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Endangered and Threatened Wildlife and Plants; Reclassification of the U.S. Breeding Population of the Wood Stork From Endangered to Threatened; Final Rule

DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

[Docket No. FWS–R4–ES–2012–0020; FXES11130900000C2–134–FF09E32000]

RIN 1018–AX60

Endangered and Threatened Wildlife and Plants; Reclassification of the U.S. Breeding Population of the Wood Stork From Endangered to Threatened

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Final rule.

SUMMARY: We, the U.S. Fish and Wildlife Service (Service or USFWS), reclassify the United States (U.S.) breeding population of the wood stork from endangered to threatened under the Endangered Species Act of 1973, as amended (Act). Further, we establish the U.S. breeding population in Alabama, Florida, Georgia, North Carolina, Mississippi, and South Carolina as a distinct population segment (DPS). The endangered designation no longer correctly reflects the status of the DPS due to improvement in its overall status. This action is based on a review of the best available scientific and commercial data, which indicate that the U.S. wood stork DPS is not presently in danger of extinction across its range. While habitat loss and fragmentation continues to impact the U.S. wood stork DPS, the increase in the abundance of the breeding population and significant expansion of the breeding range reduce the severity and magnitude of these threats.

DATES: This rule becomes effective on July 30, 2014.

ADDRESSES: This final rule, as well as comments and materials received in response to the proposed rule, are available on the Internet at *http://www.regulations.gov* at Docket Number [FWS–R4–ES–2012–0020]. Comments and materials received, as well as supporting documentation used in preparation of this rule, will be available for public inspection, by appointment, during normal business hours at: U.S. Fish and Wildlife Services, North Florida Ecological Services Field Office, 7915 Baymeadows Way, Suite 200, Jacksonville, FL 32256.

FOR FURTHER INFORMATION CONTACT: Jay Herrington, North Florida Ecological Services Field Office, (see **ADDRESSES**); by telephone at 904–731–3336; or by facsimile (fax) at 904–731–3045. If you use a telecommunications device for the deaf (TDD), please call the Federal Information Relay Service (FIRS) at 800–877–8339.

SUPPLEMENTARY INFORMATION:

Executive Summary

Why We Need To Publish a Rule

- In September 2007, we completed a 5-year status review, which included a recommendation to reclassify the U.S. breeding population of the wood stork from endangered to threatened.
- In May 2009, we received a petition to reclassify the U.S. breeding population of wood stork; the petition incorporated the Service's 5-year review as its sole supporting information.
- On September 21, 2010, we published a 90-day finding that the petition presented substantial information indicating that reclassifying the wood stork may be warranted (75 FR 57426). We requested information that would assist us in our status review.
- On December 26, 2012, we published a 12-month finding that the petitioned action was warranted and concurrently a proposed rule to reclassify the U.S. breeding population of the wood stork from endangered to threatened and designate this population as a distinct population segment (DPS) (77 FR 75947). We requested peer and public review of the proposed rule.

Summary of the Major Provisions of This Final Rule

- We reclassify the U.S. breeding population of wood stork from endangered to threatened.
- We determine that the U.S. breeding population of wood stork is a DPS.
- We amend the List of Endangered and Threatened Wildlife (50 CFR 17.11(h)) to reflect the status change to threatened and that the U.S. wood stork DPS is found in the States of Alabama, Florida, Georgia, Mississippi, North Carolina, and South Carolina.

The Basis for the Action

- The U.S. breeding population of wood stork was listed under the Act in 1984, prior to publication of the joint policy of the National Marine Fisheries Service and U.S. Fish and Wildlife Service (Services) regarding the recognition of distinct vertebrate population segments (61 FR 4722). We find that the U.S. breeding population of wood stork meets the elements of the Services' DPS policy and is a valid DPS (U.S. Wood Stork DPS).
- When the U.S. breeding population of wood stork was listed in 1984, the population was known to occur in Alabama, Florida, Georgia, and South Carolina with breeding and nesting primarily in south and central Florida with a small number of nesting colonies in north Florida, Georgia, and South Carolina. Currently wood storks occur in Alabama, Florida, Georgia, Mississippi, North Carolina, and South Carolina, with breeding and nesting documented in Florida, Georgia, North Carolina, and South Carolina.
- The best available scientific and commercial data indicate that, since the U.S. breeding population of wood stork was listed as endangered in 1984, the breeding population has been increasing and its breeding range has expanded significantly.
- We have had 3-year population averages of total nesting pairs of wood storks higher than 6,000 nesting pairs since 2003. In addition, productivity appears to be sufficient to support a growing population. However, the 5-year average number of nesting pairs is still below the benchmark of 10,000 nesting pairs identified in the recovery plan for delisting.
- As a result of continued loss, fragmentation, and modification of wetland habitats in parts of the wood stork's range, we determine that the U.S. wood stork DPS meets the definition of a threatened species under section 3 of the Act, and we are reclassifying it from endangered to threatened.

Background

Summary of Comments and Recommendations

In the proposed rule published on December 26, 2012 (77 FR 75947), we requested that all interested parties submit written comments on the proposal by February 25, 2013. We also contacted appropriate Federal and State agencies, scientific experts and organizations, and other interested parties and invited them to comment on the proposal. In addition, the Service notified affected Tribes about the proposed rule. A newspaper notice inviting general public comment was published in several newspapers in the southeastern United States. We did not receive any requests for a public hearing; therefore, none were conducted.

Peer Review, State, and Tribal Comments

In accordance with our peer review policy published on July 1, 1994 (59 FR 34270), we solicited independent expert opinions from four individuals who have scientific expertise that included familiarity with wood storks and their habitat, biological needs, recovery efforts, threats, and conservation biology principles. We invited peer reviewers to comment on the specific assumptions and conclusions in the proposed reclassification of the U.S. breeding population. We received comments from all four of the peer reviewers. The peer reviewers supported our conclusions and provided additional information, clarifications, and suggestions to improve the final rule.

Section 4(b)(5)(A)(ii) of the Act states that the Secretary must give actual notice of a proposed regulation under section 4(a) to the State agency in each State in which the species is believed to occur, and invite the comments of such agency. Section 4(i) of the Act states, ''the Secretary shall submit to the State agency a written justification for his failure to adopt regulations consistent with the agency's comments or petition.'' The Service submitted the proposed regulation to the States of Alabama, Florida, Georgia, Mississippi, North Carolina, and South Carolina. We received formal comments from the Florida Fish and Wildlife Conservation Commission, Georgia Department of Natural Resources (DNR), and North Carolina Wildlife Resources Commission. All three agencies support reclassification of the wood stork from endangered to threatened. The Mississippi Museum of Natural Science provided additional information about wood storks in Mississippi for the Service to consider.

In addition, the Service notified affected Tribes about the proposed rule. We did not receive any comments from Tribes.

(1) Comment: A peer reviewer and the Georgia DNR stated concerns and challenges that may influence future recovery of the wood stork due to climate change.

Our Response: Aspects of climate change such as sea level rise and associated tidal or storm surges, changes in rainfall patterns, storm frequency and intensity, and seasonal changes in temperature could affect the extent and quality of wood stork habitat, nesting success, and the range of the species. Any of these changes could impact the future viability of wood stork populations, either positively or negatively. Our assessments related to habitat (Factor A, below) and other natural and human influences (Factor E, below) have been expanded to more directly address observed changes and plausible projections of climate change, and related possible impacts to the wood stork. Although the information did not alter our decision to change the status of the wood stork DPS form endangered to threatened, we concur that the effects of climate change will influence the recovery of the wood stork.

As additional data and modeling become available from various scientific sources, and as conservation recommendations from the Landscape Conservation Cooperatives and others are developed for addressing the varied effects of climate change and its interactions with other conditions, it will no doubt inform recovery planning and implementation. We intend to further address climate change effects as we update the wood stork recovery plan, using the best scientific information available at that time.

(2) Comment: A peer reviewer suggested adding information and citations regarding the accuracy of the annual synoptic nesting surveys.

Our Response: We added information regarding synoptic nesting surveys in the *Rangewide Status and Demographics* section of this document. Rodgers *et al.* (1995, p. 656) indicates that aerial surveys generally underestimate counts and Rodgers *et al.* (2005, p. 230) indicates that by including ground counts in the survey and surveying a large proportion of the nesting colonies, the variability can be reduced. We have also incorporated this recommendation into the annual synoptic nest survey protocol.

(3) Comment: Peer reviewers provided additional information and citations on several topics including: natural colony turnover rates, colony distribution in the northern range, colony threats and management, mercury, avian malaria and pythons.

Our Response: We incorporated this information and the citations directly into the final determination.

(4) Comment: The Georgia DNR commented that many years of productivity data exist for colonies in Georgia, though only data from 2004 and 2005 were included in the reclassification proposal. Georgia DNR compiled, assessed, and provided the productivity data that it has collected for 32 colonies beginning in 1983, which represents more than 6,400 nests, representing 158 colony-years.

Our Response: We incorporated the data into the *Mating and Reproduction* section of this document. We have also compiled the productivity data from our files for the U.S. breeding population of wood storks and have made it available through our Web site at *http://www.fws.gov/northflorida/WoodStorks/wood-storks.htm.* We note that methods used to collect productivity data vary by colony and by area and that the USFWS recommends, when feasible, utilizing Rodgers (2005) *Protocol for Monitoring the Reproductive Success of Wood Storks in the Southeast United States* as the recommended scientific method for collecting productivity data to assess recovery.

Public Comments

We received 16 comments and letters from the public: 12 individuals, a timber company, and 3 conservation organizations. All substantive information provided during the comment period has either been incorporated directly into this final determination or addressed below.

(5) Comment: Reclassification/downlisting should not occur when FWS lacks data to determine whether one of the criteria for reclassification/downlisting has been met.

Our Response: Recovery plans are useful tools to guide conservation activities and to gauge the status of the species. However, there are many paths to accomplishing recovery of a species, and recovery may be achieved without all recovery criteria being fully met. The overriding considerations in determining listing status are the five factors listed in section 4(a)(1) of the Act. Current data indicate that since the U.S. breeding population of wood stork was listed as endangered in 1984, it has been increasing and the breeding range has expanded significantly. Productivity has supported a growing population, reducing the relative negative effects of the remaining threats to this species to the extent that the species is no longer in danger of extinction throughout all or a significant portion of its range. On balance, and in consideration of the best scientific and commercial information available, the Service believes the species best meets the definition of a threatened species. For more details of our status review, see **Summary of Factors Affecting the Species**. For additional information on the role of recovery plans, see the **Recovery Plan** section of this document.

(6) Comment: Wood stork populations in south Florida are too low and nesting success is too variable to warrant reclassification.

Our Response: We have seen substantial population growth, but we acknowledge that wood storks have had variable nesting success in south Florida. However, nesting numbers in south Florida have increased since 1986 with nesting goals being met in 5 of the past 12 years (Frederick 2013, p. 35; Table 21). We believe the final rule adequately considers both the threats and positive management actions in south Florida and, in conjunction with improvements throughout an expanded range, the species warrants reclassification from endangered to threatened. The U.S. wood stork DPS revised status as threatened acknowledges that threats to the long-term viability of the species remain.

We share the concern that the timing of nesting is not improving in the Everglades and productivity has been variable and in some years low. As several commenters noted, in 2012, most of the wood stork nests in Everglades National Park failed. Later nesting increases the risk of mortality of nestlings that have not fledged prior to the onset of the wet season (Frederick 2012, p. 44). We acknowledge that restoration of key historical hydropatterns has not fully occurred under current water management regimes. These restoration efforts take time, and will need to be adjusted as appropriate in light of emerging information and conditions related to a changing climate.

Additionally, we share the concern regarding the lack of wood stork nesting at Corkscrew Swamp Sanctuary in recent years. Our recovery partners have indicated and documented that the loss of shallow, short hydroperiod wetlands is likely a leading factor causing or contributing to this issue. We also note that, during this time period, the average rainfall for the Southwest Coast basin has been below normal (*http://www.sfwmd.gov/portal/page/portal/xweb%20weather/rainfall%20historical%20%28year-to-date%29* for 2010–2012), resulting in drought conditions, which likely contributed to, magnified, or caused this problem. Various effects of a changing climate could influence the availability of suitable nesting and foraging habitat conditions in both negative and positive ways, depending on the magnitude and timing of changes in temperature and precipitation. We intend to work with partners to use the best scientific information available as we develop specific recovery actions regarding mitigation and restoration of shallow, short hydroperiod wetlands within the core foraging area of Corkscrew Swamp Sanctuary and other colonies as necessary.

TABLE 3 [1]—THREE-YEAR AVERAGES OF WOOD STORK NESTING

3-Year averages	Everglades [1]	South Florida [2] total	Florida total	U.S. total [3]
1999–2001	1,538			
2000–2002	1,868			
2001–2003	1,596	3,179	4,838	7,417
2002–2004	1,191	2,889	5,332	8,349
2003–2005	742	2,109	4,278	7,588
2004–2006	800	2,814	4,749	8,410
2005–2007	633	2,516	3,691	7,086
2006–2008	552	2,374	3,536	7,268
2007–2009	1,468	3,393	4,273	7,748
2008–2010	1,736	3,700	5,031	8,993
2009–2011	2,263	4,628	6,183	10,147
2010–2012	1,182	3,022	4,553	8,724
2011–2013	1,686	3,671	5,593	9,692

[1] Comprehensive Everglades Restoration Program Goal: 3-year average of 1,500–2,500; (Frederick 2013, p. 36, Table 21); Recovery Goal: 5-year average of 2,500.

[2] Broward, Charlotte, Collier, Hardee, Hendry, Indian River, Lee, Martin, Miami-Dade, Monroe, Osceola, Palm Beach, Polk, Sarasota, St. Lucie; South Florida MSRP Goal: 5-year average of 3,500 (USFWS 2001).

[3] Florida, Georgia, North Carolina, South Carolina; Reclassification Goal: 3-year average of 6,000; Recovery Goal: 5-year average of 10,000 (USFWS 2013).

(7) Comment: Several commenters stated that, under the Act, less protection is afforded to a threatened species than to an endangered species, referencing the Service's ''What Is the Difference Between Endangered and Threatened?'' document at *http://www.fws.gov/endangered/esa-library/pdf/t-vs-e.pdf.* Another commenter specifically stated that downlisting the wood storks from endangered to threatened would allow USFWS to scale back protection, expanding the circumstances under which ''take'' is permitted, and under which permits for ''take'' may be issued.

Our Response: Section 4(d) of the Act allows the Service to issue such regulations that the Secretary of the Interior deems necessary and advisable to conserve the species. It must be noted, however, that by regulation at 50 CFR 17.31(a), the Service affords a threatened species the same protections and prohibitions under section 9 of the Act as those given to endangered species (with an exception pertaining to take by an authorized agent of a State) unless or until a 4(d) rule is specifically promulgated. As no 4(d) rule was proposed for the U.S. wood stork DPS, the section 9 prohibitions against take continue to apply per 50 CFR 17.31(a) and, therefore, reclassification will not significantly change the protection afforded this species under the Act.

(8) Comment: The Service should ''designate'' two regions of wood stork habitat, ''South Florida'' and ''Coastal Tidal Wetlands,'' as ''Significant Portions of the Range'' as the Service considers the next steps for recovery.

Our Response: ''Significant portion of the range,'' a term found in the definitions of endangered and threatened (Section 3 of the Act), is a consideration in the determination of whether the threats in one portion of a species' range are of such impact to the overall viability of the species that it warrants listing throughout the entire range. Current data show that the breeding range has now almost doubled in extent and shifted northward along the Atlantic coast as far as southeastern North Carolina. As a result, dependence of wood storks on any specific wetland complex has been reduced. See the **Significant Portion of the Range Analysis** of this rule for our detailed discussion of why South Florida does not represent a significant portion of the range. In addition, wood storks are known to utilize numerous habitat types. These include coastal tidal

[1] Table 3 has been created to address certain comments received. We have named it Table 3 even though it is included here before Tables 1 and 2, so as not to confuse readers by changing the Table numbering in the final rule with respect to the numbering in the proposed rule. Information from this table has been incorporated directly into the Background section of the final rule without repeating the entire table.

wetlands and marsh, lakes, and ponds, interior marsh systems, and manmade impoundments (e.g., Harris Neck NWR and Washo Reserve). This ability is advantageous for the wood stork and is one of the reasons for its improved status.

However, the commenter's recommendations will be considered during future recovery planning in determining whether the South Florida, Coastal Tidal Wetlands, or other regions should be considered as management or recovery units for the species. We intend to continue working with partners under our recovery program to restore and protect all types of habitat used by the U.S. wood stork DPS.

(9) Comment: The Service should delay implementation of the proposed reclassification rule until the science questions and gaps, data analyses, and regulatory deficiencies have all been addressed.

Our Response: The wood stork no longer meets the definition of endangered. The rule recognizes the improved status of the species from endangered (*i.e.,* currently in danger of extinction) to threatened (*i.e.,* one which is likely to become an endangered species in the foreseeable future) as a result of documented improvement in the species' population, and is based on the best available science including information regarding ongoing and likely foreseeable changes in conditions that are relevant to the DPS. The species' revised status as threatened acknowledges that threats to the long-term viability of the species remain. Implementation of the rule will not reduce any protective measures currently in place.

(10) Comment: By citing predictions that the Comprehensive Everglades Restoration Program (CERP) restoration, when fully realized, will result in large, sustainable, breeding populations of wading birds, the Service dismisses the potential for wood storks to be biologically extirpated from the Everglades. The commenter is reluctant to consider ongoing and long-term restoration efforts due to the multi-generational timeframe of the anticipated benefits.

