

Recovery for the Wood Stork

Mycteria americana

Recovery Objective: RECLASSIFY to threatened, then delist.

South Florida Contribution: THE goal for the wood stork in South Florida is to support 50 percent of the total nesting population.

Recovery Criteria

South Florida will contribute to the recovery of the total population if the loss of functional wood stork foraging habitat, as a result current and past water management practices is eliminated; if the historic timing of nest initiation is restored and occurs for 2 out of 5 consecutive years over a 20 year period; if, based on demographic data, 50 percent of the young produced by South Florida colonies recruit into the total population; if a rate of increase (r) that is greater than 1.0, sustained as a 3-year running average over 10 years is achieved, with a variance less than the average r is achieved for wood storks nesting in South Florida; if, annually, a minimum of 50 percent of the successful nests for the total population occur in the Big Cypress and Everglades basins, at a minimum of 4 colony sites; if a stable age structure is achieved; if the natural volume, timing, quality and flow of surface and ground water is restored to the Everglades and if these flows ensure the long-term protection of the wood stork's natural, pre-disturbance nesting and foraging habitat; and if the threat of disease as a result of continued mercury contamination or other environmental contaminants is ameliorated.

Species-level Recovery Actions

- S1. **Determine the distribution and status of wood storks in South Florida.** All evidence suggests that the wood stork population in the southeast U.S. is a single population, with individuals moving throughout the landscape in response to habitat conditions; the recovery of wood storks depends on the success of the birds throughout their range. Historically, South Florida supported greater than 70 percent of the nesting by wood storks in the southeast; recovery of this portion of the range of the wood stork will be vital to the recovery of the species. Distribution must be monitored into the future to determine wood stork response to Everglades restoration activities.
- S1.1. **Conduct wood stork annual nesting surveys within the Everglades and Big Cypress Basins.** The health and productivity of colonies must be known to evaluate the status and recovery of the wood stork. Long-term wading bird nesting data in South Florida suggests that the number of pairs of birds initiating nesting in a given year is a better indicator of ecosystem health than is nesting success. The number of pairs of wood storks attempting to breed in South Florida should be monitored annually to determine wood stork response to ecosystem conditions in South Florida.

the processes that determine whether storks in the non-breeding season are concentrated on a small area of habitat or dispersed throughout their entire winter range will provide management flexibility and decrease the likelihood of negative impacts to a large proportion of the population during a single season.

- S3.5.4. Continue studies on wood stork nocturnal foraging activities.** Preliminary studies by Bryan (1995 op cit.) indicate that storks in South Carolina and Georgia are active night-time feeders. The prevalence of nocturnal foraging/ activities by this species needs to be studied both seasonally and geographically in South Florida. Nocturnal feeding may be more important for wood storks feeding in tidal marshes than freshwater marshes, but, if nocturnal feeding by wood storks is significant, regulatory decisions may need to reflect this information to protect wood stork foraging grounds from disturbance "around the clock."
- S3.6. Determine the importance of wood stork roost sites.** Recent surveys of the Georgia and South Carolina coast documented the presence of a large number of stork roost sites, but only a limited number of roosts were inhabited repeatedly by numerous storks. Research concerning the function and use of such sites/habitats in South Florida is needed. If important roost sites are identified in South Florida, protective measures should be developed. These studies could also assess foraging habitats utilized from these sites, thus providing important information during the non-breeding season.
- S3.7. Determine the impacts of contaminants on wood storks in South Florida.** Potential impacts from contaminants need to be reconsidered in light of recent findings concerning the amount mercury present in the Everglades ecosystem and the discovery of severe impacts of DDT/DDE based estrogen-mimicking compounds on wildlife in a large Florida wetland (Guillette et al. 1994 op. cit.).
- S3.7.1. Conduct mercury studies on wood storks in South Florida.** Studies should be conducted in the South Florida ecosystem to document effects of mercury on wood storks.
- S3.7.2. Conduct contaminant studies on wood storks throughout the region.** Develop baseline contaminant information from a variety of colony sites throughout the region to determine if further studies are needed.
- S3.8. Complete population models for the wood stork population.** Population Viability Assessment and Risk Analysis models should be performed for the wood stork population once the necessary information is acquired. Once completed, the relative importance of the South Florida ecosystem, and the ability of the wood stork to successfully breed in South Florida, should be determined.
- S3.9. Develop models of wood stork colony dynamics in South Florida wetlands.** These models are needed as planning tools for improved ecosystem restoration programs. Potentially one important ecological model for the Everglades is a wood stork population dynamics model that is a part of the "Across-Trophic-Level System Simulation" (ATLSS) set of models being developed by the South Florida/Caribbean Field Station of the BRD.

