United States Department of the Interior

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July 3, 2002

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Log No.:	4-1-99-F-306
Application No.:	1998-05442 (IP-EB)
Dated:	December 22, 1998
Applicant:	Florida Fish and Wildlife Conservation Commission
Project:	Lakes Tohopekaliga Kissimmee, Hatchineha Cypress, and Tiger Extreme Drawdown and Habitat Enhancement Projects
County:	Osceola

Dear Mr. Duck:

This document presents the Fish and Wildlife Service's (Service) biological opinion based on our review of the proposed Lakes Tohopekaliga (Toho), Kissimmee, Cypress, Hatchineha, and Tiger Extreme Drawdown and Habitat Enhancement Project located in Osceola County, Florida, and its potential to affect the endangered Everglade snail kite (*Rostrhamus sociabilis plumbeus*) in accordance with section 7 of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 *et seq.*). Your request to initiate formal consultation was received on February 14, 2002. We have assigned Service Log Number 4-1-99-F-306 to this consultation.

Our involvement in this project has been unique in that the Service has interacted with both the Corps Regulatory (RD) and Planning (PD) Divisions. Our review of this project was initially with Corps-RD during the permit application process for muck and vegetation scraping and in-lake spoil disposal. Subsequently, we initiated discussions with the Corps-PD because they prepared an Environmental Impact Statement (EIS) for the proposed project. An EIS was determined necessary because the proposed project involves temporary deviations to lake regulation schedules within the action area. Ms. Elizabeth Bishop and Mr. Steve Brooker, of the Corps Regulatory Division are coordinating all permit applications for lake dredging (removal of aquatic vegetation and muck). Ms. Liz Manners and Ms. Catherine Byrd, of the Planning

Division and Environmental Branch of the Army Corps of Engineers (Corps), are coordinating National Environmental Policy Act (NEPA) compliance for the temporary deviation in the lake regulation schedules.

This biological opinion is based on information provided in the biological assessment and Final Environmental Impact Statement (DEIS) for Lake Toho, interagency planning meetings, technical data provided by the Florida Fish and Wildlife Conservation Commission (FWC), telephone conversations with research scientists, site visits, the Service's *South Florida Multi-Species Recovery Plan* (MSRP) (Service 1999), and information contained in the Service's files. A complete administrative record of this consultation is on file at the Service's South Florida Ecological Services office in Vero Beach, Florida.

CONSULTATION HISTORY

On December 22, 1998, the Service received a letter and project proposal [Application No. 199805442 (IP-EB)] from the Corps-RD for the Lake Toho drawdown and dredging project.

During a telephone conversation on January 20, 1999, the Service and the Corps discussed the Corps' determination that the proposed project "may affect, but is not likely to adversely affect" the bald eagle (*Haliaeetus leucocephalus*) and the Everglade snail kite.

On January 21, 1999, we sent a letter in response to the Corps' letter and the FWC project proposal, documenting our concerns regarding the project's potential impacts to bald eagles and snail kites. While we concurred with the Corps' determination of no effect for the bald eagle, our letter indicated that we did not have sufficient information to adequately assess the effects of the proposed action on the snail kite, and requested additional information.

Although we did not receive the information we requested in our letter, dated January 21, 1999, or complete consultation on the snail kite, the Corps-RD issued a Department of the Army Permit, No. 1998-05442 (IP-EB) on August 23, 1999. The permit authorized the removal of 4 million cubic yards of muck and construction of 47 in-lake disposal islands on Lake Toho.

We sent a letter on September 22, 2000, in response to the notice of intent to prepare an EIS published in the Federal Register, Volume 65, No. 151, expressing concerns for the action relative to impacts on the snail kite. An EIS was considered necessary because the project involved changing lake regulation schedules. The Service recommended that no in-lake disposal be implemented and that all dredged materials be disposed on upland sites.

On February 22, 2001, we received a letter from Corps-PD requesting a list of threatened or endangered species or critical habitat present in the proposed project area.

In a letter, dated May 7, 2001, we supplied information to the Corps-PD on endangered and threatened species in the proposed project area and requested additional information on the project and an evaluation of habitat enhancement work.

On May 31, 2001, we received information from the Corps-PD that the FWC would be constructing nest boxes to prevent snail kite nest collapse and, in consequence, determined that the action would not have adverse effects on any threatened or endangered species.

We sent a letter on June 26, 2001, to the Corps-PD, repeating our concerns that the project may adversely affect the snail kite and stated that construction of nest boxes would not be an appropriate means to reduce adverse effects on the snail kite. In addition, we suggested modifying the proposed action so as to minimize adverse affects to the snail kite.

We attended a Lake Toho Project Coordination Meeting at the SFWMD's Orlando Service Center, on June 28, 2001. The FWC stated that the drawdown must occur early enough to discourage all snail kites from nesting and prevent the possibility of nest initiation and failure during rapidly falling water (drawdown). All pumping options were eliminated as possible preferred alternatives for the project.

On July 25, 2001, we attended the Lake Toho Drawdown EIS Snail Kite Meeting at the USGS' Florida and Caribbean Science Center, Gainesville, Florida.

We participated in a conference call on August 10, 2001, during which, the Corps-PD discussed alternative scenarios for the drawdown and a tentative schedule for preparation of an EIS.

We attended a Lake Tohopekaliga Habitat Enhancement Project Coordination Meeting on August 16, 2001, at the SFWMD's Orlando Service Center. Meeting attendees discussed eleven drawdown alternatives for potential consideration in the EIS and minimum flows that are required for delivery to the Kissimmee River during the drawdown.

We attended the Lake Toho EIS Project Coordination Meeting on September 18, 2001, at the SFWMD's Orlando Service Center. We were informed by the Corps-PD that a pumping alternative would be modeled and considered in the DEIS.

We visited Lake Toho on September 6, 2001, with Catherine Johnson from the Corps' Aquatic Plant Control Section located in Kissimmee, Florida. We observed snail kites using the lake and shoreline habitat. We observed the results of static lake levels and cultural eutrophication. including extremely dense emergent macrophyte growth and muck build-up. We also observed an experimental in-lake disposal island (Figures 1 and 2).

On September 5, 2001, we received Permit Modification Application No. 1998-05442-MOD-EB from the Corps-RD. The applicant (FWC) sought to increase the amount of dredged material in Lake Toho to 6.7 million cubic yards, extend the permit two years, and create two additional spoil islands measuring 2 and 8 acres in area.

We participated in an interagency meeting on September 27, 2001, at the Kissimmee Civic Center, to discuss our concerns, under the ESA, regarding potential impacts to the snail kite, in particular, the cumulative effect of simultaneously drawing down five lakes in the Kissimmee

Chain. We discussed the interdependency and interrelatedness of the drawdown and muck scraping and explained the formal consultation process. We also summarized many additional concerns we had previously presented in writing under the Fish and Wildlife Coordination Act.

On October 3, 2001 we attended the Lake Toho Project Coordination Meeting at the SFWMD's Orlando Service Center. The Corps-PD (Liz Manners, pers. comm. 2001) indicated that the DEIS would only provide detailed evaluation for three alternatives, *i.e.* other pumping alternatives that were formerly under consideration were dropped in response to a written request from FWC. The Service expressed disappointment and suggested the Corps-PD reconsider because a pumping alternative would significantly reduce impacts to snail kites during the project by isolating the drawdown to Lake Toho.

In response to a request by FWC to modify the original permit, we sent a letter to the Corps-RD on October 5, 2001 and repeated our January 21, 1999 request for the additional information needed to complete consultation on the snail kite. We also identified multiple resource concerns and recommendations relative to issuance of the original permit.

On October 23, 2001, we participated in an Upper Chain of Lakes Regulatory Steering Committee Meeting at the Buenaventura Lakes Library, Kissimmee, Florida. We briefly reviewed our recommendation that the Corps request initiation of consultation for the snail kite and discussed with the Corps-PD and FWC the nine alternatives under consideration for the Lake Toho project.

We visited Lake Kissimmee and Lake Jackson on November 1, 2001, to observe snail kites and other wildlife resources, the effect of a 1996 drawdown and muck scraping project on current littoral vegetation, and in-lake disposal islands. We observed many snail kites using scraped areas on Lake Kissimmee, but the islands were large and formed extensive areal barriers along the littoral zone. Several of the in-lake disposal islands on Lake Kissimmee appeared to be poor quality habitat with few desirable native plant species colonizing the substrate (Figures 3 and 4). We observed substantial erosion on many islands (Figures 5 and 6). On Lake Jackson, in-lake disposal islands appeared to contain higher quality habitat than the islands on Kissimmee, but we still noted substantial erosion in some areas.

We received a package from Corps-PD on February 14, 2002, containing a letter requesting initiation of formal consultation, a DEIS for Lake Toho, a biological assessment that briefly described the project, and a technical report (White Paper) authored by Rob Bennetts and Phil Darby addressing their concerns related to the snail kite. However, the package did not include a discussion of the cumulative effects of the action in terms of multiple lake drawdowns.

On March 7, 2002, we attended an inter-agency meeting on the drawdown at the Corps' Jacksonville office with Corps-PD and Corps-RD. It was made clear at that meeting, that the applicant (FWC) would not consider using any of the money appropriated for the drawdown and muck removal project to isolate effects to Lake Toho via a pumping option. We were also informed that the FWC intended to remove muck and perform habitat enhancement projects on

Lakes Hatchineha, and Cypress [(Permit Application No. 200102471 (IP-TB)], and Lake Tiger. Thus, for the first time, we were made aware that the action area and project scope was significantly larger than the previous descriptions we were provided.

We sent a letter to the Corps-PD March 7, 2002, to acknowledge receipt of the request from the Corps to initiate formal consultation, and we concurred that the project may adversely affect the snail kite. We requested additional information that we would require to prepare our biological opinion.

In an effort to expedite the initiation of the formal consultation process, we sent an email to Corps-PD (Liz Manners and Catherine Byrd) and FWC (Marty Mann) on March 28, 2002, to clarify and review the information required by the Service in order to initiate formal consultation.

On April 5, 2002, we participated in a conference call with the Corps-PD, Corps-RD, South Florida Water Management District (SFWMD), and FWC, to discuss the status of formal consultation, the actions that will be included in consultation, and the status of the permit modification for Lake Toho.

On April 10, 2002, we received a letter from Corps-PD, dated April 5, 2002, requesting that the Service initiate formal consultation. The letter provided a clarification of the project scope and the additional details that we had requested.

On April 10, 2002 we, we acknowledged the Corps' request and indicated that formal consultation was initiated as of April 5, 2002.

On May 17, 2002, we received Permit Application No. 200102471 (IP-TB) from the Corps-RD, which is an application to remove and reconsolidate muck from Lakes Hatchineha and Cypress and create in-lake disposal islands.

We sent a letter to the Corps-RD on June 4, 2002, acknowledging our receipt of the Public Notice to scrape aquatic vegetation and muck from Lakes Hatchineha and Cypress. In this letter, we explained that these actions and their potential effects on threatened and endangered species were already being considered as part of the formal consultation process.