Our Response: As Table 2 (see Background discussion) shows, wood storks continue to nest in South Florida (including the Everglades); for 7 of the last 10 years there have been over 1,200 nesting pairs. In addition, Table 3 indicates that since 2007, 3-year averages of nesting pairs in South Florida and the Everglades have been over 3,000 and 1,100, respectively. We acknowledge that productivity has been variable in South Florida; however, wood storks continue to nest in this area. Wood storks are a long-lived species that demonstrates considerable variation in the habitat conditions it is able to utilize and in population numbers in response to changing hydrological conditions. As indicated in our analysis of the factors that are a basis for determining whether the DPS meets the definition of an endangered or threatened species, and in our section on ''Significant Portion of the Range,'' we have carefully considered various potential changes to the DPS. This includes recognizing that CERP restoration efforts and their outcomes in relation to the wood stork in South Florida may differ from what has been expected in the past, particularly due to the potential effects of climate change, and it also recognizes that adjustments in those restoration efforts may be needed as new information and conditions emerge. This does not mean, however, that we believe the data currently available support a conclusion that wood storks are likely to be biologically extirpated from the Everglades.

(11) Comment: The proposed rule did not contain analysis of any of the available models projecting sea level rise within the wood stork's breeding range.

Our Response: Please see our response to Peer Review Comment 1 and the information on projections of sea level rise that we have included, particularly in the material presented under Factor A, below.

(12) Comment: The conservation of existing shallow wetlands and restoration of former shallow wetlands is essential to stabilizing and recovery of the wood stork in South Florida.

Our Response: We agree and intend to further address this as a priority recovery action with partners in South Florida. We note also such actions will need to consider likely changing conditions (e.g., those that may result from sea level rise and associated tidal and storm surge, as well as changes in precipitation and other variables that may influence the near-term and long-term availability of suitable habitat conditions).

Summary of Changes From the Proposed Rule

During the comment period, peer reviewers provided additional information and citations on several topics including: Natural colony turnover rates, colony distribution in the northern range, colony threats and management, mercury, avian malaria, and pythons. We incorporated this information and the citations directly into this final rule. State agencies provided updated productivity data that we added to the final rule along with additional productivity data we pulled and evaluated from sources. We also added information and citations regarding the accuracy of the annual synoptic nesting surveys and 2012 and 2013 data counts to Table 1 and Table 2. In addition, based on comments received, we provided more details about ongoing and projected climate change and associated effects in relation to the wood stork DPS covered by this rule. None of these changes from the proposed rule altered our conclusion that the DPS now meets the Act's definition of a threatened species.

In this final rule, we intend to discuss only those topics directly relevant to the reclassification and new information provided during the open comment period. For more information on the biology of this species (specifically the *Taxonomy and Species Description, Life Span,* and *Feeding* sections), refer to the 12-month finding and proposed rule to reclassify the U.S. breeding population of the wood stork which published in the **Federal Register** on December 26, 2012 (77 FR 75947).

The biological information has been updated with literature and information provided during the public comment period and from our files. The following section summarizes information found in a large body of published literature and reports, including the revised recovery plan for the U.S. breeding population of the wood stork (USFWS 1997), The Birds of North America Online species account for wood stork (Coulter *et al.* 1999), and the South Florida Multi-Species Recovery Plan (USFWS 1999).

Mating and Reproduction

Wood storks are seasonally monogamous, probably forming a new pair bond every season. First breeding has been documented at 3 and 4 years old. Nest initiation varies geographically. Wood storks can lay eggs as early as October and as late as June in Florida (Rodgers 1990, pp. 48–51). Wood storks in north Florida, Georgia, and South Carolina initiate nesting on a seasonal basis regardless of environmental conditions (USFWS 1997, p. 6). They lay eggs from March to late May, with fledging occurring in July and August. Historically, nest initiation in south Florida was in November to January; however, in response to the altered habitat conditions (wetland drainage, hydroperiod alteration) in south Florida, wood storks nesting in Everglades National Park and in the Big Cypress region of Florida have delayed initiation of nesting to February or March in most years since the 1970s. Colonies that start after January in south Florida risk having young in the nests when May–June rains flood marshes and disperse fish, which can cause nest abandonment. Frederick (2012, p. 44) states that later nesting increases the risk of mortality of nestlings that have not fledged prior to the onset of the wet season, which is likely the difference between the south Florida segment of the population being a source or a sink to the wood stork population. Based upon their analysis of fledgling survival, Borkhataria *et al.* 2012 (p. 525) also note the possibility that south Florida is acting as a population sink.

Females generally lay a single clutch of two to five eggs per breeding season, but the average is three eggs. Females sometimes lay a second clutch if nest failure occurs early in the season (Coulter *et al.* 1999, p. 11). Average clutch size may increase during years of favorable water levels and food resources. Incubation requires about 30 days and begins after the female lays the first one or two eggs. Nestlings require about 9 weeks for fledging, but the young return to the nest for an additional 3 to 4 weeks to be fed. Actual colony production measurements are difficult to determine because of the prolonged fledging period, during which time the young return daily to the colony to be fed.

Wood storks experience considerable variation in production among colonies, regions, and years in response to local and regional habitat conditions and food availability (Kahl 1964, p. 115; Ogden *et al.* 1978, pp. 10–14; Clark 1978, p. 183; Rodgers and Schwikert 1997, pp. 84–85). Several recent studies documented production rates to be similar to rates published between the 1970s and 1990s. Rodgers *et al.* (2008, p. 25) reported a combined production rate for 21 north- and central-Florida colonies from 2003 to 2005 of 1.19 ± 0.09 fledglings per nest attempt (n = 4,855 nests). Rodgers *et al.* (2009, p. 3) also reported the St. Johns River basin production rate of 1.49 ± 1.21 fledglings per nest attempt (n = 3,058 nests) and for successful nests an average fledgling rate of 2.26 ± 0.73 fledglings per nest attempt (n = 2,105 nests) from 2004 to 2008.

Bryan and Robinette (2008, p. 20) reported rates of 2.3 and 1.6 fledged young per nesting attempt in 2004 and 2005, respectively, for South Carolina and Georgia. The 2011, 2012, and 2013 productivity rates for Georgia were 1.32, 1.13, and 0.67 (T. Keyes, Georgia DNR, pers. comm., 2012 and 2013). During the data collection period of 1983–2012 in Georgia, the weighted average of all years and colonies was 1.76±0.8 (158 colony-years) with a range of 0.33 to 2.65 (T. Keyes, Georgia DNR, pers. comm., 2013). Murphy and Coker (2008, p. 5) reported that since the wood stork was listed in 1984, South Carolina colonies averaged 2.08 young per successful nest with a range of 1.72 to 2.73. In 2011, South Carolina productivity was 1.6 fledged young per nest at two colonies, 1.1 in 2012 at seven colonies monitored, and 1.4 in 2013 at nine colonies monitored (C. Hand, South Carolina DNR, pers. comm., 2013).

The Palm Beach County Solid Waste Authority colony was documented with 1.08, 0.46, and 0.52 fledgling per nesting attempt in 2011, 2012 and 2013, respectively (M. Morrison, PBC, pers. comm., 2013). The Corkscrew Swamp Sanctuary colony near Naples, Florida (J. Lauritsen, Audubon, pers. comm., 2012), documented no nesting in 2010–13, which also coincides with years with drought conditions for this basin (*http://www.sfwmd.gov/portal/page/portal/xweb%20weather/rainfall%20historical%20%28year-to-date%29* for 2010–2012). Productivity was 2.29 fledglings per nesting attempt in 2009, and annual rates ranged from 0.00 (abandonment) to 2.55 (2001–2013). Cook (2011, p. 2) reports that the 2011 productivity in the Everglades was relatively low, that all 820 nests failed in 2012 (Cook 2012, p. 2). In 2013, wood storks were largely successful in the Water Conservation Areas, Tamiami West colony in the northern Everglades and lower in the southern Everglades (Cook 2013, p. 2). The U.S. breeding population of the wood stork's productivity data that have been collected using the method developed by Rogders (2005) is available at: *fws.gov/northflorida/wood storks.*

Habitat

Wood storks use a wide variety of freshwater and estuarine wetlands for nesting, feeding, and roosting throughout their range and thus are dependent upon a mosaic of wetlands for breeding and foraging. For nesting, wood storks generally select patches of medium to tall trees as nesting sites, which are located either in standing water such as swamps, or on islands surrounded by relatively broad expanses of open water (Ogden 1991, p. 43). Colony sites located in standing water must remain inundated throughout the nesting cycle to protect against predation and nest abandonment. Connectivity to the mainland is a hazard to the colony longevity and persistence (Tsai *et al.* 2011, p. 5). A wood stork tends to use the same colony site over many years, as long as the site remains undisturbed, and sufficient feeding habitat remains in the surrounding wetlands (Frederick and Ogden 1997, p. 320). Colony turnover is a typical and fairly rapid process for this species (Frederick and Meyer 2008, p. 12). Wood storks may also abandon traditional wetland sites if changes in water management result in water loss from beneath the colony trees.

Typical foraging sites include a mosaic of shallow water wetlands. Several factors affect the suitability of potential foraging habitat for wood storks. Foraging habitats must provide both a sufficient density and biomass of forage fish and other prey and have vegetation characteristics that allow storks to locate and capture prey. Calm water, about 5 to 40 cm (2 to 16 in) in depth, and free of dense aquatic vegetation, is preferred (Coulter and Bryan 1993, p. 61). During nesting, these areas must also be sufficiently close to the colony to allow storks to deliver prey to nestlings efficiently. Hydrologic and environmental characteristics have strong effects on fish density, and these factors may be some of the most significant in determining foraging habitat suitability. Important to wood stork productivity is the timing of two different factors of wetland hydrology. The production of prey that support a wood stork colony is directly related to uninterrupted hydro periods of certain durations prior to the nesting season and then prey becoming available due to short-term drawdown of water levels that cue and support wood stork nesting.

Alterations in the quality and amount of foraging habitats in the Florida Everglades and extensive drainage and land conversions throughout south Florida led to the initial decline of the wood stork nesting population and the change in the timing and location of nesting in response to the alterations in hydrology and habitat (Ogden 1994, p. 566). The overall distribution of the breeding population of wood storks is in transition. The wood stork appears to have adapted to changes in habitat in south Florida in part by nesting later, nesting in colonies in the interior Everglades system (Ogden 1994, p. 566), and by expanding its breeding range north into Georgia, South Carolina, and North Carolina (Brooks and Dean 2008, p. 58). To date, many of the colonies in the more northern range extension are much smaller than historic colonies in south Florida and this may be the factor of a more linear distribution of foraging habitats with wetlands associated with rivers, inter-tidal wetlands, isolated wetlands and marsh impoundments (Murphy and Coker 2008, p. 3).

Distribution

The wood stork occurs in South America from northern Argentina, eastern Peru, and western Ecuador, north into Central America, Mexico, Cuba, Hispaniola, and the southern United States. The breeding range includes the southeastern United States in North America, Cuba and Hispaniola in the Caribbean, and southern Mexico through Central America (Figure 1). In South America, the breeding range is west of the Andes south from Colombia to western Ecuador, east of the Andes from Colombia south through the Amazonas in Brazil to eastern Peru, northern Bolivia and northern Argentina east to the Atlantic coast through Paraguay, Uruguay, and north to the Guianas and Venezuela (Figure 1; Coulter *et al.* 1999, p. 2). The winter range in Central and South America is not well studied, but wood storks are known to occur year-round as a resident throughout the breeding range.

At the time of listing in 1984, the range of the U.S. population of wood storks was Florida, Georgia, South Carolina, and Alabama. Breeding was restricted primarily to 22 nesting colonies in peninsular Florida in 1983 and only four colonies occurring in Georgia and South Carolina. The current breeding range includes peninsular Florida (39–57 colonies 2010–2013), the coastal plain and large river systems of Georgia (17–28 colonies) and South Carolina (14–23 colonies), and southeastern North Carolina (1–3 colonies). The breeding range has expanded west to south-central Georgia and to the panhandle of Florida to the Apalachicola River system. The nesting colony database for the U.S. breeding population of the wood stork can be found at *http://www.wec.ufl.edu/faculty/frederickp/woodstork/.* The nonbreeding season range includes all of Florida; the coastal plains and large river systems of Alabama, Georgia, South Carolina; and southern North Carolina and eastern Mississippi.

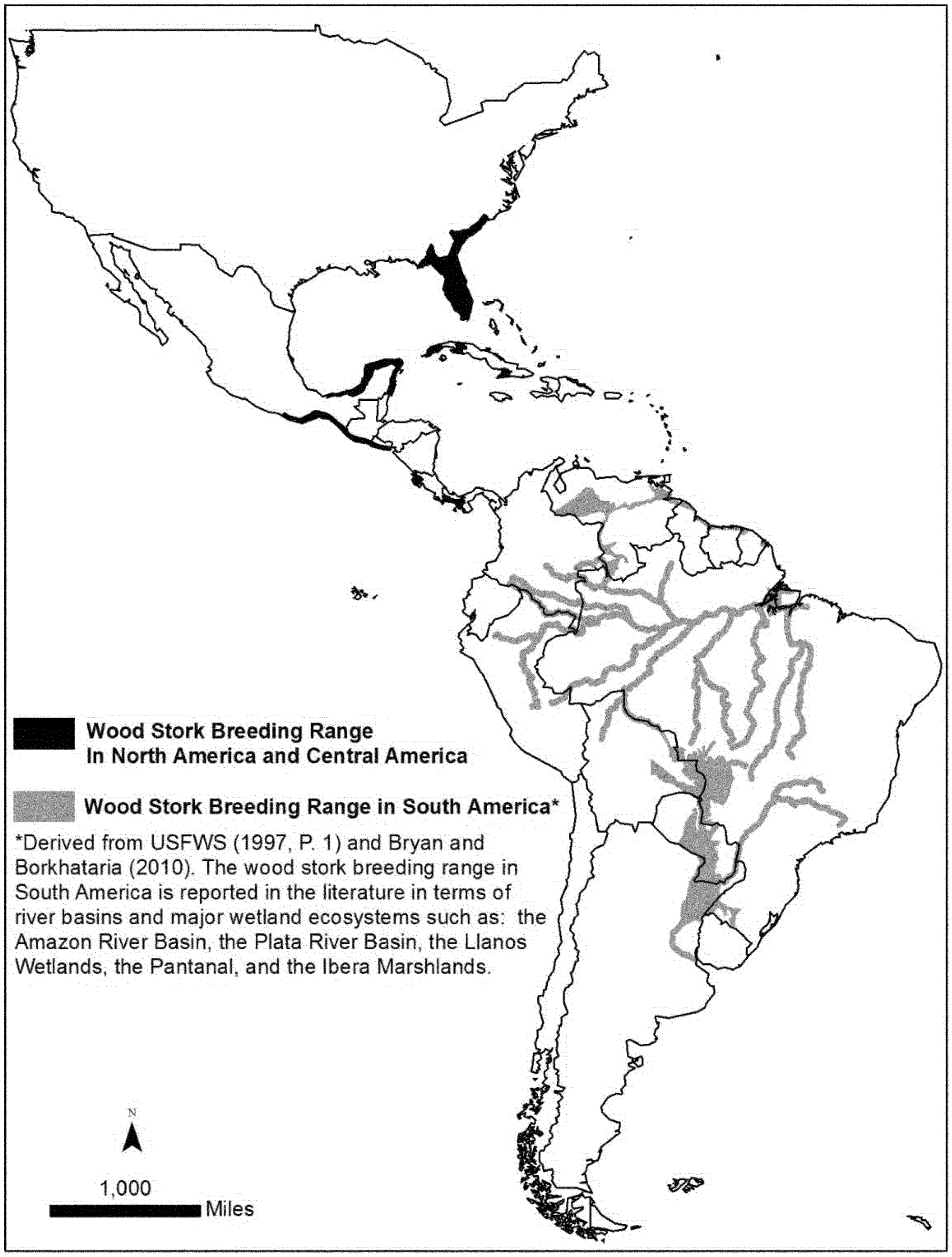

Figure 1. Breeding range of the wood stork in North, Central, and South America (USFWS 1997, p. 1; Coulter *et al.* 1999, p. 1; Bryan and Borkhataria 2010).

Wood storks are not true migrants, but some individuals do undergo lengthy inter-regional travel in response to resource availability (Coulter *et al.* 1999, p. 3; Bryan *et al.* 2008, p. 39). Generally, wood storks disperse following breeding. As the rainy season begins in May in south Florida and the Everglades, post-breeding wood storks, fledglings, and juveniles disperse throughout peninsular Florida and many move northward along the coastlines and coastal plain of Georgia, South Carolina, North Carolina and westward along large river basins in Alabama and eastern Mississippi, while others do not disperse (Coulter *et al.* 1999, p. 2; Hylton 2004, pp. 50–52; Bryan *et al.* 2008, pp. 39–40). Individuals from northern Florida, Georgia, and South Carolina colonies also disperse across the coastal plain and coastal marshes in the southeastern United States in July to August after the breeding season. Most wood storks in this population winter in south and central Florida and along the coast of peninsular Florida, Georgia, and South Carolina. These inter-regional movements have been documented through color marking, banding, radio-telemetry and satellite-telemetry studies (Comer *et al.* 1987, p. 165; Ogden 1996, p. 34; Coulter *et al.* 1999, p. 4; Savage *et al.* 1999, p. 65; Bryan *et al.* 2008, pp. 39–41).

Wood storks are seasonal visitors in Texas, Louisiana, the lower Mississippi Valley, and California. These are post breeders and juveniles from Central America (Rechnitzer 1956, p. 431; Coulter *et al.* 1999, pp. 4–5). Bryan *et al.* (2008, pp. 39–40) suggest that wood storks observed in western Mississippi and Louisiana originate from Central America, and wood storks found in eastern Mississippi originate from the U.S. population. Behaviorally, wood storks are not predisposed to travel across open waters like the Gulf of Mexico, as they use thermals for soaring flight for long-distance movements. The lack of thermals over open water restricts movements back and forth across the Gulf of Mexico from Florida to Central and South America or the Caribbean.

