally destroyed, and eight that were partially destroyed. Reduced predation rates may have been due to the use of screens over the nest sites to protect them from raccoons. The 1996 average clutch size was 90.4; hatching success was 60.7 percent; and an estimated 779 hatchlings entered the ocean (Mansfield 1996). In 1997, six loggerhead nests were found and the predation rate was zero due to the use of screens. Hatching success was 62.8 percent, and an estimated 210 hatchlings entered the ocean (Moulding and Lockwood 1997). Thirty-eight loggerhead nests were found on Elliott, Boca Chita, and Soldier Keys in 1998. An estimated 910 hatchlings entered the ocean for a hatching success of 45.5 percent. Hatchling success was lower in 1998 than 1997 due to an increase in predation (Lockwood et al. 1999). Eighteen loggerhead sea turtle strandings were reported from Biscayne NP from 1995 through 1998 (BNP 1995, Mansfield 1996, Moulding and Lockwood 1997, Lockwood et al. 1999).

The loggerhead, along with the green sea turtle, are the species most frequently observed within Biscayne Bay (Alleman et al. 1995). This species would be expected to occur along the mangrove fringe of the western shoreline of the Bay and in the salt water portion of Military Canal.

APPENDIX G

G.2.3.2 *State Listed Species*

Rim Rock Crowned Snake. The rim rock crowned snake is a state threatened species and is found in eastern Miami-Dade and Monroe counties. Information from recent sightings indicates this species occurs in the area of former Homestead AFB (Lynch 1998). This species may be the rarest snake in Florida and is threatened due to the destruction of habitat throughout its range (Moler 1992).

The rim rock crowned snake has been observed in pine rocklands, tropical hammocks, and disturbed ground such as vacant lots (Florida Natural Areas Inventory 1997). It can be found beneath trash, rocks, and rotten logs. Limited potential habitat for this species occurs in the disposal land on former Homestead AFB, principally in the remnant pine rocklands and abandoned lands. This snake was not observed on former Homestead AFB during biological studies in 1992, 1993, and 1997 (Hilsenbeck 1993, Geraghty & Miller 1993, PBS&J 1998b), although these surveys were not specifically designed to look for this secretive species. A survey for this species was conducted in June and July 1998, by establishing funnel traps and searching appropriate areas (see Figure G-4). The rim rock crowned snake was not captured during 336 trap nights at 15 funnel traps nor was it detected during searches. In addition, it was not detected on or outside the former base during other biological surveys conducted in 1998. This indicates that the rim rock crowned snake is unlikely to occur on former Homestead AFB.

G.2.4 *Birds*

Six federally listed bird species occur or have the potential to occur in the Homestead area (see Table 3.11-3). These species are also listed as endangered or threatened by the state.

G.2.4.1 *Federally Listed Species*

Wood Stork. This bird is listed as an endangered species by both the federal and Florida state governments. The U.S. population of the wood stork was listed as endangered by the federal government in 1984 because it had declined by more than 75 percent since the 1930s. There is uncertainty regarding the size of the wood stork population in the 1930s; estimates have varied from 9,400 to 25,000 pairs and over 150,000 individuals (USFWS 1998a, Kushlan and Frohring 1986). By the 1970s, the estimated number of pairs was between about 5,110 and 7,600 (USFWS 1998a). Data from the mid-1980s indicated that the wood stork population stabilized at about 6,000 nesting pairs (Ogden et al. 1987) and, more recently (from 1991 through 1995), the number of nesting pairs ranged from 4,100 to 7,850 (USFWS 1998a). Prior to the mid-1970s, the U.S. population of the wood stork apparently did not breed outside of Florida; it now breeds in parts of Georgia and coastal South Carolina. An estimated 30 to 35 percent of the wood storks nested in south Florida in the early to mid-1990s, and the remainder nested further north in Florida, Georgia, and South Carolina (USFWS 1998a). From 1992 through 1998, the number of nesting pairs of wood storks in the Everglades ranged from 25 (1998) to 567 (1992) (Frederick 1995; Gawlik 1997, 1998). During the non-breeding season (July to October), wood storks are much less common in south Florida (USFWS 1998a).

The wood stork is primarily associated with fresh water marshes, which it uses for nesting, roosting, and foraging. They typically nest in tall trees in swamps or on islands that are surrounded by open water. Coastal nesting sites occur in red mangrove and, occasionally, Brazilian pepper, cactus, and Australian pine (Rodgers et al. 1996). During the non-breeding season or while foraging, storks can be found in a wide variety of wetland habitats, including freshwater marshes, stock ponds, narrow tidal creeks, and seasonally flooded roadside or agricultural ditches. The wood stork has a specialized feeding behavior that requires a fairly high density of fish to be successful. As a result, this species will forage in a wide variety of wetlands where fish have become concentrated. Although most wood storks no longer nest in

the Everglades, the wetlands in this area are still important winter feeding areas. For example, during the winters of 1985 and 1989 (drought years), an estimated 29 and 40 percent of the U.S. wood stork population foraged in the wetlands in the water conservation areas north of Everglades NP. During the wet years of 1986 through 1988, an estimated 8 to 10 percent of the U.S. wintering population foraged in wetlands in south Florida (**Bancroft et al. 1992**).

Wood storks may nest in the same area as long as the site is undisturbed and foraging habitat exists in the surrounding area. As a result of drainage of wetlands, many wood storks have shifted their nest sites from natural to impounded wetlands. A shift in wood stork breeding colonies from south Florida to north and central Florida, as well as into Georgia and South Carolina has been observed. This shift may be due to a greater food availability in the northern breeding grounds than in south Florida (**Ogden et al. 1987**). Traditionally, wood storks in south Florida nested between November and January, but in response to deteriorating habitat, wood storks now start to nest in February or March of most years. Wood stork productivity varies greatly between years, with low production during years of limited food supplies and higher production when food supplies are greater (**USFWS 1998a**).

There are no known wood stork nest sites in the area of former Homestead AFB. The bird was not observed during the summer 1998 survey on the former base, or in the freshwater wetlands and mangrove forest along Biscayne Bay east of the former base. It was also not observed on the former base during prior summer studies (**Hilsenbeck 1993**). However, wood stork were recorded on the former base on February 11, 12, and 13, 1998; the largest number, 10, was seen on February 11 (**Table G-7**). It was also reported from disposal property (**PBS&J 1998b**), and single birds were observed foraging on disposal property twice in March 1997. The wood stork has been observed in freshwater wetlands and mangrove forests along the western shoreline of Biscayne Bay and points inland from Turkey Point north to Chapman Field Park. Observation along the western shoreline of Biscayne Bay north of Turkey Point indicates this species forages along the mangrove fringe, in freshwater wetlands, and along shallow roadside ditches (**Metro-Dade County 1994b, Dalrymple 1998, Lynch 1999, Lockwood 1998a**). Most of these observations were of single or small groups, although up to 13 were observed at Chapman Field Park (**Dalrymple 1998**), and 10 were recorded at Mangrove Point just south of Turkey Point in January 1982 (**BNP 1998**). Up to 15 wood storks were observed feeding in shallow roadside ditches over a two-month period during the winter of 1996. No birds were observed at this location during the winter of 1997, and one was observed during the winter of 1998. This location is about 1.1 miles north of the former base (**Peterla 1999b**). Most observations were during November through March, although two reports did not provide dates (**Metro-Dade County 1994b, Dalrymple 1998**). These studies confirm that the wood stork is uncommon in south Florida, including the Homestead area, during the summer. These studies also show that individuals or small groups of wood storks can be expected to occur in wetland habitat between former Homestead AFB and Biscayne Bay, particularly during the winter and early spring. Very few wood storks would be expected on the former base.

Snail Kite. The snail kite is considered endangered by the federal government and the State of Florida. It is a medium-sized raptor that occurs in Florida, Cuba, and Honduras. Critical habitat west of Homestead has been designated for this species (see Figure 3.11-5). The current distribution of the snail kite is limited to the central and southern portions of the state from the Kissimmee Chain of Lakes south to Lake Okeechobee and the Everglades (**USFWS 1998a**). This species also is known from the C-111 Basin west of U.S. Highway 1. In addition to the large freshwater systems described above, the snail kite uses many other smaller, widely dispersed wetlands within its range (**Bennetts and Kitchens 1997b**).

APPENDIX G

Table G-7. Number of Wading Birds Observed by Month on Former Homestead AFB in 1998

Month (n) ¹	Species						Total
	White Ibis	Cattle Egret	Great Egret	Great Blue Heron	Wood Stork	Other ²	
January (18)	106	157	16	7	0	88	374
February (18)	98	22	39	38	16	126	339
March (16)	39	41	38	19	0	14	151
April (17)	18	295	18	4	0	0	335
May (18)	0	599	7	21	0	0	627
June (20)	3	587	4	22	0	0	616
July (20)	155	832	38	18	0	5	1048
August (12)	218	360	24	43	0	6	651
September (7)	750	110	0	59	0	0	919
October (16)	1062	290	22	56	0	0	1430
November (15)	641	425	16	11	0	50	1143
December (13)	81	15	1	54	0	0	151
Total (190)	3,171	3,733	223	352	16	289	7,784

Source: **Peterla 1999a.**

Notes: ¹ Number of observations in parenthesis.

² Other comprises mostly little blue herons and snowy egrets with some tri-colored herons.

Snail kite habitat consists of freshwater wetlands and shallow vegetated edges of lakes where its primary food source, the apple snail, can be found. Freshwater marshes used by foraging snail kites have been characterized as palustrine emergent, long-hydroperiod wetlands (**Cowardin et al. 1979**). Typical foraging habitat is freshwater wetlands containing vegetation less than 10 feet high interspersed with open clear, calm water. Emergent vegetation in these wetlands includes spikerush and cattail, and common submerged species are water lily and arrowhead. Low trees and shrubs, such as willow and bald cypress, are often present and provide perches for foraging snail kites. Nesting is always over water, and nests are constructed in trees, shrubs, and wetland emergent vegetation. Roost sites are almost always over water, and more than 90 percent of the roost sites in Florida are in willow (**USFWS 1998a**).

During the non-breeding season, the snail kite roosts communally with anhingas, herons, and vultures. It nests in loose colonies and often forages in close proximity to other snail kites and, in some cases, with other birds such as herons (**Bennetts and Dreitz 1997**). The snail kite feeds almost exclusively on apple snails, although on rare occasions, it may feed on small turtles and fish (**Bennetts et al. 1994**). The snail kite is non-migratory, although they are highly nomadic within their range. Movements appear to be in response to changing water depths, hydroperiod, and food availability (**Bennetts et al. 1994, Bennetts and Kitchens 1997b**). Radio telemetry data indicate that the snail kites move throughout their range in Florida. They should be considered one population and managed on a regional basis (**Bennetts and Kitchens 1997a**).

The snail kite has been listed as endangered by the federal government since 1967 because of drastic population declines. In 1965, only 10 birds were found; 21 birds were found in 1967. Historically, the snail kite was considered common and was seen in groups of 100 birds. The numbers declined dramatically in the 1950s and 1960s. Annual midwinter surveys since 1969 have shown that the snail kite

has increased in numbers. For example, from 1985 through 1994, an average of 562 snail kites were recorded, with almost 1,000 birds counted in 1994 (USFWS 1998a).

The snail kite has not been recorded during ecological surveys conducted on former Homestead AFB (Hilsenbeck 1993, PBS&J 1998b, Geraghty & Miller 1993, Denton and Godley 1999, Mazzotti 1999b), nor was it recorded during wildlife surveys in the area near former Homestead AFB (Metro-Dade County 1994b, Denton and Godley 1999, Mazzotti 1999b). In addition, it has not been recorded from Biscayne NP (BNP 1998). Given its highly nomadic nature, the snail kite has the potential to occur at former Homestead AFB and surrounding areas, but such an occurrence would likely be rare and of short duration.

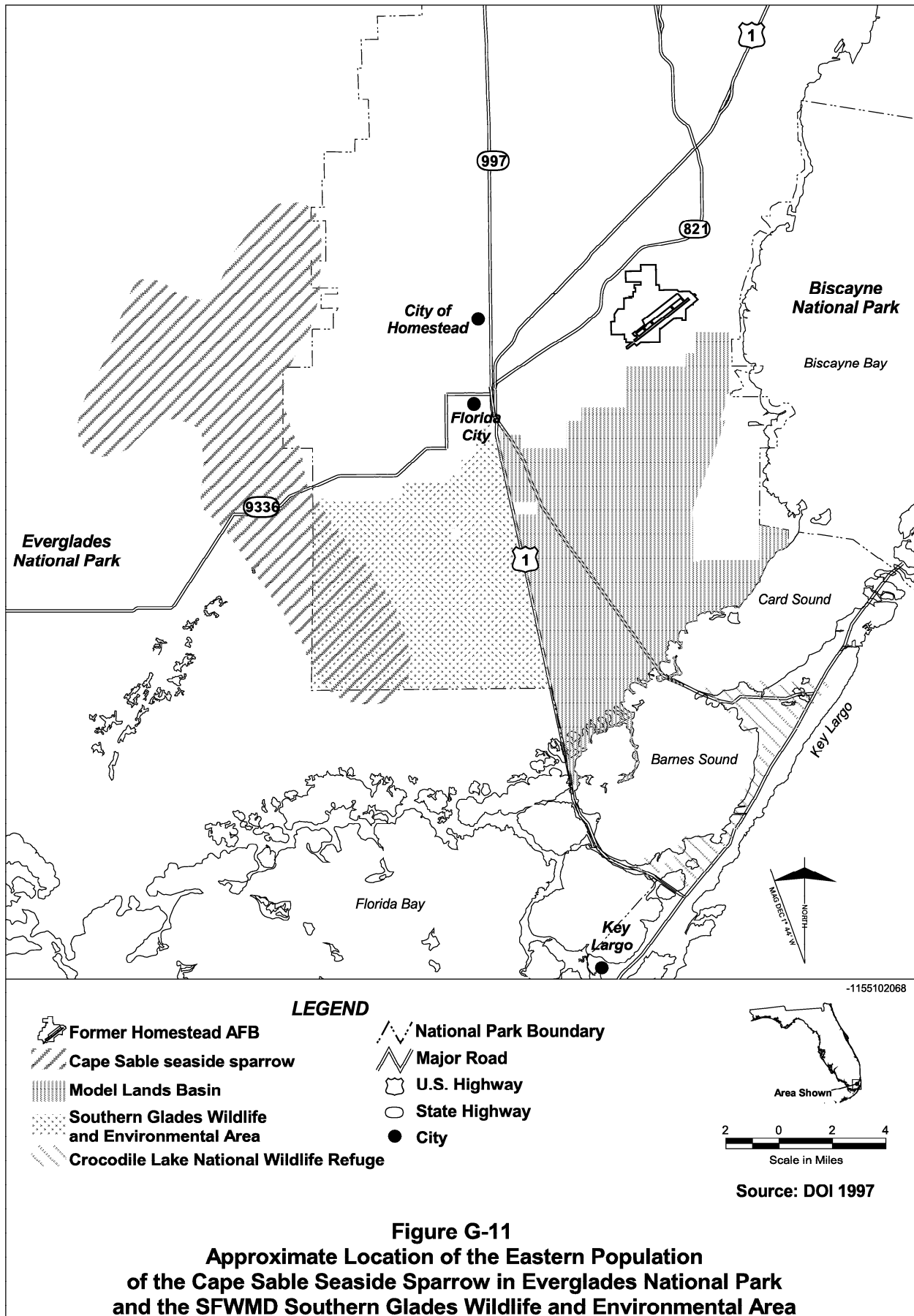
Cape Sable Seaside Sparrow. The Cape Sable seaside sparrow is a federal and state endangered species; it has been federally listed since 1967. Critical habitat, which occurs west and south of the Homestead area in the Everglades, was designated in 1977 (see Figure 3.11-5). There are eight surviving subspecies of the seaside sparrow distributed along the east and gulf coasts of the United States. The Cape Sable seaside sparrow has the most restricted range of these eight subspecies, as well as having the most restricted range of any bird species in North America. It occurs only in the Everglades region of Miami-Dade and Monroe counties (DOI 1997).