BIOLOGICAL OPINION

Description of Proposed Action

The Florida Fish and Wildlife Conservation Commission (FWC) proposes a major lake restoration project, involving drawing down water levels for dredging activities in Lakes Toho, Kissimmee, Hatchineha, Cypress, and Tiger (Figure 7). The purpose of the project is to promote habitat enhancement by the removal of nuisance vegetation and organic material that has established in all the lakes that will be drawn down. The removal of nuisance and invasive monocultural plant communities, organic muck, and established tussocks is anticipated to allow for re-establishment of beneficial aquatic plants, through aggressive post-drawdown herbicide application, for the benefit of fish and wildlife.

The Lake Toho drawdown would begin November 1, 2002 and end on February 15, 2002 at 49.0 feet NGVD. The drawdown on Lakes Kissimmee, Hatchineha, Cypress, and Tiger would begin on November 15, and end on February 15, 2002. Lake Toho would be allowed to reach 48.5 feet NGVD during the project and Lakes Kissimmee, Hatchineha, and Cypress could reach a level of 48.0 feet NGVD. Weather permitting, lakes will be managed to provide refill starting June 1 to September 1, 2002. We have not received information regarding lake levels in Lake Tiger.

Lake Toho will be drawn down to perform muck removal and muck consolidation activities using heavy equipment. A five-year Department of the Army Permit, 1998-05442 (IP-EB) was issued in May 1999, which authorizes the removal of 4 million cubic yards of aquatic vegetation and organic material (muck) from 2,844 acres of lake bottom along the 39.8 mile shoreline. Removal and consolidation of muck would be performed using bulldozers, front-end loaders, trackhoes, graders, and four to six-wheel drive dump trucks. Dredged material is permitted to be consolidated within as many as 47 in-lake disposal islands with a total area of 141 acres and 29 upland disposal sites. The applicant proposed to modify the permit, on September 5, 2001, to increase the amount of dredged material to 6.7 million cubic yards, extend the permit 2 years, and create 2 additional spoil islands of 2 and 8 acres.

While the original scope of this action was limited to dredging and in-lake disposal within Lake Toho, FWC proposes to affect Lakes Kissimmee, Hatchineha, Cypress, and Lake Tiger through significant and prolonged deviations from their normal lake regulation schedules as well as muck removal activities during this drawdown. However, the extent to which muck removal activities on all lakes are possible will depend on the status of additional permit applications [Permit Application No. 200102471 (IP-TB)] and project funding (Mike Hulon, pers. comm. 2002).

For Lake Hatchineha, the FWC has submitted Permit Application No. 200102471(IP-TB) to the Corps-RD to dredge 3,704,204 cubic yards of material, dispose some of that material on upland disposal sites, and re-consolidate the remaining material in approximately 36 in-lake disposal islands (1-2 acres each). In Lake Cypress, the FWC has applied to dredge 1,396,055 cubic yards of material, dispose some of the spoil on upland disposal sites, and re-consolidate the remaining material in approximately 24, in-lake disposal islands (1-2 acres each). In Tiger Lake, the FWC has requested action under Nationwide Permit 27 to remove approximately 150,000 cubic yards of muck, with transport of all dredged material to upland disposal sites.

The ESA requires the Service to consider interrelated and interdependent activities in assessing the effects on listed species; therefore, as listed in the Service's ESA Consultation Handbook (Service 1998), we used the "but for" test to determine whether another activity in question would occur "but for" the proposed action. That is, would the Corps-PD have prepared a DEIS to modify the regulation schedule for Lakes Toho, Cypress, Hatchineha, and Lake Tiger "but for" the intent to scrape muck in the littoral zone of Lakes Toho, Cypress, Hatchineha, and Tiger? Because the answer is no, the Service considers the actions interrelated and interdependent.

During a Kissimmee Upper Chain of Lakes Steering Committee meeting on March 7, 2002, at which FWC, Corps, SFWMD, EPA, and Service representatives were present, we were informed that the Corps and FWC would not consider any additional alternatives and we were requested to develop our biological opinion based upon the preferred Alternative, 4w, as described in the EIS.

Action Area

Although the title of the project reads "Lake Tohopekaliga (Toho) Extreme Drawdown and Habitat Enhancement Project," for the purposes of this consultation, the action area is defined by shoreline and in-lake habitat in Lakes Toho, Cypress, Hatchineha, Kissimmee, and Tiger (Figure 7). The planned temporary deviation in lake regulation schedules and dredge and fill operations, in the form of muck scraping and in-lake disposal island construction, will occur in all of these lakes.

Status of the Species

This biological opinion addresses the endangered Everglade snail kite and the effects of the proposed project on this species. No critical habitat has been designated within the action area for this species; therefore, none will be affected.

Everglade Snail Kite

The Everglade snail kite is a wide-ranging New World raptor species found primarily in lowland freshwater marshes in tropical and subtropical America from Florida, Cuba, and Mexico south to Argentina and Peru. The subspecies from Florida and Cuba (*Rostrhamus sociabilis plumbeus*) was first listed as endangered pursuant to the Endangered Species Conservation Act in 1967. The Florida population of snail kites is considered to be a single population with considerable distributional shifts. The combination of a range restricted to the watersheds of the Everglades, Lake Okeechobee and the Kissimmee Chain of Lakes, and the upper St. Johns River, with a highly specific diet composed almost entirely of apple snails (*Pomacea paludosa*), makes the snail kite's survival directly dependent on the hydrology and water quality of these watersheds. Each of these watersheds has experienced, and continues to experience, habitat degradation due to urban development and agricultural activities.

Species Description

The snail kite is a medium-sized raptor, with a total body length for adult birds of 36 to 39.5 cm and a wingspan of 109 to 116 cm (Sykes *et al.* 1995). In both sexes, the tail is square-tipped with a distinctive white base, and the wings are broad, and paddle-shaped. Adults of both sexes have red eyes, while juveniles have brown eyes (Brown and Amadon 1978, Clark and Wheeler 1987). The slender, decurved bill is an adaptation for extracting the kite's primary prey, the apple snail; the bill is a distinguishing character for field identification in both adults and juveniles.

Distribution

The subspecies *R. s. plumbeus* occurs in Florida, Cuba (including Isla de la Juventud) and northwestern Honduras. There is no evidence of movement of birds between Cuba and Florida, but this possibility has not been ruled out (Sykes 1979, Beissinger *et al.* 1983). In Florida, the historic range of the snail kite was larger than at present. Historically, snail kites were known to nest in Crescent Lake and Lake Panasoffkee in north-central Florida and as far west as the Wakulla River (Howell 1932, Sykes 1984).

The current distribution of the snail kite in Florida is limited to central and southern portions of the State. Six large freshwater systems are located within the current range of the snail kite: Upper St. Johns drainage, Kissimmee Valley, Lake Okeechobee, Loxahatchee Slough, the Everglades, and the Big Cypress basin (Beissinger and Takekawa 1983, Sykes 1984, Rodgers *et al.* 1988, Bennetts and Kitchens 1992, Rumbold and Mihalik 1994, Sykes *et al.* 1995). Habitats in the Upper St. Johns drainage include the East Orlando Wilderness Park, the Blue Cypress Water Management Area, the St. Johns Reservoir, and the Cloud Lake, Strazzulla, and Indrio impoundments. In the Kissimmee Chain of Lakes, snail kites are found at Lake Pierce, Lake Tohopekaliga, East Lake Tohopekaliga, Cypress Lake, Lake Hatchineha, Lake Marion, Lake Marian, Lake Kissimmee, Tiger Lake, Lake Arbuckle, and Lake Istokpoga. Lake Okeechobee and surrounding wetlands represent significant snail kite nesting and foraging habitats, particularly the large marsh in the southwestern portion of the lake and the area southwest of the inflow of the Kissimmee River. In the Loxahatchee Slough region of Palm Beach County, snail kites are found at the West Palm Beach Water Catchment Area, the Pal-Mar Water Conservation District, and borrow lakes on property belonging to the Solid Waste Authority of Palm Beach County and the City of West Palm Beach. Wetlands in the Everglades region supporting the snail kite are the Arthur R. Marshall Loxahatchee NWR (including WCA 1, WCA 2, WCA 3), Shark River Slough and Taylor Slough in Everglades National Park, and the C-111 basin west of U.S. Highway 1. In the Big Cypress basin, snail kites use the Lostman's and Okaloacoochee sloughs, Hinson Marsh, and the East Loop and Corn Dance units of Big Cypress National Preserve. The Savannas State Preserve, in St. Lucie County, the Hancock impoundment in Hendry County, and Lehigh Acres in Lee County are among the smaller more isolated wetlands used by snail kites (Sykes *et al.* 1995). Although the above list generally describes the current range of the species, radio tracking of snail kites has revealed that the network of habitats used by the species includes many other smaller widely dispersed wetlands within this overall range (Bennetts and Kitchens 1997a).

Habitat

Snail kite habitat consists of freshwater marshes and the shallow vegetated edges of lakes (natural and man-made) where apple snails can be found. These habitats occur in humid, tropical ecoregions (Bailey 1978) of peninsular Florida and are characterized as palustrine-emergent, long-hydroperiod wetlands (Cowardin *et al.* 1979) often on an organic peat substrate overlying oolitic limestone or sand or directly on limestone or marl (Davis 1946).

Suitable foraging habitat for the snail kite is typically a combination of low profile (< 3 m) marsh with an interdigitated matrix of shallow (0.2-1.3 m deep) open water, which is relatively clear and calm. Marsh vegetation is dominated by spike rush (*Eleocharis cellulosa*), maidencane (*Panicum hemitomon*), sawgrass (*Cladium jamaicense*), and/or cattails (*Typha* spp.). The shallow open-water areas are with or without sparse vegetation, such as white water lily (*Nymphaea odorata*), arrowhead (*Sagittaria lancifolia*), pickerel weed (*Pontederia lanceolata*), and floating heart (*Nymphoides aquatica*). Giant bulrush (*Scirpus validus*) is common at the deep-water edge of marshes in the lakes. Low trees and shrubs also are often interspersed with the marsh and open water. These often include willow (*Salix caroliniana*), dahoon holly (*Ilex cassine*), pond apple (*Annona glabra*), bald cypress (*Taxodium distichum*), pond cypress (*T. ascendens*), wax myrtle (*Myrica cerifera*), buttonbush (*Cephalanthus occidentalis*), and *Melaleuca quinquenervia,* an invasive exotic species.