Rangewide Status and Demographics

At the global level, the International Union for Conservation of Nature (IUCN) classifies the wood stork as a species of ''least concern.'' This is due to the apparent demographic stability documented in its large range that encompasses portions of North, Central, and South America (IUCN 2010, p. 1). Bryan and Borkhataria (2010, p. 2) compiled and summarized the conservation status for wood storks in Central and South America and provide the following description with regard to the rangewide status of the wood stork:

> The IUCN Red List/BirdLife International listing classifies the wood stork as a species of ''least concern'' for its entire range (BirdLife International 2008, 2009). This classification is based on breeding/resident range size, population trends, population size. This classification is due in part to an extremely large global breeding range (estimated at 14,000,000 km^2) and a moderately small to large population estimate (38,000–130,000 birds). Although the species' global population trend is thought to be decreasing, the decline is not thought to be sufficiently rapid to reach critical thresholds to threaten the species (BirdLife 2009: a ''vulnerable'' population exhibits a >30% decline over 10 years or three generations). Population size estimates for South America range from 50,000–100,000 wood storks (Byers *et al.* 1995) and approximately 48,000–70,000 wood storks in Central and North America (Kushlan *et al.* 2002).

Also, a recent assessment aimed at identifying the world's most climate vulnerable species across many taxa included consideration of the wood stock throughout its entire range in North, Central and South America. The assessment concluded that the relative overall climate change vulnerability of the wood stork is low (Foden *et al.* 2013, Appendix A).

The U.S. wood stork population decline between 1930 and 1978 is attributed to reduction in the food base necessary to support breeding colonies, which is thought to have been related to loss of wetland habitats and changes in hydroperiods (Ogden and Nesbitt 1979, p. 521; Ogden and Patty 1981, p. 97; USFWS 1997, p. 10; Coulter *et al.* 1999, p. 18). The U.S. breeding population is considered regionally endangered by IUCN due to habitat degradation (IUCN 2011). Ogden (1978, p. 143) concluded the U.S. wood stork breeding population in the 1930s was probably less than 100,000 individuals, or between 15,000 and 20,000 pairs. The estimated U.S. population of breeding wood storks throughout the southeastern United States declined from 15,000–20,000, to about 10,000 pairs in 1960, to a low of 2,700–5,700 pairs between 1977 and 1980 (Ogden *et al.* 1987, p. 752). The low of 2,700 nesting pairs was documented in 1978, during the severe drought when many wood storks likely did not breed.

During the 29-year period since listing under the Act (1984 to 2013), 20 synoptic surveys of nesting colonies of the wood stork in the U.S. population's breeding range (Florida, Georgia, South Carolina, and North Carolina) were completed. Fourteen of those resulted in counts exceeding 6,000 pairs. Ten of those higher counts occurred since 2002 (2002, 2003, 2004, 2006, 2008, 2009, 2010, 2011, 2012, and 2013; Table 1; USFWS 2013). Three counts of more than 10,000 pairs have occurred during the past 8 years, and the count of 12,720 pairs in 2009 is the highest on record since the early 1960s. This population estimate along with a conservative estimate of 4,000 pre-breeding age birds suggest 30,000 storks were inhabiting the United States in 2009 (Bryan and Borkhataria 2010, p. 2). Nest counts were 8,149 in 2010, 9,579 in 2011, 8,452 in 2012, and 11,046 in 2013 (Table 1).

The Service and its partners have used synoptic aerial surveys to monitor the wood stork breeding population during the peak of the nesting season (April) since the mid-1970s. The Service acknowledges the limitations involved in relying on aerial surveys for developing wood stork population estimates as they may underestimate numbers of nests (Rodgers *et al.* 1995, p. 655). Frederick *et al.* (2003, p. 282) found that accuracy of aerial counts of wading birds can be quite high and Rodgers *et al.* (2005, p. 230) found that, by including ground counts in the survey and surveying a large proportion of the nesting colonies, the variability can be reduced. The Service notes that the wood stork is a long-lived species that demonstrates considerable variation in nesting population numbers in response to changing hydrological conditions. This long reproductive lifespan allows wood storks to tolerate reproductive failure in some years, and naturally occurring events have undoubtedly always affected the breeding success of this species, causing breeding failures and variability in annual nesting (USFWS 1997, p. 11) and productivity.

TABLE 1—WOOD STORK NESTING DATA IN THE SOUTHEASTERN UNITED STATES [USFWS 2013]

Year	Total		Florida		Georgia		South Carolina		North Carolina	
	Nesting pairs	Colonies	Nesting pairs	Colonies	Nesting pairs	Colonies	Nesting pairs	Colonies	Nesting pairs	Colonies
1975	9,752	27	9,610	24	142	3				
1976	5,310	17	5,294	16	16	1				
1977	5,263	25	5,125	21	138	4				
1978	2,695	18	2,595	16	100	2				
1979	4,648	24	3,800	22	55	2				
1980	5,063	25	4,766	20	297	5				
1981	4,442	22	4,156	19	275	2	11	1		
1982	3,575	22	3,420	18	135	2	20	1		
1983	5,983	25	5,600	22	363	2	20	1		
1984	6,245	29	5,647	25	576	3	22	1		
1985	5,193	23	4,562	30	557	5	74	1		
1986	....	....	(**)	....	648	4	120	3		
1987	....	....	(**)	....	506	5	194	3		

TABLE 1—WOOD STORK NESTING DATA IN THE SOUTHEASTERN UNITED STATES [USFWS 2013]—Continued

Year	Total		Florida		Georgia		South Carolina		North Carolina	
	Nesting pairs	Colonies	Nesting pairs	Colonies	Nesting pairs	Colonies	Nesting pairs	Colonies	Nesting pairs	Colonies
1988	....	....	(**)	....	311	4	179	3		
1989	....	....	(**)	....	543	6	376	3		
1990	....	....	(**)	....	709	10	536	6		
1991	4,073	37	2,440	25	969	9	664	3		
1992	....	....	(**)	....	1,091	9	475	3		
1993	6,729	43	4,262	29	1,661	11	806	3		
1994	5,768	47	3,588	26	1,468	14	712	7		
1995	7,853	54	5,523	31	1,501	17	829	6		
1996	....	....	(**)	....	1,480	18	953	7		
1997	....	....	(**)	....	1,379	15	917	8		
1998	....	....	(**)	....	1,665	15	1,093	10		
1999	7,768	71	6,109	51	1,139	13	520	8		
2000	....	....	(**)	....	566	7	1,236	11		
2001	5,582	44	3,246	23	1,162	12	1,174	9		
2002	7,855	70	5,463	46	1,256	14	1,136	10		
2003	8,813	78	5,804	49	1,653	18	1,356	11		
2004	8,379	93	4,726	63	1,596	17	2,057	13		
2005	5,572	73	2,304	40	1,817	19	1,419	13	32	1
2006	11,279	82	7,216	48	1,928	21	2,010	13	125	1
2007	4,406	55	1,553	25	1,054	15	1,607	14	192	1
2008	6,118	73	1,838	31	2,292	25	1,839	16	149	1
2009	12,720	86	9,428	54	1,676	19	1,482	12	134	1
2010	8,149	94	3,828	51	2,708	28	1,393	14	220	1
2011	9,579	88	5,292	45	2,160	19	2,031	23	96	1
2012	8,452	77	4,539	39	1,905	17	1,827	19	181	2
2013	11,046	100	6,948	57	1,873	19	2,020	21	205	3

** No survey data available for North and Central Florida.

Previous Federal Actions

For more information on previous Federal actions, refer to the 12-month finding and proposed rule to reclassify the U.S. breeding population of the wood stork (77 FR 75947).

Distinct Vertebrate Population Segment Analysis

On February 7, 1996, we published in the **Federal Register** our ''Policy Regarding the Recognition of Distinct Vertebrate Population Segments under the Endangered Species Act'' (DPS Policy) (61 FR 4722). For a population to be listed under the Act as a distinct vertebrate population segment, three elements are considered: (1) The discreteness of the population segment in relation to the remainder of the species to which it belongs; (2) the significance of the population segment to the species to which it belongs; and (3) the population segment's conservation status in relation to the Act's standards for listing, (*i.e.,* is the population segment, when treated as if it were a species, endangered or threatened). The Act defines ''species'' to include ''. . . any distinct population segment of any species of vertebrate fish or wildlife which interbreeds when mature'' (16 U.S.C. 1532(16)). The best available scientific information supports recognition of the U.S. breeding population of the wood stork as a distinct vertebrate population segment. We discuss the discreteness and significance of the population segment within this section; the remainder of the document discusses the status of the U.S. wood stork DPS.

Discreteness

The DPS policy states that a population segment of a vertebrate species may be considered discrete if it satisfies either one of the following conditions:

(1) It is markedly separated from other populations of the same taxon as a consequence of physical, physiological, ecological, or behavioral factors. Quantitative measures of genetic or morphological discontinuity may provide evidence of this separation; or

(2) It is delimited by international governmental boundaries between which significant differences exist in control of exploitation, management of habitat, conservation status, or regulatory mechanisms that are significant in light of section 4(a)(1)(D) of the Act.

Globally, wood storks occur only in the Western Hemisphere and comprise a mosaic of breeding populations in North, Central, and South America, and the Caribbean, each with unique nesting sites, foraging areas, and seasonal movement patterns in response to regional environmental factors. Historically, wood storks nested in all Atlantic and Gulf coastal United States from Texas to South Carolina (Bent 1926, p. 65; Cone and Hall 1970, p. 14; Dusi and Dusi 1968, p. 14; Howell 1932, pp. 113–115; Oberholser 1938, p. 76; Oberholser and Kincaid 1974, p. 124; Wayne 1910), although the colonies outside Florida formed irregularly and contained few birds (Ogden and Nesbitt 1979, p. 512).

Currently, the range of the U.S. breeding population includes Alabama, Florida, Georgia, Mississippi, North Carolina, and South Carolina, with breeding and nesting documented in Florida, Georgia, North Carolina, and South Carolina. The U.S. wood stork population represents the northernmost extent of the wood stork's range and the only population breeding in the United States (USFWS 1997, p. 1; Coulter *et al.* 1999, pp. 2–3). The U.S. population's breeding range is separated by the Strait of Florida from the next nearest nesting population, which is located in Cuba, 151 km (94 mi) away; it is approximately 965 km (600 mi) over the Gulf of Mexico from the other North American nesting colony, which breeds in southern Mexico. However, wood storks are not behaviorally predisposed to travel across the open ocean. Wood storks use thermals for soaring flight for long-distance movements. The lack of thermals over water may restrict movements from Florida to the Caribbean or to Mexico and Central and South America (Coulter *et al.* 1999, p. 4). The available evidence does not suggest that wood storks have crossed the Florida Straits between the Caribbean islands and the United States or crossed the Gulf of Mexico to or from Central and South America.

Lengthy inter- and intra-regional movements, related to food availability, to the wetlands of the Mississippi River Basin and adjacent coastal plain river basins have been documented from both the U.S. population and Central American wood storks (Coulter *et al.* 1999, p. 5; Bryan *et al.* 2008, pp. 40–41). These studies suggest post-breeding dispersal occurs along the coastal plain, not across the Gulf of Mexico, and that wood storks observed in eastern Mississippi originate from the southeastern United States and those observed in western Mississippi and Louisiana originate from Central America. A small percentage of wood storks from both the United States and Central America apparently overlap during this post-breeding season dispersal within Mississippi. Some small but unknown level of mixing may occur between U.S. and Central American breeding populations in Mississippi (Bryan *et al.* 2008, pp. 40–41; R. Borkhataria, University of Florida, pers. comm., 2010). However, based upon satellite-telemetry studies (*e.g.,* Hylton 2004, pp. 50–52; Bryan *et al.* 2008, pp. 39–40; Borkhataria 2009, pp. 120–124) and other marking studies, mixing appears negligible. Based on the above information, if the U.S. population were extirpated, it is our assessment that repopulation from the Central American wood storks would not be sufficient to replenish the depleted population in the foreseeable future.

Genetic data support the conclusion that wood storks occurring in the southeastern United States function as one population. Stangel *et al.* (1990, p. 15) employed starch gel electrophoretic techniques to examine genetic variation in Florida wood stork colonies. The study did not indicate significant allozyme differences within or between colonies. Van Den Bussche *et al.* (1999, p. 1083) used a combination of DNA or allozyme approaches and found low levels of genetic variability and allelic diversity within Georgia and Florida colonies, suggesting one population of wood storks in the southeastern United States. A genetic comparison using mitochondrial DNA (mtDNA) between U.S. and Brazilian wood storks (the north and south ends of the geographic range) reveals that either a demographic decline or a recent evolutionary bottleneck reduced the levels of mtDNA variability of the U.S. population (Lopes *et al.* 2011, p. 1911). The genetic structuring assessment revealed no significant differentiation between the U.S. and Brazilian wood storks, indicating that either the populations were only recently separated or that gene flow continues to occur at low levels, and the haplotype network analysis indicated low levels of gene flow between populations that were closely related in the past (Lopes *et al.* 2011, p. 1911). Genetic studies indicate no significant differences between U.S. and Brazilian wood storks. However, satellite-tracked movements of U.S. and Central American wood storks indicate that U.S. and Brazilian birds likely do not interbreed (Hylton 2004, pp. 50–52; Bryan *et al.* 2008, pp. 39–40; Borkhataria 2009, pp. 120–124). Based on the genetic information, we conclude that a past demographic decline has led to the reduced levels of genetic variability in all populations of wood stork that were studied, that U.S. and other populations were only recently separated, that the southeastern U.S. populations act as a single population, and negligible or very low gene flow occurs between the populations in the United States and Brazil.

Consequently, we conclude, based on the best available information, that the U.S. breeding population of the wood stork is markedly separated from wood stork populations in the Caribbean, Mexico, Central America, and South America based on physical separation and wood stork dispersal behavior.

Significance

The DPS policy states that populations that are found to be discrete will then be examined for their biological or ecological significance to the taxon to which they belong. This consideration may include evidence that the loss of the population would create a significant gap in the range of the taxon. The U.S. breeding population of the wood stork represents the northernmost portion of the species' range in the world (Coulter *et al.* 1999, p. 2) and the only population breeding in the United States. Loss of this population would result in a significant gap in the extent of the species' range. Because the nearest populations in the Caribbean and North America would not likely be able to naturally repopulate the U.S. breeding population if it were extirpated, wood storks would no longer breed in the Everglades and in the salt- and fresh-water wetlands of Florida, Georgia, South Carolina, and North Carolina. Maintaining a species throughout its historical and current range helps ensure the species' population viability and reduce impacts to the species as a whole due to localized stochastic events. Therefore, we find that loss of the U.S. breeding population of the wood stork, whose range has expanded to include Mississippi and North Carolina (USFWS 2007, p. 11), would constitute a significant gap in the range of the species as a whole.

Summary

Based on the above analysis, we conclude that the U.S. breeding population of wood storks meets both the discreteness and significance elements of the 1996 DPS policy. Therefore, we recognize this population as a valid DPS.

Recovery Plan

Section 4(f) of the Act directs us to develop and implement recovery plans for the conservation and survival of endangered and threatened species unless we determine that such a plan will not promote the conservation of the species. The Act directs that, to the maximum extent practicable, we incorporate into each plan:

(1) Site-specific management actions as may be necessary to achieve the plan's goals for conservation and survival of the species;

(2) Objective, measurable criteria which, when met, would result in a determination in accordance with the provisions of section 4 of the Act, that the species be removed from the Federal List of Endangered and Threatened Wildlife and Plants (List); and

(3) Estimates of the time required and cost to carry out the plan's goal and to achieve intermediate steps toward that goal.

Recovery plans are intended to provide guidance to the Service, States, and other partners on methods of eliminating or ameliorating threats to listed species and on criteria that may be used to determine when recovery is achieved. However, recovery plans are not regulatory documents and cannot substitute for the determinations and promulgation of regulations required under section 4(a)(1). Determinations to reclassify a species on the list made under section 4(a)(1) must be based on the best scientific and commercial data available at the time of the determination, regardless of whether these data differ from the recovery plan. They must reflect determinations made in accordance with sections 4(a)(1) and 4(b) of the Act. Specifically, section

4(a)(1) requires that the Secretary determine whether a species is endangered or threatened (or not) because of one or more of five threat factors. Section 4(b) requires the determination made under section 4(a)(1) as to whether a species is endangered or threatened because of one or more of the five factors be based on the best scientific and commercial data available.

In the course of implementing conservation actions for a species, new information is often gained that requires recovery efforts to be modified accordingly. There are many paths to accomplishing recovery of a species, and recovery may be achieved without all criteria being fully met. For example, one or more criteria may have been exceeded while other criteria may not have been accomplished, yet the Service may judge that, overall, the threats have been minimized sufficiently or are not of sufficient imminence, intensity, or magnitude, and the species is robust enough, to reclassify the species from endangered to threatened. In other cases, recovery opportunities may have been recognized that were not known at the time the recovery plan was finalized. These opportunities may be used instead of methods identified in the recovery plan.

Likewise, information on the species may be learned that was not known at the time the recovery plan was finalized. The new information may change the extent that criteria need to be met for recognizing recovery of the species. Overall, recovery of the species is a dynamic process requiring adaptive management, planning, implementing, and evaluating the degree of recovery of a species that may, or may not, fully follow the guidance provided in a recovery plan.

Thus, while the recovery plan provides important guidance on the direction and strategy for recovery and indicates when a rulemaking process may be initiated, the determination to reclassify a species on the Federal List is ultimately based on an analysis of whether the species is endangered or threatened, as defined by the Act. The following discussion provides a brief review of the recovery planning for wood storks, as well as an analysis of the recovery objectives and criteria as they relate to evaluating the status of the species.

We published the original recovery plan for the U.S. breeding population of wood stork on September 9, 1986, and revised it on January 27, 1997 (USFWS 1997). The recovery plan includes reclassification criteria and delisting criteria: The recovery criteria for the U.S. breeding population DPS of wood storks state that reclassification from endangered to threatened could be considered when there are 6,000 nesting pairs and annual average regional productivity is greater than 1.5 chicks per nest per year (both calculated over a 3-year average). Delisting could be considered when there are 10,000 nesting pairs (50 percent of historical population), and annual regional productivity greater than 1.5 chicks per nest per year (both calculated over a 5-year average from the time of reclassification). As a subset of the 10,000 pairs, a minimum of 2,500 successful nesting pairs must occur in the Everglades and Big Cypress systems and 3,500 in the South Florida Ecosystem as defined by the South Florida Multi-Species Recovery Plan (USFWS 1999, p. 4–417).