In the 1930s, Cape Sable in Monroe County was the only known breeding range of the Cape Sable seaside sparrow. After the hurricane of 1935, the freshwater wetlands transitioned into areas dominated by salt-tolerant plants, and the Cape Sable seaside sparrow disappeared from Cape Sable. Currently, the center of abundance for the Cape Sable seaside sparrow is three populations in Shark River Slough in Everglades NP, Big Cypress National Preserve, and the Southern Glades Wildlife and Environmental Area. The western population is in the center of Everglades NP and southern Big Cypress National Preserve, the Ingram population is completely in Everglades NP, while the eastern population is in Everglades NP and the Southern Glades Wildlife and Environmental Area (Figure G-11). The eastern population is closest to the Homestead area. The most recent census data (1997) indicates that this species declined approximately 40 percent since 1981. The estimated population was 6,624 birds in 1981 and 3,920 birds in 1997 (USFWS 1998a). Since 1980, the western core population has declined 90 percent since 1980, the eastern population has declined 47 percent, and the Ingraham population has remained essentially stable. The decline in the western populations is attributed to high water levels, while the eastern population declined as a result of its habitat drying up and frequent fires. The root cause of these declines is changes in hydrology resulting from water management practices. It is predicted that the Cape Sable seaside sparrow will go extinct within 20 years if measures are not taken to facilitate the recovery of the western and eastern populations' habitat (DOI 1997).

Cape Sable seaside sparrows nest from late February through early August, with the majority of nesting in spring when the marl prairies are dry. The end of the breeding season usually begins when the rainy season starts (Lockwood et al. 1997). Nesting ceased in 1995 and 1996 when water depths reached 5.5 inches. The preferred nesting habitat is short hydroperiod prairie community dominated by muhly grass with open spaces. They avoid dense grassland, long hydroperiod wetlands, and shrubby areas.

Fire may be an important factor in the maintenance of Cape Sable seaside sparrow habitat by limiting the growth of woody vegetation and the density of ground cover (USFWS 1998a). However, fires may be detrimental if they occur too frequently. Presently, it is not known how long marl prairie will remain free of woody vegetation; therefore, the fire frequency necessary to maintain this habitat is not known (DOI 1997). The distribution of the Cape Sable seaside sparrow during the non-breeding season is not completely known (Lockwood et al. 1997), although it is non-migratory and tends to stay in its breeding territory after the end of the breeding season (USFWS 1998a, DOI 1997).

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The Cape Sable seaside sparrow has not been recorded on former Homestead AFB or the surrounding area, including Biscayne NP (**Metro-Dade County 1994b**, **BNP 1998**, **Geraghty & Miller 1993**, **Hilsenbeck 1993**, **PBS&J 1998b**, **Denton and Godley 1999**, **Mazzotti 1999b**, **Bass and Ferro 1999**). The mangrove swamp forest and exotic plant dominated freshwater wetlands between former Homestead AFB and Biscayne Bay are not appropriate habitat for this species (**Bass and Ferro 1999**). The Cape Sable seaside sparrow would not occur in these areas in the future because of the lack of appropriate habitat and the restricted movement patterns of the populations in the Everglades.

Roseate Tern. The roseate tern was federally listed as endangered in the northeastern United States and threatened in Florida in 1987. The Caribbean population of the roseate tern breeds from Florida through the West Indies to islands off Central and South America. The roseate tern is strictly a coastal species that is usually observed foraging along the nearshore surf. Open sandy beaches isolated from human activity provide the optimal nesting habitat for this species. In Florida, this species nests on isolated islands, rubble islets, dredge-spoil islands, and roof-tops between the Dry Tortugas and Marathon in the Florida Keys (**USFWS 1998a**).

The roseate tern, as well as other species of terns, experienced dramatic declines in the late 19th Century, but started to recovery after passage of the Migratory Bird Treaty Act. This species started to decline again in the 1950s, with the greatest declines beginning in the 1970s. Habitat destruction and alteration has had a major affect on this species in Florida. Currently, there are an estimated 300 pairs nesting from the Dry Tortugas to Marathon. Roseate terns are absent from their Florida nesting colonies after the breeding season and likely winter in South America (**USFWS 1998a**).

The nearest breeding roseate tern colonies are in the Florida Keys. Occasional transient terns from these colonies or migrants from the northeastern United States may occur at Biscayne Bay. Data from the bird occurrence information collected at Biscayne NP since the 1970s indicate that two juvenile roseate terns were observed in the reef tract in 1987 (**BNP 1998**). It is assumed that the roseate tern may occur very infrequently along the mangrove fringe of Biscayne Bay and even less infrequently as a transient in the area of former Homestead AFB.

Piping Plover. This is an endangered species in the Great Lakes region and threatened elsewhere in the United States (**USFWS 1988**). It is also considered a threatened species by Florida. The piping plover has experienced range-wide declines. The principal factors leading to the long-term declines are habitat deterioration (**Haig and Oring 1985**), human disturbance (**Flemming et al. 1988**), and predation (**Gaines and Ryan 1988**). The results of the 1996 international piping plover census indicate there are 5,837 breeding plovers in 20 states and 9 Canadian provinces; this represents a 7 percent increase over a 1991 census (**USGS 1996**). Studies on Assateague Island in Maryland and Virginia showed that predation accounted for 91 percent of the known nest losses and that recreational activities (off-road vehicle use and foot traffic) are likely not a factor in reduced productivity (**Patterson et al. 1991**). However, other studies indicate that human disturbances may be an important component in this species' decline throughout its range. Predation rates along beaches in southern Nova Scotia may have increased from 1975 to 1987 and, at the same time, the number of plovers nesting among the dune grass also increased (**Flemming et al. 1988**). Over 76 percent of the predation was from avian predators that patrol open beaches, but not grass nesting sites. In North Dakota, predation accounted for 93 percent of egg loss. In addition, nesting success was less in territories that showed evidence of human activity (e.g., all terrain vehicles) or cattle grazing (**Gaines and Ryan 1988**). In 1996, the increase in the number of piping plovers along the Atlantic seaboard was likely the result of intense efforts to reduce predation losses and human disturbance, while the declines in the great plains region is probably due to massive flooding of the Missouri River (**USGS 1996**).

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The piping plover winters, but does not breed, in Florida. These birds are part of a wintering population that occurs along beaches from North Carolina to Jamaica and across the Gulf to Laguna Madre of Texas and Mexico (USGS 1996). This species can be found wintering at beaches, sandflats, dunes, barrier island beaches, and spoil islands along the Gulf of Mexico and the Atlantic Coast (USFWS 1988). In Florida, wintering piping plovers have been extirpated from entire counties. Museum records and Christmas bird counts indicate this species regularly wintered in Miami-Dade County; it is now rarely seen in the county during the winter (USFWS 1998a). This species was recorded only four times at Biscayne NP: once in 1978, once in 1996, and twice in 1997 (BNP 1998). This information plus the lack of suitable winter foraging habitat indicates that the piping plover would occur rarely along the western shoreline of Biscayne Bay. The occurrence of this species on former Homestead AFB would be even more infrequent.

Bald Eagle. The bald eagle is a federal and State of Florida threatened species. It is typically a water-dependant species occurring near estuaries, large lakes, reservoirs, major rivers, and along sea coasts. In Florida, this species usually nests within 1.5 miles of the open water it uses as foraging habitat. Nests are usually located in the tallest trees in an area. In Florida, nests are often in the ecotone between forest and water; in much of Florida bald eagles nest in pines (*Pinus* spp.) and bald cypress. In Florida Bay in the Everglades, most bald eagles nest in black and red mangroves, half of which are snags (Curnutt and Robertson 1994).

Bald eagles nest in south Florida in winter, generally beginning in September, with peak egg laying in December. Incubation takes about 35 days and fledging occurs within 10 to 12 weeks of hatching. Parental care may continue four to six weeks after fledging (USFWS 1998a). After the completion of the breeding season, many bald eagles migrate north for the summer. Based on banding returns, Broley (1947) determined that juvenile bald eagles fledged in Florida were also highly migratory, with some flying as far as the northern United States and southern Canada. Other researchers have documented the occurrence of adult, as well as juvenile non-breeding southern bald eagles in the northern United States and Canada in the summer (Wright 1953, Stoeck 1979, Spofford 1969). Data from Hawk Mountain show a southward migration of adult and juvenile bald eagles during September, and it was assumed that these were southern birds migrating back to their breeding grounds (Bildstein 1998). Bald eagles with breeding grounds in southeast Florida, including the Everglades, apparently reside there year-round, while bald eagles from the west coast and central-Florida are more apt to migrate north for the summer (Broley 1947, Robertson 1998, Millsap et al. 1999).

A decline in nesting bald eagles in Florida was first noted in the late 1940s (Broley 1947). By the 1970s, the bald eagle population in most of Florida was less than 50 percent of historic levels and still decreasing. In contrast, data from the Everglades indicates that the number of nesting pairs has been stable from the 1960s to the present (USFWS 1998a). Since the bald eagle was listed as an endangered species, populations have recovered. The banning of DDT and other persistent organochlorines are major factors in this increase. The bald eagle was reclassified in 1995 as threatened because of substantial increases throughout its range. In 1963, there were an estimated 417 active nests producing 0.59 young per active nest and, by 1995, there were about 4,450 occupied territories producing 1.17 young per occupied territory. By 1998, there were an estimated 5,748 nesting pairs in the lower 48 states (USFWS 1999a). The increase in Florida has been equally dramatic, with the number of active breeding territories increasing from a low of 88 in 1973 to 980 in 1998 (USFWS 1998a, 1999a). In July 1999, the USFWS proposed to delist the bald eagle completely (USFWS 1999a).

The nearest breeding pair of bald eagles is about 7.5 miles south of former Homestead AFB at the south end of Biscayne NP. The next closest nest sites are in Florida Bay in Everglades NP where eagles have

nested on 52 of the 235 keys (**Curnutt and Robertson 1994**). An estimated 35 to 40 bald eagle nests were observed in Florida Bay from October 1995 through March 1996 (**Gawlik 1998**). The nearest nest is about 17 miles south of the former base in Barnes Sound. Eagles have been nesting on the same mangrove island in Biscayne Bay since at least the 1950s. This nest site has been monitored sporadically over the years, and in 1995, a pair constructed a nest in a snag on this mangrove island. Breeding behavior was observed in November of 1995 and adults incubated up until at least February 10, 1996. One eaglet was sighted from a helicopter on March 11, 1996. One young fledged on May 7. The juvenile was last observed in the area on June 11, and the adults were last observed in the area on June 15. This was the first documented successfully fledged young from this nest site since 1984 (**Howitt 1996**). A pair of bald eagles was observed at this nest site in December 1998; and in February 1999, it appeared that the female was incubating, but subsequent observations indicated the bald eagles failed to produce any young in 1999 (**Lockwood 1999a**). Historic nest sites are located in the area of the Deering Estate, Key Biscayne, and Key Largo (**Lynch 1998**). Over the years, there have been numerous bald eagle sighting in the Black Point area, but nesting has never been confirmed (**Robertson 1998, Lockwood 1998b**). The most recent aerial survey for nesting bald eagles in this area occurred in 1998, and a bald eagle nest was not detected (**Lockwood 1998b**). Except for the current active nest site, the historic nest sites on Biscayne Bay were abandoned in the 1960s (**Robertson 1998**). The bald eagle has been reported from the former Homestead AFB on one occasion (**PBS&J 1996c**) and from Homestead ARS (**SEA 1997**). This information indicates that the bald eagle commonly forages along the western shoreline of Biscayne Bay north and south of Military Canal and occurs on rare occasions at former Homestead AFB.

G.2.4.2 State Sensitive Species

A total of 33 state-listed sensitive bird species occur or have the potential to occur in the Homestead area in addition to the 6 federal and state listed species considered in Section G.2.4.1 (see Tables 3.11-4 and 3.11-6). This includes 1 endangered, 3 threatened, 9 rare, 19 species of special concern, and 1 species whose status is undetermined (**Rodgers et al. 1996, Florida Game and Fresh Water Fish Commission 1997**).

Arctic Peregrine Falcon. This falcon is a Florida endangered species and the peregrine falcon (*Falco peregrinus anatum*) was a federally endangered species that was delisted in 1999 (**USFWS 1999b**). Historically, there were an estimated 7,000 to 10,000 nesting pairs of peregrine falcons in North America. Dramatic declines began in the 1940s at the same time organochlorine pesticides such as DDT were entering the environment. Declines continued into the 1970s, and this species was extirpated from east of the Mississippi River by 1965. At its lowest point, an estimated 324 pairs of peregrine falcons nested on the continent in 1975 (**Fyfe et al. 1976**). By 1980, the population level had stabilized. By 1985, the species had begun its recovery and by 1998, there were almost 1,600 breeding pairs in the United States and Canada (**USFWS 1998b**). The peregrine falcon recovery has been dramatic, and in 1995, the USFWS proposed to remove this species from the endangered species list. More recently, the ad hoc committee appointed by the Raptor Research Foundation reviewed the status of the peregrine falcon and recommended that the populations in Alaska, Pacific, Rocky Mountain Southwest, and Canada recovery regions be de-listed and the populations in the Eastern Recovery Region be down listed to threatened (**Millsap et al. 1998**). In August 1999, it was completely delisted.

The peregrine falcon does not nest in Florida, but either migrates through or winters in Florida, especially along the coastal and barrier island shorelines. Peregrine falcons typically arrive in Florida in September and October and begin their northward migration in March; most are gone by late May (**Rodgers et al. 1996**). The peregrine falcon has been recorded at Biscayne NP 42 times from 1980 to 1998 (**BNP 1998**). All these observations occurred when wintering birds would be expected in the area. In addition, one peregrine falcon was observed along the west shore of Biscayne NP in September 1998 (**Denton and**

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Godley 1999). It is therefore assumed that migrating and wintering peregrine falcons occur along the west shoreline of Biscayne NP. This species may occur occasionally at former Homestead AFB, but its use of this area is expected to be infrequent. The peregrine falcon has not been observed on the former base during any biological surveys (**Geraghty & Miller 1993, Hilsenbeck 1993, PBS&J 1998b, Denton and Godley 1999, Mazzotti 1999b**).