Snail kites require foraging areas that are relatively clear and open in order to visually search for apple snails. Therefore, dense growth of herbaceous or woody vegetation is not conducive to efficient snail kite foraging or for apple snails. The interspersed emergent vegetation enables apple snails to climb near the surface to feed, breathe, and lay eggs. Nearly continuous flooding of wetlands for > 1 year is needed to support apple snail populations that in turn sustain foraging by the snail kite (Sykes 1979, Beissinger 1988). Cultural eutrophication of water bodies in Florida is occurring through disposal of domestic sewage and runoff of nutrient-laden water from agricultural lands. This degradation of water quality promotes dense growth of exotic and invasive native plants, particularly, cattail, water lettuce (*Pistia stratiotes*), water hyacinth (*Eichhornia crassipes*), and hydrilla (*Hydrilla verticillata*). Dense growth of these plants reduces the ability of snail kites to locate apple snails. Nesting almost always occurs over water, which deters predation (Sykes1987b). Nesting substrates include small trees (usually < 10 m in height), including willow, bald cypress, pond cypress, *Melaleuca*, sweetbay (*Magnolia virginiana*), swamp bay (*Persea borbonia*), pond apple and dahoon holly. Shrubs used for nesting include wax myrtle, cocoplum (*Chrysobalanus icaco*), buttonbush, sesbania, elderberry (*Sambucus simpsonii*), and Brazilian pepper (*Schinus terebinthifolius*). Nesting also can occur in herbaceous vegetation, such as sawgrass, cattail, bulrush, and reed (*Phragmites australis*) (Sykes *et al.* 1995). Nests are more often observed in herbaceous vegetation around Lake Kissimmee and Lake Okeechobee during periods of low water when dry conditions beneath the willow stands (which tend to grow to the landward side of the cattails, bulrushes and reeds) prevent snail kites from nesting in woody vegetation. Nests constructed in herbaceous vegetation on the waterward side of the lakes's littoral zone are more vulnerable to collapse due to the weight of the nests, wind, waves, and boat wakes, and are more exposed to disturbance by humans (Chandler and Anderson 1974; Sykes and Chandler 1974; Sykes 1987b; Beissinger 1986, 1988; Snyder *et al.* 1989a). An important feature for snail kite nesting habitat is the proximity of suitable nesting sites to foraging areas. Thus, extensive stands of contiguous woody vegetation are generally unsuitable for nesting.

Roosting sites are also almost always located over water. On average, in Florida, 91.6 percent are located in willows, 5.6 percent in *Melaleuca,* and 2.8 percent in pond cypress. Roost sites are in the taller vegetation among low-profile marshes. Snail kites tend to roost around small openings in willow stands at a height of 1.8 to 6.1 m, in stand sizes of 0.02 to 5 ha. Roosting also has been observed in *Melaleuca* or pond cypress for stands with tree heights of 4 to 12 m (Sykes 1985a).

Reproduction

The breeding season in Florida varies widely from year to year in relation to rainfall and water levels. Ninety-eight percent of the nesting attempts are initiated from December through July, while 89 percent are initiated from January through June (Sykes 1987c, Beissinger 1988, Snyder *et al.* 1989a). Snail kites often renest following failed attempts as well as after successful attempts (Beissinger 1986, Snyder *et al.* 1989a), but the actual number of clutches per breeding season is not well documented (Sykes *et al.* 1995).

Copulation can occur from early stages of nest construction, through egglaying, and during early incubation if the clutch is not complete. Egg laying begins soon after completion of the nest or is delayed a week or more. An average 2-day interval between laying each egg results in the laying of a three egg clutch in about 6 days. The clutch size is 1 to 5 eggs, with a mode of three (Sykes 1987c, Beissinger 1988, Snyder *et al.* 1989a). Incubation may begin after the first egg is laid, but generally after the second egg (Sykes 1987c). In Florida, the incubation period lasts 24 to 30 days (Sykes 1987c). Incubation is shared by both sexes, but the sharing of incubation time between sexes varies among nests (Beissinger 1987b).

Hatching success is variable from year to year and between areas. In nests where at least one egg hatched, hatching success averaged 2.3 chicks/nest. The most successful months for hatching are February (19 percent), March (31 percent), and April (23 percent) (Sykes 1987c).

Foraging

The snail kite feeds almost exclusively on apple snails in Florida. The snail kite uses two visual foraging methods: course-hunting, while flying 1.5 to 10 m above the water surface, or still-hunting from a perch. While course-hunting, the flight is characterized by slow wing beats, alternating with gliding; the flight path is usually into the wind, with the head oriented downward to search for prey. Snails are captured with the feet at or below the surface, to a maximum reach of approximately 16 cm below the surface. Snail kites do not plunge into the water to capture snails and never use the bill to capture prey. Individuals may concentrate hunting in a particular foraging site, returning to the same area as long as foraging conditions are favorable (Cary 1985). Capture rates are higher in summer than in winter (Cary 1985), with no captures observed at a temperature less than 10°C. Snail kites frequently transfer snails from the feet to the bill while in flight to a perch. Feeding perches include living and dead woody-stemmed plants, blades of sawgrass and cattails, and fence posts.

The snail kite is known to feed on the introduced snail *Pomacea bridgesi* (Takekawa and Beissinger 1983). On rare occasions, snail kites in Florida prey on small turtles (Sykes and Kale 1974, Beissinger 1988, Bennetts *et al.* 1988). Snail kites have also been observed feeding upon crayfish (*Procambarus spp.*) and a speckled perch (*Pomoxis nigromaculatus*) (Bennetts *et al.* 1994).

Status and Trends

A. Historical Population Estimates

When the snail kite was listed as endangered in 1967 (32 FR 4001), the species was considered to be at an extremely low population level. In 1965, only 10 birds were found, 8 in WCA2A and two at Lake Okeechobee. A survey in 1967 found 21 birds in WCA2A (Stieglitz and Thompson 1967). On this basis, the snail kite was included in the first group of species to be listed under the Endangered Species Conservation Act, the predecessor to the current Endangered Species Act. The publication Threatened Wildlife of the United States (Bureau of Sport Fisheries and Wildlife 1973) cited the following as the status of the snail kite: Jeopardized because of the very small population and increasingly limited amount of fresh marsh with sufficient water to ensure an adequate supply of snails on which it depends for food.

Historic records of snail kite nesting include areas as far north as Crescent Lake and Lake Panasoffke in north-central Florida and as far west as the Wakulla River (Howell 1932, Sykes 1984). Several authors (Nicholson 1926, Howell, 1932, Bent 1937) indicated that the snail kite was numerous in central and South Florida marshes during the early 1900s, with groups of up to 100 birds. Sprunt (1945) estimated the population to be 50 to 100 individuals. As a result of hunting pressures, the snail kite apparently plummeted to its lowest population between 1950 and 1965. By 1954, Sprunt estimated the population at no more than 50 to 75 birds (Sprunt 1954). Limited resources were available at that time for researchers to reach potential snail kite habitats, and the resulting low level of survey effort may have biased these low snail kite population estimates. However, there is little doubt that the snail kite was severely endangered at that time and that its range had been dramatically reduced.

Sykes (1984) reported the range of the snail kite in Florida, as of 1980, to include the following areas: southwestern Lake Okeechobee (Glades County), portions of WCAs 1, 2B, and 3A (Miami-Dade, Broward, and Palm Beach counties), the Lake Park Reservoir (Palm Beach County), the northern portion of Everglades National Park just south of Tamiami Trail (Miami-Dade County) the Savannas (St. Lucie County), and the headwaters of the St Johns River (Indian River and St. Lucie counties). Although mentioned in his previous report (Sykes 1984), the 1984 survey results did not include reports of birds within the Kissimmee valley. The first to report snail kites on Lakes Toho and Kissimmee were Beissinger and Takekawa (1983). They reported that 3 to 25 snail kites were observed on Lake Kissimmee and 6 to 32 were observed on Lake Tohopekaliga in 1981-1982, which were considered part of a number of drought related habitats. Rodgers (1994) recorded significant nesting and foraging by snail kites in the Kissimmee Chain of Lakes into the mid-1990s, which he characterized as a reoccupation of a portion of the species' historic range. Snail kite surveys from the later 1990s, 2000, and 2001 continue to indicate extensive use of the Kissimmee Chain of Lakes by snail kites for nesting and foraging activities.

Prior to 1969, the snail kite population was monitored only through sporadic and inconsistent surveys (reviewed by Sykes 1984). From 1969 to 1994, an annual quasi-systematic mid-winter snail kite count was conducted by a succession of principal investigators. Counts since 1969 have ranged from 65 in 1972 to 996 in 1994. Bennetts *et al.* (1993, 1994) caution that the 1993 and 1994 counts were performed with the advantage of having numerous birds radio-tracked. This influenced the total count, because radioinstrumented birds could be easily located and often led researchers to roosts that had not been previously surveyed. Bennetts and Kitchens (1997a) and Bennetts *et al.* (1999) have since analyzed these counts and the sources of variation in these counts, including observer effects, differences in level of effort, and sampling error. While significant sources of error were identified, this analysis provides a convincing argument that these data could provide a crude indication of trends, provided that all influences of detection rates had been adequately taken into account. The sources of variation should be recognized prior to using these data in subsequent interpretations, especially in attempting to determine population viability and the risk of extinction.

While acknowledging the problems associated with making year-to-year comparisons in the count data, some general conclusions are apparent. Lake Okeechobee apparently retains some suitable snail kite habitat throughout both wet and dry years. In contrast, snail kite use of WCA3A fluctuates greatly, with low use during drought years, such as 1991, and high use in wet years, such as 1994. However, we recommend caution when using these conclusions as absolute values for shifts in habitat use or measures of changes in total population. Although sharp declines have occurred in the counts since 1969 (for example, 1981, 1985, 1987), it is unknown to what extent this reflects actual changes in population. Rodgers *et al.* (1988) have stated that it is unknown whether decreases in snail kite numbers in the annual count are due to mortality, dispersal (into areas not counted), decreased productivity, or a combination of these factors. Despite these problems in interpreting the annual counts, the data since 1969 have indicated a generally increasing trend (Sykes 1979, Rodgers *et al.* 1988, Bennetts *et al.* 1994). However, the degree of this apparent increase in the snail kite's population needs to be confirmed with alternative methods of estimating population size.

B. Most Recent Population Estimate

The imperfect natured of previous snail kite population estimation methods have been reviewed by Bennetts *et al.* (1999). The lack of reliability of previous surveys, due to observer differences, site effects, low water levels, and effort, lead to work on capture-resighting methods for snail kite population estimation. Dreitz *et al.* (2001) estimated the year 2000 snail kite population to be 2,772 ± 296 (mean ± standard error) individuals, using resighting data collected from central and southern Florida from 1997-2000. They recommended that population growth rates for snail kites be estimated using capture-resighting methods because it is less biased and provides a measure of sampling error. Bennetts (pers. comm. 2001) suggests that this estimate is more accurate than those obtained using data from annual counts; therefore, the high number, compared to previous years, does not necessarily suggest an increase in population.

It is difficult to identify any long-term trend in reproductive success, because of the considerable variability in nest success among years, locations, and local nest environments (Sykes 1979, 1987c; Beissinger 1986; Bennetts *et al.* 1988; Snyder *et al.* 1989a), but several of these researchers have attributed the variability to water levels. As noted above, part of this effect, particularly in the lakes, is attributed to differences in nest site selection (more herbaceous substrates in low-water years versus a higher proportion of woody substrates in high-water years). The basis of comparison is between high-water years versus low-water years, rather than within-year differences between water depth at nest sites. Drought may affect nesting success by depressing apple snail populations (Kushlan 1975, Beissinger and Takekawa 1983) and through increased access by terrestrial predators (Beissinger, 1986).

