Ivory-billed Woodpecker
(*Campephilus principalis*)

5-Year Review:
Summary and Evaluation

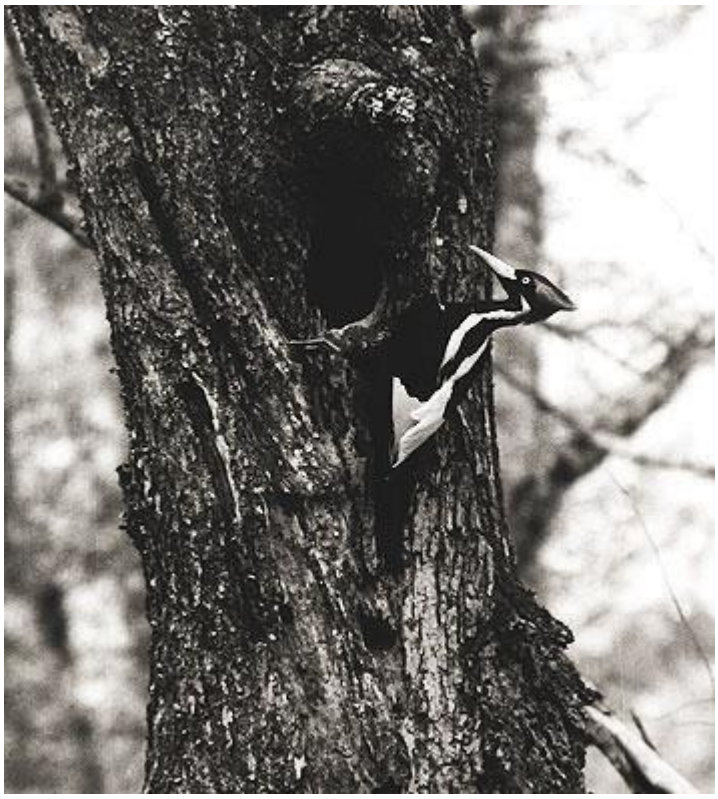


Photo by David Allen, 1935 (copyright Cornell Lab of Ornithology)

U.S. Fish and Wildlife Service
Southeast Region
Louisiana Ecological Services Field Office
Lafayette, Louisiana

5-YEAR REVIEW
Ivory-billed woodpecker (*Campephilus principalis*)

I. GENERAL INFORMATION

A. Methodology used to complete the review: The Louisiana Ecological Services Field Office conducted this 5-year review. We announced initiation of this review and requested information in a published *Federal Register* notice with a 60-day comment period (83 FR 90092). We received and considered four public comments during the 60-day open comment period. We also considered a variety of additional resources, including published and unpublished scientific information provided by other Service offices, State wildlife agencies, stakeholders, and other partners. Specific sources included the final rule listing this species under the Endangered Species Act (ESA); the Recovery Plan (Service 2010); peer reviewed scientific publications; unpublished field observations by Federal, State, and other experienced biologists; unpublished studies and survey reports; and notes and communications from other qualified individuals. The completed draft review was shared to our cooperating Arkansas Service Field Office and several independent peer reviewers for review and evaluation. Comments were evaluated and incorporated into this final document as appropriate (see Appendix A).

B. Reviewers
Lead Region: Southeast Region, Kelly Bibb, (404) 679-7132
Lead Field Office: Louisiana Ecological Services Field Office, Amy Trahan (337) 291-3126
Cooperating Field Office: Arkansas Delta Suboffice, Ecological Services Field Office, Jason Phillips, (870) 503-1101

C. Background:

1. **Federal Register Notice citation announcing initiation of this review:** May 7, 2018. 83 FR 90092.

2. **Species status: Presumed extinct.**
Based on extensive search efforts for the ivory-billed woodpecker (IBWO) that resulted in no conclusive evidence to show that the species persists within its historic range, we believe that it no longer exists in its habitat or range. Additional species-specific data supporting this decision is found in Section II of this document.

3. **Recovery achieved:** 1. (1=0-25% species recovery objectives achieved). Since we presume this bird to be extinct, we will not be able to recover this species.

4. **Listing history**
Original Listing
FR notice: 32 FR 4001
Date listed: March 11, 1967
FR notice: 35 FR 8495
Date listed: June 2, 1970
Entity listed: species

Classification: Endangered

5. **Associated rulemakings:** None.

6. **Review History:**
Recovery Plan: Recovery Plan for the Ivory-billed Woodpecker (*Campephilus prinicpalis*) (2010)

Each year, the Service reviews and updates listed species information for inclusion in the required Recovery Report to Congress. Through 2013, we did a recovery data call that included status recommendations such as "Presumed Extinct" for this bird. We continue to show that species status recommendation as part of our 5-year reviews. The most recent evaluation for this bird was completed in 2018. This annual gathering of listed species information has not provided new information to point toward potential persistence of the species.

Five-year reviews: Since the listing of the IBWO, there have been two Notices of Status Reviews that included this species.