Southeastern American Kestrel. The southeastern American kestrel is a state threatened species and a federal species of concern. The southeastern American kestrel and the northern American kestrel (*Falco sparverius*) are the only subspecies in the United States, although American kestrels in Cuba (*F. s. sparveroides*) may occur in the Florida Keys (**Robertson and Woolfenden 1992**). The southeastern and northern American kestrels are similar in appearance and are often confused during the winter when both can occur together in the southern United States (**Lane and Fischer 1997**).

The southeastern American kestrel pair bond is strong, and pairs often remain at or near the nesting territory year-round, using the same territory during successive years. Courtship and pair bonding begins in late January, and eggs are laid from mid-March to late May. Incubation lasts about 30 days, with fledging typically in another 30 days. The adults continue to bring food to the young for several weeks after fledging, and the family group will often hunt together until the young disperse (**Lane and Fischer 1997**).

The southeastern American kestrel is usually found in open pastures or woods that include snags. They can be found in agricultural lands, pine flatwoods, old-growth slash pine, grasslands, pastures, open sites in suburban areas such as golf courses and parks, edges of river bottoms, and in coastal areas. Their habitat must include an adequate amount of open areas, with perch sites for foraging, adequate prey base, and suitable nest sites. The availability of nest sites is considered a limiting factor in the distribution and abundance of the southeastern American kestrel (**Lane and Fischer 1997**).

The long-term decline of the southeastern American kestrel in Florida appears to be related to human-induced habitat modification. This species likely disappeared from Miami-Dade County between the mid-1930s and 1940s due to cutting of slash pine forests and fire suppression that resulted in increased growth of the understory. Furthermore, the reestablishment of the southeastern American kestrel in south Florida is not likely because foraging and nesting habitat have largely been eliminated (**Hoffman and Collopy 1988**). It is believed that the Southeastern American kestrel still does not occur in south Florida (**Lane and Fischer 1997, Rodgers et al. 1996**).

The American kestrel was a common species on former Homestead AFB from December 1992 through March 1993 and September and October 1993; it was not, however observed from April through August 1993 (**Hilsenbeck 1993**). This could indicate that the birds observed on the former base during that time were wintering migrant northern American kestrels, and not the southeastern subspecies. The southeastern American kestrel was reported on the former base, however, in March 1993 and November 1997 (**Geraghty & Miller 1993, PBS&J 1998b**). As indicated above, this is the time of year the northern American kestrel was previously observed on the former base, making identification between the two difficult. A series of five surveys for the southeastern American kestrel took place in appropriate habitat on former Homestead AFB during June and July 1998 (see Figure G-6 for the areas surveyed). The southeastern American kestrel was not observed during these surveys or during other biological surveys on the former base during the summer of 1998. The American kestrel was recorded 86 times from January to early April and October into December 1998. It was not recorded during the bulk of the breeding season from the second week in April through August even though 88 observations took place (**Peterla 1999a**). In addition, it was not recorded along canals in the area of the former base and the western shoreline of Biscayne NP during ground and aerial surveys for sensitive species of reptiles and birds during the summer of 1998. Other studies report the occurrence of the American kestrel in the area

of former Homestead AFB, but do not provide subspecies information (**BNP 1998, Metro-Dade County 1994b**). Based on the 1992/1993 and 1998 surveys, and the fact that the southeastern American kestrel is not believed to occur in Miami-Dade County, it is concluded that the southeastern American kestrel does not presently reside on former Homestead AFB, and likely has not occurred in the area of the former base for many years. It is further concluded that the southeastern American kestrels previously reported on the former base (**Geraghty & Miller 1993, PBS&J 1998b**) probably were the northern American kestrel.

Least Tern. The least tern is a state threatened species because of habitat loss. It occurs along the coast of the United States, while the federally endangered interior least tern nests principally along the Missouri and Mississippi river systems (**Whitman 1988**). Historically, the least tern nested on open mainland and barrier island beaches with a coarse substrate of sand shells and small rocks. The development of beach front property and recreation has reduced suitable ground nesting locations for this species. With the disappearance of this habitat, this species now also nests on manmade areas such as dikes, dredged material islands, sand pit mines, construction fill sites, and on roofs of buildings (**Gore and Kinnison 1991, Whitman 1988**).

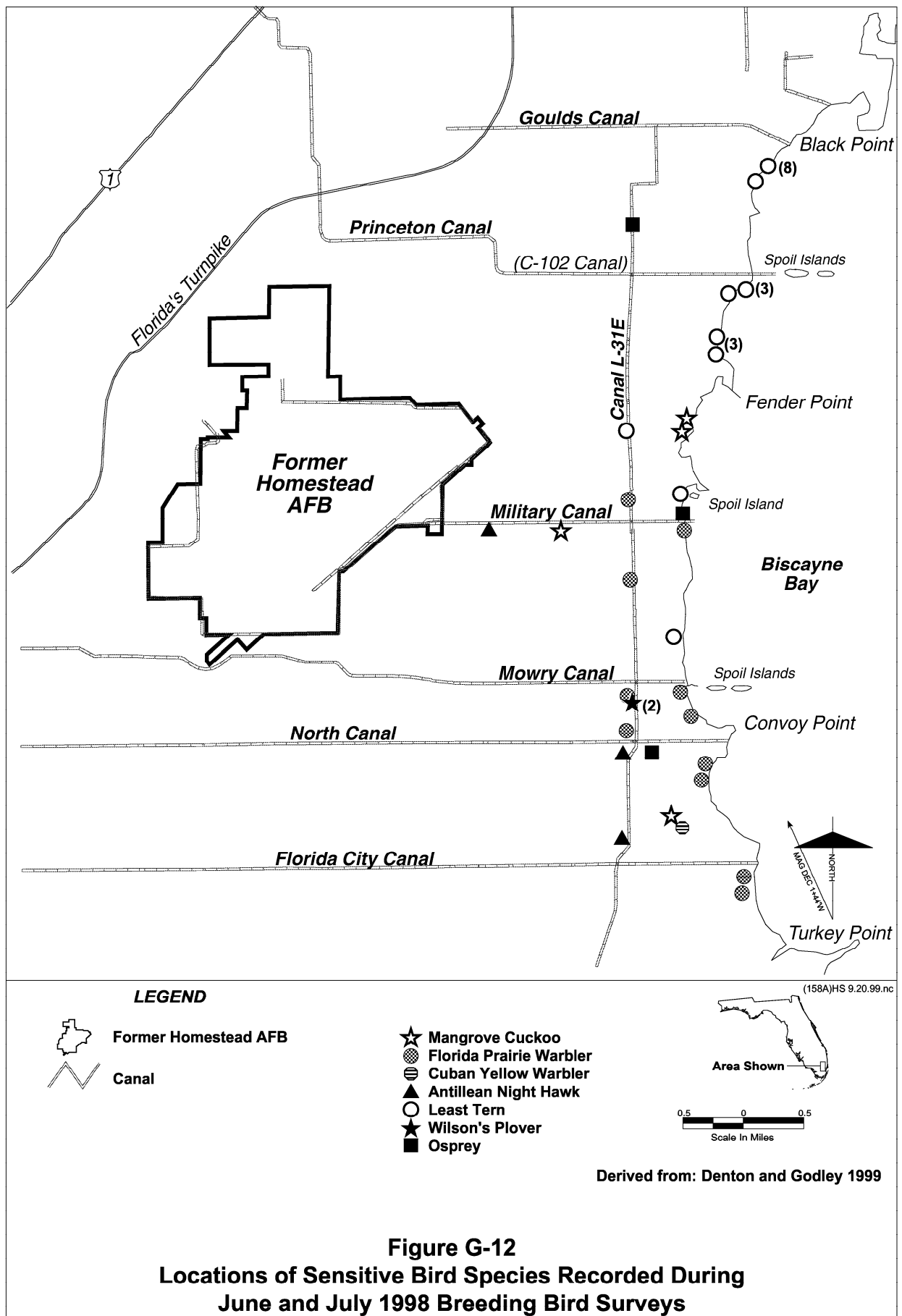
During a 1995 survey in southeastern Florida, 1,437 least terns in 29 active colonies were observed (**Zambrano et al. 1997**). Ninety-three percent of the colonies were on roof tops, and the remaining were on natural substrate such as beaches or rock coral. Four active colonies were observed in Miami-Dade County: two on the keys of Biscayne NP and two near the western shoreline of Biscayne Bay. One mainland site was in the Turkey Point area, and the other was near the northern boundary of Biscayne NP (**Zambrano et al. 1997**). In 1995, the least tern nested on a beach on Soldier Key in Biscayne NP and on a rooftop on Virginia Key. The beach nesting colony site on Soldier Key was not occupied in 1996 (**Howitt 1996**).

The least tern nests in the region around former Homestead AFB on Biscayne NP keys, and along the western shoreline of Biscayne Bay. It has been recorded 21 times at Biscayne NP, with most observations in the summer (**BNP 1998**). Twenty least terns were observed in June 1998 at nine locations along the western shoreline of Biscayne NP during breeding bird surveys (**Figure G-12**), and 20 more were observed during the aerial wading bird surveys (**Table G-8**). This species was observed twice on the former base in 1998 (**Table G-9**). The least tern will continue to occur at Biscayne NP, and occasional individuals will likely occur on former Homestead AFB.

White-Crowned Pigeon. The white-crowned pigeon is a state threatened species. This species is of recent West Indian origin and is generally confined to mangrove and tropical hardwood hammock forests on the mainland and Florida keys (**Odum et al. 1982**).

The white-crowned pigeon occurs at Biscayne NP, and observations indicate that it is likely a fairly common nesting species. During surveys on Biscayne NP keys, four adults were observed collecting nesting material on West Arsenicker Key on May 31, 1996, and 18 to 22 birds were observed roosting on this Key, also in May 1996 (**Howitt 1996**). Approximately 750 white-crowned pigeons were recorded at Biscayne NP during 74 observations between 1979 and 1997, and the range in number recorded per observation was 1 to 54 (**BNP 1998**). Most of the observations were on Biscayne NP keys. Potential habitat for this species occurs in the mangrove fringe along the western shoreline of Biscayne Bay. However, the white-crowned pigeon was not recorded during the June and July 1998 breeding bird surveys along the mangrove fringe and other habitats along the western shoreline of Biscayne NP. It also was not observed during breeding bird surveys on former Homestead AFB or during other wildlife surveys conducted in 1998 or at other times. This indicated that white-crowned pigeons would likely be rare along the western shoreline of Biscayne NP, and even more infrequent on the former base due to lack of appropriate habitat.

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**Table G-8. Wading Birds and Other Aquatic Birds Observed During Aerial Surveys
Along the Western Shoreline of Biscayne Bay, Freshwater Wetlands, and
Other Habitats East of Former Homestead AFB**

Species	Survey dates (1998)			Total
	June 2	June 26	July 14	
Cattle egret	7	213	5	225
White ibis ¹	7	81	113	201
Great egret ¹	3	7	31	41
Snowy egret ¹	1	5	35	41
Double-crested cormorant	0	8	13	21
Least tern ¹	0	8	12	20
Tricolor heron ¹	3	3	7	13
Little blue heron ¹	0	3	7	10
Great blue heron	0	1	7	8
Glossy ibis ¹	1	0	6	7
Brown pelican ¹	0	0	5	5
Great white heron ¹	3	2	0	5
Roseate spoonbill ¹	0	0	1	1
Muscovy duck	0	1	0	1
Osprey ¹	0	1	0	1
Common gallinule	0	0	1	1
Total State Sensitive Species	18	110	217	345
Grand Total	25	333	243	601

Source: Denton and Godley 1999.

Note: ¹ State sensitive species.

Mangrove Cuckoo. The mangrove cuckoo is a state rare species found in most islands in the Caribbean Basin, as well as south Florida. It nests in mangroves and almost any other wooded habitat such as hardwood hammocks, provided they are not too fragmented. Its breeding range is generally restricted to coastal areas. This species is secretive, especially during the non-breeding season. However, evidence suggests that at least part of the population winters in south Florida (Rodgers et al. 1996).

From 1980 to 1997, the mangrove cuckoo was recorded 24 times from Biscayne NP (BNP 1998). One bird was observed in the winter and one in the summer, with the rest reported during the spring and fall. It was recorded in 1996 during breeding bird surveys of the outer keys and Biscayne NP, but was not considered a nesting species (Howitt 1996). The mangrove cuckoo was not detected during the 1993 wildlife surveys in the wetlands and mangrove forests along the western shoreline of Biscayne Bay (Metro-Dade County 1994b).

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Table G-9. Number of Wading Birds and Other Aquatic Birds Observed on Former Homestead AFB During June and July 1998

Species	Dates (1998)							Total
	June					July		
	2	4	6	8	29	4	18	
Cattle egret	0	25	6	0	1	14	4	50
White ibis ¹	1	25	0	0	0	6	0	32
Snowy egret ¹	6	15	1	2	0	2	0	26
Great egret ¹	0	7	1	1	1	7	1	18
Laughing gull	7	0	0	0	0	9	0	16
Little blue heron ¹	4	0	1	4	1	3	0	13
Green-backed heron	0	0	3	0	0	2	8	13
Tricolor heron ¹	3	0	0	0	0	5	2	10
Great blue heron	1	1	0	0	0	2	1	5
Black-necked stilt	2	2	0	0	0	0	0	4
Common gallinule	0	0	0	0	0	0	3	3
Osprey ¹	1	0	0	0	1	0	0	2
Least tern ¹	0	1	0	0	1	0	0	2
Magnificent frigatebird	1	0	0	0	0	0	0	1
Total								
Sensitive species	15	48	3	7	4	23	3	103
Other species	11	28	9	0	1	27	16	92
Grand Total	26	76	12	7	5	50	19	195

Source: Denton and Godley 1999, Mazzotti 1999b.

Notes: ¹ State sensitive species

Breeding bird surveys were conducted for the mangrove cuckoo and other species in June and July 1998. Twenty-two species that likely nest in the survey area were detected, and the common grackle was the most common species recorded (**Table G-10**). Other common species were the, northern cardinal, northern flicker, and red-bellied woodpecker. The mangrove cuckoo was detected at four locations including along Military Canal, a power line corridor south of Convoy Point, and twice at the same location along the Biscayne Bay shoreline between Military Canal and Fender Point (see Figure G-12). It was not recorded during 1998 breeding bird surveys or other wildlife surveys on former Homestead AFB, or during previous surveys on the former base. This information indicates that the mangrove cuckoo nests in small numbers in the wooded habitat along the west shore of Biscayne Bay. It likely does not nest on former Homestead AFB because extensive tracts of wooded nesting habitat required by this species are lacking.