Collapse of nests constructed in herbaceous vegetation is also cited as a cause of increased nest failure during low-water years. This is because the water table is usually below the ground surface at willow heads and other stands of woody vegetation during drought, causing snail kites to nest in herbaceous vegetation, where the nests are more vulnerable to collapse. This effect is more prevalent in lake environments than in the Everglades. Weather also can result in the variability of nesting success. Wind storms can cause toppling of nests, particularly on Lake Okeechobee and Lake Kissimmee due to the long wind fetch across these large lakes. Cold weather can also produce nest failure, either through decreased availability of apple snails or mortality of young due to exposure. Abandonment of nests before egg-laying is common, particularly during drought or following passage of a cold front. The overall fledging success to a nestling age of 6 weeks in the 1980 to 1993 period was 0.83 fledgling/nest or 0.29 fledgling/egg (n = 776 nests) (Sykes *et al.* 1995). Although considerable variability (due to natural and man-caused variation in water levels) should be expected in future years of monitoring, this success rate may serve as a baseline for evaluating the relative productivity of the snail kite population.

The snail kite has apparently experienced population fluctuations associated with hydrologic influences, both man-induced and natural (Sykes 1983a, Beissinger and Takekawa 1983, Beissinger 1986), but the amount of fluctuation is debated. However, the abundance of its prey, apple snails, has been definitively linked to water regime (Kushlan 1975; Sykes 1979, 1983a). Drainage of Florida's interior wetlands has reduced the extent and quality of habitat for both the snail and the kite (Sykes 1983b). The snail kite nests over water and nests become accessible to predators in the event of unseasonal drying (Beissinger 1986, Sykes 1987c). In dry years, the snail kites depend on water bodies that normally are suboptimal for feeding, such as canals, impoundments, or small marsh areas, remote from regularly used sites (Beissinger and Takekawa 1983, Bennetts *et al.* 1988, Takekawa and Beissinger 1989). These secondary or refuge habitats could be vital to the continued survival of this species in Florida.

The principal threat to the snail kite is the loss or degradation of wetlands in central and South Florida. Nearly half of the Everglades has been drained for agriculture and urban development (Davis and Ogden 1994). The Everglades Agricultural Area alone eliminated 8,029 km^2 of the original Everglades, and the urban areas in Miami-Dade, Broward and Palm Beach counties have contributed to the reduction of habitat. North of Everglades National Park, which has preserved only about one-fifth of the original extent of the Everglades, the remaining marsh has been fragmented into shallow impoundments. The Corps of Engineers' Central and Southern Florida Project encompasses 46,600 km2 from Orlando to Florida Bay and includes about 1,600 km each of canals and levees, 150 water control structures, and 16 major pump stations. This system has disrupted the volume, timing, direction, and velocity of freshwater flow.

Degradation of water quality, particularly runoff of phosphorous from agricultural and urban sources, is another concern for the snail kite. The Everglades was historically an oligotrophic system, but major portions have become eutrophic, primarily due to anthropogenic sources of phosphorus and nitrogen (cultural eutrophication). Most of this increase has been attributed to non-point source runoff from agricultural lands north of the lake, in the Kissimmee River, Taylor Slough and Nubbin Slough drainages (Federico el al. 1981). Cultural Eutrophication also is a concern in the Kissimmee chain of lakes. Nutrient enrichment leads to growth of dense stands of herbaceous emergent vegetation, floating vegetation (primarily water hyacinth and water lettuce) and woody vegetation, which inhibits the ability of snail kites to find successfully forage along the shoreline of lake areas. Regulation of water stages in lakes and the WCAs is particularly important to maintain the balance of vegetative communities required to sustain snail kites.

<u>Analysis of the species likely to be affected</u>

The Corps-PD determined that the proposed action will not effect the endangered wood stork (*Mycteria americana*), threatened bald eagle (*Haliaeetus leucocephalus*), and the threatened eastern indigo snake (*Drymarchon corais couperi*). Thus, these species will not be considered in this biological opinion. The Corps-PD determined that the proposed action will likely adversely affect the snail kite and initiated formal consultation with the Service on April 5, 2002. The snail kite will be considered further in this biological opinion.

<u>Environmental Baseline</u>

Status of the species in the action area

The action area consists of a chain of lakes within a corridor that is approximately 35 miles long (north to south) and 15 miles wide (east to west). Snail kites use all of the lakes that will be affected by the drawdown. Most of the available snail kite data are for Lakes Toho and Kissimmee and little, if any, data are available for Lakes Hatchineha, Cypress, and Tiger. The snail kite's use of these lakes depends upon available prey abundance, foraging habitat, and nesting habitat.

Lake Toho

The Service received monthly snail kite survey data from 1986-2001 from the FWC. The Service has summarized these data in Figure 8. Surveys were not performed for all months during all years and varied from 10-12 months per year. The Service calculated the mean ± 1 standard deviation (S.D.) of these monthly observations and determined that 26.8 ± 23.5 snail kites/month were observed during the 1986-2001 sampling period. During the FWC's monthly snail kite survey on Lake Toho, in April, 2002, 67 birds and 16 nests were observed. Eight of the observed nests contained eggs. In the beginning of May, 44 birds, 7 successful nests, 9 active nests, and 7 nest failures were observed. By May 30, 2002, 35 snail kites were observed and all nest activity had ceased. A University of Florida researcher observed 21 active nests on Lake Toho on May 18, 2002 (Adriene Landrum, pers. comm. 2002)

Lake Kissimmee

The Service received annual snail kite survey data from 1986-2001 from the FWC. The Service summarized these data in Figure 9. The Service calculated the mean ± 1 S.D and determined that

46.0 ± 32.0 snail kites were observed during the annual sampling events. Prior to the 1996 drawdown, an average of 31 nests/year have been observed on Lake Kissimmee. In 1999, 46 snail kite nests were observed on the lake (Rodgers and Schwikert 2001).

Lakes Hatchineha, Cypress, and Tiger

Hatchineha , Cypress, and Tiger provide 25.3, 11.4, and 8.1 miles of shoreline, respectively, much of which presents suitable snail kite nesting and foraging habitat. While nesting frequency is unknown, all lakes support populations of apple snails and snail kites are regularly observed foraging on these lakes (Wiley Kitchens, pers. comm. 2002; Rob Bennetts, pers. comm. 2002).

Factors affecting the species environment within the action area

Water management actions in the Everglades and in Florida's lakes are the most important human-controlled factors in survival and recovery of the snail kite. A careful approach to water level management is required to maintain favorable foraging and nesting habitat conditions for the snail kite and its primary prey species. Nearly continuous flooding of wetlands for > 1 year is needed to sustain apple snail populations (Sykes 1979, Beissinger 1988). Prolonged drying of wetlands, especially in an impounded area with little variation in water depth, can cause the local depletion of apple snails. Snyder *et al.* (1989a) attributed poor reproductive success of snail kites in WCA3A in years following drought due to an extended lag time between re-flooding and recovery of apple snails to levels that allow higher nesting success.

Drawdowns in the Kissimmee Chain of Lakes

The Kissimmee Chain of Lakes (KCL) have been restricted to narrow water regulation schedules when compared to their natural degree of variability in years prior to regulation. Overly dense concentrations of vegetation begin to grow in the littoral zone, which restricts water flow and leads to the buildup of organic sediment in bands around the lake's shorelines. This pattern can significantly affect the overall productivity of the lakes. Ideally, lake management schedules throughout the KCL should be modified to resemble the degree and timing of water level fluctuations in the pre-management period. However, water regulation schedules are now restricted by the proximity of floodable structures to shorelines and by water supply considerations. Because societal constraints make it impractical to fluctuate water levels according to historic cycles of flooding and drought, the SFWMD and the FWC have proposed and conducted periodic extreme drawdowns, with or without physical removal of organic sediment.

In addition to water level stabilization, Williams (1984) discussed many management concerns in the upper KCL, namely: lowered lake levels, upland drainage, floodplain encroachment, water pollution, and growth of exotic plant species. The mismanagement issues he identified still plague the lakes and can create unfavorable conditions for the snail kite. Habitat degradation is, perhaps, the greatest threat to snail kites in the action area. Cultural eutrophication combined with static lake levels (compared to historic and natural fluctuations) and highly opportunistic invasive native and exotic vegetation are main factors causing habitat degradation in the KCL. This degradation results in the accumulation of organic sediment and dense stands of emergent vegetation that effectively create a barrier to fish and other organisms that would normally inhabit the littoral zone.

With adequate planning, isolated extreme drawdowns can be carried out to oxidize the organic sediments and curb dense growths of nuisance plant species without adversely affecting Florida's snail kite population. In conjunction with aggressive post-drawdown herbicide treatments, drawdowns have the potential to enhance foraging conditions by opening up dense vegetation in the littoral zone. However, the long-term net benefit to snail kites has not yet been documented after extreme drawdowns (Rodgers 2001). Although many drawdowns have been conducted in the KCL, few studies have been conducted to assess their effects on snail kite nesting and foraging activity. Following a 1990 drawdown of East Lake Toho , (Sweatman *et al.* 1998) observed snail kite use of scraped and unscraped areas and (Rodgers 1994) observed snail kite nesting activity. In addition, following the 1996 drawdown of Lake Kissimmee, Rodgers (2001) studied snail kite nesting activity.

The Service must consider the results from East Lake Toho and will also use the results of any snail kite studies from drawdowns on Lake Kissimmee (1977 and 1996) and Lake Toho (1971, 1979, and 1987), to assess the potential for effects to Lake Toho during the proposed 2002 Lake Toho Drawdown and Habitat Enhancement Project. We chose East Lake Toho, Lake Toho, and Lake Kissimmee because they serve as the primary habitat for snail kite use in the Upper Kissimmee Chain of Lakes, which is the action area where snail kites will be affected by the proposed Toho Drawdown.

The drawdown at East Lake Tohopekaliga in 1990, which exposed 40-50 percent of the lake bottom and included burning and discing of aquatic plants and mechanical removal of vegetation and muck, caused the abandonment of 10 of 12 nests in 1990 (Rodgers 1994). The loss of snail kite nests at East Lake Tohopekaliga in 1990 apparently was caused by the inability to remove the water quickly enough to below the level of the waterward edge of the littoral marsh before snail kites began to nest. Emergency dredging of an outlet canal was required to accelerate the drainage of water beyond the edge of the marsh.