- S4. Monitor wood storks in South Florida.** Annual nesting and foraging surveys should be completed for wood storks in South Florida. These surveys will provide the information necessary to monitor the success of ecosystem and species-specific recovery actions. Surveys should be performed on an annual basis within both the Everglades and Big Cypress basins until the species is delisted.
- S4.1. Conduct long-term monitoring of the number of wood storks initiating nesting in South Florida, as described by tasks 1.1. and 1.2.**
- S4.2. Organize systematic censuses of wood stork foraging habitat in the Big Cypress region, comparable to existing censuses (Systematic Reconnaissance Flights) in the Everglades basin.** The fact that declines in nesting effort and delays in timing of colony formation have shown similar trends in the Big Cypress basin and have been well documented in the Everglades basin suggests that the Big Cypress colonies are dealing with similar kinds of habitat deterioration on the foraging grounds. The location and relative importance of stork foraging grounds in the Big Cypress basin are much less known, and should be determined as a basis for developing protection strategies in this region.; this survey would provide the information necessary to monitor the success of both ecosystem and species-specific recovery actions.
- S4.3. Continue foraging surveys in the Water Conservation Areas and Everglades NP.** This information is necessary to follow the trends of wood storks in South Florida and should be continued until the species is delisted.
- S4.4. Initiate and continue demographic surveys, such as colony surveys to determine productivity; additionally, studies to determine survivorship should be continued until enough data has been collected to determine wood stork rates of growth, reproduction, and survival.** This information will be critical to determine whether or not the species can be delisted.
- S5. Increase public awareness.** Wood storks are an indicator species of the Everglades ecosystem; the health of the Everglades can be measured by the ability of the wood stork to successfully breed in the Everglades. The Maine coastal seabird colony restoration program uses the puffin as its "symbol". The wood stork is a "symbol" of the ability of the health of the Everglades and Big Cypress basins and could be used as a barometer of the success of Everglades restoration projects.
- S5.1. Increase awareness and appreciation of wood storks through educational materials.** Wood storks utilize a variety of wetland habitats and have been identified as an indicator species for the Everglades. Additionally, they are visually unique and generate interest from the general public. Make the wood stork a symbol of the Everglades through the use of environmental education materials and programs.
- S5.1.1. Develop and distribute educational materials.** Currently, there are several brochures, videos and educational packets available that focus on wood storks. This information needs to be kept up to date. New educational material should be developed to increase the awareness of a larger audience.
- S5.1.2. Develop information for private landowners.** Wood storks breeding in the Corkscrew Swamp and in the northern and central Big Cypress basin in South Florida forage in surrounding wetlands, many of which are on

Habitat-level Recovery Actions

- H1. Prevent degradation of existing wood stork habitat in South Florida through identification and protection.** At a minimum, for continued survival of the U.S. population, currently occupied nesting, foraging and roosting habitat in South Florida must be protected from further loss or degradation. Watersheds supporting natural nesting habitat should remain unaltered, or be restored to function as a natural system if previously altered.
- H1.1. Create distribution maps of important wood stork colony, foraging, and roosting sites in South Florida for protection and restoration.** Important colony sites have been identified for the WCAs and Everglades NP. However, colony sites in the Big Cypress basin are not as well known. Very little is known about roosting sites in South Florida. Identifying all important colony sites and important roosting sites and foraging habitat is critical to the recovery of the wood stork. A GIS database should be developed from data collected by colony, roosting, and foraging surveys, as delineated by species-specific tasks 1.1 and 1.3; a GIS database will aid recovery biologists in targeting areas in need of protection, restoration, or management, and will allow managers and private landowners to more efficiently protect and manage these lands for wood storks.
- H1.2. Prioritize habitats that need protection.** Develop a prioritization scheme to focus protection and restoration efforts on colonies and feeding sites with the greatest degree of threat. Efforts should be made to identify important foraging and roost sites associated with high priority colonies.
- H1.3. Work with private landowners to protect habitat.** Conservation agencies need to recognize the significant contributions that private landowners can make for the protection of wood storks. For example, many of the foraging grounds utilized by storks breeding at the Corkscrew colony in South Florida are in private ownership and are threatened by conversion to citrus farming; the future success of this colony is dependant on maintaining viable foraging habitat within the region.
- H1.3.1. Inform landowners.** Inform all landowners having critical foraging and roost sites (as defined in task 1.2.) on their properties. Encourage compliance with existing regulatory mechanisms (see task 1.6.).
- H1.3.2. Provide assistance and support to landowners in managing their property for the benefit of wood storks.** Assistance can be in the form of written material explaining best management practices, site visits, local recognition, tax and/or monetary incentives. State and federal agencies should work with private land owners in an effort to incorporate wood stork feeding habitat into current management practices.
- H1.3.3. Develop management plans for private lands.** Conservation agencies should assist landowners in developing specific management plans for their properties. These management plans should adequately protect sites yet be flexible enough to respond to the changing needs of the landowner. The success or failure of management prescriptions for nesting, roosting and foraging areas should be clearly documented and reported.
- H1.4. Protect sites from disturbance.** The FWS developed Habitat Management guidelines for wood storks (Ogden, 1990 op. cit.) in an effort to reduce disturbance to colony sites. These management guidelines discuss various types of activities known

to disturb nesting wood storks. Additionally, certain types of habitat management activities can adversely impact colony sites. Cypress logging is a potential threat to some colonies. Human disturbance causes wood storks to leave nests, exposing eggs to predation and exposure. Posting or other appropriate protection may provide some benefit to storks nesting or foraging within the Big Cypress and Everglades basins.