Antillean nighthawk. This nighthawk is a state rare species. It was first recorded in Key West in 1941, and currently breeds throughout the Florida Keys including the outer keys of Biscayne NP. It nests mostly in man-made habitats such as at borrow pits, along unpaved roadsides, parking lots, airports, and on flat-roofed buildings (**Rodgers et al. 1996**). This species may have nested on the mainland in Miami-Dade County at Virginia Key in the 1950s and south of Florida City in the 1980s. An additional 30 records of this species (based on its calls) have been reported from the mainland in south Florida (**Robertson and Woolfenden 1992**).

Table G-10. Maximum Number of Birds Recorded During Breeding Bird Surveys Along Military and L-31E Canals, the Western Shoreline of Biscayne Bay, and a Tidal Creek^a

Species ¹	Military Canal ²	Canal L-31E	Biscayne Bay Shoreline	Tidal Creek	Total
Common grackle	20	98	8	6	132
Northern cardinal	24	38	21	6	89
Red-wing blackbird ³	6	32	3	4	45
Northern flicker	3	10	6	0	19
Red-shouldered hawk	5	5	2	0	12
Red-bellied woodpecker	3	7	1	0	11
European starling	4	5	0	0	9
Mourning dove	3	5	1	0	9
Prairie warbler ³	1	1	3	0	5
Purple martin ³	0	2	2	0	4
Blue jay	2	1	0	0	3
Antillean nighthawk	1	2	0	0	3
Pileated woodpecker	0	2	1	0	3
White-eyed vireo ³	1	1	0	0	2
Mangrove cuckoo ^{3,4}	1	0	1	0	2
Common ground dove	1	1	0	0	2
Gray kingbird ³	0	0	0	2	2
Northern mockingbird	0	0	2	0	2
Chuck-will's-widow ³	0	1	0	0	1
Clapper rail	0	1	0	0	1
Fish crow	1	0	0	0	1
Downy woodpecker	0	1	0	0	1
Cuban yellow warbler ^{3,5}	0	0	0	0	0
Total	76	213	51	18	358

Source: **Denton and Godley 1999.**

- Notes:
- ¹ Includes species that may breed along the transects and not wading birds and other species that only forage in the area.
 - ² 1998 Survey dates for Military Canal were June 3, 8, 22, 24 and July 13; for Canal L-31E were June 4 and 22 and July 13; for the coastline were June 9, 10, and 23 and July 14; and for the tidal stream were June 4 and 8.
 - ³ Neotropical migrant (**BNP 1998**).
 - ⁴ One additional mangrove cuckoo was detected along a power line corridor south of Convoy Point.
 - ⁵ One Cuban yellow warbler singing along power line corridor south on Convoy Point.

The outer keys of Biscayne NP are included in the breeding range (**Rodgers et al. 1996**) of the Antillean nighthawk. It was recorded once near the Biscayne NP visitor center in 1986 (**BNP 1998**). Before 1998, this species was not recorded from former Homestead AFB or the surrounding area. One bird was recorded along Military Canal on June 3 and two birds along Canal L-31E on June 4 (see Table G-10). Seven were recorded from former Homestead AFB on June 2 and one on June 4, 1998. All records of this species were based on its call, which is distinct from the common nighthawk's call. It is not known if this species nests on or near the former base.

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Black-whiskered vireo. The black-whiskered vireo is a state rare species that breeds throughout the Florida Keys and along the west and east shoreline up to central Florida. It winters in the Amazon Basin from central Brazil to Peru (Rodgers et al. 1996). This vireo is widespread in coastal mangrove forests and also in hardwood habitat that borders the mangroves (Robertson and Woolfenden 1992).

The black whiskered vireo was recorded 161 times on the outer keys of Biscayne NP during late March to late September of 1984 through 1997 (BNP 1998). Up to three individuals were recorded on Elliott Key during the 1996 breeding season, including two singing males, and it is assumed that this species breeds on the outer keys of Biscayne NP. The black-whiskered vireo was not detected during 1993 wildlife studies along the western shoreline of lower Biscayne Bay, although it is included in the Deering Estate bird list (Metro-Dade County 1994b). It was also not detected during breeding bird surveys along Military and L-31E canals and the western shoreline of Biscayne Bay in 1998. In addition, it was not detected during breeding bird surveys at former Homestead AFB in 1998 or during earlier surveys. Based on these studies, the black-whiskered vireo is likely not a nesting species on the former base although occasional individuals may occur during migration. It is probably a rare nesting species in the mangrove habitat along the west shoreline of Biscayne Bay.

Worm-Eating Warbler. This bird is a state rare species that breeds throughout much of the eastern United States, but only widely scattered breeding locations occur in extreme northern Florida. This species winters in Mexico, part of the Caribbean, and occasionally in south Florida. Its migration routes appear to be along the Florida Coast (Rodgers et al. 1996). Wooded areas with dense undergrowth are important migration and wintering habitat.

The worm-eating warbler has been recorded 38 times on Elliott and Sands Keys in Biscayne NP. Most of the observations have been during migration. Only four birds were observed from 1979 through 1997 during the Christmas Bird Counts (BNP 1998). This indicates that the worm-eating warbler is principally a migrant species at Biscayne NP. The worm-eating warbler has not been recorded on former Homestead AFB and is not expected to occur there given the open nature of the habitat.

Louisiana Waterthrush. The Louisiana waterthrush is a state rare species that breeds throughout much of the eastern United States, as well as in northern tier counties of Florida. It is rare throughout Florida during migration, although there are winter records from central Florida. Six Louisiana waterthrush were observed between 1986 and 1997 in Biscayne NP, but none during the Christmas Bird Counts (BNP 1998). It was not recorded during surveys on former Homestead AFB, and the potential for it to occur there is slight.

American Redstart. The American redstart is a state rare species. Its breeding range includes much of the eastern United States and Canada, as well as the extreme northwest portion of Florida. The redstart is a frequent winter resident in central and south Florida and is more common in south Florida along the coast. Typical winter habitat includes forest borders, second growth woodlands, and mangroves, although winter habitat requirements in Florida are not well known (Rodgers et al. 1996).

The American redstart was one of the most numerous birds recorded from Biscayne NP; it was detected 451 times from 1980 to 1998, mostly from the outer keys. Because only 15 of these observations were during the winter, it appears that the redstart uses Biscayne NP primarily during migration (BNP 1998). The redstart was not observed during wildlife surveys conducted along the mangrove fringe of Biscayne NP and associated freshwater wetlands, although it was listed in the Deering Estate bird list (Metro-Dade County 1994b). Small numbers of wintering redstarts were observed recently in disturbed and early successional habitat at Chapman Field Park and Matheson Hammock Park on Biscayne Bay (Dalrymple and O'Hare 1998, Dalrymple 1998). The redstart was uncommon on former

Homestead AFB in 1993 during the winter and during migration periods and was not observed during the summer (**Hilsenbeck 1993, Denton and Godley 1999**). This species will continue to occur in small numbers on former Homestead AFB during winter and during migration, as well as in wooded areas around the former base and along the western shoreline of Biscayne Bay.

Cuban Yellow Warbler. The Cuban yellow warbler is one of 37 subspecies of the wide-spread yellow warbler. This subspecies occurs in extreme southern Florida, Cuba, and the Bahamas. In the early 1940s, it was first recorded as a breeding species when it was detected in the Florida Keys. It has since spread north to Biscayne Bay. The Cuban yellow warbler inhabits red and black mangrove forests and is rarely found in other habitats (**Rodgers et al. 1996**). This species is thought to be non-migratory and winters in the area of its breeding grounds.

In much of its range, the Cuban yellow warbler nests in the same habitat as the Florida prairie warbler, with a nesting season from late April to early July (**Prather and Cruz 1995**). Densities in prime habitat in Florida Bay are an estimated one pair per hectare, with much lower densities in less favorable habitat (**Rodgers et al. 1996**). During breeding bird surveys of the outer keys at Biscayne NP, two singing males were heard, and nest material collection was observed on three different dates in May and June 1996, indicating this species likely nests on these keys. During breeding bird surveys in 1998, one singing Cuban yellow warbler was detected along a power line corridor just south of Convoy Point (Figure G-12). A total of 6.25 miles of mangrove fringe was surveyed three times during the 1998 breeding season, but this species was not recorded. This indicates the breeding population of Cuban Yellow warblers in the mangrove habitat along the west shoreline of Biscayne NP is low. This species was also not detected during other surveys of the mangrove forest along Biscayne Bay, nor was it detected during the 1998 breeding bird surveys and other wildlife surveys on former Homestead AFB. This species is absent from former Homestead AFB because of the lack of the preferred mangrove nesting habitat. This species would be expected to continue to nest in small numbers on the keys and, probably to a lesser degree, along the western shoreline of Biscayne NP.

Brown Pelican. The brown pelican is a Florida species of special concern, but is not a federally listed species in Florida. The brown pelican was listed in 1970 as an endangered species throughout its range, partially in response to the brown pelican's susceptibility to DDT, which was banned in the United States in 1972. Between 1968 and 1976, the average annual brown pelican population in Florida was over 6,300 pairs. After DDT and other pesticides such as endrin were banned, the brown pelican started its recovery, and the average number of pairs between 1977 and 1985 grew to over 8,000. That number increased to about 12,300 pairs in 1989, but then decreased to about 10,000 pairs in 1995. In 1985, this species was taken off the endangered species list in part of its range, including Florida. It remains federally endangered in other parts of its range (**Rodgers et al. 1996**).

As the brown pelican populations recovered in Florida, a change in breeding colony distribution was noted. A 40 percent decrease in nesting pairs was noted in south Florida, including Florida Bay and Florida Keys. It is believed that this decrease is due to decreased food supplies. At the same time, a 230 percent increase in nesting brown pelicans was observed along the Gulf of Mexico north of Tampa; nesting north of Vero Beach on the Atlantic coast increased by 255 percent (**Rodgers et al. 1996**).

The brown pelican typically nests on small- to medium-sized islands, and most of the nest sites are or were at one time vegetated with mangroves. This species also requires loafing habitat, which can consist of beaches or mangroves. Mangrove islands used for loafing can also become nesting sites. Florida brown pelicans typically begin to lay eggs in December, with nesting continuing throughout the summer (**Rodgers et al. 1996**).

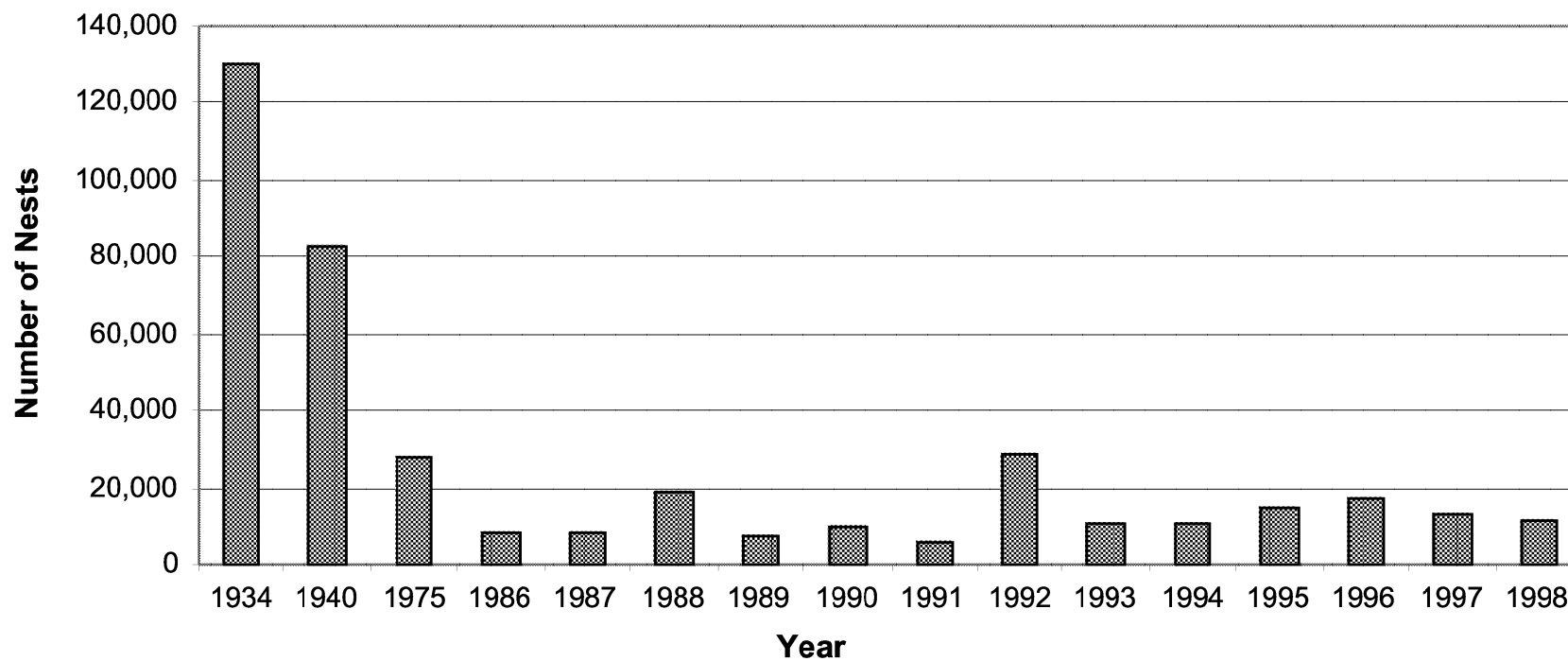
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The brown pelican is not known to nest in Biscayne Bay or in Biscayne NP. However, Biscayne Bay is commonly used for foraging and loafing, and over 5,600 pelicans were recorded from 1979 to 1998. The majority were recorded in the winter, with some observed in the spring and fall, and very few in the summer (**BNP 1998**). This species was observed at the eastern end of Military Canal and also on former Homestead AFB in one study (**PBS&J 1998b**), but was not reported from the former base during other biological studies. The brown pelican will continue to be common at Biscayne NP, particularly during the winter, and it may occur periodically as an infrequent transient at the former base.

Wading Birds. The state endangered wood stork is addressed in Section G.2.4.1. The state species of special concern discussed in this section include the reddish egret, roseate spoonbill, great white heron, great egret, little blue heron, snowy egret, tricolored heron, black-crowned night heron, yellow-crowned night heron, glossy ibis, white ibis, and least bittern. This section provides an overview of the status of wading birds in south Florida, followed by brief species-specific discussions.