Sweatman *et al.* (1998) evaluated the effects of the 1990 drawdown of East Lake Toho by observing and classifying snail kites as occupying enhanced (vegetation and muck scraped sites) and non-enhanced (unscraped areas). Birds observed within 25 meters adjacent to an enhanced site were considered to be using an enhanced area. From 1990 to 1997, the authors observed significantly more snail kites (approximately 3:1) on enhanced versus non-enhanced sites. Thus, they concluded that, although there may be short-term impacts to snail kites (*i.e.*, nesting elimination) during drawdowns, the long-range benefits outweigh short term losses due to improved habitat for snail kites. The study suggests that snail kites preferentially occur in less densely vegetated littoral zone; however, the study did not assess overall long-term snail kite use and productivity on East Lake Toho. Using their data, we calculated an average of 135 ± 46 (mean ± 1 S.D.) adult snail kites observed from 1990-1994 and only 38 ± 28 (mean ± 1 S.D.) from 1995-1997. In 1996 and 1997, there were no successful snail kite nests. Nesting on East

Lake Toho since the 1990 drawdown has been characterized as infrequent (Rodgers 2001). While we cannot draw any conclusions as to the reduced use of East Lake Toho by snail kites after 1995, it is possible that climatic conditions, exotic vegetation, or lake regulation changes affected the kite. In addition, habitat was not aggressively maintained using herbicides after the drawdown, which may have caused the habitat to quickly revert to a state that was not preferred by snail kites (M. Hulon, pers. comm. 2002). It is also a possibility that drawdowns are not effective in providing quality snail kite habitat and forage for the long-term (*i.e.* > 5 years).

At Lake Toho, Darby *et al.* (2001) recently surveyed three sites, each with four 400m by 400m study plots that were dominated by pickerelweed. Few snails were found in the areas sampled on Lake Toho and densities were two to five times lower than most areas that have been sampled in south Florida. The sampling that was performed was part of a larger study that proposes to study the effects of the drawdown; therefore, it may be difficult to interpret the results because the sample sites were composed of dense pickerelweed, which is not optimal apple snail habitat. In a study that Darby *et al.* (2001) initiated prior to the 2002 proposed drawdown, they reported apple snail densities in Lake Toho as 4.5 times lower than densities in Lake Kissimmee; a lake that had already been characterized as having with apple snail densities that have not recovered to normal levels. Based on these data, the Service believes that the population density of apple snails may already be suboptimal for snail kites in Lake Toho. Therefore, because of the relatively low pre-drawdown apple snail densities in Lake Toho, the proposed action may have more drastic effects on apple snails than those observed in the past.

In 1987, approximately 225,000 cubic yards of muck were removed from Lake Toho during an extreme drawdown. Snail kites did not resume nesting after the 1986 drawdown at Lake Tohopekaliga until 1990. The reason for the delay in resumption of nesting after the 1986 drawdown at Lake Tohopekaliga is not fully understood. However, snail kites have returned to nest in that lake in recent years. A reduction in apple snails, as a result of the drawdown, was likely a significant mechanism that caused snail kites to avoid nesting on Lake Toho after the drawdown. While appropriate nesting substrate may have been available, the lack of their primary prey would preclude them from using the lake

The 1996 drawdown of Lake Kissimmee is perhaps the most relevant action to use as a case study to assess potential affects to snail kites during the proposed project on Lake Toho. Lake Kissimmee is hydrologically connected to Toho, used by a substantial number of snail kites, and the only lake in the KCL that experienced management actions that approach the level of magnitude that may occur on Lakes Toho, Hatchineha, Cypress, and Tiger. In 1992 and 1993, in during a study of East Lake Toho, Lake Toho, Lake Okeechobee, and Lake Kissimmee, Rodgers (1994) observed Lake Kissimmee supporting the second largest number of snail kites of all the lakes. As a result of this study, Rodgers (1994) predicted that a drawdown of Lake Kissimmee would result in an average yearly loss of 32 to 33 nests and approximately 24 fledglings.

The 1996 Lake Kissimmee drawdown included the consolidation and partial removal of approximately 2 million cubic yards of muck and aquatic vegetation. The Lake Kissimmee drawdown and muck scraping project was similar to the proposed Lake Toho, Hatchineha, and Cypress projects, in that in-lake disposal was used as a method to consolidate muck into several large in-lake disposal islands within the lake's perimeter. While this may have allowed creation of a larger unvegetated, shallow-water area to be managed as low-density, vegetated littoral zone, in-lake disposal also resulted in the permanent conversion of in-lake (wetland) habitat to uplands. In 1996, dredging across a shoal occurred prior to commencement of the drawdown to speed up the drainage. Lake Kissimmee water stages were drained quickly enough before February 1996 such that snail kites did not attempt to nest around the lake. Presumably, snail kites dispersed to other suitable areas to nest. Following the 1996 drawdown, snail kites returned to nest in Lake Kissimmee in 1997 and 1998.

Darby *et al.* (1998) concluded that the apple snail population in Lake Kissimmee declined by 80 percent as a result of the 1996 drawdown. Research by Darby *et al.* (2001) found that apple snails have not yet recovered to pre-drawdown levels on Lake Kissimmee. Their results concern the Service because suboptimal levels of a prey species may have adverse effects on snail kites. Foraging efficiency may be lowered as snail kites spend more time hunting for a lower density of prey species. Consequently, snail kite metabolic reserves may be compromised which may negatively affect reproduction and juvenile survival. Data on snail kite nesting on Lake Kissimmee from 1987-1999 suggests that snail kite nesting activity is recovering to levels estimated prior to the drawdown (Rodgers 2001). While that is encouraging, snail kite productivity, measured as fledgling success for 1997, 1998, and 1999, was significantly lower than the average snail kite productivity from 1987-1995. While we cannot directly establish a causal relationship between a recovering apple snail population and reduced snail kite productivity from the limited studies available, it appears likely that snail kites are bioenergetically compromised and cannot provide optimal levels of parental investment to their clutch and/or newly hatched birds. Because adults typically move less than a few hundred meters from the nest for foraging while rearing young (Beissinger and Snyder 1987), low density apple snail populations may result in the following: 1) longer time away from the nest, leaving eggs vulnerable to exposure and predation and 2) a reduction in fledgling success as a result of reduction in food sources for both parents and chicks.

When considering the effect of prolonged drawdowns on apple snails, poor post-drawdown apple snail population recovery is not surprising. As suggested by Darby and Percival (2000), dry downs could be important to maintain healthy apple snail population dynamics because drawdowns can help maintain emergent vegetation for apple snail respiration and oviposition. The suggestion of using localized and appropriately timed drawdowns to maintain optimal density apple snail populations is logical and supported by the Service, but there is no evidence to support that suggestion at the current time; the limited data that is available actually points to the contrary. For example, Lake Kissimmee was drawn down in 1996, and results from five year post drawdown apple snail sampling, performed in fall of 2001, suggest that the apple snail population on Lake Kissimmee had not yet recovered to pre-drawdown densities that were estimated in the fall of 1995 (Darby 2001). Specifically, his preliminary data show that sample sites that had the highest densities of apple snails in 1995 had 3 to 30 times lower densities when sampled in 2001. Darby and Percival (2000) have performed several studies to observe apple snail response to drawdowns. Telemetry indicates that during drawdowns, apple snails do not tend to move towards deep-water refuge habitat. Instead, apple snails aestivate to minimize dehydration, metabolic loss, and predation.

Research by Darby et al.(1998) indicates that early drying, before June, may be far more detrimental to apple snail populations (and by extension, detrimental to snail kites) than the incidental take of snail kite nests that early drying is intended to avoid. Darby *et al.* (1998) suggest that the adverse impact on apple snails is lessened when drying occurs after the snails have completed their reproductive cycle and the young are of sufficient size to withstand a drying event. This point is normally reached during late May or early June, the time that the natural system reached its minimum water levels. Previously, the Service had recommended that drainage be initiated immediately after the threat of hurricanes has passed (around November 30) and that the water should be lowered beyond the extent of herbaceous vegetation prior to February 1 to discourage nesting of snail kites in areas where nests are likely to collapse (FWS 1995). Because of our improved understanding of apple snail responses to extreme drawdowns, the Service now believes that recommendations made by Bennetts and Darby (2002), to initiate drawdowns late in the spring and for a duration of less than 4 months, should be followed in the future for KCL lake management activities. Late spring drawdown initiation would allow a portion of the population to reproduce, and a duration of less than 4 months would give aestivating apple snails a better chance at surviving the prolonged period of dessication. The Service believes that these issues need to be further explored.

The FWC has had better success with maintaining open water areas interspersed with low to moderate density emergent vegetation on Lake Kissimmee compared to other lakes that have been drawn down; this appears to be due to aggressive post-drawdown herbicide treatment and mechanical harvesting (M. Hulon, personal communication 2002). We visited the lake in 2001 and, although we had concerns with the in-lake disposal islands, we did observe littoral zone with, what appeared to be an optimal diversity and densities of submerged and emergent vegetation.

Additionally, drawdowns that affect snail kite habitat in one watershed unit (*e.g.* St. Johns Marsh) should not coincide with natural drying in another watershed (*e.g.* Everglades). Although long-range prediction of drought and wet cycles is not yet exact, consideration of the periodicity of these cycles should be factored into planning for periodic drying of managed areas. Human-caused drawdowns might be most adverse to the snail kite at the onset of multiple-year droughts, because it may be difficult to refill lakes or marsh impoundments during the following years, and the snail kite will have reduced opportunity to find suitable nesting and foraging habitat over several years.

When low water stages occur during the nesting season on Lake Okeechobee and the Kissimmee Chain of Lakes, snail kites frequently nest in the waterward edge of herbaceous vegetation, where nests are more vulnerable to collapse due to the inability of the vegetation to support the nest and the greater exposure to wind, waves, and boat wakes. The location of the nests closer to open water during periods of low water also exposes snail kites to a potentially higher level of human disturbance. The availability of woody vegetation often results in higher fledging success through reduced nest collapse, which is more prevalent in non-woody substrates.

Some authors have emphasized the importance of the availability of suitable habitat during periods of drought, which were thought to be a limiting factor in the population (Beissinger 1986, Sykes 1987b). Drainage of Florida's interior wetlands has reduced the extent and quality of habitat for both the snail and the snail kite (Sykes 1983b). Additionally, since the snail kite nests over water, nests may become accessible to predators in the event of unseasonal drying (Beissinger 1986, Sykes 1987c). In dry years, the kite depends on water bodies that often are suboptimal for feeding during periods of normal rainfall, such as canals, impoundments, or small marsh areas, remote from regularly used sites (Beissinger and Takekawa 1983, Bennetts *et al.* 1988, Takekawa and Beissinger 1989). Beissinger and Takekawa (1983) and Takekawa and Beissinger (1989) divided snail kite habitat into primary, secondary and drought-related areas. Bennetts (pers. comm. 1996) disagrees with characterizing any particular area into those categories; he believes that snail kites spread the risk of fluctuating habitat conditions by their ability to move long distances across the landscape within a network of habitats. Bennetts and Kitchens (1997b) and Kitchens et al.(2002) hypothesize that the spatial extent and heterogeneity of habitat quality throughout the snail kite's range buffers the risks that may be posed by droughts, because the spatial extent and duration of drought conditions will vary across the species' range. Protection of both larger and smaller wetlands in several subregions (St. Johns Marsh, Kissimmee Chain of Lakes, Lake Okeechobee, Loxahatchee Slough, and Everglades/Big Cypress) is required to maintain this spatial heterogeneity and spatial extent. Because the 1992 to 1995 duration of Bennetts' study did not include a period of drought, continued radio tracking of snail kites during and after several cycles of drought will be necessary to determine the degree of effect on the snail kite population as a whole.