Recovery Actions

The recovery plan identifies four primary recovery actions for the U.S. breeding population of the wood stork: (1) Protect currently occupied habitat, (2) restore and enhance habitat, (3) conduct applied research necessary to accomplish recovery goals, and (4) increase public awareness. These primary recovery actions have been initiated. Many of the actions listed under these categories are of high priority to implement and are ongoing.

Recovery Task (1): Protect currently occupied habitat. At a minimum, for continued survival of the U.S. breeding population, currently occupied nesting, roosting, and foraging habitat 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. Recovery actions under this recovery task include: (1.1) Locate important habitat, (1.2) prioritize habitat, (1.3) work with private landowners to protect habitat, (1.4) acquire land, (1.5) protect sites from disturbance, and (1.6) use existing regulatory mechanisms to protect habitat.

Recent habitat models (*e.g.,* Gawlik 2002; Herring 2007; Borkhataria 2009; Rodgers *et al.* 2010; Borkhataria *et al.* 2012); ongoing annual monitoring of nesting colonies (*e.g.,* Cook and Koboza 2012; Brooks and Dean 2008; Murphy and Coker 2008; Winn *et al.* 2008; Frederick and Meyer 2008); surveys of nesting colony core foraging areas in Florida, Georgia, and South Carolina (*e.g.,* Herring 2007; Bryan and Stephens 2007; Lauritsen 2010; Tomlinson 2009; Meyer 2010); and satellite-telemetry studies (*e.g.,* Hylton 2004; Hylton *et al.* 2006; Bryan *et al.* 2008; Borkhataria 2009; Lauritsen 2010; Borkhataria *et al.* 2012) are helping to update conservation information and tools that are used to identify, prioritize, protect, restore, and acquire important wood stork habitats. Core foraging areas near large colonies on protected lands, like Corkscrew Swamp Sanctuary in Florida, Harris Neck National Wildlife Refuge in Georgia, and Washo Reserve in South Carolina, have been identified. However, alteration and loss of foraging habitat continues as a threat to recovery, as such habitat continues to be lost today through the continual expansion of the human environment, resulting in new development and associated roads and other infrastructure. The Service has developed a brochure, Wood Stork Conservation and Management for Land Owners, to assist public and private land managers in protecting and restoring wood stork habitat (USFWS 2001). The Wood Stork Habitat Management Guidelines (Ogden 1990) have also been updated (Bryan 2006) and are an important conservation tool to provide guidance on protecting wood storks and their habitats. In an effort to minimize loss of wetland habitats important to wood stork recovery, like those within the core foraging area of a nesting colony, the Service's South and North Florida Ecological Services Field Offices have also developed a ''May Affect'' key to assist regulators with review of wetland dredge and fill permit applications.

Lands being purchased for conservation through Federal, State and private acquisition programs also contribute to wood stork recovery. *Florida Forever* is the largest State public land acquisition program of its kind in the United States with approximately 9.9 million acres managed for conservation in Florida; more than 2.5 million acres were purchased under the *Florida Forever* and *Preservation 2000* programs (*http://www.dep.state.fl.us/lands/fl_forever.htm*). Listed species, wetlands quality, and other attributes that affect wood storks are considered in the ranking criteria for lands purchased in these programs. Southeastern U.S. State natural resource agency acquisition programs include: Florida Forever; Georgia Land Conservation Program; South Carolina Land Legacy and Conservation Bank Act; North Carolina Natural Heritage Trust Fund, Parks and Recreation Trust Fund, Clean Water Management Trust Fund, Agricultural Development and Farmland Preservation Trust Fund; Alabama Forever Wild Trust Fund; and Mississippi Wildlife Heritage Fund. The purpose of these programs is to preserve statewide networks of land and water resources by providing land conservation funding options that may include grants, low interest loans, and tax incentives which augment other private, local, State, and Federal funding sources to achieve the permanent conservation of land through the acquisition of conservation easements and fee simple ownership.

Consistent with the recent adoption of the Department of the Interior policy on climate change adaptation (523 DM 1; *http://elips.doi.gov/elips/0/doc/3741/Page1.aspx*) and a similar policy by the Service (056 FW 1; *http://www.fws.gov/policy/056fw1.html*), we will evaluate and address the impacts of climate change in our planning and decision making, as appropriate. Also, the Landscape Conservation Cooperative (LCC) initiative will likely provide information that informs wood stork recovery through landscape-level conservation strategies to restore, manage, and conserve the biodiversity of the region in the face of both climate change and intense development pressure associated with a rapidly growing human population. Ongoing and forthcoming efforts at State, county, and other local levels related to climate change adaptation also are likely to inform how we revise and implement the recovery plan for the wood stork. Future updates to the recovery plan will consider and include emerging information such as on-going and projected change in climate and related effects on wood stork habitat and will help to guide future recovery efforts.

Recovery Task (2): Restore and enhance habitat. A prerequisite for recovery of the wood stork in the southeastern United States is the restoration and enhancement of suitable habitat throughout the mosaic of habitat types used by this species. Recovery actions include: (2.1) Restore the Everglades and Big Cypress systems, (2.2) enhance nesting and roosting sites throughout the range, and (2.3) enhance foraging habitat by modifying hydrologic regimes in existing artificial impoundments to maximize use by wood storks.

Wood storks depend upon a mosaic of wetlands throughout the coastal plain of the southeastern United States for breeding and foraging. Ecosystems and wetlands are being restored throughout the southeastern United States through programs such as the Comprehensive Everglades Restoration Program (CERP) (RECOVER 2009); Kissimmee River Restoration Project, which includes a goal to restore over 40 square miles of river and floodplain ecosystem including 43 miles of meandering river channel and 27,000 acres of wetlands (USACE 2011); and Upper St. Johns Basin Restoration Project, which has enhanced and restored 150,000 acres of marsh (SJRWMD 2011). These and other large-scale wetland restoration projects are significantly contributing to wood stork recovery by reducing the threat of habitat loss. Research by Tsai *et al.* (2011, p. 5) provides recommendations for enhancing nesting habitat and concludes that management and conservation priority should be given to colonies that are large, have been in existence for more than 10 years, and are located on islands rather than mainland shorelines. Management actions that can enhance the isolation of colonies from the mainland apparently are very effective as colonies on true islands are less likely to be extirpated and are much more likely to be colonized than those that have partial or complete connection with the mainland (Tsai *et al.* 2011, p. 5). These recommendations will inform efforts to update recovery actions and initiatives.

Management plans such as State wildlife action plans (*http://www.wildlifeactionplans.org/*) help to identify important habitats on which to focus conservation efforts. Other management plans such as the North American Waterbird Conservation Plan (2002) and the North American Waterfowl Management Plan (USFWS 2011) also help to identify focus areas for conservation. By highlighting important habitats or areas, such as the ACE Basin and Winyah Bay in South Carolina, funds and conservation initiatives are directed towards restoring these important habitat areas and contribute to recovery by reducing the threat due to loss of habitat. Thousands of acres are being protected, enhanced, restored, and brought under conservation easements to assist in wildlife conservation through programs such as the Wetland Reserve Program (WRP) and the Farm Bill, including 70,000 acres of wetlands in Alabama, Florida, Georgia, Mississippi, North Carolina, and South Carolina in 2010 (NRCS 2011). The WRP is a voluntary program offering landowners the opportunity to protect, restore, and enhance wetlands on their property.

The U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS) provides technical and financial support to help landowners with their wetland restoration efforts. The goal of the NRCS is to achieve the greatest wetland functions and values, along with optimum wildlife habitat, on every acre enrolled in the program. This program offers landowners an opportunity to establish long-term conservation and wildlife practices and protection and, therefore, provides some benefits to wood stork recovery. In Florida, the WRP program has restored over 200,000 acres of wetlands (Simpkins, Service, pers. comm., 2011) and more than 115,000 acres in Alabama, Georgia, and South Carolina. A majority of the Florida WRP-restored acres have been within the Everglades and Big Cypress systems. A 2006 WRP restoration of 200 acres of farmland in Camilla, Georgia, now supports the newest Georgia wood stork colony, with over 100 nesting pairs annually. This task will be complete once viable nesting occurs throughout the range of this DPS. The most significant wetland restoration goal for wood storks is to recover viable nesting subpopulations in the traditional Everglades and Big Cypress nesting areas, including Corkscrew Swamp Sanctuary, as outlined by CERP. Overall, future wetland restoration efforts in the southeast United States will be beneficial to wood stork recovery.

Future updates to the recovery plan will consider emerging information on climate change and possible effects on wood stork habitat restorations and enhancements and will help to guide future recovery efforts.

Recovery Task (3): Conduct applied research necessary to accomplish recovery goals. Recovery efforts for the wood stork will be more effective with a better understanding of population biology, movement patterns of U.S. and neighboring populations of wood storks, foraging ecology and behavior, the importance of roost sites, and the possible impacts of contaminants. Recovery actions include: (3.1) Determine movement patterns of U.S. and neighboring populations of wood storks, (3.2) determine population genetics, (3.3) monitor productivity of stork populations, (3.4) monitor survivorship of stork populations, (3.5) determine extent of competition/cooperation between wood storks and other wading birds in mixed nesting colonies, (3.6) determine foraging ecology and behavior, (3.7) determine the importance of roost sites, and (3.8) determine the impacts of contaminants on wood stork populations. The following is a summary of several recent monitoring and research findings.

The South Florida Wading Bird Report (1996–2012) annually reports on habitat monitoring and research with respect to the CERP and foraging and nest monitoring projects for wood storks and wading birds utilizing the Everglades and Big Cypress systems. This report provides an annual assessment on the Restoration Coordination and Verification Program (RECOVER), the system-wide science arm of the CERP. Per Recovery Action 3.1 and 3.6, satellite-telemetry studies are providing new insight into movement patterns (*e.g.,* Hylton 2004; Bryan *et al.* 2008; Borkhataria 2009; Lauritsen 2010). Surveys to determine foraging distances from nesting colonies and satellite-telemetry research are helping to update our understanding of wood stork foraging ecology and of core foraging areas (*e.g.,* Herring 2007; Bryan and Stephens 2007; Borkhataria 2009; Borkhataria *et al.* 2012; Meyers 2010; Lauritsen 2010; Tomlinson 2009). Satellite-telemetry data and initiation of additional banding studies are helping to refine survival estimates (Borkhataria 2009, pp. 63–64) for population modeling (Borkhataria 2009) as identified under Recovery Action 3.4. This population viability analysis demonstrated that, despite the recent population growth, the south Florida portion of the population could decline to a level that cannot be reversed even if some individuals remain in the coming 50-year period (Borkhataria 2009, p. 15).

Recent and ongoing systematic reconnaissance flights of the Everglades, Kissimmee River, water conservation areas, Big Cypress National Preserve, and Upper St. Johns River are monitoring wood stork abundance and distribution in south Florida (Cheek 2012, pp. 23–26; Alvarado 2012, pp. 32–42; Nelson 2010, p. 40; D. Hall, SJRWMD, pers. comm., 2008). Annual synoptic nesting colony surveys help to monitor the status of the breeding population. Per Recovery Action 3.3, recent productivity research and monitoring efforts have documented productivity rates to be similar to rates documented between the 1970s and 1990s (Rodgers *et al.* 2008; Bryan and Robinette 2008). Rodgers *et al.* (2008, p. 25) recommends developing an unbiased estimator of productivity that takes into consideration the lack of nesting during some years to more accurately estimate wood stork productivity at the regional level.

A prime example of how research can influence management for wood stork recovery is Borkhataria *et al.* (2012). This research documented the effects of water management on juvenile stork survival in south Florida and confirms the CERP goal of returning Everglades wood stork nest initiation to an earlier time frame so that chicks are fledging prior to the summer rainy season. To be successful reproductively, wood storks in south Florida require prey be available during the nesting season, with particularly high energy demands when chicks are growing and fledging (Frederick *et al.* 2008, p. 3). This typically happens during the winter/spring dry season in south Florida when water levels recede most reliably.

A genetic structuring and haplotype network analysis comparison indicates that either a demographic decline or a recent evolutionary bottleneck reduced the levels of genetic variability in the U.S. population (Lopes *et al.* 2011, p. 1911). The genetic structuring assessment revealed no significant differentiation, indicating that U.S. and Brazilian wood stork populations were only recently separated or that gene flow between these populations continues to occur at low levels. The haplotype network analysis indicated low current levels of gene flow between populations that were closely related in the past (Lopes *et al.* 2011, p. 1911).

Recovery Task (4): Increase public awareness. Wood storks utilize a wide variety of wetland habitats. They are visually unique and generate interest from the public. These factors have made the wood stork the subject of many environmental education materials and programs. Many brochures, videos, and educational packets are available. Recovery actions include: (4.1) Increase awareness and appreciation through educational materials, and (4.2) provide opportunities for the public to view wood storks in captivity.

Examples of such wood stork educational efforts to increase public awareness can be found on our Web site (*http://www.fws.gov/northflorida/WoodStorks/wood-storks.htm*) and the Web sites of many of our recovery partners, including the Everglades National Park (*http://www.nps.gov/ever/naturescience/woodstork.htm*), Florida Fish and Wildlife Conservation Commission (*http://myfwc.com/research/wildlife/birds/wood-storks/*), Georgia Department of Natural Resources *(http://www.georgiawildlife.com/sites/default/files/uploads/wildlife/nongame/pdf/accounts/birds/mycteria_americana.pdf*), South Carolina Department of Natural Resources (*http://www.dnr.sc.gov/cwcs/pdf/Woodstork.pdf*), University of Florida (*http://www.wec.ufl.edu/faculty/frederickp/woodstork/*), Audubon Society (*http://birds.audubon.org/species/woosto),* Corkscrew Sanctuary Swamp (*http://www.corkscrewsanctuary.org/Wildlife/Birds/profiles/wost.pdf*), and others.

Opportunities for the public to view wood storks in the wild include almost all National Wildlife Refuges (NWR) and National Parks and Preserves in Florida and coastal Georgia and South Carolina, including the Everglades National Park, Ten Thousand Island NWR, J.N. Ding Darling NWR, Loxahatchee NWR, Pelican Island NWR, Merritt Island NWR, Harris Neck NWR, and ACE Basin NWR. Several wood stork nesting colonies can also be seen at public observation areas that do not disturb the colony, such as Audubon's Corkscrew Swamp Sanctuary, Parotis Pond in Everglades National Park, Pelican Island NWR, St. Augustine Alligator Farm, Jacksonville Zoo and Gardens, and Harris Neck NWR.

Recovery Achieved

The recovery criteria for the U.S. breeding population DPS of wood storks state that reclassification from endangered to threatened could be considered when there are 6,000 nesting pairs and annual average regional productivity is greater than 1.5 chicks per nest per year (both calculated over a 3-year average). Although variable, productivity appears to be sufficient to support continued population growth as evidenced by the increasing nesting population and range expansion.

1. Nesting pairs. The U.S. breeding population of the wood stork has been increasing since it was listed in 1984 (Brooks and Dean 2008, p. 58; Borkhataria 2009, p. 34). Regional synoptic nesting surveys to census wood stork colonies have been continuous in south Florida and Georgia since 1976 and in South Carolina since 1981. Nest censuses of the entire breeding range were conducted in 1975–1986, 1991, 1993–1995, 1997, 1999, and 2001–2013 (Table 1) with a census of almost every active colony. The 3-year average for nesting pairs has exceeded the reclassification criterion of 6,000 every year since 2003 (Table 2). However, the nesting pair average is well below the 5-year average of 10,000 nesting pairs (a benchmark for delisting), and the 5-year averages for nesting in the Everglades and Big Cypress Systems are below 2,500 nesting pairs (another benchmark for delisting), as nesting in south Florida remains variable (Table 2).