Historically, wading birds concentrated in the Everglades during the dry season because of the abundant aquatic life in pools as water levels decreased. These birds nested in large numbers along the southern edge of the Everglades in the mangrove forests that border Florida Bay and the Gulf of Mexico. Around the turn of the century, market hunters killed large numbers of these birds, but the populations recovered after market hunting was banned. By the 1930s, there were an estimated 125,000 to 150,000 wading birds nesting in the Everglades. This included 4,000 pairs of wood storks, 20,000 pairs of herons and egrets, with white ibis making up the remainder (**Bancroft 1989**). The largest colonies occurred along the mangrove fringe in Everglades NP. Wading bird survey data for the 1950s and 1960s were sporadic and incomplete. During that time period, wood storks and white ibis moved out of the Everglades in large numbers and began nesting in central and northern Florida, as well as South Carolina and Georgia (**Frederick 1995**). The movement out of the Everglades may have been in response to environmental degradation from agricultural development and surface water management practices that affected the aquatic prey populations and the ability of wading birds to capture prey items. This included decreased fresh water flow into the mangrove fringe estuary, which in turn resulted in a substantial decline in prey abundance in these areas (**Frederick 1995, Walters et al. 1992**). Studies have shown that wading bird nesting is directly linked to food supply and that nesting problems can be traced to inadequate or unavailable food supplies (**Frederick 1995**). As a result of these water management practices, the number of pairs of nesting wading birds in the Everglades has decreased substantially since the 1930s and 1940s and, except for 1992, have been around 10,000 to 15,000 pairs since 1986 (**Figure G-13**). Water management practices may also be why many wading birds now nest in the Water Conservation Areas rather than Everglades NP, and why many wading birds now delay their nesting season (**Frederick 1995; Bancroft 1989; Gawlik 1997, 1998**).

The estimated number of wading bird nests in the Everglades in 1997 (12,850) and 1998 (11,223) was similar. El Niño weather patterns in 1997 and 1998 resulted in delayed winter water drawdown and late nesting by wading birds. In addition, there was a decrease of 1,372 nests in the freshwater Everglades, and an increase of 1,244 nests in Florida Bay and the southwest coast, suggesting a shift in nest site locations. The estimated number of nests in the mainland colonies in Everglades NP was 756, which is the lowest number in the park's history. Only 4.6 percent of the 1998 nests along the south coast of the Everglades were in the mangrove fringe, whereas 75 to 95 percent of the nests in the 1930s and before were in this habitat type. One of the goals of the South Florida Ecosystem Restoration Task Force is for at least 26 percent of the nesting wading birds in the Everglades to use these mangrove areas. The percent of wading birds nesting in this habitat for the last three years has been much lower than this goal (2 to 11 percent) (**Gawlik 1997, 1998**).



Derived from: Gawlik 1998,
Gawlik 1997, Frederick 1995

Figure G-13
Estimated Number of Nesting Pairs of Wading Birds in the Everglades Since 1934

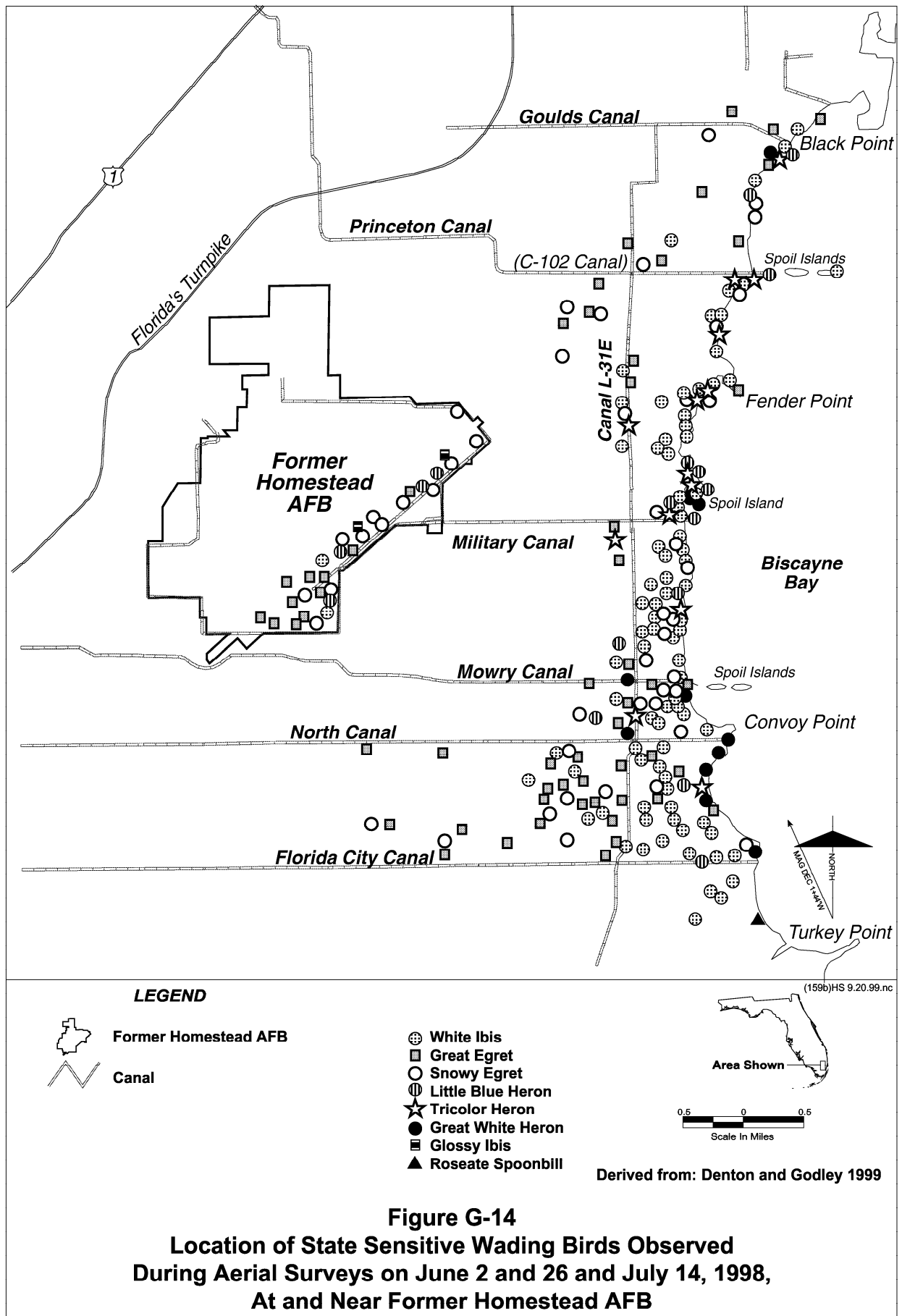
Great White Heron. This is the white phase of the great blue heron. Historic data for this species prior to human disturbance is lacking, but anecdotal information indicates there was a large population of great white herons in the Everglades. In the mid-1930s, the population was less than 50, but then it began to recover. By 1960, the population was 800 to 900 individuals, but a major hurricane in 1960 reduced the population by 30 to 40 percent. A search in a limited area detected 100 great white heron carcasses. Within two years, the population had recovered to within 90 percent of its pre-hurricane levels and by 1984, a little over 1,500 birds were counted (**Powell et al. 1989**). Current data indicate there were 171 to 257 great white heron nests in Florida Bay during the 1995–98 nesting seasons. An additional four nests were reported from mainland colonies in Everglades NP, and no nests were observed in the Water Conservation Areas or the Loxahatchee National Wildlife Refuge (**Gawlik 1997, 1998**). Telemetry studies and observations of marked birds have shown that many leave Florida Bay in the summer and move north to coastal and inland sites up to 300 kilometers north of Florida Bay. Many of these marked birds returned to Florida Bay for the winter nesting season (**Rodgers et al. 1996**).

The great white heron nests exclusively in coastal and estuarine areas, mostly on islands in Florida Bay. During the breeding season, this species forages mainly in shallow open water, mudflats, or shallow areas vegetated with sea grass. During the non-breeding season, they forage in marine and freshwater habitats.

The great white heron has been recorded numerous times at Biscayne NP throughout the year, but mostly in the winter (**BNP 1998**). It has been recorded as a nesting species on West Arsenicker and Arsenicker Keys in 1975, 1980, 1983–84, and 1996 (**Howitt 1996**). This species was recorded along the mangrove fringe of Biscayne NP during 1998 aerial surveys (**Denton and Godley 1999**), but not from former Homestead AFB (**Figure G-14**). The great white heron will continue to occur sporadically along the mangrove fringe of Biscayne NP, as well as in the wetlands inland from the fringe. Although it has not been observed on former Homestead AFB, it would be expected to occur occasionally on the former base.

Great Egret. This species was a prime target for plume hunters at the end of the 19th Century and, as a result, was almost driven to extinction; the passage of the Migratory Bird Treaty Act in 1918 probably saved this species. Under this protection, great egret populations recovered, and by the 1930s, there was an estimated 73,000 in Florida alone. The current breeding range of this species covers much of North America, including all of Florida (**Rodgers et al. 1996**). Surveys from 1992 through 1998 (1996 data not available) in the Everglades resulted in the observation of 3,300 to 4,500 great egret nests. This was the most common nesting species in the Everglades, except in 1992 when the White ibis was more numerous. In addition, 61 to 84 percent of these birds nested in Water Conservation Areas 2 and 3 during this time period (**Gawlik 1997, 1998; Frederick 1995**).

The great egret was recorded numerous times at Biscayne NP during all seasons, including during the Christmas Bird Counts (**BNP 1998**). This species has been observed nesting on Arsenicker and West Arsenicker Keys: 8 to 20 nests were observed in the 1970s, 100 nests in 1983–84, and three nests in 1996 (**Howitt 1996**). The great egret was observed at numerous locations on and in the area of former Homestead AFB (**Figure G-14**). This species typically occurred as single individuals, although small dispersed groups of two to four individuals were observed (**Tables G-11 and G-12**). In addition, it was one of the most common wading birds recorded during the 1998 summer wading bird aerial surveys (see **Table G-8**). The great egret was observed near the runway on former Homestead AFB every month of the year in 1992 and 1993 (**Hilsenbeck 1993**) and was also recorded from the former base during other studies (**PBS&J 1998b, Mazzotti 1999b, Peterla 1999a**). In 1998, 223 egrets were observed during 190 observations throughout the year on former Homestead AFB (**Peterla 1999a**). The great egret will continue to be a fairly common species at Biscayne NP and in the wetlands between the park and the former base. In addition, small numbers will continue to forage on the former base in the shallow wetlands and open fields.



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Table G-11. State Listed Wading Birds Observed Along Military Canal, Canal L-31E, and the Western Shoreline of Biscayne Bay, June and July 1998

Date/Sampling Point ¹	Species					Total
	Great Egret	Little Blue Heron	Snowy Egret	Tricolor Heron	White Ibis	
June 3, 1998						
M ²	1	3	2	2	N ³	8
June 4, 1998						
L10	1	1	0	0	1	3
L11	1	0	1	1	3	6
L12	0	0	0	1	0	1
L13	0	1	0	0	3	4
L14	0	0	0	0	14	14
L15	3	0	0	0	1	4
June 4, 1998						
B1	2	0	0	0	0	2
L3	0	0	0	1	0	1
L5	1	0	0	0	0	1
MO3	1	0	0	0	0	1
June 5, 1998						
L3	0	1	0	1	0	2
L5	1	0	0	0	0	1
L7	0	0	0	0	4	4
June 8, 1998						
B2	1	0	0	0	0	1
L10	0	0	0	0	3	3
L ²	1	1	1	0	0	3
M3	0	1	0	0	2	3
June 9, 1998						
C8	0	0	0	1	0	1
C15	0	0	0	1	0	1
June 10, 1998						
C7	1	0	0	0	0	1
C13	0	1	0	0	0	1
C17	0	0	0	1	0	1
C ²	0	1	1	1	0	3
June 22, 1998						
M6	0	1	0	0	0	1
L1	0	0	0	2	0	2
L7	0	0	0	0	4	4

Date/Sampling Point ¹	Species					Total
	Great Egret	Little Blue Heron	Snowy Egret	Tricolor Heron	White Ibis	
June 23, 1998						
C16	0	0	0	1	0	1
C17	0	0	2	0	0	2
C19	0	0	0	2	0	2
C20	1	0	0	2	0	3
C ²	0	0	0	0	N	N
July 13, 1998						
L3	0	0	0	0	4	4
L5	0	0	0	0	31	31
L8	0	0	0	0	6	6
July 14, 1998						
C1	0	0	1	0	0	1
C4	0	0	0	1	0	1
C5	0	1	0	0	3	4
C7	2	1	0	4	0	7
C9	0	1	0	0	0	1
C12	0	0	0	2	11	13
C13	0	0	0	2	0	2
C16	0	0	0	0	8	8
C20	0	0	6	3	6	15
C23	4	0	8	4	20	36
July 15, 1998						
L9	0	2	0	0	4	6
L10	1	1	0	0	0	2
L12	1	1	0	0	0	2
Total						
B	3	0	0	0	0	3
C	8	5	18	25	48	104
L	10	8	2	6	78	104
M	1	5	2	2	2	12
MO	1	0	0	0	0	1
Grand Total	23	18	22	33	128	224
Average Number Per Detection	1.4	1.2	2.8	1.7	7.1	4.8

Source: **Denton and Godley 1999.**

Notes: ¹ B = tidal stream, C = Biscayne Bay coastline, L = Canal L-31E, M = Military Canal, MO = Mowry Canal. (See Figure G-5 for location of sampling points.)

² Sample points not provided.

³ Numerous birds observed flying over site and not counted in total.

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Table G-12. State Listed Wading Birds Observed Along Canals During the Eastern Indigo Snake Surveys in June and July 1998

Location/Date	Species						Total
	Great Egret	Little Blue Heron	White Ibis	Yellow Crowned Night Heron	Snowy Egret	Tricolor Heron	
Canal L31-E							
June 8	1	0	0	0	0	0	1
June 28	1	0	0	0	0	0	1
June 28	1	0	0	0	0	0	1
July 19	1	1	1	0	0	1	4
July 19	1	1	7	0	0	0	9
July 19	1	0	0	0	0	0	1
July 19	1	0	0	0	0	0	1
North Canal							
June 28	1	0	0	0	0	0	1
July 19	4	0	0	0	1	0	5
Military Canal							
June 8	0	1	1	0	0	0	2
June 9	1	0	0	0	0	0	1
July 19	4	0	0	0	0	0	4
Florida City Canal							
June 9	1	0	0	0	0	0	1
June 27	0	0	0	0	1	0	1
June 28	0	0	3	0	0	0	3
July 19	0	0	1	0	0	0	1
Canal C-102							
June 27	0	0	0	1	0	0	1
July 19	3	0	1	0	0	0	4
Mowry Canal							
June 8	1	0	0	0	0	0	1
June 27	3	0	0	0	0	0	3
June 28	0	0	1	0	1	0	2
July 17	0	0	2	0	0	1	3
Gould’s Canal							
June 8	0	0	3	0	7	0	10
June 9	2	0	0	0	0	0	2
June 27	0	0	0	1	0	0	1

Location/Date	Species						Total
	Great Egret	Little Blue Heron	White Ibis	Yellow Crowned Night Heron	Snowy Egret	Tricolor Heron	
Total							
L31-E	7	2	8	0	0	1	18
North	5	0	0	0	1	0	6
Military	5	1	1	0	0	0	7
Florida City	1	0	4	0	1	0	6
C-102	3	0	1	1	0	0	5
Mowry	4	0	3	0	1	1	9
Gould's	2	0	3	1	7	0	13
Grand Total	27	3	20	2	10	2	64
Average Number Per Detection	1.7	1.0	2.2	1.0	2.5	1.0	2.6

Source: Mazzotti 1999b.