H1.5. Use existing regulatory mechanisms to protect foraging habitat in South Florida. The central and northern Big Cypress basin historically supported large numbers of nesting wood storks. Presently, much of this historic range is being converted to citrus and pasture for cattle grazing. Coordinated efforts should also be used to seize opportunities to provide enhanced feeding areas through the mitigation process.

H1.5.1. Review federal actions for impacts to wood storks. Wetlands are altered for mining, agriculture, and residential purposes. Permitting authority over such activities is held by local governments, agencies in the State of Florida (DEP, SFWMD) and the federal government (COE, EPA). Important feeding areas should be included as a category of waters for which the FWS receives COE pre-discharge notification pursuant to Section 404 of the Clean Water Act. Section 7 of the Endangered Species Act requires that all federal agencies ensure that their actions are not likely to jeopardize the continued existence of any listed species or destroy or modify their critical habitat. Federal agencies conducting actions that may affect the continued existence of wood storks must consult with the Service.

H1.5.2. Encourage conservation of wood stork habitat in conservation plans, section 10(a) (1)(B) of the Endangered Species Act provides for incidental take permits that have the potential to contribute to the conservation of listed species. If appropriate, applicants should be encouraged to consider conservation of wood stork habitat when preparing Habitat Conservation Plans.

marsh project
H2. Restore and enhance habitat. A prerequisite for the recovery of wood storks in the southeastern United States is the restoration and enhancement of suitable habitat throughout the mosaic of habitat types used by this species. Historically, South Florida supported greater than 70 percent of the nesting by wood storks in the southeast. The deterioration of the Everglades and Big Cypress basins has resulted in decreased nesting by wood storks in South Florida, and increased nesting in northern Florida, Georgia, and South Carolina.

H2.1. Restore South Florida Ecosystem. Recover traditional Everglades and Big Cypress colony locations. The water delivery formula and schedules developed by the Experimental Water Deliveries Program, the structural modifications to canals and levees proposed for ecosystem restoration of Everglades NP through the Modified Water Deliveries and C-111 Projects, and the regional Everglades restoration planning process (C&SF Restudy) conducted by the Corps of Engineers, should address the recovery of the ecological processes that made it possible for the pre-drainage Everglades basin to support such large numbers of storks and other wading birds. These ecological processes were made possible by the large spatial scale of the pre-drainage Everglades, the strong between-year variation in surface water patterns, and the strong flows of surface water into the estuaries.

Corkscrew Swamp colony has consistently supported a significant number of nesting wood storks in South Florida. Many of the surrounding wetlands used for foraging by wood storks in this colony are in private ownership and are in danger of being converted to other land uses, such as citrus farming. Protecting these wetlands will be critical to protect the Corkscrew colony and help to preserve wood stork colonies in South Florida.

- H2.3. Acquire land identified as important habitat for wood storks in South Florida.** Federal and State conservation agencies and private conservation organizations should continue efforts to acquire important habitat utilized by wood storks in South Florida. Initial land acquisition efforts should be carefully targeted to sites having the greatest potential for maintaining storks over time. Large, stable colonies that are in immediate threat from disturbance either through direct threat to the colony site or through a loss of surrounding foraging habitat, should be of highest priority. Priority should also be given to larger colonies with a history of annual use, sites most in need of management, and colony sites where alternate habitat is not available.
- H3. Conduct research on the critical habitat components necessary to trigger successful nesting by wood storks in South Florida.** We do not know what specific habitat characteristics are necessary to trigger nesting by wood storks in South Florida. Wood storks could be responding to a suite of habitat characteristics such as water depth, photo period, rainfall patterns, prey densities, etc... Projects should be completed that will help to identify some of these habitat characteristics.
- H3.1. Determine the densities, species composition and size classes of fishes necessary to result in successful nesting by wood storks in South Florida.** Use information gathered in task 3.5 (species-level) to establish study locations. Water management practices may have resulted in fish populations that no longer represent "natural" populations. This information may aid us in developing the appropriate operational criteria for the Everglades restoration. It will also establish a baseline from which to compare the effects of ecosystem restoration activities.
- H3.2. Determine the effects of natural and human-caused hydrologic events on the ecology of the prey base utilized by wood storks in South Florida.** This information can be used to determine the optimal operational schedules for South Florida's public lands.
- H3.3. Determine if reduced freshwater flows into the northern Florida Bay mainland estuaries, as a result of the South Dade Conveyance System and the Experimental Program of Water Deliveries to Everglades NP, have caused wood storks to delay nesting in South Florida.** These mainland estuaries historically provided important early dry season foraging habitat; reduced freshwater flows may have significantly altered available prey base.
- H4. Monitor the status of areas identified as important wood stork habitat in South Florida.** Monitor habitats identified by task H1.1. annually to determine whether changes are occurring in response to management actions. For example, habitats likely to be affected by hydrologic restoration projects should be monitored to determine impacts, both beneficial and adverse, on wood storks. The appropriate management decisions need to be considered, discussed, and implemented if adverse impacts are detected.