TABLE 2—WOOD STORK NESTING DATA IN THE SOUTHEASTERN UNITED STATES AND 3-YEAR AVERAGES (USFWS 2013). SOUTH FLORIDA INCLUDES WOOD STORK NESTING IN THE FOLLOWING FLORIDA COUNTIES: BROWARD, COLLIER, HENDRY, LEE, MARTIN, MIAMI-DADE, MONROE, AND PALM BEACH

Year	Total		South FL		Central/North FL		GA		SC		NC	
	Nesting pairs	3-yr avg	Nesting pairs	3-yr avg	Nesting pairs	3-yr avg	Nesting pairs	3-yr avg	Nesting pairs	3-yr avg	Nesting pairs	3-yr avg
1981	4,442	....	2,428	....	1,728	....	275	....	11			
1982	3,575	....	1,237	....	2,183	....	135	....	20			
1983	5,983	4,667	2,858	2,174	2,742	2,218	363	258	20	17		
1984	6,245	5,268	1,245	1,780	4,402	3,109	576	358	22	21		
1985	5,193	5,807	798	1,634	3,764	3,636	557	499	74	39		
1986	....	....	643	895	....	....	648	584	120	72		
1987	....	....	100	514	....	....	506	570	194	129		
1988	....	....	755	499	....	....	311	488	179	164		
1989	....	....	515	457	....	....	543	453	376	250		
1990	....	....	475	582	....	....	709	521	536	364		
1991	4,073	....	550	513	1,890	....	969	740	664	525		
1992	....	....	1,917	981	....	....	1,091	923	475	558		
1993	6,729	....	587	1,018	3,675	....	1,661	1,240	806	648		
1994	5,768	....	741	1,082	2,847	....	1,468	1,407	712	664		
1995	7,853	6,783	1,140	823	4,383	3,635	1,501	1,543	829	782		
1996	....	....	1,215	1,032	....	....	1,480	1,483	953	831		
1997	....	....	445	933	....	....	1,379	1,453	917	900		
1998	....	....	478	713	....	....	1,665	1,508	1,093	988		
1999	....	....	2,674	1,190	....	....	1,139	1,394	520	843		
2000	....	....	3,996	2,383	....	....	566	1,123	1,236	950		
2001	5,582	....	2,888	3,186	358	....	1,162	956	1,174	977		
2002	7,855	....	3,463	3,449	2,000	....	1,256	995	1,136	1,182		
2003	8,813	7,417	1,747	2,699	4,057	2,138	1,653	1,357	1,356	1,222		
2004	8,379	8,349	1,485	2,232	3,241	3,099	1,596	1,502	2,057	1,516		
2005	5,572	7,588	591	1,274	1,713	3,004	1,817	1,689	1,419	1,611	32	
2006	11,279	8,410	2,648	1,575	4,568	3,174	1,928	1,780	2,010	1,829	125	
2007	4,406	7,086	696	1,312	857	2,379	1,054	1,600	1,607	1,679	192	116
2008	6,118	7,268	344	1,229	1,494	2,306	2,292	1,758	1,839	1,819	149	155
2009	12,720	7,748	5,816	2,285	3,612	1,988	1,676	1,674	1,482	1,643	134	158
2010	8,141	8,993	1,220	2,460	2,600	2,571	2,708	2,225	1,393	1,571	220	168
2011	9,579	10,147	2,131	3,056	3,161	3,124	2,160	2,181	2,031	1,635	96	141
2012	8,452	8,620	1,234	1,528	3,305	3,137	1,905	2,258	1,827	1,750	181	166
2013	11,046	9,692	3,059	2,141	3,889	3,452	1,873	1,979	2,020	1,959	205	161

2. Productivity. Researchers need to systematically determine reproductive success (number of fledged young per nest and number of fledged young per successful nest) for a majority of the colonies in the same year(s) to better estimate productivity of the breeding population (USFWS 1997, p. 24). Since nesting success often exhibits a significant negative trend with hatching date (Rodgers and Schwikert 1997, p. 85), the entire nesting season must be sampled to avoid biasing reproductive success data based on a few visits (Rodgers 2005, p. 1). The Service acknowledges that the productivity dataset is incomplete, with less than 25 percent of the colonies surveyed for productivity during recent years and 50 percent surveyed between 2003 and 2007. During this time period, Brooks and Dean (2008, p. 56) indicate the average productivity rate for all colonies monitored in the southeastern United States was 1.2 chick/nest attempt between 2003 and 2005; 1.5 chick/nest attempt between 2004 and 2006; and 1.5 chick/nest attempt between 2003 and 2006 (Brooks and Dean 2008, p. 56). Due to funding and manpower constraints, rangewide, statewide, and regional monitoring of wood stork productivity only has occurred episodically (*e.g.,* early 1980s and 2000s). As 80 to 90 wood stork colonies are now active annually, Rodgers *et al.* (2008, p. 32) identifies that there is a need to develop a long-term program of monitoring that relies on monitoring of fewer colonies. The following are summaries of recent productivity monitoring in Florida, Georgia, and South Carolina. The full productivity data set can be viewed at: *http://www.fws.gov/northflorida/WoodStorks/wood-storks.htm.*

Florida: Rodgers *et al.* (2008, p. 25) reported a combined production rate for 21 north- and central-Florida colonies from 2003 to 2005 of 1.19+0.09 fledglings per nest attempt (n = 4,855 nests). Rodgers *et al.* (2009, p. 3) reported the St. Johns River basin production rate of 1.49+1.21 fledglings per nest attempt (n = 3,058 nests) and, for successful nests, an average fledgling rate of 2.26+0.73 fledglings per nest attempt (n = 2,105 nests) from 2004 to 2008. The Jacksonville Zoological Gardens and Disney Wilderness Preserve colonies report productivity rates of 2.0 and 0.5, respectively, in 2011 and 2.2 and 0.8 for 2012. The Palm Beach County Solid Waste Authority colony was documented with 1.08 and 0.46 fledgling per nesting attempt in 2011 and 2012, respectively (M. Morrison, PBC, pers. comm., 2013). The Corkscrew Swamp Sanctuary colony near Naples, Florida, documented no nesting in 2010–12 (Lauritsen 2010, p. 12; 2011, p. 14; and 2012, p. 12). Cook (2011, p. 2) reports that the 2011 productivity in the Everglades was relatively low and that all 820 nests failed in 2012 (Cook, 2012, p. 2).

Georgia: Bryan and Robinette (2008, p. 20) reported rates of 2.3 and 1.6 fledged young per nesting attempt in 2004 and 2005, respectively, for South Carolina and Georgia. The 2011 and 2012 productivity rates for Georgia were 1.32 and 1.13 (T. Keyes, Georgia DNR, pers. comm., 2012). During the past 29 years of data collection (1983–2012) in

Georgia, the weighted average of all years and colonies was 1.76+0.8 (158 colony-years) with a range of 0.33 to 2.65 (T. Keyes, Georgia DNR, pers. comm., 2013).

South Carolina: Murphy and Coker (2008, p. 5) reported that since the wood stork was listed in 1984, South Carolina colonies averaged 2.08 young per successful nest with a range of 1.72 to 2.73. In 2011, South Carolina productivity was 1.6 fledged young per nest at two colonies and 1.1 in 2012 at seven colonies monitored (C. Hand, SC DNR, pers. comm., 2013).

Based upon the nesting population criteria in the recovery plan, we considered reclassifying the U.S. breeding population of the wood stork to threatened status because wood storks and their habitat would continue to receive the protections of the Act, and management efforts continue to protect, maintain, enhance, and restore habitat to support a growing population. The U.S. breeding population of the wood stork has surpassed the recovery criteria for nesting pairs outlined as necessary for reclassification. As shown in Table 2 of this document, the nesting population is increasing and well above the reclassification benchmark (Brooks and Dean 2008, p. 58; and Table 2). The total number of nesting colonies has remained stable in south Florida, and the number of colonies in central and north Florida, Georgia, South Carolina, and North Carolina continue to increase (Ogden *et al.* 1987, p. 754; Brooks and Dean 2008, p. 54; Table 1). The nesting range continues to expand with new colonies documented in North Carolina, South Carolina, western Georgia, and northern Florida. Although variable and not well documented, productivity appears to be sufficient to support continued population growth, as evidenced by the increasing population and range expansion described above. Population trends suggest that the overall population may approach the delisting benchmark of 10,000 nesting pairs during the next 15 to 20 years. Nesting numbers show a stable or increasing population, however, data are not available to evaluate the productivity criterion of 1.5 chicks per nest per year.

Summary of Factors Affecting the Species

Section 4 of the Act and its implementing regulations (50 CFR part 424) set forth the procedures for listing, reclassifying, or removing a species from the Federal List of Endangered and Threatened Wildlife. Under section 3 of the Act, a species is ''endangered'' if it is in danger of extinction throughout all or a ''significant portion of its range'' and is ''threatened'' if it is likely to become endangered within the foreseeable future throughout all or a ''significant portion of its range.'' The word ''range'' refers to the range in which the species currently exists, and the word ''significant'' refers to the value of that portion of the range being considered to the conservation of the species. The ''foreseeable future'' is the period of time over which events or effects reasonably can or should be anticipated, or trends extrapolated. A species may be determined to be an endangered or threatened species due to one or more of the five factors described in section 4(a)(1) of the Act: (A) The present or threatened destruction, modification, or curtailment of its habitat or range; (B) overutilization for commercial, recreational, scientific, or educational purposes; (C) disease or predation; (D) the inadequacy of existing regulatory mechanisms; or (E) other natural or manmade factors affecting its continued existence.

The following analysis examines all five factors currently affecting or that are likely to affect the wood stork within the foreseeable future:

A. The Present or Threatened Destruction, Modification, or Curtailment of Its Habitat or Range

Throughout its range in the southeastern United States, wood storks are dependent upon wetlands for breeding and foraging. Preventing loss of wood stork nesting habitat and foraging wetlands within a colony's core foraging area is of the highest priority. In addition, winter foraging habitat is important to recovery, as it may determine the carrying capacity of the U.S. wood stork DPS. While the immediacy and the magnitude of this factor are substantially reduced when compared to when this species was originally listed, as the population is larger and occupies a much larger breeding season and nonbreeding season range, the destruction, fragmentation, and modification of its wetland habitats continues to occur and could accelerate in the absence of the protections of the Act.

Hefner *et al.* (1994, p. 21) estimated that 1.3 million acres of wetlands lost in the southeastern United States between the mid-1970s and mid-1980s were located in the Gulf-Atlantic Lower Coastal Plain, an area upon which wood storks are dependent. Ceilley and Bartone (2000, p. 70) suggest that short hydroperiod wetlands provide a more important pre-nesting food source and provide for a greater early nestling survivorship for wood storks than previously known. Wetlands that wood storks use for foraging are being lost through permitted activities where mitigation is provided. However, it is not known if wood stork foraging wetlands are being replaced with like-quality foraging wetlands within the core foraging area of an impacted colony. Lauritsen (2010, pp. 4–5) suggests that today's mitigation practices lead to a disproportionate loss of short hydroperiod wetlands. The impacts of the loss of short hydroperiod (isolated) wetlands, which supply most of the food energy for initiating reproduction (Fleming *et al.* 1994, p. 754), may result in no nesting or abandonment of nesting attempts by wood storks at colonies like Corkscrew Swamp Sanctuary. Lauritsen (2010, p.2) indicates the historic extent of wet prairies within the core foraging area of the Corkscrew Swamp colony has decreased by 70 percent, while deep marsh habitat has increased when compared to pre-development conditions. Frederick and Meyer (2008, p. 15) suggest that the decline in colony size in Florida reflects the increasingly fragmented nature of Florida's wetlands resulting from development. Future projections from reports like Florida 2060 (1000 Friends of Florida, *http://www.1000friendsofflorida.org/connecting-people/florida-smart-growth-advocates-2/*) suggest 7 million acres of land could be converted from rural and natural to urban uses and wetland habitats will become more isolated and degraded.

The decline of south Florida's Everglades and Big Cypress ecosystems is well-documented (*e.g.,* Davis and Ogden 1994). Prior to 1970, a majority (70 percent) of the wood stork population nested south of Lake Okeechobee and declined from 8,500 nesting pairs in the early 1960s to around 500 pairs in the late 1980s and early 1990s (USFWS 1997, p. 10). The primary cause of this decline was the loss of wetland function of these south Florida ecosystems that resulted in reduced prey availability or loss of wetland habitats (USFWS 1997, p. 10).

Wood storks use manmade wetlands for foraging and breeding purposes. Human-made wetlands include, but are not limited to, storm water treatment areas and ponds, golf course ponds, borrow pits, reservoirs, roadside ditches, agricultural ditches, drainages, flow-ways, mining and mine reclamation areas, and dredge material sites. The impacts can be positive in certain scenarios as these wetlands can provide protected foraging and nesting habitat, and may offset some losses of natural wetlands caused by development. A significant number of wood stork colonies are located where water management practices can impact the nesting habitat negatively. Colonies that are perpetually flooded will have no tree regeneration. Draining surface waters of a colony's wetland or pond will prevent wood storks from nesting, and lowered water levels after nest initiation facilitate raccoon predation. Lowering surface water or water table may occur through water control structures, manipulating adjacent wetlands, or water withdrawals from the local aquifer and can prevent wood storks from nesting or cause colony failure.

Water Management and Prey Availability

Water management and the effect it has on prey availability to nesting wood storks in south Florida and the Everglades continue to impact wood stork recovery. A key wood stork goal and prediction of CERP relates to the ecological bird-prey-hydrology relationship. The goal to return natural flows and hydropatterns is predicted to result in a return to natural timing of nesting, the restoration of large wood stork nesting colonies in the coastal zone and recovery of wood stork breeding populations in the Everglades. The early results from CERP suggest that wood storks are responding to the altered water management regimes and other factors by nesting more consistently in the coastal zone and by increasing populations (Frederick 2012, p. 38), however, there is little evidence that timing of nesting is improving for breeding wood storks in south Florida. Based upon their analysis of fledgling survival, Borkhataria *et al.* 2012 (p.525) notes the possibility that south Florida is currently acting as a population sink. Frederick (2012, p. 44) states that later nesting increases the risk of mortality of nestlings that have not fledged prior to the onset of the wet season, which is likely the difference between the south Florida segment of the population being a source or a sink to the wood stork population. CERP is a significant long-term conservation effort that, if successful in restoring natural flows and hydropatterns, will greatly benefit wood stork recovery. Frederick (2012, p. 38) indicates that full restoration of wading bird populations in the Everglades is predicted as a result of full restoration of key historical hydropatterns, which have not occurred yet as there are many restoration projects and management regimes yet to be implemented. Another concern, Borkhataria *et al.* (2012, p. 517) show a relationship between temporally fluctuating hydrologic factors and juvenile wood stork survival rates, highlighting the need for water management to also consider the timing of managed wetland manipulations, as human-induced changes have impacts on when birds nest and ultimately how the population is fairing. In years with high water levels that resulted in unsuitable foraging habitat for post-fledging juveniles studied in the Everglades, the young birds moved into more terrestrial agricultural and developed landscapes and were more vulnerable to mortality, which may have been related to relatively low aquatic prey density in those areas (Borkhataria *et al.,* p. 524)

Conservation managers implement water management regimes at several large impoundments in Georgia, South Carolina and North Carolina that support wood stork recovery. Several impounded sites support nesting colonies and the water management at these sites help to promote nesting and provide protection from predators. Other impoundments near nesting colonies are managed to make prey available to the nesting wood storks to feed their chicks and to chicks when they fledge from the colonies through water drawdowns that help concentrate prey at optimal times during the nesting season.

Sea-Level Rise

Climate change is on-going and one of its many effects involves sea level rise (SLR), which poses widespread and continuing threats to coastal environments at global, regional, and local levels (Melillo *et al.* 2014, pp. 9–10, 397). The effects of sea level rise can include complete inundation of coastal habitat, as well as intrusion of saltwater into estuaries and more inland areas, including freshwater marshes, which can result in changes in the suitability of habitat for various animal species. These and other changes both now and in the future depend on the magnitude of the SLR and other factors such as storm surges (e.g., SCDNR 2013 p. 52; Williams 2013, pp. 188, 191).

Since about 1880, when reliable record-keeping began for sea level, global sea level has risen about 200 mm (8 in) (Melillo et al., 2014, p. 21). For more than a century the rate of global mean SLR has been greater than at any time over the previous two millennia, and the rate is accelerating: from 1901–2010 the average increase was 1.7 mm/yr (0.07 (in/yr), from 1971–2010 it was 2.0 mm/yr (0.08 in/yr), and between 1993–2010 it was 3.2 mm/yr (0.13 in/yr) (Intergovernmental Panel on Climate Change (IPCC) 2013, p. 11). Although SLR is due in part to natural variability in the climate system, scientists attribute the majority of the observed increase in recent decades to human activities that contribute to ocean thermal expansion related to ocean warming, and melting of ice: The IPCC reported that approximately 75 percent of the observed increase in global mean SLR since the early 1970's can be explained due to melting of glaciers and ocean thermal expansion from warming (ibid.), and an estimated 87 percent of the trend in ocean thermal expansion since 1970 has been induced by human activity (Marcos and Amores 2014).

Trend data show increases in sea level have been occurring throughout the southeastern Atlantic and Gulf coasts and according to Mitchum (2011, p. 9) the overall magnitude in the region has been slightly higher than the global average. At local levels, SLR varies by location as well as seasonally. State-by-state averages are available based on tidal gauge measurements. Measurements summarized for stations at various locations in Florida indicate SLR there has totaled approximately 200 mm (8 in.) over the past 100 years, with an average of about 3.0 mm/yr (0.12 in/yr) since the early 1990's (Ruppert 2014, p. 2). The relatively few tidal gauges in Georgia, South Carolina, and southern North Carolina also show increases, the largest being in South Carolina (NOAA Web site *http://tidesandcurrents.noaa.gov/sltrends/sltrends.shtml*, accessed May 2 and May 9, 2014).

Continued global SLR is considered virtually certain to occur throughout this century and beyond (Stocker et al., 2013, p. 100; Levermann *et al.* 2013, entire). Depending on the methods and assumptions used, however, the range of possible scenarios of global average SLR for the end of this century is relatively large, from a low of 0.2 meters (m) (approximately 8 in.) to a high of 2 m (approximately 78 in., i.e., 6.6 ft) (Parris et al. 2012, pp. 2, 10–11). Although this relatively wide range reflects considerable uncertainty about the exact magnitude of change, it is notable that increases are expected in all cases, and at rates that will exceed the SLR observed since the 1970's (IPCC 2013, pp. 25–26).

The highest projection of global sea level rise typically cited is 2 m (approximately 6 ft 7 in) by 2100, which is the high end of the range of projections provided in a paper by Pfeffer *et al.* (2008). In that paper, the projections range from 0.8–2.0 m (2 ft 7.5 inches–6 ft 7 inches). Based on analysis of glaciological conditions that would be required for a sea level rise of 2 m or more, however, the authors concluded that: (1) increases of more than 2 m are ''*physically untenable;''* (2) a rise of about 2 m by 2100 ''*could occur under physically possible glaciological conditions but only if all variables are quickly accelerated to extremely high limits'';* and (3) ''*more plausible but still accelerated conditions''* would result in a rise of about 0.8 m (2.6 ft) by 2100. They also stated that the assumptions underlying their range of sea level rise contained ''substantial uncertainties'' and recognized the need for more study in order to support improvements in projections (Pfeffer *et al.,* 2008, p. 1342). Thus it is logical to conclude that although SLR of 2 m (6 ft 7 in) by the end of the century is theoretically possible, it is not particularly plausible. This interpretation has been supported in subsequent literature on SLR. For example, in their review of SLR projections, Nichols *et al.* concluded that the upper part of the projected ranges are possible but not likely to occur (Nicholls *et al.* 2011, pp. 165, 168).

The IPCC's most recent projections of SLR are based on the four climate change scenarios they currently use, with a base period of 1986–2005 for comparison. The range of global mean SLR they project for 2046–2065 is 0.24–0.30 m (9.5–11.8 in.), and for 2081–2100 the range is 0.40–0.63 m (15.8–24.0 in.) (IPCC 2013, pp. 23–26). The IPCC acknowledges that higher projections have been made using other types of sea-level rise models and underlying assumptions, but notes a lack of consensus in the scientific community about those processes and thus the IPCC's assessed confidence in those projections (which include the higher projections of SLR), is low (IPCC 2013, p. 26).