Little Blue Heron. The little blue heron is a widely distributed nesting species in Florida and elsewhere along the Atlantic coast and southeastern United States. It did not suffer from the plume trade in the late 19th and early 20th centuries, but has apparently declined as a result of degradation of wetlands and alteration of wetland hydroperiods. The little blue heron nests in a variety of woody vegetation at coastal and inland locations. It forages in diverse locations including man-made canals and roadside ditches. Migratory little blue herons move into and through Florida during the winter, resulting in an increase in numbers during that season (Rodgers et al. 1996). Recent data indicate that about 1,400 to 2,100 little blue herons nested in the Everglades from 1992 through 1995, with 47 to 70 percent nesting at Loxahatchee National Wildlife Refuge, and the remainder in Water Conservation Areas 2 and 3 (Frederick 1995).

The little blue heron is a common winter bird at Biscayne NP (BNP 1998). It also breeds at Biscayne NP, having been recorded at the rookeries on Arsenicker and West Arsenicker Keys in the 1970s and 1980s. Birds in breeding plumage were observed at these rookeries in 1996, but the number of nests was not determined (Howitt 1996). Scattered individuals were observed foraging along Military Canal, Canal L-31E, and the western shoreline of Biscayne Bay in June and July 1998 (see Figure G-14, Tables G-11 and G-12). The little blue heron roosted at small scattered sites along the western shoreline of Biscayne Bay during the winter of 1999. It was observed every month from December 1992 to October 1993 on former Homestead AFB, where four to six individuals consistently foraged in shallow wetlands (Hilsenbeck 1993). Zero to four individuals were detected in June and July 1998 (see Table G-9), comprising a large percentage of the "other" wading birds tallied on former Homestead AFB (see Table G-7). The little blue heron will continue to be a common species at Biscayne NP, especially during the winter, and small groups may establish roosts along the western shoreline of Biscayne Bay. Individuals and small groups will continue to forage along the canals in the area, as well as on former Homestead AFB.

Tricolor Heron. The tricolor heron nests along much of the Atlantic and Gulf Coasts of the United States, as well as over much of central and south Florida. This bird's dark color and habit of nesting in wooded areas makes accurate census counts difficult. The number of nesting birds in south Florida has decreased from an estimated 15,000 pairs in the 1930s to 3,500 pairs in the 1970s, to 1,100 to 1,400 pairs

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in 1986 and 1987 (**Rodgers et al. 1996**). More recently, the estimated number of pairs in the Everglades from 1992 through 1995 ranged from about 1,000 to 2,000 pairs (**Frederick 1995**).

The tricolor heron nests most often in mangrove islands along the coast, although it sometimes nests at inland locations. This species feeds in a wide variety of coastal and inland habitats such as marshes, mangrove swamps, roadside ditches, and around ponds and lakes.

The tricolor heron was recorded most frequently in Biscayne NP during summer and winter (**BNP 1998**). Summer observations were mostly of nesting herons on the Arsenicker keys, while winter observations occurred mostly during the Christmas Bird Counts. Nineteen to 100 tricolor heron nests were estimated to occur on the Arsenicker Keys in the 1970s and early 1980s, and it was assumed to nest on these keys in 1996, although this was not confirmed. This species nested from May to July on these keys (**Howitt 1996**). Widely scattered individuals and small groups were observed foraging along canals and the mangrove shoreline of Biscayne Bay in June and July 1998 (see Figure G-14, Tables G-11 and G-12). This species was more common along mangrove shoreline than canals, which is consistent with its preference for coastal areas. It was also observed every month from, December 1982 through October 1993, foraging in shallow wetlands on former Homestead AFB (**Hilsenbeck 1993**). Three to seven birds were also observed on the former base in June and July 1998 (Table G-9). This species will likely continue to nest at Biscayne NP and continue to forage along the mangrove fringe, wetlands, and canals inland from the fringe, and on the former base.

Reddish Egret. The reddish egret is a state rare species and historically may have nested as far north as Tampa Bay on the west coast and Cape Canaveral on the east coast of Florida. In the late 1800s, the reddish egret declined sharply in Florida and, by the early 1900s, had apparently disappeared from the state entirely. It reappeared in the 1930s, and by the mid-1970s there were an estimated 300 birds, mostly in Florida Bay (**Powell et al. 1989**). Very few reddish egret nests were observed in Florida Bay or elsewhere in the Everglades from 1995 through 1998 (**Gawlik 1998**). Reddish egrets nest exclusively on coastal natural or dredged material islands covered with mangrove, Brazilian pepper, or other woody vegetation. This species forages principally in coastal areas such as broad, barren sand or mudflats (**Rodgers et al. 1996**).

The reddish egret was recorded at Biscayne NP on eight occasions from 1979 through 1996, with three nesting pairs on West Arsenicker Key in 1980. Reddish egrets in breeding plumage were also observed on this key in 1996, but breeding was not confirmed (**BNP 1998, Howitt 1996**). This species was recorded during wildlife studies along the western coastline of Biscayne Bay in cattail and open water habitats (**Metro-Dade County 1994b**), but was not observed in this area during aerial and ground surveys conducted in 1998 (**Denton and Godley 1999**). In addition, the reddish egret was not recorded on Homestead AFB. The reddish egret may make occasional use of the mangrove fringe and other wetlands along the western shoreline of Biscayne Bay and may also nest in small numbers on West Arsenicker Key. It would occur very infrequently, if at all, on former Homestead AFB because it prefers to forage along the coastline.

Snowy Egret. The snowy egret, along with the great egret, was almost driven to extinction as a result of the plume trade in the late 19th and early 20th centuries. This species recovered after plume hunting ended and apparently reached peak numbers between the 1930s and early 1950s (**Rodgers et al. 1996**). As a result of water management practices, the number of snowy egrets began to decline. The average number of pairs in the Everglades from 1975 through 1978 was 3,400, and by the 1980s, this number had declined by 78 percent to an average of 946 pairs (**Bancroft 1989**). More recently, the number of pairs of snowy egrets in the Everglades was 2,295 in 1992, 1,494 in 1993, 461 in 1994, and 568 in 1995

(Frederick 1995). The estimated number of nests in the Everglades declined to about 450 in 1997 and 300 in 1998 (Gawlik 1997, 1998).

The snowy egret nests in a variety of woody plants both in coastal and inland wetlands. It is widely distributed in Florida and also nests along the Atlantic coast north of Florida and in the lower Mississippi Valley. This species is non-migratory in Florida, although snowy egrets from more northern breeding grounds move south for the winter (Rodgers et al. 1996).

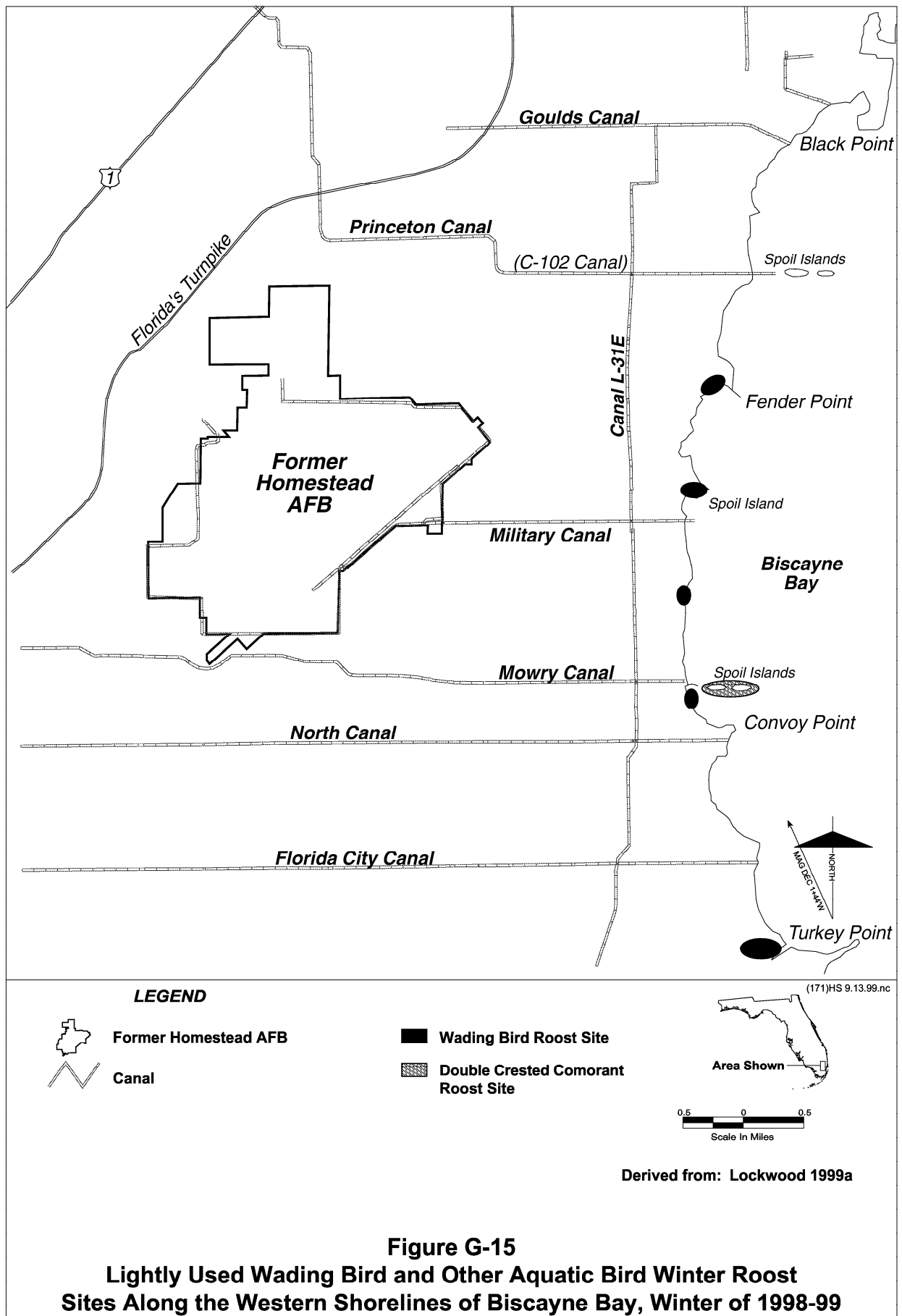
The snowy egret is fairly common at Biscayne NP and was most often recorded during summer and winter (BNP 1998). Two nests of this species were found on the Arsenicker Keys in 1975, and 15 nests were observed on these keys in 1996 (Howitt 1996). Widely scattered individuals and small groups were observed along the western shoreline of Biscayne Bay and canals and wetlands inland from the bay in June and July of 1998 (see Figure G-14, Tables G-11 and G-12). This species also roosted in small numbers along the western shoreline of Biscayne Bay during the winter of 1998–99 (see Figure G-15). The snowy egret was recorded on former Homestead AFB every month from December 1992 through October 1993 (Hilsenbeck 1993), and up to 15 were observed during June and July of 1998 in the area of the runway (see Table G-9). In addition, this species comprised a large percentage of the “other” wading birds recorded during 190 observations from June 5 through December 12, 1998 (see Table G-7). The snowy egret will continue to occur at Biscayne NP and may continue to nest on the Arsenicker Keys. It is also expected to forage in small numbers on former Homestead AFB and in surrounding wetlands and canals.

Night Herons. The black-crowned and yellow-crowned night herons are both state species of special concern. The black-crowned night heron is widespread in North America and breeds throughout much of Florida. The Yellow-crowned night heron occurs in the eastern United States and nests in more widely scattered locations than the black-crowned night heron. Due to these species’ dark plumage, tendency to nest below the canopy, and secretive habitats, there is little information regarding their population sizes. Both species nest in a variety of marine, estuarine, and inland wetland habitats (Rodgers et al. 1996).

The black-crowned night heron has been recorded more frequently at Biscayne NP than the yellow-crowned night heron, and most observations of both species were in the winter (BNP 1998). These species have not been recorded as nesting species at Biscayne NP (Howitt 1996, BNP 1998), but given their secretive nature, it is likely that one or both species nest in Biscayne NP. The yellow-crowned night heron was observed every month during an 11 month biological study on former Homestead AFB in 1992 and 1993 (Hilsenbeck 1993), but not during other biological surveys on the former base. The black-crowned night heron was not recorded on the former base during recent biological surveys, but is known from Homestead ARS (SEA 1997). Both species of night herons will continue to occur and likely nest in the mangrove fringe along Biscayne Bay and in the wetlands inland from the mangroves. Both will also continue to forage in the wetlands and along the canals around and on former Homestead AFB.

Glossy Ibis. The glossy ibis nests along the Atlantic seaboard and throughout much of Florida. This species was considered a rare breeding bird in Florida prior to the 1930s, but the number gradually increased during the next three decades to an estimated 3,500 birds in the 1970s. The population trend for this species since the 1970s is unknown. This species also spread up the Atlantic seaboard starting in the 1930s, with the northernmost colony established in Maine in 1972. The glossy ibis nests primarily in central Florida, with a small number of birds nesting in south Florida. It is essentially a freshwater species that forages in seasonally flooded grasslands, roadside ditches, shallow marshes, and along lake shores.

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The glossy ibis was only recorded twice from Biscayne NP: once in 1975 and once in 1986 (**BNP 1998**). However, recent observations indicate this species is more common in the park than indicated by these data. During biological field surveys in June 1998, a flock of seven birds was observed in the early morning flying north up the western shoreline of Biscayne Bay, and a flock of seven was observed flying south along the shoreline in the late afternoon of the same day. Small numbers of glossy ibis were also observed during aerial wading bird surveys, also in June and July 1998 (see Table G-8). This species was not recorded from former Homestead AFB during earlier surveys, but was recorded during the 1998 surveys (see Figure G-14). The glossy ibis is expected to continue to occur at least as a transient along the mangrove shoreline of Biscayne NP and will likely forage in the mangrove fringe and other wetlands along this shoreline. It will likely continue to occur sporadically in the shallow wetlands on former Homestead AFB.

White Ibis. The white ibis nests along the Atlantic seaboard north to Virginia, along the Gulf coast, and in central and south Florida. This colonial nesting wading bird is nomadic, and nesting colonies are in different locations from year to year. There were an estimated 100,000 breeding white ibis in Florida during the first half of the 20th Century. This species began to decline in the 1950s, and statewide surveys in 1988 indicated there were 34,000 white ibis in Florida. Consistent with its nomadic nature, the number of white ibis nests counted recently in the Everglades have fluctuated dramatically from 16,500 nests in 1992 to 600 nests in 1993. Two to three thousand nests were reported from the Everglades in 1994 and 1995, while about 3,700 nests were reported in 1997 and 1560 nests in 1998 (**Gawlik 1997, 1998; Frederick 1995**). Overall, there has been a dramatic decrease (95 percent) in the number of nesting white ibis in Everglades NP. There has also been a shift out of Everglades NP to water Conservation Areas 2 and 3 and the Loxahatchee National Wildlife Refuge (**Frederick 1995**). The reduction in nesting white ibis in the Everglades reached an all time low in 1998 when no nests were reported (**Gawlik 1997**). Historically, this species nested in large numbers in the estuarine mangrove areas of the park, but they no longer use these areas because of a reduction in prey species over the last 30 years.