Effects of the Action

Factors to be considered

The proposed projects have the potential to induce both short-term and long-term effects on the snail kite at Lakes Toho, Hatchineha, Cypress, Kissimmee, and Tiger. The drawdown can essentially be viewed as a localized drying event within the Kissimmee Chain of Lakes which is one of four watershed units that make up the overall hydroscape used by snail kites (Kitchens *et al.* 2002). Potential short-term effects include: 1) disruption of nest initiation and nest abandonment due to dewatering within suitable habitat, 2) disruption of foraging and sheltering activities, and 3) reduction in reproductive success. Potential long-term effects include: 1) conversion of foraging habitat from wetlands to uplands, 2) reduction in the abundance of primary prey organisms (apple snails) for at least two to three years, and 3) increase in foraging habitat via muck scraping and restoration of littoral habitat with moderately dense emergent vegetation.

Analyses for effects of the action

The following questions were asked when predicting the direct and indirect effects of the action:

1) How much littoral zone will be available for snail kite nesting and feeding on Lake Toho?

2) How much littoral zone will be available for snail kite nesting and feeding on Lakes Kissimmee, Hatchineha, Cypress, and Lake Tiger?

3) How much littoral zone will be inundated to sustain a substantial portion of the apple snail population and prevent major impacts to the population?

Direct Effects

The magnitude and duration of the drawdown is likely to prevent snail kites from using the lakes that have reduced water levels for at least a year or two after the drawdown (Bennetts and Darby 2002). With data we received from Rob Bennetts, we calculated the water stage of Lake Toho, measured in November, from 1987-1997 at 54.37 ± 0.44 feet (mean ± 1 S.D.) NGVD. Therefore, it is reasonable to expect that the lake will deviate at least 5 feet below the normal lake stage for at least four months. When Lake Toho was drawn down in 1987, the lake reached 48.5 feet NGVD by March 1, gradually started to refill in July, and did not reach 54.0 feet NGVD until mid November (Corps 2002). Snail kites that are currently using the lakes and those that will fly to the lakes with the expectation of using it will be forced to relocate to other suitable wetland habitat. The lakes will be drawn down by mid-February, 2002, which will make some of the lakes unattractive and ineffective for snail kite nesting throughout the drawdown process. Lake Toho will have no suitable nesting habitat during the drawdown (Marty Mann, pers. comm. 2002); thus, nest failures, as a result of the action, are unlikely. Considering these factors, and the fact that any snail kite nests that are, on the that unlikely chance initiated, highly likely to be abandoned, the Service believes that Lake Toho will be unavailable for nesting and foraging during the drawdown. When Lake Toho was drawn down in 1987, snail kites did not nest there for three years; therefore, we must consider Lake Toho unavailable for nesting for at least three years post-drawdown.

The surface area of Lake Kissimmee will be reduced by approximately 9,000 acres from the normal maximum stage. However, at 48 feet, the lake is estimated to have approximately 10,600 acres of inundated littoral zone for snail kite nesting and foraging (Marty Mann, pers. comm. 2002). Lakes Hatchineha, Cypress, and Tiger are not expected to provide snail kite nesting habitat available during the drawdown, but a small amount of foraging habitat may be available (Marty Mann, pers. comm. 2002).

Indirect Effects

In Lake Toho, the drawdown is expected to result in greater than an 80 percent reduction of the snail kite's primary prey, the apple snail population. The littoral zone is expected to be dry during the peak reproductive months (March, April, and May) (Darby *et al.* 1998), which will result in significant loss in number of apple snail recruits into the 2003 year class. Based upon data collected by Darby *et al.* (1998) before and after the 1996 Lake Kissimmee drawdown, the Service believes that apple snail populations will be suppressed for at least two to three years. This may be a conservative estimate because the most recent results of apple snail sampling on Kissimmee found that at half the sampling sites, apple snail densities have not recovered to pre-drawdown levels (Darby 2001). Littoral zone inundation estimates, provided by Marty Mann (pers. comm. 2002) suggest that Lake Kissimmee will have a significant amount of inundated apple snail habitat during the drawdown (approximately 10,600 acres) and that Lakes Hatchineha, Cypress, and Tiger will, at the least, have apple snail refugia for post-drawdown recovery. Thus, it is difficult to predict the intensity of the effect on apple snails in these lakes; while they are likely to be affected, time for recovery to pre-drawdown levels should not be as long as expected in Lake Toho. This uncertainty, due to lack of extensive monitoring of effects, is the basis for the Service's emphasis on expansion of current field monitoring efforts in the Conservation Recommendations section of this Biological Opinion.

Interrelated and interdependent action

The drawdown of Lakes Toho, Hatchineha, Cypress, Kissimmee, and Tiger is for the purpose of scraping muck in the littoral zone and re-consolidating it into in-lake disposal islands and will result in a loss of potential snail kite foraging habitat. Muck scraping activities may result in the construction of 49 in-lake disposal islands that could have a collective area of 151 acres. Wetland areas, within the current border of the lake shore, will be converted to uplands through creation of in-lake disposal islands. The Service has expressed concerns with in-lake disposal and recommended that all material be removed from the lake. The creation of multiple in-lake disposal islands will reduce the contiguity of the littoral zone and the overall potential wetland area (littoral zone) for snail kite foraging. The Service understands that the FWC also prefers upland disposal and will only use in-lake disposal as a last resort. However, the FWC has not agreed to reduce the amount of scraped material and re-allocate funds to upland disposal. The drawdown and muck scraping project is designed as a fisheries enhancement project and the underlying goal is to create optimal littoral habitat for important recreational fish species such as largemouth bass (*Micropterus salmoides*) and bluegill (*Lepomis macrochirus*) (Corps 2002). Due to a lack of upland disposal sites and/or funding to transport spoil to suitable upland sites, in-lake disposal allows the FWC to create the maximum amount of littoral habitat for recreational fisheries within the financial constraints of the project.

Beneficial effects

Snail kite habitat may benefit as a result of this project. The project will provide a clean slate for an aquatic plant control program that should aid in establishing a littoral zone with low to moderate densities of emergent vegetation in those areas that currently contain dense stands of pickerel weed, cattails, and other vegetation that is unsuitable for snail kite foraging (Bennetts and Darby 2002). After scraping, and recovery of apple snail populations, these areas may be enhanced as snail kite foraging habitat. However, any benefits to snail kites will be a function of apple snail population recovery time and the potential reoccurrence of drawdowns and future muck scraping activities. Therefore, in an effort to measure the potential short-term and long-term impacts and benefits of future drawdown and muck scraping projects, it is critical that the FWC thoroughly assess the effects of the drawdown on apple snails and snail kites, on littoral habitat, and provide an assessment of the rate of additional post-drawdown muck accumulation in treated and untreated areas of the lakes. Measuring these parameters in the project lakes and control lakes, as suggested by Dierberg *et al.* (1998), may increase our ability to discern the effects of the drawdown and habitat enhancement project from confounding factors, such as climatological conditions.

<u>Species response to the proposed action</u>

Snail kites are expected to disperse to other suitable habitat as a result of the action. Some snail kite researchers suggest that snail kites are likely to breed at alternative locations as a result of the drawdown (Bennetts and Darby 2002) and droughts (Dreitz *et al.* 2001). However, others suggest that the effects of low water on snail kites extends beyond nest success, and can cause snail kites to abandon further nesting attempts, shorten their breeding season, and decrease the possibility of multiple brood attempts (Beissinger 1995; Beissinger and Snyder 2002). Moreover, Beissinger and Snyder (2002) suggest the following:

"*While kites move readily across the Florida landscape in search of flooded wetlands during low water (Beissinger and Takekawa 1983, Takekawa and Beissinger 1989) or other conditions (Bennetts and Kitchens 1997), these movements often fail to place many birds in habitat adequate for breeding. In our experience, few kites have nested after dispersal after low water conditions, and their nest success has typically been poor (Beissinger 1986, Snyder et al. 1989, Takekawa and Beissinger 1989). Thus, such movements may allow many kites to escape starvation, but enable few to nest and even fewer to fledge young.*"

Because the scope of this action includes the major snail kite habitats within the Kissimmee Chain of Lakes, and in light of these two differing opinions described above, it is reasonable to expect that an as yet to be determined portion of displaced snail kites will either not nest during the year 2003, or have unsuccessful nests. This resulting reduction in nesting and/or nest success would be a direct result of the drawdown; that is, above and beyond the normal percentage of snail kites that fail to initiate nests or have unsuccessful nests.

The response of this local drying event, within Lakes Toho, Hatchineha, Cypress, Kissimmee, and Tiger, is likely to elicit a behavioral response, in which snail kites move to different habitats. Kitchens *et al.* (2002) suggested that local drying events that do not include all or many of the watersheds, are not likely to result in a numerical response at the population level. The drawdown may lead to temporary reduction in recruitment during the year it is conducted, which is a form of incidental take. Cumulatively, the loss of reproductive output may be a factor in the species existence; however, in the context of this long-lived species, the loss of a few nests is not likely to affect the survival and recovery of the snail kite population as a whole. Habitat quality and adult survival, in the long-term, are probably more important for the recovery of the species. *

Cumulative Effects

These effects include the effects of future State, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. The Service does not consider future federal actions that are unrelated to the proposed action because they require separate consultation pursuant to section 7 of the Endangered Species Act. Current and future urbanization in the upper Kissimmee Basin has and will continue to have the potential to affect littoral habitat in all of the lakes affected by the proposed action. Much of the shoreline habitat on the Kissimmee Chain of Lakes has the potential to be disturbed through development of private lands. These developments could affect the quality and quantity of snail kite nesting habitat. Other future actions within the action area that will degrade, fragment, or directly eliminate native habitat include expansion of agricultural operations along shoreline areas. While the implementation of best management practices (BMPs) may alleviate some of the problems with excessive nutrient inputs to the lake, continued urban and agricultural development may have a greater effect on the rate of nutrient loading.

Conclusion

Based upon our analysis of the current status of the snail kite, the environmental baseline for the action area, the effects of the proposed projects, and the cumulative effects, it is the Service's biological opinion that the Lakes Toho, Hatchineha, Cypress, Kissimmee, and Tiger drawdowns and habitat enhancement project is not likely to jeopardize the continued existence of the snail kite. No critical habitat is within the action area for this project; therefore, none will be affected.

INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and Federal regulation pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement. The Fish and Wildlife Service will not refer the incidental take of any migratory bird or bald eagle for prosecution under the Migratory Bird Treaty Act of 1918, as amended (16 U.S.C. §§ 703-712), or the Bald and Golden Eagle Protection Act of 1940, as amended (16 U.S.C. §§ 668-668d), if such take is in compliance with the terms and conditions (including amount and/or number) specified herein.

The measures described below are non-discretionary, and must be undertaken by the Corps so that they become binding conditions of any grant or permit issued to the FWC, as appropriate, for the exemption in section 7(o)(2) to apply. The Corps has a continuing duty to regulate the activity covered by this incidental take statement. If the Corps (1) fails to assume and implement the terms and conditions or (2) fails to require the FWC to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protection coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the Corps must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement. [50 CFR 402.14(i)(3)].