The Third National Climate Assessment (NCA) projects that global mean sea level will rise another 1–4 feet (i.e., approximately 0.3–1.2 m) in this century (Melillo *et al.* 2014, pp. 9, 21, 44–45). The NCA also acknowledges the future scenarios of global SLR range from 8 in to 6.6 ft (0.2–2 m) by the end of the Century, and notes that the relatively large range reflects differences in climate models, natural climate variability, uncertainties regarding melting of glacier and the Antarctic and Greenland ice sheets especially, and future rates of greenhouse gas emissions (Melillo *et al.* 2014, p. 45; Carter *et al.* 2014, p. 414; see also Williams 2013, entire, for a discussion of various influences on SLR). Emerging scientific information reflects further concern about possible acceleration in the rate of ice sheet melting (e.g., Levermann et al., 2013, Moore *et al.* 2013, Menel and Levermann 2014). This includes new modeling which indicates early stage collapse of portions of the West Antarctic Ice sheet has begun, with enough ice to raise global sea level by 1.2 m (3 ft. 11 in) and no known obstacles that would preclude continued further melt, although the time period of melting and effects is somewhat uncertain and is expected to be moderate during this century and generally increase after that, and could span two or more centuries (Joughlin et al 2014, entire; Rignot et al 2014, entire). This information was not available when the IPCC conducted its modeling, and suggests the ''high'' end of the IPCC's projected range of SLR, at about 2 feet, may be too conservative, whereas the higher end (2–4 feet) of the NCA projection of 1–4 ft. for average global SLR by the end of this Century appears reasonable. Current modeling capability does not allow precise projections of SLR at local scales (e.g., see Parris *et al.* 2012, p. 5; Williams 2013, pp. 189–190).

The effects of sea level rise include inundation of coastal habitat and intrusion of saltwater into estuaries and more inland areas including freshwater marshes, which can result in changes in vegetation and in the presence and density of various animal species; these and other changes both now and in the future depend on the magnitude of the SLR and other factors such as storm surges (e.g., SCDNR 2013 p. 52; Williams 2013, pp. 188, 191). Although we expect SLR will continue to occur and even accelerate, the information presented above makes it clear that the magnitude (with most estimates being in the range of 1–4 feet by the end of this century and as described above the lower half of the range appears more plausible) as well as the extent to which SLR will inundate current wood stork habitat is relatively uncertain at this time.

There also is considerable uncertainty about the likely effects of SLR on wood stork habitat, and at this point in time we do not have quantitative predictions of how much nesting habitat or foraging habitat might be affected by such impacts. Based on the best scientific information currently available, the effects appear likely to be mixture of both positive and negative influences on habitat. As noted in our description of habitat for this species (above) and under Factor C (below), wood stork colony sites located in standing water must remain inundated throughout the nesting cycle to protect again predation and nest abandonment. Sea level rise could result in more favorable conditions of inundation throughout the nesting cycle in some areas that currently become seasonally too dry to be suitable. Conversely, additional inundation could make render some currently suitable foraging habitat adjacent to nesting colonies too deep to be suitable as foraging habitat.

The duration of inundation by SLR also will make a difference: As noted earlier, colonies that are perpetually flooded have no tree regeneration and thus SLR could result in loss of some colonies over time at locations where inundation becomes perpetual. At the same time, SLR could result in development of estuaries and suitable habitat for nesting and foraging at sites relatively more inland than currently suitable habitat and thus support range expansion, although human development and climate change adaptation measures aimed at protecting human communities and infrastructure could substantially affect the extent and location of new estuaries that might become established in the face of a changing climate (e.g., Feagin *et al.* 2010 entire; Torio and Chmura 2013 entire).

To summarize, although we acknowledge that SLR is on-going and is certain to continue at global to local levels, likely at an accelerated rate, there is considerable uncertainty as to what the magnitude and rate will be in areas that are part of the wood stork's range, and inland parts of the range may not be effected at all by SLR. Further, although we are concerned about the potential effect of SLR on wood stork habitat, it appears that SLR could result in both positive and negative changes for the wood stork and we cannot determine what the net overall effect will be in the foreseeable future in relation to the threatened destruction, modification, or curtailment of the habitat or range of the DPS.

Habitat Protection, Acquisition, Restoration

While habitat loss, fragmentation, and degradation continue to occur throughout the range of the U.S. population of wood stork, protection, acquisition, and restoration efforts are also in progress. Natural wetlands are being targeted for acquisition to be protected through the management of public lands for wildlife and water conservation (NRCS 2006, p. 1); also see *Recovery Task (1) Protect currently occupied habitat* in the Recovery Plans section. The Wetlands Reserve Program has restored over 200,000 acres of wetlands in Florida and over 115,000 acres in Alabama, Georgia, and South Carolina during the past 18 years. Thousands of acres of wetlands are also being protected on private lands through conservation easements to assist in habitat and wildlife protection through restoration (Dahl 2006, p. 16). Wetland losses are being avoided, minimized, and mitigated through the regulatory process (Votteler and Muir 2002, pp. 1–2). Recommendations for improved implementation and tracking of wetland mitigation with respect to monitoring and protecting important wood stork habitat are laying the groundwork for improving the regulatory system to better protect wood storks. Large-scale restoration projects like the CERP, Kissimmee River Restoration Project, and St. Johns River Headwaters Restoration Project are significant conservation efforts that greatly benefit wood stork recovery.

Additionally, the species' response to the threat of habitat loss and degradation indicates its ability to seek out new nesting and foraging areas. Since 1980, wood storks have expanded their breeding range north into Georgia, South Carolina, and North Carolina, and the total number of breeding adults is now approaching the delisting criterion set out in the species' recovery plan. Seventy percent of the population now breeds north of Lake Okeechobee and the Everglades (Brooks and Dean 2008, p. 53). These positive indicators throughout the range suggest that the viability of the U.S. wood stork DPS may no longer be as closely tied to the health of the Everglades for reproduction.

With regard to important wood stork habitats, a number of the nesting colonies occur on Federal conservation lands and are consequently afforded protection from development and large-scale habitat disturbance. Wood stork colonies also occur on a variety of State-owned properties, and existing State and Federal regulations provide protection on these sites. However, approximately half of known wood stork colonies occur on private lands. Through conservation partnerships, colonies can be protected through the owners' stewardship. In an effort to minimize potential loss of colony sites, partnerships have been developed through conservation easements, wetland restoration projects, and other conservation means. Also, the wetland areas near nesting colonies play a vital role in the success of a nesting colony. Due to the regulatory status of wetlands, conservation of wetlands shown to be important to wood storks can be largely achieved through the application and improved implementation of existing wetland laws and mitigation practices, such as the Clean Water Act (CWA, 33 U.S.C. 1251 *et seq.*) and the interagency cooperation provisions under section 7 of the Act.

In summary, loss, fragmentation, and modification of wetland habitats continue as threats to wood storks. Changes in local habitat conditions are known to impact wood storks. Based on the best available scientific information, it is our assessment that the species is showing the ability to respond to these threats through expansion of its range, adjusting reproductive timing, and utilizing a variety of wetlands for foraging, roosting, and breeding, including manmade wetlands. Historically, the core of the wood stork breeding population was located in the Everglades and Big Cypress systems of south Florida. Populations there had diminished because of deterioration of the habitat. In recognition of the importance of the Everglades and Big Cypress systems to wood stork recovery, the recovery plan states that, as a prerequisite for full recovery, these ecosystems should once again provide the food resources that are necessary to support traditional wood stork nesting patterns at historical nesting areas. However, current data show that the breeding range has now almost doubled in area and shifted northward along the Atlantic coast as far as southeastern North Carolina. As a result of their range expansion, dependence of wood storks on any specific wetland complex has been reduced. Even though habitat destruction and modification are still a threat to full recovery, the improved wood stork population statistics suggest that wetland habitat is not yet limiting the population, at least at the landscape level (USFWS 2007, p. 16). Habitat loss, fragmentation, and modification of wetland habitats continue around nesting colonies and core foraging areas, and still threaten the viability of the U.S. wood stork DPS. There is also considerable uncertainty about the likely effects of for example SLR on wood storks and their habitat. Based on the best scientific information currently available, the effects appear likely to be mixture of both positive and negative influences on habitat.

B. Overutilization for Commercial, Recreational, Scientific, or Educational Purposes

Monitoring of and research on wood storks over the past 20 years has increased. A few scientific research permits with potential to harm individual wood storks have been issued. This level of take/harm is not expected to adversely impact wood stork recovery or present a threat to the species.

Wading birds and other waterbird species, including wood storks, can impact production at fish farms. A Georgia catfish farmer located approximately 25 miles west of the Chewmill and Birdsville colonies in Jenkins County, Georgia, has documented hundreds of wood storks aggregating and foraging on the littoral edges of the ponds during the late summer in recent years. U.S. Department of Agriculture, Wildlife Services Division (Wildlife Services) has documented hundreds of wood storks, and in one case 1,000 wood storks, roosting on fish pond dikes in the eastern Mississippi, west-central Alabama area (J. Taylor, U.S. Department of Agriculture, pers. comm., 2007). Wildlife Services found that the wood storks were generally loafing, and if they were feeding, they were taking diseased and oxygen-deprived fish and not impacting production. Nonetheless, operators of fish farms often respond to such activities by taking wood storks. Unpermitted wood stork take has been documented at a Mississippi catfish farm and a Florida tropical fish farm. Each of these incidents ended in prosecution for shooting wood storks. However, wood stork take at aquaculture facilities likely still occurs. To what extent this type of take occurs is unknown. Migratory Bird Treaty Act (MBTA; 16 U.S.C. 701 *et seq.*) depredation permits assist in minimizing unauthorized take. Depredation permits are issued to allow the take of migratory birds that are causing serious damage to public or private property, pose a health or safety hazard, or are damaging agricultural crops or wildlife. Wildlife Services provides expert technical advice and information regarding hazing and harassment techniques.

Research permits are issued to eliminate or minimize impacts to wood storks from scientific research. Overutilization was not identified as a threat at the time of listing in 1984, and we conclude that overutilization for commercial, recreational, scientific, or educational purposes is not a threat to the U.S. wood stork DPS now or in the foreseeable future.

C. Disease or Predation

Limited information is available regarding potential impacts from disease or parasites. Hematozoa (blood parasites) have been documented to a limited extent in wood storks in Florida and Georgia (Forrester *et al.* 1977, p. 1273; Fedynich *et al.* 1998, p. 166). Avian malaria has recently been documented in U.S. wood storks, but the available information does not indicate that avian malaria is a significant factor affecting the DPS.

Adequate water levels under nesting trees or surrounding nesting islands deter raccoon predation of wood stork colonies. Water level manipulation or prolonged drought that keeps levels too low can facilitate raccoon predation of wood stork nests. In many cases, colonies also have a population of alligators nearby that deter raccoon predation (Coulter and Bryan 1995, p. 242), and removal of alligators from a nesting colony site could lead to increased raccoon predation. On the other hand, as described above (see Factor A), in some areas sea level rise may result in more favorable water levels that can help deter predation by raccoons. However, human disturbance may cause adults to leave nests, exposing the eggs and downy nestlings to predators (*e.g.,* fish crows), sun, and rain. Great horned owls have been documented nesting in and near colonies and likely impact the colony to some degree.

A breeding population of Burmese pythons has been documented in the Florida Everglades, and a study has documented that pythons preyed upon wood storks (Dove *et al.* 2011, p. 128). Given the observed impact they have had on small mammal populations in south Florida (Dorcas *et al.* 2012, p. 2418), if these snakes or other species of nonnative reptiles become established in additional areas within the south Florida ecosystem, they could pose a significant threat to nesting wood storks and other species of colonial-nesting water birds. Monitoring and research is underway to determine the impacts and effects of Burmese python on wading bird nesting colonies and specifically wood storks and also to alligator populations in the Everglades. At the present time, research does not indicate that predation by pythons occurs at a level that would threaten the U.S. wood stork DPS, now or in the foreseeable future.

A small number of the nonindigenous sacred ibis (*Threskiornis aethiopicus*) were discovered breeding in the Everglades in 2005 and the exponential population growth rates and expanding distribution of this species in France demonstrate the potential for this species to become invasive in Florida (Herring and Gawlik 2008, p. 969). Recent research has documented the sacred ibis as a predator of both eggs and chicks in colonial nesting colonies in their native region (Williams and Ward 2006, p. 321), and they could have a negative impact on wood storks and other colonial nesting birds if a breeding population is established in Florida. Palm Beach County, the Florida Fish and Wildlife Conservation Commission, and Wildlife Services recently teamed up to eradicate invasive sacred ibises where they were known to occur in south Florida, 2007–09. Experts believe that all sacred ibises living in the wild in south Florida have been removed and are cautiously hopeful that the sacred ibis has proven to be a ''success story'' for invasive species management (Johnson and McGarrity 2009, p. 5).

As summarized above, we have a few documented instances of disease and predation within the range of the U.S. wood stork DPS. However, this information does not indicate that disease or predation occur at a level that would threaten the U.S. wood stork DPS, now or in the foreseeable future.

D. The Inadequacy of Existing Regulatory Mechanisms

In addition to the Act, the MBTA provides Federal protection to the U.S. wood stork DPS. Florida, Georgia, South Carolina, North Carolina, Alabama, and Mississippi wildlife laws also list and protect wood storks. These Federal and State laws prohibit the taking of a wood stork, their nests, or their eggs, except as authorized through permitted activities such as scientific research and depredation permits. However, the MBTA and State laws do not prohibit clearing, alteration, or conversion of wetland foraging habitats or nesting colony sites during the non-nesting season.

The CWA regulates dredge and fill activities that would adversely affect wetlands, which constitute wood stork habitat. Section 404 of the CWA regulates the discharge of dredged or fill materials into wetlands. Discharges of dredged or fill materials are commonly associated with projects to create dry land for development sites, water-control projects, and land clearing. The U.S. Army Corps of Engineers (Corps) and the Environmental Protection Agency (EPA) share the responsibility for implementing the permitting program under section 404 of the CWA. These Federal actions must not jeopardize the continued existence of any species protected under the Act.

When impacts to wetlands cannot be avoided or minimized, wetland mitigation is often employed to replace an existing wetland or its functions by creating a new wetland, restoring a former wetland, or enhancing and preserving an existing wetland. This is done to compensate for the authorized destruction of the existing wetland. As discussed earlier, it is not known if wood stork foraging wetlands are being replaced with like-quality foraging wetlands within the core foraging areas of impacted colonies. Lauritsen (2010, pp. 4–5) indicates that the Uniform Mitigation Assessment Method (UMAM, *http://www.dep.state.fl.us/water/wetlands/mitigation/umam/index.htm*) does not accomplish type-for-type wetland mitigation, which can result in considerable losses to wetland functions performed only by shallow short hydroperiod wetlands.

Section 404 of the CWA currently provides little protection for isolated wetland habitats. A 2001 U.S. Supreme Court opinion (*Solid Waste Agency of Northern Cook County* (SWANCC) v. *U.S. Army Corps of Engineers,* 531 U.S. 159 (2001)) substantially reduced the jurisdiction of the Federal Government in regulating isolated wetlands. While many States in the southeastern United States regulate those activities affecting wetlands that are not protected by section 404 of the CWA, Florida is the only State known to regulate isolated wetlands. In South Carolina, Georgia, Alabama, and North Carolina, no State laws protect isolated wetlands. The EPA and the Corps have developed a proposed rule to clarify whether a waterway, water body, or wetland is protected by the CWA and have sent this proposed rule to the Office of Management and Budget for interagency review. The EPA/Corps proposed rule will provide greater consistency, certainty, and predictability nationwide by providing clarity in determining where the CWA applies. The proposed rule is limited to clarifying current uncertainty concerning the jurisdiction of the CWA that has arisen as an outgrowth of Supreme Court decisions. It focuses on clarifying protection of the network of smaller waters that feed into larger ones, to keep downstream water safe from upstream pollutants. It would also clarify protection for wetlands that filter and trap pollution, store water, and help keep communities safe from floods. However, the proposed rule does not propose changes to existing regulatory exemptions and exclusions. For more information see (*http://water.epa.gov/lawsregs/guidance/wetlands/CWAwaters.cfm*).

Within the range of the wood stork in the southeastern U.S., a wide array of activities have begun at Federal, State, County, and local levels which involve analysis and planning for climate change, especially with regard to sea level rise and associated storm surge in coastal areas. These efforts are in the early stages of development and the situation is complicated by uncertainty about the magnitude and rate of climate change and its effects, including the possibility of both positive and negative effects on the wood stork. Thus we do not have a basis at this time for assessing the possible effectiveness of such that will assist us in addressing climate change in relation to wood stork populations and habitat.

The Service's Wood Stork Habitat Management Guidelines (Ogden 1990) recommend that active colony sites be protected from local hydrologic changes and from human activities (*e.g.,* timber harvesting, vegetation removal, construction, and other habitat-altering activities) that are likely to be detrimental to the colony (USFWS 1997, p. 18). The Service also recommends that feeding sites be protected to the maximum extent possible. The Service's North and South Florida Ecological Services Field Offices have developed ''May Affect'' keys to assist regulators with review of wetland dredge and fill permit applications and in an effort to minimize loss of wetland habitats important to wood stork recovery, like those within the core foraging area of a nesting colony.

In summary, a number of regulatory mechanisms implemented by Federal and State agencies protect wood storks and conserve their habitat. Take of wood storks is illegal under both the Act and MBTA. The CWA minimizes impacts on jurisdictional wetlands that are important to wood storks; however, the CWA alone is not sufficient to eliminate all impacts, as discussed in Factor A. Whether existing habitat protections and conservation mechanisms are inadequate can be assessed only by monitoring the status of the wood stork population. Recent trends indicate that the range is expanding and the breeding population has increased, suggesting that the combination of the CWA, the Act, the MBTA, and State regulations are adequate to protect jurisdictional wetlands to allow population growth. However, non-jurisdictional wetlands continue to be lost to development due to lack of existing regulatory mechanisms, and, therefore, loss of these wetlands continues as a threat to this species.