The white ibis nests in a variety of freshwater and marine habitats, although it appears that freshwater foraging habitat is required for adults who are feeding young. This species forages in shallow-water areas, although they have been observed feeding on lawns, pastures, and at landfills. The white ibis can travel up to 19 miles one way on foraging trips and still successfully raise its young.

The white ibis is commonly observed at Biscayne NP, with most observations occurring during the winter Christmas Bird Counts (**BNP 1998**). This species also nests on the Arsenicker Keys: 106 nests were counted in July 1975, 100+ nests in May 1976, 94 nests in June of 1980, and 11 nests in June of 1996 (**Howitt 1996**). Five flocks of 10 to 50 white ibis were observed flying north along the western shoreline of Biscayne Bay while conducting a breeding bird survey along Military Canal on June 3, 1998. One flight of 40 to 50 white ibis were then observed flying south along the western shoreline of Biscayne Bay past Military Canal in the late afternoon on June 2, 1998. This flight pattern indicates these birds were traveling to and from roost sites and/or rookeries to a foraging location(s). A potential foraging location is the Miami-Dade County landfill, about 3.4 miles north of Military Canal. The white ibis commonly forages at landfills even when feeding its young (**Rodgers et al. 1996**). Possible roost or rookery locations for these birds are the Arsenicker Keys or Florida Bay, where 200 nests were observed in June 1998 (**Gawlik 1998**). The one-way trip from the Arsenicker Keys to the landfill is 10 miles, and the same trip from the east end of Florida Bay is about 21 miles. The trip from Arsenicker Keys is within the foraging travel distances reported for this species (19 miles), while the trip from eastern Florida Bay exceeds this distance. Observation of the flight path of some of these groups indicated they were coming from the direction of Florida Bay and not the Arsenicker Keys.

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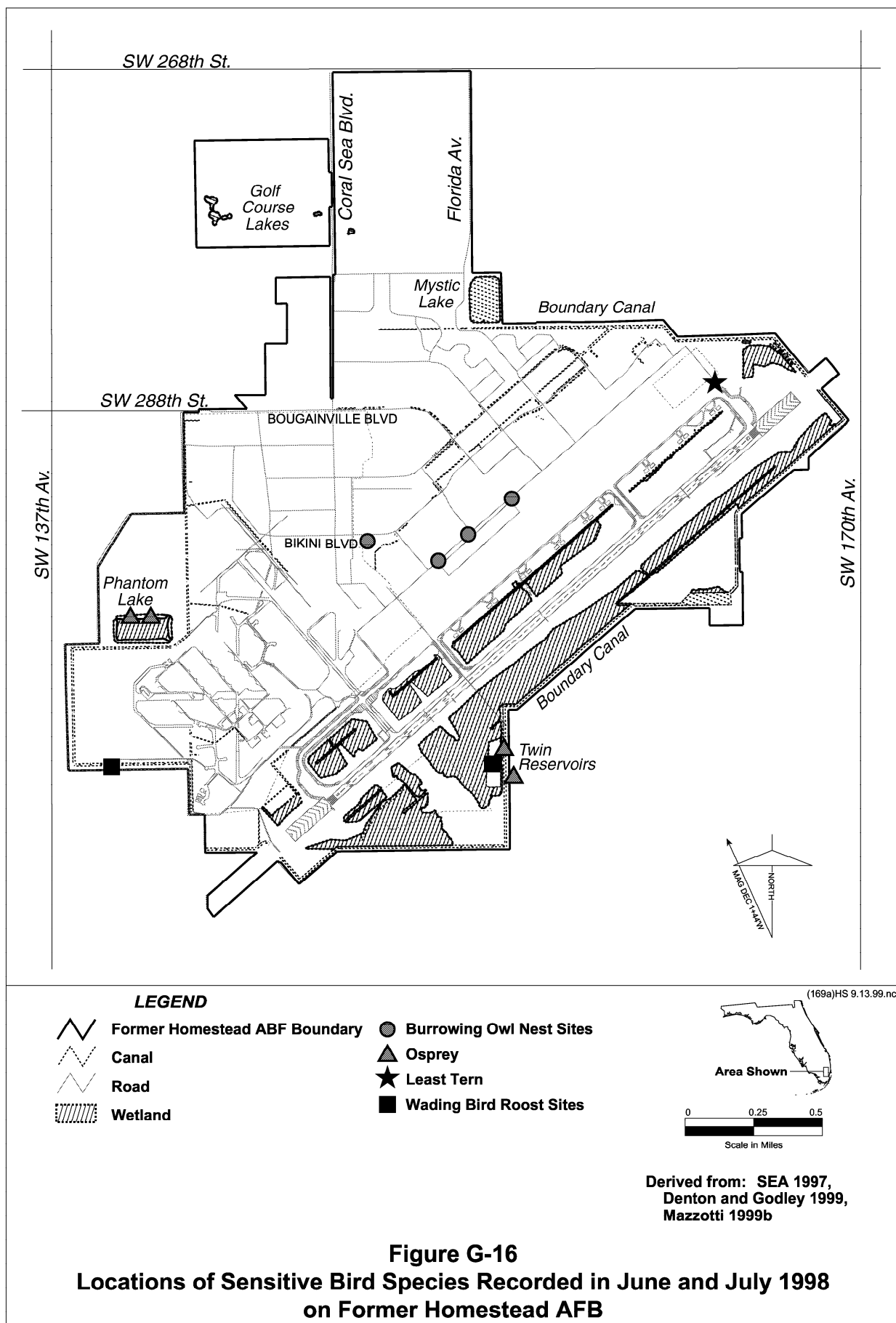
The white ibis was the second most common species of wading birds observed (cattle egrets were most numerous) during aerial surveys in June and July 1998, with 113 recorded on July 14, 1998 (see Table G-8) (**Denton and Godley 1999**). These birds were scattered throughout the mangrove and freshwater wetlands between former Homestead AFB and Biscayne Bay (see Figure G-14). White ibis were frequently observed foraging in small groups under the mangroves along the western shoreline of Biscayne Bay in February 1999. These birds may roost along the western shoreline of Biscayne Bay in the winter (see Figure G-15).

The white ibis was not observed during biological surveys of former Homestead AFB in 1992 and 1993 (**Hilsenbeck 1993**), but it was observed during surveys in June and July 1998 (see Table G-9). In addition, it was the second most common wading bird species (cattle egrets were more common) recorded during 190 observations in 1998. A total of 3,171 birds were recorded, with the largest number occurring from July through November. Very few were observed from March through June (see Table G-7). The largest number observed on the former base in 1998 was 600 on September 18. This species, along with cattle egrets and other unidentified species of herons and egrets, roost in Australian pine next to the twin reservoirs (see **Figure G-16**). The roost was active during the summer of 1998 (**BNP 1998**), as well as at other times during the last two years (**Peterla 1999b**). The white ibis will continue to use Biscayne NP, particularly during the winter and the summer nesting season. In addition, early morning and late afternoon flights along the western shoreline of Biscayne Bay may continue as long as roost and/or rookeries within flight distance of the preferred foraging location(s) are in use. This species is also expected to continue to forage along the mangrove fringe and other wetlands, canals, and roadside ditches in the area around and on former Homestead AFB.

Roseate Spoonbill. The roseate spoonbill is a state rare species and once bred in large numbers in south Florida prior to the 1880s. Plume hunters and later, meat hunters, reduced the roseate spoonbill to one colony of 15 pairs on Bottle Key in Florida Bay by 1941. Subsequently, the population began to recover, and by 1979 there were an estimated 1,254 breeding pairs. The population was reduced by 64 percent by 1984 and remained at this reduced level throughout the remainder of the 1980s (**Powell et al. 1989**). As the spoonbill recovered, it also reoccupied some of its former nesting range outside of Florida Bay. During the 1995–96 through 1997–98 nesting season, 45 to 50 spoonbill nests were observed in Florida Bay. However, this may be an underestimation because of the difficulty in observing this species during aerial surveys (**Gawlik 1998**).

The roseate spoonbill nests on coastal islands vegetated with mangroves and, in some cases, Brazilian pepper. They forage in shallow marine, brackish, and freshwater sites and the mangrove fringe; the freshwater Everglades are currently the main foraging areas for this species (**Rodgers et al. 1996**).

There are no records of the roseate spoonbill nesting at Biscayne NP, but it has been recorded from the park numerous times, mostly in the mid 1970s and mid- to late 1990s. In addition, most birds were observed in the winter (**BNP 1998**). This species was also observed in cattail marsh and open water during 1993 wildlife surveys of the western coastline of Biscayne NP (**Metro-Dade County 1994b**), and one bird was observed along the mangrove fringe during 1998 aerial wading bird surveys (see Table G-8 and Figure G-14). The spoonbill was not recorded on former Homestead AFB during recent wildlife surveys. This species will continue to occur sporadically along the mangrove fringe and associated freshwater wetlands, and although it has not been recorded on former Homestead AFB, it would be expected to occur on the former base from time to time.



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Least Bittern. This bird occurs over much of the eastern United States, including all of Florida. It nests in fresh and brackish wetlands and is less common in mangroves. It inhabits a variety of wetland types, including lake shores, ditches, reservoirs and other impounded areas—even wetlands close to human habitation. Nests are typically built over water. The least bittern forages from perches (**Rodgers et al. 1996**).

There is no population estimate for the least bittern in Florida because it is a very secretive species. Available information indicates it is likely fairly common, and it may nest in the freshwater wetlands inland from the mangrove fringe along the western shoreline of Biscayne NP and in the cattail wetlands and around the lakes on former Homestead AFB. The reduction of wetlands in Florida has undoubtedly resulted in a reduction of this species, but it is one of the few wading birds that benefits from dense cattail stands in areas like the Everglades (**Rodgers et al. 1996**). This species has not been recorded in Biscayne NP, the mangrove fringe, or during most biological surveys on former Homestead AFB. This species was observed, however, on Homestead ARS (**SEA 1997**).

American Oystercatcher. The American oystercatcher's breeding and major non-breeding ranges are north of Miami. It needs extensive beaches, sandbars, or mudflats for feeding and roosting, and sparsely vegetated sand areas for nesting (**Rodgers et al. 1996**). Twelve American oystercatchers were observed on six dates at Biscayne NP from 1984 through 1997. This included one observation during the 1985 Christmas Bird Count (**BNP 1998**). This species would continue to occur very sporadically at Biscayne NP and would not be expected to occur at former Homestead AFB.

Wilson's Plover. Wilson's plover occurs along much of the Atlantic and Gulf coasts and nests and forages on sandy beaches and tidal flats along the coast in the Homestead area. Nesting populations occur north of Miami, Florida Bay, and the Florida Keys. This species also migrates through or winters in south Florida, with spring migration occurring from late February to mid-March, and fall migration in August and September (**Rodgers et al. 1996**).

A total of 53 Wilson's plovers were recorded on 25 days between 1979 and 1997 at Biscayne NP. Most of these observations took place in the summer and winter, and all but four have taken place in the 1990s (**BNP 1998**). This species successfully nested on Boca Chita Key in Biscayne NP in 1996 (**Howitt 1996**). Wilson's plover was not observed during wildlife surveys of the mangrove fringe and other wetlands along the western shoreline of Biscayne Bay, the Chapman Field or Matheson Hammock parks, or on former Homestead AFB. Two Wilson's plovers were observed along Canal L-31E on July 15, 1998 (see Figure G-12) and it may occur occasionally along the western shoreline of Biscayne Bay. This species will likely continue to use the beach habitat on the Biscayne NP keys for nesting and foraging. It would likely be very infrequent on former Homestead AFB.

Cooper's Hawk. The Cooper's hawk occurs as a breeding species over much of North America, including the northern two-thirds of Florida. It occurs in south Florida as a migrant and wintering species (**Rodgers et al. 1996**). Wintering and migrating Cooper's hawks can be found in woody habitat that supports their major food supply, which is small- to medium-sized birds. The Cooper's hawk has apparently recovered from population lows in the 1970s that were due to DDT and other persistent pesticides (**Bednarz et al. 1990**). It is questionable if it should continue to be a species of special concern in Florida (**Rodgers et al. 1996**).

Cooper's hawks were reported from Biscayne NP in the fall and winter on only five occasions (**BNP 1998**). They were observed on former Homestead AFB during the spring and fall migration of 1993, but was considered rare (**Hilsenbeck 1993**). This species was not observed on the former base during other biological surveys. Cooper's hawk would be expected to continue as a rare migrant and also, potentially,

a winter resident on the former base. They could also occur as a rare migrant almost anywhere between the former base and Biscayne Bay.

Osprey. The osprey is a state species of special concern but is not listed by the federal government. It nests throughout Florida, and migrating osprey occur in Florida as they move back and forth from their northern breeding ground to their tropical wintering grounds. The osprey has recovered from serious declines in the 1950s and 1960s due to pesticide contamination, although the Florida populations were apparently not greatly affected (**Rodgers et al. 1996**).

The osprey nests in all regions of Florida, and they appear to be maintaining their historical distribution in the state. Nesting osprey are most common in bays and estuaries along the west coast of Florida between the mouth of the Apalachicola River and Florida Bay and along the Atlantic coast between St. Mary's River and Merritt Island. Osprey nest in cypress, mangrove, and pine trees. Nests in Florida Bay are usually in mangroves or shrubs, but can even occur on the ground (**Rodgers et al. 1996**). Osprey also require open, relatively clear water to capture fish.

Ospreys begin nesting in Florida Bay in late November and lay eggs before the end of December. Nesting is usually completed by April in south Florida and by July in north Florida. After nesting is complete, osprey in south Florida do not generally migrate out of the area, although some may travel into central Florida during the non-breeding season (**Rodgers et al. 1996**).

The osprey has been observed along the western shoreline of Biscayne Bay and along Military Canal. This species was recorded 100 times between 1974 and 1998 at Biscayne NP (**BNP 1998**). In 1998, there were three known active osprey nests in Biscayne NP: two on Elliott and one on Sands Keys (**Lockwood 1999a**). In addition, one osprey nest was reported from Chapman Field Park along the western shoreline of Biscayne Bay (**Dalrymple 1998**). Osprey nests were not recorded along the western shoreline of Biscayne Bay during aerial and ground surveys conducted in 1998 (**Denton and Godley 1999**), or during aerial surveys for bald eagle nests (**Lockwood 1998b**), so it likely does not nest along the coastline between Convoy Point and Black Point. The osprey was observed on former Homestead AFB near Phantom Lake (**SEA 1997**), and it was observed twice in June 1998, including at Phantom Lake and at the twin reservoirs (Figure G-16). The osprey will likely continue to nest in the keys of Biscayne Bay and forage along the western shoreline of the bay. In addition, it will likely continue to forage inland from the coast, but would use former Homestead AFB infrequently.