Amount or Extent of Take Anticipated

Because snail kites are nomadic and vary substantially in their yearly use of the Kissimmee Chain of Lakes, it is difficult to calculate an accurate number of snail kites that will be affected by the actions. Furthermore, snail kite nesting and occurrence data are not available for Lakes Hatchineha, Cypress, and Tiger. The lack of complete data prevents the Service from calculating an exact number of snail kites that will be affected by the drought conditions that will be imposed upon the snail kite as a result of the drawdown. However, the action will reduce the availability and abundance of apple snails and snail kites will be forced to leave Lakes Toho, Cypress, Hatchineha, and Tiger to prevent starvation (Kitchens et al 2002). Due to the drawdown and construction activities related to muck scraping, the Service anticipates incidental take of all snail kites associated with 10,300 acres of exposed lake bottom on the 22,500 acre Lake Toho, 8,400 acres of exposed lake bottom on the14,000 acre Lake Hatchineha, 2,400 acres of exposed lake bottom on the 5,500 acre Lake Cypress, and 1000 acres of exposed lake bottom of the 2164 acre Lake Tiger. Only 8,400 acres of lake bottom will be exposed in Lake Kissimmee and 30 percent of the 40,400 acre lake is expected to be inundated with water sufficient for snail kite foraging and nesting (Marty Mann, pers. comm. 2002). Consequently, we do not believe that there will be incidental take of snail kites at Lake Kissimmee as a result of the action. The duration of this effect will be for at least two years after the drawdown on Lakes Toho, Hatchineha, Cypress, and Tiger (Bennetts and Darby 2002). The incidental take resulting from the proposed project is expected to be in the form of harassment. Harassment would be a result of significant habitat modification and construction activities during the drawdown leading to injury due to the disruption of normal breeding, feeding, and sheltering activities.

Reasonable and Prudent Measures

During informal consultation discussions, the Service suggested several project modifications to reduce incidental take of snail kites. These suggestions included: 1) reducing the scope of the project by isolating Lake Toho and maintaining normal regulated water levels in Lakes Hatchineha, Cypress, Kissimmee, and Tiger as snail kite habitat; 2) reducing the duration and magnitude of the drawdown to reduce impacts on apple snails; 3) initiating the drawdown after peak apple snail reproduction (late spring) as recommended by Bennetts and Darby (2002); and 4) avoiding all in-lake disposal and resulting wetland loss. However, the FWC could not incorporate these recommendations because they did not consider them to be practicable considering the fisheries enhancement goals, financial constraints, and scheduling of the project.

The Service believes that the following reasonable and prudent measures are necessary and appropriate to minimize incidental take.

1. Minimize the amount of incidental take associated with habitat conversion.

2. Minimize the amount of incidental take associated with loss of prey availability.

3. Manage littoral habitat to improve snail kite foraging and nesting.

Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the ESA, the Corps must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline required reporting/monitoring requirements. These terms and conditions are non-discretionary.

1. On all lakes that will be affected by the drawdown, bi-weekly monitoring of kite activities will begin no later than February 1, 2003, and will continue until nesting activity ceases (either until the last juvenile kite has fledged or, in the absence of any active nests, at least one month following any observed attempts at nesting). Intensive monitoring of snail kite activity will be necessary. We suggest monitoring of snail kite sightings, nest building, potential (but unlikely) egg laying, hatching, predation and nest fate. Any nests will be clearly marked to prevent destruction by crews working on the lake restoration project. Water depth around the nest, vegetation, height of the nest above water level, the status of eggs or juveniles in the nest, and their fledging success shall be recorded bi-weekly.

2. Although nest baskets have been used effectively to reduce the collapse of nests in herbaceous substrates along the northwestern shoreline of Lake Okeechobee, Lake Tohopekaliga, and East Lake Tohopekaliga (Sykes and Chandler 1974), their use on a routine basis is now considered to provide limited benefits relative to the intensive effort required (R. Bennetts, pers. comm. 1996; J. Rodgers, pers. comm. 1996). Moreover, Bennetts and Darby (2002) have recommended not using artificial nest supports for the planned Lake Toho drawdown.

   Thus, any nest considered to be in danger of collapse shall not be artificially supported using the standard basket method previously implemented in the Kissimmee Chain of Lakes. Although collapse of a particular nest is not usually desirable, in the context of the impending temporary loss of habitat, early nest collapse may allow snail kites to seek suitable nesting habitat elsewhere.

3. The FWC should survey Lake's Toho, Hatchineha, Cypress, and Tiger prior to and during the drawdown, to determine if selective cutting of emergent vegetation (bulrush) is necessary to further discourage snail kite nesting in.

4. A desirable density of emergent and submerged vegetation be maintained in the newly scraped littoral zone in perpetuity. Continual management of the littoral zone will allow for efficient snail kite foraging and provide appropriate habitat for nesting.

5. The planned drawdown and muck scraping project should be postponed in the event of a system-wide drought until normal climatological conditions resume.

Snail kite and apple snail monitoring reports will be submitted to the Service's South Florida Ecological Services Office, Vero Beach, Florida. Notification under the terms and conditions specified above should be directed to Jay Slack, Supervisor of the FWS' South Florida Ecosystem Office at (772) 562-3909.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs Federal Agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

1. In order to more fully assess the effects of habitat restoration activities (drawdown and muck scraping) on apple snail abundances in Lake Toho and Lake Kissimmee, the Service recommends the Corps support the currently proposed study by Dr. Phil Darby of the University of West Florida. The goals of the study are to: 1) Compare the effect of drawdown with scraping versus drawdown alone on apple snail abundance; 2) Assess the effect of herbicide application on apple snail abundance; 3) Continue to monitor the apple snail population in Lake Kissimmee for long-term recovery data; and 4) Determine how drying affects apple snail egg laying on Lake Toho. The project has already begun; sites have been selected and pre-drawdown apple snail densities have been estimated. The Service also encourages the proposed study by Dr. Wiley Kitchens of the Florida Cooperative Fish and Wildlife Research Unit. Dr. Kitchens will address usage and quality of littoral habitats along with vegetation surveys and studies of vegetation dynamics before, during, and after drawdown/muck scraping in Lake Toho. Specifically, the study will target snail kite habitat for evaluation during the study. The Service also recommends that Lakes Hatchineha, Cypress, and Tiger also be studied to determine the effect of the drawdown on apple snail survival and reproduction.

2. The Service recommends that the Corps and the FWC develop a comprehensive fish and wildlife habitat management plan for the Kissimmee Chain of Lakes. This long-term lake management plan should not include any in-lake disposal, or the construction of additional in-lake disposal islands when and if future muck scraping projects occur. Using upland disposal only, will prevent further filling of wetlands in the littoral zone (conversion of submerged lands to uplands).

3. Herbicide applications will be required; however, the Service recommends that the FWC continue to research alternative methods, such as mechanical harvesting and bioremediation.

Control of aquatic weeds has probably improved foraging conditions for the snail kite in some areas by opening up dense growths of water hyacinth, water lettuce, and *Hydrilla*. However, spraying should not occur near snail kite nests located in herbaceous vegetation (*e.g.*, cattail, bulrush). The SFWMD, the FWC, and the DEP have cooperated in closing areas to herbicide spraying around snail kite nests, which reduces the risk of nest collapse. However, more research is needed on the long-term effects of the herbicides being used on the aquatic food web in general, and particularly, any effects on apple snails.

4. Reduction of nutrient loading to marshes is needed to slow the growth of dense vegetation which hampers efficient foraging by snail kites. Efforts to reduce nutrient loading are being conducted to benefit the South Florida Ecosystem as a whole, and will have benefits to a number of fish and wildlife species in addition to the snail kite. Best Management Practices (BMPs) have been effective in reducing nutrient input to Lake Okeechobee from the Kissimmee River, Taylor Slough, and Nubbin Slough drainages. BMPs are included in implementation provisions of the Everglades Forever Act of 1994 (Chapter 373.4593 FS), as are the construction of Stormwater Treatment Areas. More effort needs to be directed at identifying and rectifying problems with nutrient inputs to the peripheral habitats so critical to the snail kite during drought.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

REINITIATION NOTICE

This concludes formal consultation on the action outlined in the Lake Toho, Hatchineha, Cypress, and Tiger extreme drawdowns and habitat enhancement projects under Section 7 of the Act. As provided in 50 CFR § 402.16, reinitiation of formal consultation is required if: (1) the amount or extent of incidental take is exceeded (*i.e.* the project scope increases to involve additional lakes or the lakes require a change in regulation schedule that is greater than currently proposed), (2) new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion, (3) the agency action is subsequently modified in a manner that causes an adverse effect to the listed species or critical habitat that was not considered in this opinion, or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of take is exceeded, any operations causing such take must cease pending reinitiation.

Thank you for the opportunity to comment on this project. If you have any questions regarding this biological opinion, please contact David E. Hallac at (772) 562-3909 ext. 279.

Sincerely yours,

James J. Slack
Field Supervisor
South Florida Ecological Services Office

cc:
Audubon of Florida, Lorida, Florida (Paul Gray)
Corps, Regulatory Division, Merritt Island, Florida (Steve Brooker)
Corps, Regulatory Division, Merritt Island, Florida (Elizabeth Bishop)
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FWC, Gainesville, Florida (James Rodgers, Jr.)
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SFWMD, Orlando, Florida (Bill Stimmel)
University of Florida, FL CFWRU, Gainesville, Florida (Wiley Kitchens)
University of West Florida, Pensacola, Florida (Philip Darby)
USGS, Florida and Caribbean Science Center, Gainesville, Florida (Robert Bennetts)

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FIGURES

Figure 1. Experimental In-lake disposal island in Lake Tohopekaliga (2001)

Figure 2. Close-up view of vegetation on an experimental in-lake disposal island in Lake Toho.

Figure 3. Lack of desirable vegetation on Lake Kissimmee in-lake disposal island (2001).

Figure 4. Lack of diverse vegetation on in-lake disposal island in Lake Kissimmee (2001).

Figure 5. Erosion on in-lake disposal island in Lake Kissimmee (2001).

Figure 6. In-lake disposal island erosion in Lake Kissimmee.