E. Other Natural or Manmade Factors Affecting Its Continued Existence

Changes in Climate Suitability

One of the concerns related to the effects of climate change is whether the size of the area with climate conditions that are suitable for a species will shrink substantially or change in location relative to the current range of a species, as well as the ability of a species to shift its range in a timely way, if needed. One approach for assessing such possibilities involves climate envelope modeling (CEM), which is a type of species distribution modeling that involves predicting the future locations of climate suitability for a species based on a correlation between its current or past occurrence and climate information, such as the minimum and maximum climate conditions (the ''climate envelope'') where the species occurs (Watling *et al.* 2013, p. 36). The wood stork is one of several species in the southeastern U.S. for which climate modeling has been conducted to make predictions for the 20-year period 2041–2060, and the wood stock is one of the species for which the climate envelope (i.e., area of climate suitability) is predicted to expand (Bucklin *et al.* 2012, entire; Watling *et al.*, 2012, pp. 1–8).

More specifically, the results of Watling *et al.* (2012, p. 6) predict that for 2041–2060 the relative size of the climate envelope for the wood stork will expand to approximately 5.6 times the size of the contemporary climate envelope in the Southeast. (Data for this prediction are available via *http://crocdoc.ifas.ufl.edu/projects/climateenvelopemodeling/* and maps depicting the current and predicted climate envelopes for the wood stock based on these data are in our files.) Also, although a comparison of two different approaches for dealing with climate projections yielded somewhat different predictions of the likely area of climate suitability for 2041–2060, both approaches predicted increases in the size of the area of the climate envelope in the southeast for the woodstork (Bucklin *et al.* 2012, pp. 7–10). The climate envelope information does not mean that the wood stork will change its range to match the changing conditions that were modeled. Nevertheless, the study results, plus the fact that the wood stork is capable of expanding its range (as described in the *Distribution* section, above), lead us to conclude that the potential changes in temperature and precipitation associated with a changing climate over the next several decades, as considered in the models, are not going to be limiting for the southeastern U.S. DPS of the wood stork. It also is significant that a recent assessment which considered the wood stork throughout its entire range (i.e., not limited to the southeast U.S. DPS) concluded that the species has overall low vulnerability to various impacts of climate change (Foden *et al.* 2013, Appendix A).

Contamination Events

Contamination events can be triggered by restoration or natural events, such as hurricanes or flooding, that can expose concentrations of contaminants. For example, from November 1998 through early April 1999, a bird mortality event occurred on the north shore of Lake Apopka, Florida, on former farmlands that had been purchased by the St. Johns River Water Management District and NRCS. An estimated 676 birds died on-site, mostly white pelicans (*Pelecanus erythrorhynchos*) and various species of wading birds, including the wood stork. Of the estimated 1,991 wood storks present in the area, 43 died on-site (Rauschenberger 2007, p. 16). The cause of death was attributed to organochlorine pesticide (OCP) toxicosis (Rauschenberger 2007, p. 16). The birds were exposed to OCPs by eating OCP-contaminated fish, which became easy prey as fish moved from ditches into the flooded fields, located in the eastern part of the restoration area (Rauschenberger 2007, p. 16).

Mercury, heavy metals, and other contaminants that may impair reproduction and cause other health issues are being studied in wood storks and many other wading bird species (Bryan *et al.* 2012; Gallagher *et al.* 2011; Martin 2010; Frederick and Jayasena 2010; Brant *et al.* 2002; Bryan *et al.* 2001; Gariboldi *et al.* 2001). Wetlands in the southeastern United States have many ecosystem attributes ideal for promoting high methylmercury production rates (inorganic mercury converts to methylmercury in the natural environment and fish-eating birds will accumulate this toxin in their systems) (Hall 2008, p. 124) and are probably a threat throughout the range. Frederick and Jayasena (2010, p. 1851) suggest reduced productivity from sublethal effects of mercury in white ibis; it is possible that wood storks could also be impacted but this theory requires further investigation. Also, exposure to contaminants by foraging in manmade wetlands may pose a potential risk to wood stork health and reproduction. On the other hand, pesticide contamination has not generally been considered to adversely affect wood stork reproduction (Bowerman *et al.* 2007, p. 1506; Ohlendorf *et al.* 1978, p. 616).

Oil spills are a concern for the U.S. wood stork DPS; however, very few cases of actual oiled wood storks have been documented. The magnitude of the threat that oil spills play to wood stork recovery and their habitats is unknown and is dependent on the frequency and extent and timing of a spill. Wood stork protection should be specified explicitly in contaminant spill contingency plans which involve State and Federal agencies, along with local oil spill control groups, in efforts to contain and clean up leaks and spills which could impact wood stork habitat; haze wood storks away from the spill areas and capture and treat individuals that become seriously contaminated.

Algal Blooms (Red Tide Events)

Harmful algal blooms, specifically red tide events, have become more prevalent along Florida's coast. Hallegraeff (2010, p. 1) and Moore *et al.* (2008, p. 220) suggest the likelihood that harmful algal blooms will increase due to climate change. Brevetoxicosis (caused by taking in a brevetoxin produced by *Karenia brevis*) was documented in 2005 as the cause of death of a wood stork (Spalding 2006). Wood storks can be exposed to harmful microalgae and their toxins through a variety of mechanisms, including aerosolized transport (*i.e.,* respiratory irritation in mammals, turtles, birds); bioaccumulation through consumption of prey containing toxins or toxic cells (crustaceans, gastropods, fish, birds, turtles, mammals); and mechanical damage by spines, setae, or other anatomical features of the cells (FWC 2007, p. 1). In addition to dead fish, large numbers of aquatic birds, particularly double-crested cormorants *(Phalacrocorax auritus),* red-breasted mergansers *(Mergus merganser),* and lesser scaup *(Aythya affinis),* were found moribund or dead in red tide areas during the Florida west coast *Karenia brevis* red tide of October 1973 to May 1974 (FWC 2007).

Electrocution

Electrocution mortalities of wood storks from power lines have been documented and reported to us by power companies and by State and Federal wildlife law enforcement. In most cases, when a problem location is identified, it is retrofitted using standard avian protection guidelines to prevent electrocutions. The guidelines recommend using heavily insulated wire, spreading the wires apart to prevent grounding as body parts touch the wires, or burying the wires underground. The Service's Wood Stork Habitat Management Guidelines (Ogden 1990) include recommendations that new transmission lines be at least 1 mile away from colony sites and tall transmission towers no closer than 3 miles from active colonies. The Service also recommends similar guidance for cell phone towers and wind turbines. These recommended distances are provided to help minimize the risk of powerline and tower collisions. The guidelines are intended to protect both adult wood storks making foraging forays to and from the colony to feed chicks and also fledglings that are learning to fly and making foraging forays to and from the colony.

Other Threats

The following is a list of threats that have also been documented to occur, but we have concluded that, due to low incident numbers and minimal documentation, the impacts at this time are very low and do not impede recovery.

Human disturbance is known to have a detrimental effect on wood stork nesting (USFWS 1997, pp. 10, 12). Wood storks have been documented to desert nests when disturbed by humans, thus exposing eggs and young birds to the elements and to predation by gulls and fish crows (Coulter *et al.* 1999, p. 19).

Documentation of road kill mortalities of wood storks has increased (B. Brooks, USFWS, pers. comm., 2010). Many factors may contribute to this, such as better reporting or more storks using roadside ponds, ditches, swales, and flow-ways as foraging habitat.

Hurricanes are an environmental factor that can impact large areas of the 6 state geographic range in the southeast U.S. of the U.S. wood stork DPS both in positive and negative ways depending upon frequency and intensity. According to the National Climate Assessment, there is considerable uncertainty about the details of hurricane activity prior to the 1980s, when data from satellites became available. Since the 1980s, measures of the Atlantic hurricane activity have increased substantially, including the intensity, frequency, duration, and number of strongest (Category 4 and 5) hurricanes. There also is uncertainty about the role of natural variability in these recent changes in hurricane activity, as compared to the role of human-caused changes in climate. As for the future, on average, models project a slight decrease in the annual number of tropical cyclones, but an increase in the number of the strongest (Category 4 and 5) hurricanes over this century. Most of the existing studies also project greater rainfall rates during hurricanes in a warmer climate (Walsh *et al.* 2014, pp. 41–42; 65; Carter *et al.* 2014, p. 399).

Stochastic events, including hurricanes but also severe thunderstorms, do pose other potential risks. Loss of nesting trees due to storm events can have a negative impact on nesting habitat. Severe local storm events have impacted individual colonies, causing chick mortality and even blowing nests out of trees. There are also benefits to wood stork habitat from large rain events associated with hurricanes and other storm systems. Timing of rain events can impact active colonies and local foraging conditions. However, large rain events can also improve hydrologic conditions locally and regionally for current and future nesting seasons. They can also reduce impacts of the nutrient overload to the nesting vegetation and dilute the nutrient load within the wetland from the guano produced by a colony.

As described previously, most wood stork colonies in the southeastern United States have relatively short survival histories and only a handful of colonies have survived more than 20 years. The large numbers of short-lived colonies indicate that colony abandonment and novel colony initiation seems to be typical of the species (Tsai *et al.* 2011, p. 2). The wood stork's ability to seek out new locations for nesting indicates they will continue to respond in a similar fashion to changes in habitat availability that result from changes in habitat suitability associated with hurricanes or other storm events. With regard to foraging, they respond to habitat changes on daily, seasonal, and annual basis, and in drought vs wet years, as well as in the breeding vs non-breeding seasons. This has included responding to major changes that have occurred in the Everglades, where some still nest. They also have expanding their breeding range. Consequently despite past, on-going, and plausible future changes in hurricanes and other severe storms, we anticipate both positive and negative effects depending upon timing, frequency and intensity.

The invasion of exotic plants into natural wetland areas can prevent wood storks from foraging due to high density and canopy cover of the plants (USFWS 2010, p. 127). Invasion into natural nesting habitats by exotic species, including Brazilian pepper (*Schinus terebinthifolius*), melaleuca (*Melaleuca quinquenervia*), and Australian pine (*Casuarina equisetifolia*), may present a problem; however, wood storks are using exotic species for nesting habitat at many manmade wetland colony sites, such as borrow pits. Even though wetlands overgrown with exotics may preclude wood storks from foraging within, they do have a conservation benefit as they flood during the wet season and provide a prey source to adjacent wetlands. Wood storks are also documented utilizing Brazilian pepper as nesting substrate (USFWS 1999, p. 4–396).

Summary of Factor E

In summary, other natural or manmade factors affecting the wood stork's continued existence, such as contaminants, harmful algal blooms, electrocution, road kill, invasion of exotic plants and animals, human disturbance, and stochastic events, are all documented at minimal levels to affect wood storks.

We have no evidence that observed increased temperatures associated with climate change have had an adverse effect on the U.S. wood stork DPS or its habitat. The climate envelope modeling (described above) indicates a substantial increase in the area of suitable temperature conditions and precipitation for the species in the coming decades. Hurricane activity has increased since the 1980s, and although the number of tropical cyclones may decrease in the future, there may be an increase in severe, i.e., class 4 and class 5, hurricanes. The wood stork has evolved under conditions that have included considerable variability habitat distribution and abundance, and conditions that include exposure to hurricanes of varying magnitude. The wood stork utilizes a wide variety of habitats throughout its range in the southeastern United States; this ability to use alternative habitats (as evidenced by the wood storks' expansion from the Everglades of Florida into marshes and tidal areas throughout the southeastern United States (Brooks and Dean 2008, p. 58), helps to buffer this species from some of the impacts to its habitat through natural or manmade threats. We conclude that other natural or manmade factors are not a significant factor affecting the U.S. wood stork DPS, now or in the foreseeable future.

Conclusion

Whether a species is currently on the brink of extinction in the wild depends on the life history and ecology of the species, the nature of the threats, and the species' response to those threats. Loss, fragmentation, and modification of wetland habitats continue as threats to U.S. wood storks. Based on the best available scientific information, our assessment is that the species is showing the ability to respond to these threats through expanding its range, adjusting its reproductive timing, and utilizing a variety of wetlands, including manmade wetlands, to forage, roost, and breed. Current data show that the breeding range has now almost doubled in extent and shifted northward along the Atlantic coast as far as southeastern North Carolina. As a result, dependence of wood storks on any specific wetland complex has been reduced. Even though habitat destruction and modification are still a threat to recovery, the improved wood stork population statistics also suggest that wetland habitat is not yet limiting the population, at least at the landscape level.

A number of regulatory mechanisms are being implemented by Federal and State agencies to protect wood storks and conserve their habitat. Take of wood storks is illegal under both the Act and MBTA. Whether habitat protection and conservation mechanisms are inadequate must be assessed in terms of the wood stork population. Recent trends indicate that the range of the U.S. wood stork DPS is expanding and that the breeding population has increased, suggesting that existing regulatory mechanisms are adequate to allow population growth. However, we remain concerned that the status of this species would be expected to deteriorate should the Act's requirements to consult on all Federal actions affecting the species' habitat or the prohibition on take (including significant habitat modification) be removed. We recognize there are significant recommendations that we can make to help improve implementation of regulatory mechanisms to further minimize impacts to wetland habitats and we intend to work with our partners to work on and address these issues.

Other threats such as overutilization of the species for commercial, recreational, scientific, or educational purposes; disease and predation; and other natural or manmade factors (*e.g.,* contaminants, harmful algal blooms, electrocution, road kill, invasion of exotic plants and animals, human disturbance, and stochastic events) are known to occur but are not significant.

While there continue to be ongoing threats, the U.S. wood stork DPS is increasing and expanding its overall range. Population criteria for reclassification have been exceeded with 3-year population averages higher than 6,000 nesting pairs since 2003 (range of 7,086 to 10,147 nesting pairs). Delisting criteria of 10,000 nesting pairs (5-year average) has not been achieved. The wood stork population has exceeded 10,000 nesting pairs twice during the past 5 years (2006 and 2009), and the 2009 count of 12,720 nesting pairs represents the highest count since the early 1960s. Productivity, though variable, is sufficient to support a growing population. Based on the analysis presented above and the fact that the nesting pair reclassification criteria has been met and exceeded and productivity appears to be supporting a growing population, we have determined the U.S. wood stork DPS is not presently in danger of extinction throughout its range. Because loss, fragmentation, and modification of wetland habitats continue around nesting colonies and core foraging areas, and biological goals of the recovery plan are still applicable, we conclude that the U.S. wood stork DPS is likely to become endangered within the foreseeable future and, therefore, should be reclassified as threatened under the Act.

Significant Portion of the Range Analysis

Having determined that the U.S. wood stork DPS meets the definition of threatened, we must next consider whether there is a significant portion of the range where the wood stork remains in danger of extinction. The phrase ''significant portion of its range'' (SPR) is not defined by the Act, and we have never addressed in our regulations: (1) The outcome of a determination that a species is either endangered or likely to become so throughout a significant portion of its range, but not throughout all of its range; or (2) what qualifies a portion of a range as ''significant.''

Two district court decisions have addressed whether the SPR language allows the Service to list or protect less than all members of a defined ''species'': *Defenders of Wildlife* v. *Salazar,* 729 F. Supp. 2d 1207 (D. Mont. 2010), concerning the Service's delisting of the Northern Rocky Mountain gray wolf (74 FR 15123, April 2, 2009); and *WildEarth Guardians* v. *Salazar,* 2010 U.S. Dist. LEXIS 105253 (D. Ariz. Sept. 30, 2010), concerning the Service's 2008 finding on a petition to list the Gunnison's prairie dog (73 FR 6660, February 5, 2008). The Service had asserted in both of these determinations that it had authority, in effect, to protect only some members of a ''species,'' as defined by the Act (*i.e.,* species, subspecies, or DPS), under the Act. Both courts ruled that the determinations were arbitrary and capricious on the grounds that this approach violated the plain and unambiguous language of the Act. The courts concluded that reading the SPR language to allow protecting only a portion of a species' range is inconsistent with the Act's definition of ''species.'' The courts concluded that, once a determination is made that a species (*i.e.,* species, subspecies, or DPS) meets the definition of ''endangered species'' or ''threatened species,'' it must be placed on the list in its entirety and the Act's protections applied consistently to all members of that species (subject to modification of protections through special rules under sections 4(d) and 10(j) of the Act).

Consistent with that interpretation, and for the purposes of this rule, we interpret the phrase ''significant portion of its range'' in the Act's definitions of ''endangered species'' and ''threatened species'' to provide an independent basis for listing a species in its entirety; thus there are two situations (or factual bases) under which a species would qualify for listing: A species may be endangered or threatened throughout all of its range; or a species may be endangered or threatened in only a significant portion of its range. If a species is in danger of extinction throughout an SPR, it, the species, is an ''endangered species.'' The same analysis applies to ''threatened species.'' Therefore, the consequence of finding that a species is endangered or threatened in only a significant portion of its range is that the entire species will be listed as endangered or threatened, respectively, and the Act's protections will be applied across the species' entire range.

We conclude, for the purposes of this rule, that interpreting the SPR phrase as providing an independent basis for listing is the best interpretation of the Act because it is consistent with the purposes and the plain meaning of the key definitions of the Act; it does not conflict with established past agency practice (*i.e.,* prior to the 2007 Department of the Interior Solicitor's Opinion), as no consistent, long-term agency practice has been established; and it is consistent with the judicial opinions that have most closely examined this issue. Having concluded that the phrase ''significant portion of its range'' provides an independent basis for listing and protecting the entire species, we next turn to the meaning of ''significant'' to determine the threshold for when such an independent basis for listing exists.

Although there are potentially many ways to determine whether a portion of a species' range is ''significant,'' we conclude, for the purposes of this rule, that the significance of the portion of the range should be determined based on its biological contribution to the conservation of the species. For this reason, we describe the threshold for ''significant'' in terms of an increase in the risk of extinction for the species. We conclude that a biologically based definition of ''significant'' best conforms to the purposes of the Act, is consistent with judicial interpretations, and best ensures species' conservation. Thus, for the purposes of this rule, a portion of the range of a species is ''significant'' if its contribution to the viability of the species is so important that, without that portion, the species would be in danger of extinction.