Florida Burrowing Owl. The Florida burrowing owl is a state species of special concern, but not a federally listed species. Historically, this species was reported in the central peninsula of Florida, the Florida Keys, and the Bahama Islands. The burrowing owl apparently underwent a range expansion in the 1940s, and it now occurs in south Florida including the Homestead area. Statewide surveys for this species have not been conducted, so the population size is unknown. Based on available information, the statewide population of the burrowing owl in 1987 was estimated to be between 3,000 and 10,000 pairs. Fairly dense populations occur in some Florida counties, including Miami-Dade County (**Rodgers et al. 1996**).

The Florida burrowing owl is usually found in open, well-drained areas with short herbaceous ground cover. Historically, these habitat requirements were met in the dry prairies of central Florida in the vicinity of burns. Clearing land for human development and draining wetlands greatly increased the amount of habitat available to the burrowing owl. This is thought to be the reason for its range expansion in Florida. This species now nests in developed areas such as golf courses, airports, canal banks, and in other partially developed areas. In developed areas, they tend to be found where 25 to 75 percent of the landscape is developed. It is believed that the Florida burrowing owl was nomadic in response to

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changing available habitat created by fire in its historic range. Today, this nomadic tendency is apparent as this species inhabits recently disturbed land, but then leaves when habitat conditions deteriorate (Rodgers et al. 1996).

Most of the burrowing owl nesting activity occurs during the dry season from February through late May. Fledging activity peaked in late May in Cape Coral Florida. This species shows a high degree of site fidelity; 78 percent of the adults in the Cape Coral population remained on their territories from 1987 to 1989 (Rodgers et al. 1996).

Two pairs of burrowing owls were observed on former Homestead AFB in 1992; these two pairs had disappeared in 1993 (Geraghty & Miller 1993). This species was not recorded during the 1992/93 biological surveys of former Homestead AFB (Hilsenbeck 1993). Biological surveys in 1998 revealed the existence of three active and one inactive burrowing owl nest sites in short-grass habitat near the runway (see Figure G-16). This species was not observed along Military Canal or any other areas surveyed for sensitive species outside the former base.

Terns. The royal, sandwich, and Caspian terns are state species of special concern. These species nest in a few locations along the central coasts of Florida, but can be found in south Florida during the winter. Wintering birds occur at aquatic habitats both along the coasts and at inland lakes, wetlands, and other water bodies (Rodgers et al. 1996).

The Royal tern is the most common of the three species at Biscayne NP where it was recorded almost 100 times from 1979 through 1997, with all observations occurring between August and May. This species was one of the most common species in the Christmas Bird Counts at Biscayne NP, where 100 to almost 300 birds were recorded during each count. The Sandwich tern was recorded 37 times from 1979 through 1997 at Biscayne NP, and 34 of 37 birds were observed in fall and winter. The Caspian tern, the least common of the three, was recorded 20 times from 1979 through 1997. All these observation took place in late fall and early winter (BNP 1998). In summer, the terns nest well away from Biscayne NP, as indicated above, which explains why they were not recorded there in summer. These species of terns were not recorded on former Homestead AFB, although an occasional individual may be expected to occur at one of the small lakes.

Florida Prairie Warbler. The Florida prairie warbler is a state sensitive species whose status is undetermined. There are two subspecies of the prairie warbler. The northern prairie warbler (*Dendroica discolor discolor*) breeds in the eastern United States and winters in the Caribbean. The Florida prairie warbler breeds in Florida and winters in Florida and the Caribbean. The Florida prairie warbler nests mostly in mangroves along the east and west coasts of central and south Florida, as well as in the Florida Keys. Recent surveys on Key Largo indicated that the density of this subspecies during the nesting season was 0.86 to 1.09 pairs per hectare. The breeding season in the Florida Keys was late April to early July. No evidence that cowbirds parasitized nests of the subspecies was noted in the keys (Prather and Cruz 1995), although there is evidence that this does occur elsewhere (Rodgers et al. 1996).

The prairie warbler is common at Biscayne NP, having been recorded 718 times from 1973 to 1998. Most of these observations occurred during the winter, including 330 observations during the Christmas Bird Counts from 1979 to 1997. There were also numerous observations during the spring and fall migrations (BNP 1998). It is assumed that most of the wintering and migrant birds observed were the northern prairie warbler. The Florida prairie warbler was the most abundant warbler recorded during breeding bird surveys in Biscayne NP from April through June 1996; four to six territories were recorded on Sands, Elliott, Adams, and East Arsenicker keys (Howitt 1996). Thirteen singing males were recorded during breeding bird surveys in 1998, and the locations of 11 were recorded (Figure G-12). One was heard along

Military and Mowry canals, four along Canal L-31E, and five along the mangrove fringe coastline (**Denton and Godley 1999**). The prairie warbler was not recorded on former Homestead AFB. Nesting Florida prairie warblers would not be expected to occur on the former base due to lack of appropriate nesting habitat, but migrating and, possibly, wintering prairie warblers are likely in the overgrown areas on the former base. In addition, this species will continue to nest along the mangrove fringe of the western shoreline of Biscayne Bay.

G.2.5 Mammals

Sensitive mammals that occur or have the potential to occur in the Homestead area are the West Indian manatee and Florida panther, both of which are listed by the federal and state governments. The Key Largo cotton mouse and Key Largo woodrat are included in this section, although these species do not occur in the Homestead area.

West Indian Manatee. The West Indian or Florida manatee was listed as a federally endangered species in 1967, and critical habitat was designated in 1976. It is also a State of Florida endangered species. The present distribution of the West Indian manatee includes the coasts and rivers of Florida and Georgia, the Greater Antilles, eastern Mexico, Central America, and northern South America. Two subspecies are recognized, the Florida manatee found in Florida and the Antillean manatee (*Trichechus manatus manatus*) found in the remaining range. Year-round populations of the Florida manatee occur in coastal and inland waterways in Georgia and Florida. During the summer months, Florida manatees may range as far north as Rhode Island, west to Texas, and east to the Bahamas. The abundance of the manatee in Florida tends to be greatest around areas such as the St. Johns River and Biscayne Bay. In the winter, they concentrate in areas of natural or man-made warm waters, including Biscayne Bay and its rivers and canals (**USFWS 1998a**).

Several factors contribute to the distribution of the manatee in Florida, including (1) areas of warm water to use in the winter, (2) availability of aquatic vegetation, (3) proximity of channels at least 6 feet deep, and (4) availability of fresh-water sources. Seventeen major manatee winter concentration sites have been identified, and manatee migrate to these areas when the water temperature drops below 68 degrees Fahrenheit. As the water warms up in the spring, some manatees will migrate out of the wintering areas to their summer habitats. In south Florida, manatees forage in submerged aquatic vegetation, with deeper channels often in close proximity to these foraging areas. They are frequently observed foraging in water three to 9 feet deep. In south Florida, the manatee feed most often on species such as turtle grass and manatee grass. In the winter, manatees will often spend most of the day in warm water and swim out to feeding sites in late afternoon to feed in the sometimes cooler water. Manatees often occur in quiet waters such as canals and rivers to feed, rest, obtain fresh drinking water, mate, and calve (**USFWS 1998a**).

Manatees emit sounds within the human auditory range and these vocalizations are probably used for communication. They hear fairly well, especially low-frequency sounds. Manatees can remain submerged for several minutes. The longest recorded time submerged was 24 minutes (**USFWS 1998a**).

Aerial surveys for the manatee have been conducted for the last 19 years, but given the limitations of this methodology, the actual population size cannot be determined. Therefore, the long-term population trends for the manatee in Florida are not known. Aerial surveys do provide a general index of manatee population status. For example, the aerial survey in 1996 resulted in an estimated 2,639 manatees in Florida, with 1,457 along the east coast and 1,182 along the west coast. These estimates represent a minimum number and may not be the total number of manatees in Florida (**USFWS 1998a**).

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The distribution of the manatee in Biscayne Bay has been monitored by Miami-Dade County and Florida Department of Natural Resources since 1987. Biscayne Bay supports a year-round population of manatees, with the largest number observed in winter. During the winter months, the manatee concentrate in natural tributaries such as the Little River, Miami River, Coral Gables Waterway, and Black Creek. Manatees in north Biscayne Bay travel out to the sea grass beds in late afternoon, and radio tracking data indicate they feed in these areas at night. In the summer, it appears that most manatees travel north out of the bay; several radio tracked animals left Miami-Dade County and spent the summer in Brevard County. It appears that about 30 animals remain in Miami-Dade County in the summer. The majority of manatee sightings occur in northern Biscayne Bay and its tributaries. In the area around former Homestead AFB, there have been numerous manatee observations from 1989 through 1994 in and near Black Creek, about three miles north of Military Canal and Mowry Canal, and Convoy Point, about two miles south of Military Canal. Three manatee sighting were recorded in and near Military Canal from 1989 through 1994 (**Metro-Dade County 1995b**). More recent data indicate that two adult manatees were observed in Military Canal downstream of the salinity control structure on April 27, 1995; one adult manatee was observed feeding in Biscayne Bay at the mouth of Military Canal on April 21, 1996 (**Mayo 1998**); and two manatees were in the fresh water portion of Military Canal for an undetermined period of time in June 1999 (**Lockwood 1999b**). The manatee was not observed along the western shoreline of Biscayne Bay or the nearby canals during the extensive ground and aerial surveys in June and July 1998. This species was not recorded on former Homestead AFB and is not expected to occur in the canals on the former base in the future.

Florida Panther. The Florida panther is a federal and state endangered species. It is one of the most endangered mammals in the world, and a small population of 30 to 50 adults in south Florida represents the only known population of this subspecies in the wild. Historically, this species ranged to eastern Texas and the lower Mississippi Valley east through the southeastern states and all of Florida. The only known remaining population is centered around the Big Cypress Swamp and the Everglades region. Radio tracking data indicate the center of the population is in Collier and Hendry counties; tracking data has documented the occurrence of the Florida panther in eight other counties including Miami-Dade and Monroe counties (**USFWS 1998a**).

Florida panther preferred habitat consists of native upland forests, and understory thickets of very dense saw palmetto is important resting and denning habitat. Radio-telemetry studies have shown that hardwood hammocks and pine flatwoods are preferred over wetlands and disturbed habitat. Hardwood hammocks are the most productive habitats for white-tailed deer which may be why this habitat type is preferred by the panther (**USFWS 1998a**).

The Florida panther space themselves out over the available habitat, and the home range of several females may occur within one male's home range. The average home range size for males is from 20 to 457 square miles, averaging 200 square miles. Female home range size averages 75 square miles. The average dispersal distance for subadult males was 23 miles and subadult females, 6 miles.

The population size of the Florida panther at the turn of the century may have been about 500, but hunting, habitat loss through residential and agricultural development, loss of prey base, and other factors lead to its decline. In 1950, this species was listed as a game species in Florida and, by 1958, was listed as a Florida endangered species. The population was estimated to be 100 to 300 animals in 1966. The Florida panther continued to decline to its present population size and, based on existing demographic and genetic conditions, the Florida panther will likely be extinct in only a few decades. Factors that continue to affect the Florida panther are habitat loss and fragmentation; environmental contaminants; prey availability; human disturbances; and mortality, disease, and genetic erosion (**USFWS 1998a**).

The Florida panther has not been reported from Biscayne NP. Documented Florida panther habitat exists south of former Homestead AFB in the model lands and C-111 Basin (Alleman et al. 1995). Radio-tracking data from the late 1980s showed that a panther lived in the Model Lands and spent most of its time south of Palm Drive 3.5 or more miles from former Homestead AFB. It did, on occasion, travel closer to the base and approached to within less than one mile of the former base (Ferro 1999a). For example, on June 13, 1987, this cat was about one-half mile south of the base, and on March 30, 1988, it was about 0.75 mile south of the west end of the runway near North Canal (Ferro 1999a). More recently, there have been a few unconfirmed sightings of the Florida panther south of the former base in the Palm Drive area (Wasilewski 1999a). Based on this, the Florida panther would not be expected to occur on former Homestead AFB, would be unlikely to occur between the former base and Biscayne Bay, but may occur to the south of the former base.

Key Largo Cotton Mouse. The Key Largo cotton mouse is a federal and state endangered species. It is a subspecies of the cotton mouse, one of the most common small mammals in Florida and throughout the southeastern United States. This subspecies is distinct from other cotton mouse subspecies by its larger size, more reddish color, and restricted habitat. Historically, the Key Largo cotton mouse inhabited hardwood hammocks throughout Key Largo, but as a result of the elimination of this plant community type, it is found only in north Key Largo (north of the Intersection of U.S. Highway 1 and County Route 905). It uses a variety of tropical hardwood hammock plant community types, from recently burned early successional types to mature hammock forests. The Key Largo cotton mouse is a nocturnal species and feeds on a variety of plant and animal matter. It is often associated with the Key Largo woodrat and is found in woodrat holes, nests, and runways (USFWS 1998a).

The Key Largo cotton mouse was listed as an endangered species, and critical habitat was proposed in 1984. The critical habitat proposal was subsequently withdrawn in 1986. The principal factor leading to this listing was the elimination and fragmentation of habitat due to human commercial and residential development. Before European settlement, there were an estimated 12,000 acres of tropical hammock forest on Key Largo, which has been reduced to an estimated 2,100 acres in north Key Largo. Of this, 91 percent is protected, and the remainder is vulnerable to urbanization. It is believed that the remaining stands of tropical hardwood hammock in south Key Largo are too small and fragmented to support this species. An attempt was made to establish a population on Lignumvitae Key State Botanical Site in 1970, and although one cotton mouse was trapped in 1977, later trapping efforts indicate this species no longer occurs on this key (USFWS 1998a).

Key Largo Woodrat. The Key Largo woodrat is a federal and state endangered species. This subspecies is endemic to the tropical hardwood hammocks of Key Largo and is the southern most subspecies of the eastern woodrat that occurs over much of the eastern United States. The Key Largo woodrat once inhabited hardwood hammocks throughout Key Largo, but as a result of the elimination of this plant community type, it is found only in north Key Largo (north of the intersection of U.S. Highway 1 and County Route 905). The two most important habitat characteristics for this species are materials for building stick nests and cover. Nests are typically built at the base of a tree, boulder, or other object, and can be 4 feet high and 6.5 to 8 feet in diameter. The nests have several entrances and generally one central chamber. An individual may use more than one nest, and nests can be used by a number of generations. This species is an active climber and uses well-defined trails over the forest floor. They are nocturnal and feed on a wide variety of plant material (USFWS 1998a).

APPENDIX G

The Key Largo woodrat was listed as an endangered species in 1984. The decline of the woodrat and its extirpation from its historic range in south Key Largo is largely attributable to human commercial and residential development in its tropical hardwood hammock habitat. It is believed that the remaining stands of tropical hardwood hammock in south Key Largo are too small and fragmented to support this species. An attempt was made to establish a population on Lignumvitae Key State Botanical Site in 1970, and although an estimated 476 stick nests and 85 woodrats were present in 1979, the numbers began to decline in the 1980s, and no woodrats were taken during 400 trap nights in 1990. It is believed that this species occurs in very small numbers or may be extirpated from this key (**USFWS 1998a**).