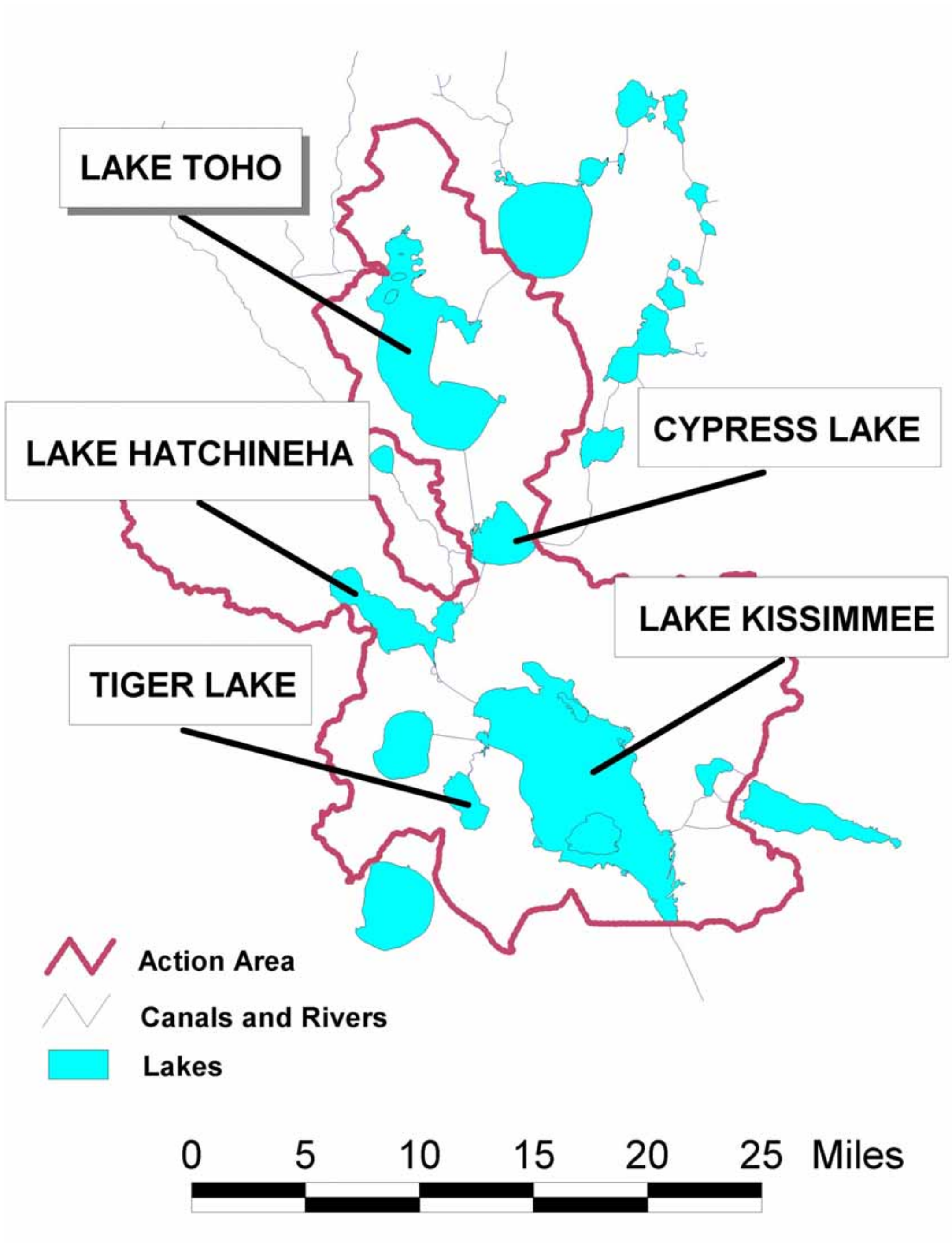

Figure 7. Action area for the Lakes Toho, Cypress, Hatchineha, Kissimmee, and Tiger Drawdown and Habitat Enhancement Projects.

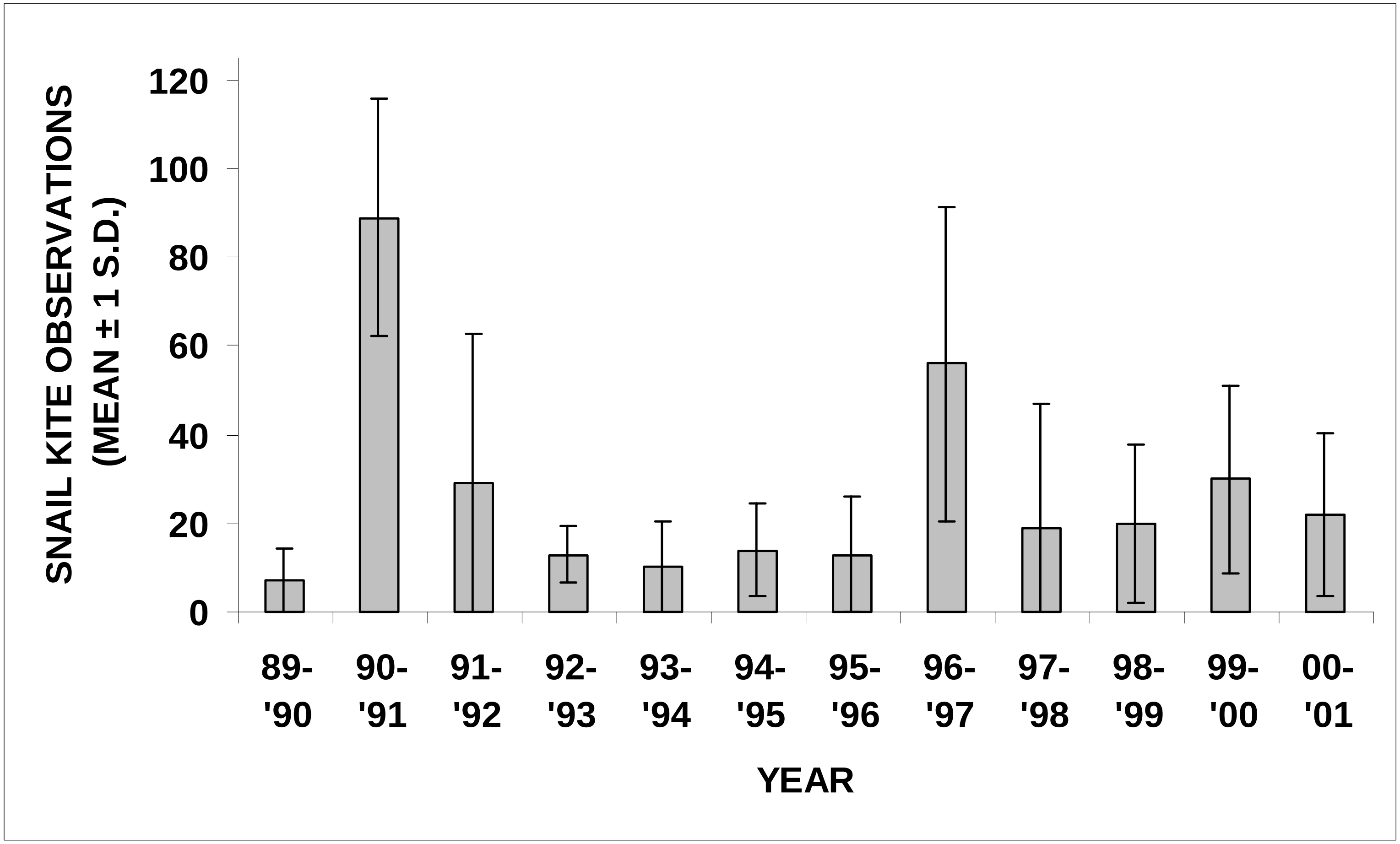

Figure 8. Mean monthly (10-12 month) snail kite observations on Lake Tohopekaliga from 1989-2001*.

*The Service used data collected by the Florida Fish and Wildlife Conservation Commission to construct this figure.

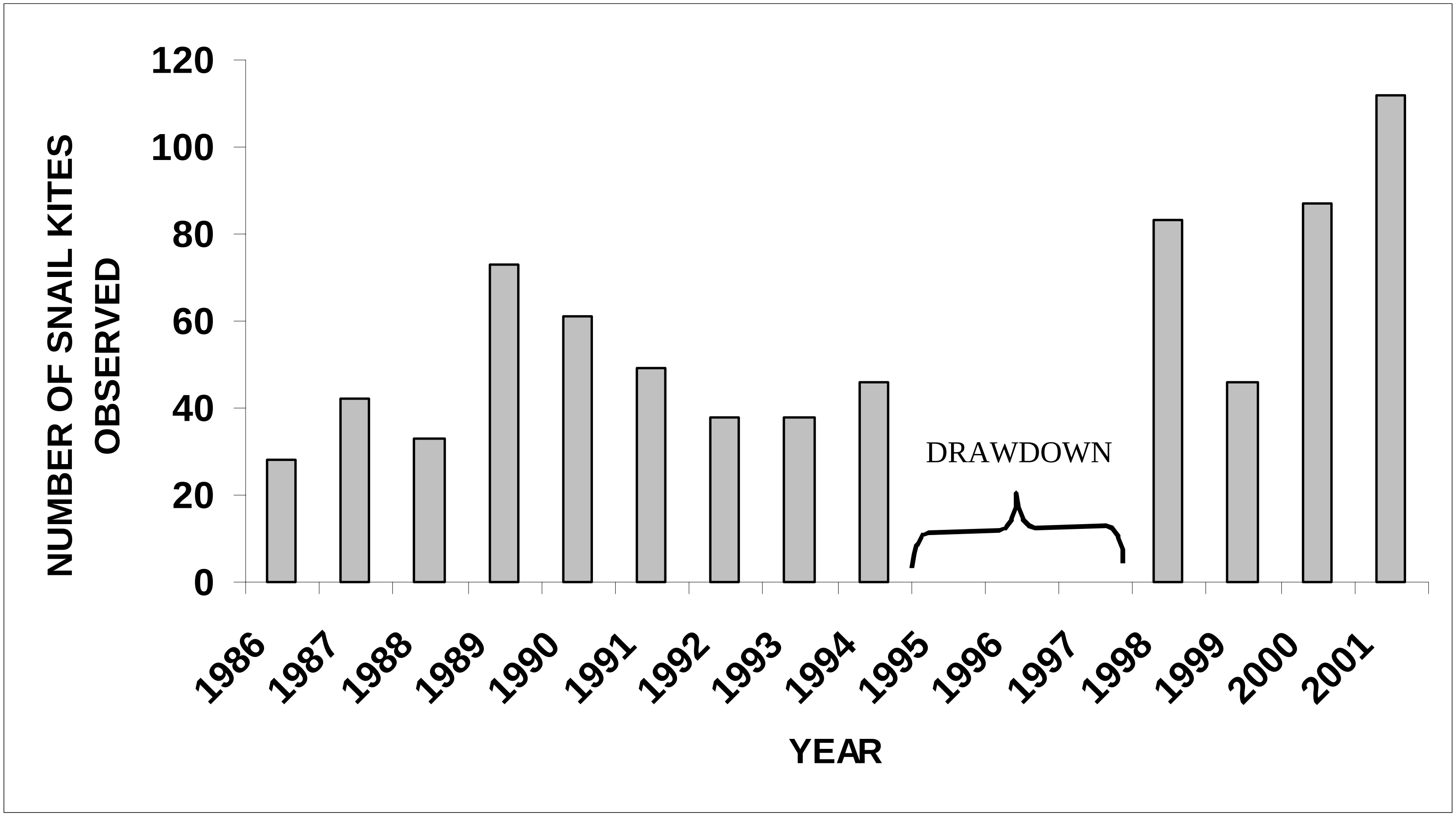

Figure 9. Annual mid-winter snail kite surveys on LakeKissimmee from 1986-2001*.

*The Service used data collected by the Florida Fish and Wildlife Conservation Commission to construct this figure.