We evaluate biological significance based on the principles of conservation biology using the concepts of redundancy, resiliency, and representation. *Resiliency* describes the characteristics of a species that allow it to recover from periodic disturbance. *Redundancy* (having multiple populations distributed across the landscape) may be needed to provide a margin of safety for the species to withstand catastrophic events. *Representation* (the range of variation found in a species) ensures that the species' adaptive capabilities are conserved. Redundancy, resiliency, and representation are not independent of each other, and some characteristic of a species or area may contribute to all three. For example, distribution across a wide variety of habitats is an indicator of representation, but it may also indicate a broad geographic distribution contributing to redundancy (decreasing the chance that any one event affects the entire species), and the likelihood that some habitat types are less susceptible to certain threats, contributing to resiliency (the ability of the species to recover from disturbance). None of these concepts is intended to be mutually exclusive, and a portion of a species' range may be determined to be ''significant'' due to its contributions under any one of these concepts.

For the purposes of this rule, we determine if a portion's biological contribution is so important that the portion qualifies as ''significant'' by asking whether, *without that portion,* the representation, redundancy, or resiliency of the species would be so impaired that the species would have an increased vulnerability to threats to the point that the overall species would be in danger of extinction (*i.e.,* would be ''endangered''). Conversely, we would not consider the portion of the range at issue to be ''significant'' if there is sufficient resiliency, redundancy, and representation elsewhere in the species' range that the species would not be in danger of extinction throughout its range if the population in that portion of the range in question became extirpated (extinct locally).

We recognize that this definition of ''significant'' establishes a threshold that is relatively high. On the one hand, given that the outcome of finding a species to be endangered or threatened in an SPR would be listing the species throughout its entire range, it is important to use a threshold for ''significant'' that is robust. It would not be meaningful or appropriate to establish a very low threshold whereby a portion of the range can be considered ''significant'' even if only a negligible increase in extinction risk would result from its loss. Because nearly any portion of a species' range can be said to contribute some increment to a species' viability, use of such a low threshold would require us to impose restrictions and expend conservation resources disproportionately to conservation benefit: Listing would be rangewide, even if only a portion of the range of minor conservation importance to the species is imperiled. On the other hand, it would be inappropriate to establish a threshold for ''significant'' that is too high. This would be the case if the standard were, for example, that a portion of the range can be considered ''significant'' only if threats in that portion result in the entire species' being currently endangered or threatened. Such a high bar would not give the SPR phrase independent meaning, as the Ninth Circuit held in *Defenders of Wildlife* v. *Norton,* 258 F.3d 1136 (9th Cir. 2001).

The definition of ''significant'' used in this rule carefully balances these concerns. By setting a relatively high threshold, we minimize the degree to which restrictions would be imposed or resources expended that do not contribute substantially to species conservation. But we have not set the threshold so high that the phrase ''in a significant portion of its range'' loses independent meaning. Specifically, we have not set the threshold as high as it was under the interpretation presented by the Service in the *Defenders* litigation. Under that interpretation, the portion of the range would have to be so important that current imperilment there would mean that the species would be *currently* imperiled everywhere. Under the definition of ''significant'' used in this rule, the portion of the range need not rise to such an exceptionally high level of biological significance. (We recognize that if the species is imperiled in a portion that rises to that level of biological significance, then we should conclude that the species is in fact imperiled throughout all of its range, and that we would not need to rely on the SPR language for such a listing.) Rather, under this interpretation we ask whether the species would be endangered everywhere without that portion, *i.e.,* if that portion were completely extirpated. In other words, the portion of the range need not be so important that even being in danger of extinction in that portion would be sufficient to cause the remainder of the range to be endangered; rather, the *complete extirpation* (in a hypothetical future) of the species in that portion would cause the remainder of the range to be endangered.

The range of a species can theoretically be divided into portions in an infinite number of ways. However, there is no purpose to analyzing portions of the range that have no reasonable potential to be significant *and* threatened or endangered. To identify only those portions that warrant further consideration, we determine whether there is substantial information indicating that: (1) The portions may be ''significant,'' and (2) the species may be in danger of extinction there or likely to become so within the foreseeable future. Depending on the biology of the species, its range, and the threats it faces, it might be more efficient for us to address the significance question first or the status question first. Thus, if we determine that a portion of the range is not ''significant,'' we do not need to determine whether the species is endangered or threatened there; if we determine that the species is not endangered or threatened in a portion of its range, we do not need to determine if that portion is ''significant.'' In practice, a key part of the portion status analysis is whether the threats are geographically concentrated in some way. If the threats to the species are essentially uniform throughout its range, no portion is likely to warrant further consideration. Moreover, if any concentration of threats applies only to portions of the species' range that clearly would not meet the biologically based definition of ''significant,'' such portions will not warrant further consideration.

Applying the process described above, we evaluated the U.S. wood stork DPS's range to determine if any areas could be considered a significant portion of its range, and a key portion of that determination is whether the threats are geographically concentrated in some manner. As detailed in the threat analysis in this rule, the primary threat to the wood stork—habitat loss, fragmentation, and modification—is a relatively uniform threat across the species' range.

It could be argued that, at the time of listing, the threat of habitat destruction and fragmentation to the U.S. wood stork DPS at one time was concentrated in south Florida. With the current habitat regimes, nesting wood storks have persisted in south Florida with nesting numbers below historic counts but also varying annually from hundreds to several thousand in many years (Table 2). Even though we note above that no concentration of threats currently occurs in the range of this DPS, we provide here more detail on south Florida to determine whether it is a significant portion of the range in light of the emphasis on south Florida in the wood stork recovery plan.

The wood storks nesting in south Florida (the region south of Lake Okeechobee from Lee County on the west coast to Palm Beach County on the east coast, and the Everglades and Big Cypress systems) now represent approximately 25 percent of the breeding wood storks in the United States during the past 10 years (Tables 1 and 2). Total nesting pairs in this region have been variable, but showed a general pattern of decline during the 1970s and remained low through the mid-1980s. However, wood stork nesting increased in south Florida from the mid-1990s (an average of 400 to 500 pairs) to a high of 5,816 pairs in 2009. A 3-year running average since the time of listing in 1984 ranges from 457 to 3,449 pairs, with considerable variability. These observed fluctuations in the nesting between years and nesting sites have been attributed primarily to variable hydrologic conditions during the nesting season and timing of the nesting season (Crozier and Gawlik 2003, p. 1; Crozier and Cook 2004, pp. 1–2; Frederick 2012, p. 44). Frequent, heavy rains during nesting can cause water levels to increase rapidly. The abrupt increases in water levels during nesting, termed reversals (Crozier and Gawlik 2003, p. 1), may cause late nest initiation, nest abandonment, re-nesting, and poor fledging success.

For example, optimal foraging conditions in 2006 resulted in high nesting success, but the 2-year drought that followed in 2007 and 2008 resulted in no nesting success in the Corkscrew Sanctuary rookery (Lauritsen 2007, p. 11; Lauritsen 2008, p. 12). However, 2009 nesting data for Corkscrew Sanctuary rookeries noted 1,120 nests producing 2,570 nestlings (Lauritsen 2009, p. 13). Similar rebounds in nesting activity were recorded for other south Florida rookeries in 2009, with possibly the largest number of nest starts since 1975, estimated at about 4,000 nests throughout the Everglades and Big Cypress Systems (Newman 2009, p. 51) and a total of 5,816 nesting pairs in south Florida and counts of 2,100 and 1,200 in 2011 and 2012, respectively (Table 2). Frederick (2012, p. 44) states that later nesting increases the risk of mortality of nestlings that have not fledged prior to the onset of the wet season, which is likely the difference between the south Florida segment of the population being a source or a sink to the wood stork population.

The CERP established performance measures and related goals for wood storks and other wading bird species. Metrics include the number of pairs of nesting wood storks and the location of the wood stork colonies. The timing of nesting, which shifted from historical periods of November through December to January through March, is also a metric. These metrics have shown some recent positive measures in Everglades restoration. Restoration models predict that the return of natural flows and hydrologic patterns will result in large, sustainable breeding wading bird populations, with large colonies in the coastal zone of the Everglades and a return to natural timing of nesting, with wood stork nest initiation in November or December. Cook and Kobza (2010, p. 2) suggest that Everglades National Park may be more attractive to nesting birds in recent years and that the 2009 breeding season was the best nesting year in south Florida since the 1940s. The 2009–2010 nesting year did show an improvement in nest timing with wood stork nesting in January, which is earlier than previous years, but still outside the nesting onset target of November to December (Newman 2009, p. 52; Gottlieb 2010, p. 42). Cook and Kobza (2010, p. 2) report a general shift of colony locations to the coast in recent years. Frederick (2012, p. 44) also confirms more wood storks nesting in coastal colonies and an increase in the number of wood storks nesting in the Everglades since 1986; however, there appears to be little improvement on the timing of nesting (Frederick 2012, p. 44).

Although the variability of habitat conditions affects the nesting efforts in south Florida and at times total failure of a colony occurs or little to no nesting, we do not believe such variability will cause extirpation of wood storks in south Florida. Wood storks are a long-lived species that demonstrate considerable variation in population numbers in response to changing hydrological conditions (USFWS 1997, p. 10). We are not aware of any other threat within this portion of the range that would act synergistically and heighten our level of concern for the wood stork population. Consequently, we recognize that it is desirable to improve the nesting success of wood storks in south Florida, and timing of nest initiation appears to be a key factor. However, we conclude that the present level of habitat threat, when combined with the restoration efforts of CERP and the significant number of wood storks nesting in south Florida and throughout the range, is not of a magnitude that leads us to delineate the wood storks in and around south Florida as being more in danger of extirpation than wood storks breeding in central/north Florida through North Carolina, nor as being a significant portion of the range of the U.S. wood stork DPS.

In summary, the primary threats to the U.S. wood stork DPS (habitat loss, fragmentation, and modification) are relatively uniform throughout the DPS's range.

A growing population with an expanding distribution provides less risk to the species and the breeding range extension makes them less vulnerable to the potential threats. We have determined that none of the existing or potential threats currently place the U.S. wood stork DPS in danger of extinction throughout all or a significant portion of its range. The best available information indicates the U.S. wood stork DPS is likely to become an endangered species within the foreseeable future throughout all of its range due to the impacts of habitat loss, fragmentation, and modification. Thus, the U.S. wood stork DPS meets the definition of a threatened species throughout its range.

Available Conservation Measures

Conservation measures provided to species listed as endangered or threatened under the Act include recognition, recovery actions, requirements for Federal protection, and prohibitions against certain practices. Recognition through listing increases public awareness of threats to the U.S. breeding population of the wood stork, and promotes conservation actions by Federal, State, and local agencies, private organizations, and individuals. The Act provides for possible land acquisition and cooperation with the States, and for recovery planning and implementation. The protection required of Federal agencies and the prohibitions against taking and harm are discussed, in part below.

A number of the nesting colonies of the U.S. wood stork DPS occur on Federal conservation lands and are consequently afforded protection from development and large-scale habitat disturbance. Wood stork colonies also occur on a variety of State-owned properties, and existing State and Federal regulations provide protection on these sites. A significant number of wood stork colonies occur on private lands, and through conservation partnerships, many of these colonies are protected through the owners' stewardship. In many cases, these partnerships have been developed through conservation easements, wetland restoration projects, and other conservation means. The fact that wood stork habitat is primarily wetlands also assures the opportunity for conference or consultation on most projects that occur in wood stork habitat under the authorities described below.

Section 7(a) of the Act, as amended, requires Federal agencies to evaluate their actions with respect to the U.S. breeding population of the wood stork. If a Federal action may affect the wood stork or its habitat, the responsible Federal agency must consult with the Service to ensure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of the wood stork. Federal agency actions that may require consultation with us include Corps' involvement in projects such as residential development, mining operations, construction of roads and bridges, or dredging that requires dredge/fill permits. Protecting and restoring wetlands that wood storks are dependent upon through the environmental regulatory review process is the most important action that Federal, State, and local regulatory agencies can undertake and is key to wood stork recovery.

The Act and its implementing regulations set forth a series of general prohibitions and exceptions that apply to all endangered and threatened wildlife. As such, these prohibitions would be applicable to the wood stork. These prohibitions, under 50 CFR 17.21 (17.31 for threatened wildlife species), make it illegal for any person subject to the jurisdiction of the U.S. to "take" (including to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or to attempt any of these) within the United States or upon the high seas, import or export, deliver, receive, carry, transport, or ship in interstate or foreign commerce in the course of a commercial activity, or to sell or offer for sale in interstate or foreign commerce, any endangered wildlife species. It also is illegal to possess, sell, deliver, carry, transport, or ship any such wildlife that has been taken in violation of the Act. Certain exceptions apply to agents of the Service and State conservation agencies.

We may issue permits to carry out otherwise prohibited activities involving threatened wildlife species under certain circumstances. Regulations governing permits are codified at § 17.32 for threatened species. Such permits are available for scientific purposes, to enhance the propagation or survival of the species and for incidental takes in the course of otherwise lawful activities. For threatened species, permits are also available for zoological exhibition, educational purposes, and special purposes consistent with the purposes of the Act.

Questions regarding whether specific activities will constitute a violation of section 9 of the Act should be directed to the U.S. Fish and Wildlife Service, North Florida Ecological Services Field Office (see **FOR FURTHER INFORMATION CONTACT** section). Requests for copies of the regulations regarding listed species and inquiries about prohibitions and permits may be addressed to the U.S. Fish and Wildlife Service, Ecological Services Division, 1875 Century Boulevard, Suite 200, Atlanta, GA 30345 (telephone 404–679–7313, facsimile 404–679–7081).

Effects of This Rule

This final rule revises 50 CFR 17.11(h) to reclassify the U.S. wood stork DPS from endangered to threatened on the List of Endangered and Threatened Wildlife. This rule formally recognizes that the U.S. wood stork DPS is no longer in danger of extinction throughout all or a significant portion of its range. This reclassification does not significantly change the protections afforded this species under the Act. Based on new information about the range of the U.S. wood stork DPS and where nesting is now occurring, this rule also revises 50 CFR 17.11(h) to reflect that the U.S. wood stork is a DPS and the range of the U.S. wood stork DPS has expanded from Alabama, Florida, Georgia, and South Carolina to also include North Carolina and Mississippi (see *Distinct Vertebrate Population Segment Analysis* section).

The regulatory protections of section 9 and section 7 of the Act will remain in place for the wood stork. Anyone taking, attempting to take, or otherwise possessing a wood stork, or parts thereof, in violation of section 9 of the Act is subject to a penalty under section 11 of the Act. Pursuant to section 7 of the Act, all Federal agencies must ensure that any actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of the U.S. wood stork DPS.

Recovery actions directed at the wood stork will continue to be implemented as outlined in the recovery plan (Service 1997). Highest priority recovery actions include: (1) Locate nesting habitat; (2) locate roosting and foraging habitat; (3) inform landowners; (4) protect (nesting) sites from disturbance; (5) use existing regulatory mechanisms to protect habitat; and (6) monitor nesting and productivity of stork populations.

Finalization of this rule does not constitute an irreversible commitment on our part. Reclassification of the U.S. wood stork DPS from threatened status to endangered status could occur if changes occur in management, population status, or habitat, or if other factors detrimentally affect the DPS or increase threats to the species' survival. Such a reclassification would require another rulemaking.

Required Determinations

Paperwork Reduction Act of 1995

This rule does not contain any new collections of information that require approval by the Office of Management and Budget (OMB) under the Paperwork Reduction Act (44 U.S.C. 3501 *et seq.*). This rule will not impose recordkeeping or reporting requirements on State or local governments, individuals, businesses, or organizations. An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number.

National Environmental Policy Act

We have determined that we do not need to prepare an environmental assessment or environmental impact statement, as defined in the National Environmental Policy Act of 1969 (42 U.S.C 4321 *et seq.*), in connection with regulations adopted pursuant to section 4(a) of the Endangered Species Act. We published a notice outlining our reasons for this determination in the **Federal Register** on October 25, 1983 (48 FR 49244).

Government-to-Government Relationship With Tribes

In accordance with the President's memorandum of April 29, 1994, ''Government-to-Government Relations with Native American Tribal Governments'' (59 FR 22951), Executive Order 13175, and the Department of the Interior Manual Chapter 512 DM 2, we have considered possible effects on and have notified the Native American Tribes within the range of the U.S. breeding population of the wood stork about this rule. They have been advised through a written informational mailing from the Service. If future activities resulting from this rule may affect Tribal resources, a Plan of Cooperation will be developed with the affected Tribe or Tribes.

References Cited

A complete list of references cited is available on the Internet at *http://www.regulations.gov* and upon request from the North Florida Ecological Services Field Office (see **FOR FURTHER INFORMATION CONTACT**).

Authors

The primary authors of this document are the staff members of the North Florida Ecological Services Field Office (see **FOR FURTHER INFORMATION CONTACT**).

List of Subjects in 50 CFR Part 17

Endangered and threatened species, Exports, Imports, Reporting and recordkeeping requirements, Transportation.

Regulation Promulgation

We amend part 17, subchapter B of chapter I, title 50 of the Code of Federal Regulations, as set forth below:

PART 17—[AMENDED]

■ 1. The authority citation for part 17 continues to read as follows:

Authority: 16 U.S.C. 1361–1407; 16 U.S.C. 1531–1544; 16 U.S.C. 4201–4245; unless otherwise noted.

■ 2. Amend § 17.11(h) by revising the entry for ''Stork, wood'' under ''BIRDS'' in the List of Endangered and Threatened Wildlife to read as follows:

§ 17.11 Endangered and threatened wildlife.

* * * * *

(h) * * *

Species		Historic range	Vertebrate population where endangered or threatened	Status	When listed	Critical habitat	Special rules
Common name	Scientific name						
*	*	*	*	*	*		*
BIRDS							
*	*	*	*	*	*		*
Stork, wood	*Mycteria americana.*	U.S.A. (CA, AZ, TX, to Carolinas), Mexico, C. and S. America.	U.S.A. (AL, FL, GA, MS, NC, SC).	T	142, 837	NA	NA
*	*	*	*	*	*		*

* * * * *

Date: May 23, 2014.

Daniel M. Ashe,

Director, U.S. Fish and Wildlife Service.

[FR Doc. 2014–14761 Filed 6–27–14; 8:45 am]

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