April 4, 1985 (50 FR 14123) – Notice of Status Review – to determine if the species is extinct and should therefore be proposed for removal from the Federal list of threatened and endangered wildlife. The Service did not receive any confirmed reports of live birds as a result of that review. In 1986, the Service funded a large-scale survey that included coverage of potential sites throughout its historic range (Jackson 1989 and 2006). The study also included soliciting requests for new sightings and investigating those reports for validity, as well as researching historical sources (Jackson 1989). No conclusive evidence of IBWOs was obtained during that study; however, neither did it conclusively determine that the IBWO was extinct.

November 6, 1991 (56 FR 56882) **–** Notice of Review for all species (foreign and domestic listings) listed before 1991. In this review, the status of many species was simultaneously evaluated with no in-depth assessment of the five factors or threats as they pertain to the individual species. The notice stated that the Service was seeking any new or additional information reflecting the necessity of a change in the status of the species under review. The notice indicated that if significant data were available warranting a change in a species' classification, the Service would propose a rule to modify the species' status. No change in the bird's listing classification was found to be warranted.

In an email dated January 31, 2018, Carey Perry, Louisiana Department of Wildlife and Fisheries (LDWF), sent an attachment of a 2014 survey report that concluded there were no IBWOs encountered and that LDWF had no further new information.

In an email dated September 11, 2018, Judith Ratcliffe, North Carolina Natural Heritage Program, indicated that she had no new information on the species.

In an email dated September 11, 2018, Kate Slankard, Kentucky Department of Fish and Wildlife Resources, indicated that she had no new information to provide on the IBWO.

In an email dated September 13, 2018, Curtis Smalling, Audubon North Carolina, indicated that he had no new information to provide regarding the species, however, wanted to inform the Service about the regional efforts for bottomland forest protection and enhancement.

In an email dated September 16, 2018, Jon Blanchard, North Carolina State Parks and Recreation, indicated he had no new information on the IBWO.

In an email dated September 27, 2018, David Allen, North Carolina Wildlife Resources Commission, indicated he had no new information on the IBWO and that they have not had any credible sightings or evidence that the IBWO still exists.

7. **Species' Recovery Priority Number at start of review (48 FR 43098):** 5. This recovery priority number indicates a high degree of threat and low recovery potential for this species. The recovery plan indicated this number more accurately reflected the significant reduction in the species' habitat and the general consensus over 60 years that it was near extinction (and some thought it to be already extinct).

8. **Recovery Plan**
   Recovery Plan for the Ivory-billed Woodpecker (*Campephilus principalis*)
   Date Issued: April 16, 2010

II. REVIEW ANALYSIS

A. Application of the 1996 Distinct Population Segment (DPS) Policy

1. Is the species under review listed as a DPS? No.

2. Is there relevant new information that would lead you to consider listing this species as a DPS in accordance with 1996 policy? No.

B. Recovery Criteria

1. **Does the species have a final, approved recovery plan containing objective, measurable criteria?** No. The extremely limited knowledge available on the IBWO at the time the recovery plan was written prevented the development of more specific measurable recovery criteria; therefore, interim criteria were developed.

2. **Adequacy of recovery criteria.**

   a. **Do the recovery criteria reflect the best available and most up-to-date information on the biology of the species and its habitat?** The 2010 recovery plan and its interim criteria are 8 years old and although much is unknown about

the IBWO, the plan used the best available information on the biology of the species and its habitat known at the time. Since the recovery plan, we have not documented any new occurrences and have gained no new supporting evidence for its existence.

b. Are all of the 5 listing factors that are relevant to the species addressed in the recovery criteria? We only have interim recovery criteria that are not measureable due to the limited knowledge of the species. To some extent, they do address possible threats to this bird if it existed, such as habitat fragmentation.

3. List the recovery criteria as they appear in the recovery plan, and discuss how each criterion has or has not been met, citing information:
We will address the interim recovery criteria in this section (Service 2010).
Criterion 1: Potential habitats for any occurrences of the species are surveyed.

Status: Since the reported IBWO in 2004/2005 at the Cache River National Wildlife Refuge (NWR), a survey design was developed and implemented for search efforts throughout the species' historical range. Many State, Federal and private partners (e.g., state wildlife agencies, the Service, and the Cornell Laboratory of Ornithology) collaborated over a five-year period to conduct extensive searches for evidence of the species' presence within the historical range; however, no individuals were reliably located and no conclusive evidence confirmed the species' persistence (Service 2010). Since the five-year survey effort was completed, other survey efforts based on sightings and vocalizations reported by wildlife professionals and other individuals have continued throughout the range through present day. These efforts include:

- 2005-2013 – Pearl River swamp, Louisiana and Choctawhatchee River swamp, Florida – Michael Collins spent approximately 1500 hours surveying these two swamps with a kayak and video cameras – three video clips were produced from both areas, however the blurred images are inconclusive as to whether they are IBWOs or not (Collins 2017, Donahue 2017).
- 2007-2011 – 30 additional areas in the Southeastern United States (Pascagoula Basin of Mississippi, Mobile Basin of Alabama, Congaree and Coastal Basins of South Carolina, Apalachicola Basin of North Florida, and Everglades/Big Cypress Complex of South Florida) were surveyed with no prescence of IBWOs found (Lammertink and Rohrbaugh 2016).
- 2011 – White River NWR, Arkansas – searches were completed one and a half years after a tornado with findings of no evidence of IBWO presence observed adding to negative outcome of the 2005-2009 search efforts in this NWR (Lammertink and Rohrbaugh 2016).
- 2011 – Avoyelles Parish, Louisiana – survey on private property and Pomme de Terre Wildlife Management Area (WMA). No observations of IBWO were made (Lammertink and Rohrbaugh 2016).
- 2011 – Lee River State Natural Area, South Carolina – No evidence of IBWO presence was found during surveys (Lammertink and Rohrbaugh 2016).
- 2009-present – Louisiana – a search group, Project Coyote was founded by Frank Wylie and continued on by Mark Michaels, to search for IBWOs in

Louisiana – no conclusive evidence has been found that constitutes confirmation that the species' persists (Michaels 2018).

- 2016 – Cuba – Tim Gallagher, Martjan Lammertink, Mac McClelland, and Greg Kahn started initiating an expedition to Cuba in search of the IBWO – no presence found (McClelland 2016).

Criterion 2: Current habitat use and needs of any existing populations are determined.

Status: We cannot find any existing populations or individuals to determine what they may need.

Criterion 3: Habitat on public land where IBWOs are located is conserved and enhanced.

Status: We have not been able to locate new IBWOs on public land since the Recovery Plan was published. Cache River NWR has continued to acquire and restore new tracts of land since the location of one suspected individual in 2004. We are not aware if these tracts are beneficial to IBWO because that possible male individual has not been detected again. This criterion cannot be met, if we are not able to locate individuals.

Criterion 4: Habitat on private lands is conserved and enhanced through the use of voluntary agreements (e.g., conservation easements, habitat conservation plans) and public outreach.

Status: Various partners such as The Nature Conservancy (TNC), Ducks Unlimited, and private landowners have been implementing measures to protect wetlands and swamps where IBWOs are suspected to have occurred based on historical range maps and data. They are using tools such as the Natural Resources Conservation Service's (NRCS) Wetland Reserve Program (WRP) and Habitat Incentives Programs and the Service's Partners for Fish and Wildlife program to reforest areas. There is some evidence that increased outreach has helped with potential sightings since the publication of the Recovery Plan. However, IBWO sightings on private lands have not been well documented or have been determined to be misidentifications (i.e. the pileated woodpecker), therefore we have been unable to confirm IBWOs. This criterion cannot be met, if we are unable to locate individuals to better know what habitat to conserve.

Criterion 5: Viability of any existing populations (numbers, breeding success, population genetics, and ecology) is analyzed.

Status:
No existing populations have been found to be able to evaluate their viability.

Criterion 6: The number and geographic distribution of subpopulations needed to create conditions favorable to a self-sustaining metapopulation and to evaluate habitat suitable for species reintroductions is determined.

Status: No existing populations or individuals have been found to help us evaluate this criterion.

C. Updated Information and Current Species Status

1. Biology and Habitat

The information in this review updates the status of the IBWO. Such a review has not occurred since the recovery plan was written in 2010. We relied heavily on published literature and communications and data from other Service offices, and federal and state agencies.

a. Information on the species' biology and life history:

The IBWO was first described by Mark Catesby in 1731 (Tanner 1942) under a different taxonomic nomenclature. It has been described as the largest woodpecker in the United States and the second largest in North America with an overall length of approximately 48-51 centimeters (cm) (18-20 inches), an estimated wingspan of 76-80 cm (29-31 inches), and a weight of 454-567 grams (g) (16-20 ounces); however, data from live birds is lacking so these estimates were given by John J. Audubon and other ornithologists from the late 19th century who collected specimens (Service 2010). The IBWO has a black and white plumage with a white chisel-tipped beak, yellow eyes, and a pointed crest. They are sexually dimorphic, two sexes of the same species exhibiting different characteristics (i.e. sizes, coloring, etc.), where females have a solid black crest and males are red from the nape to the top of the crest with an outlining of black on the front of the crest (Service 2010).

The IBWO has a vocalization that has been described as a nasally "kent" call resembling the sound caused by the blowing on the mouthpiece of a clarinet or saxophone or the sound of a toy trumpet. The notes of these calls can be given singly, doubly, or in a series of three such as "yent-yent-yent" as recorded at a nest in 1935 and can function as a distress call, contact call, or displays at a nest (Allen and Kellogg 1937, Allen 1939, Service 2010). A characteristic of most members of this genus make a non-vocalized rapid, loud double knocking. This "rapping" is often described as a "double knock" or "double rap" consisting of two rapid knocks, however, these raps can also occur singly (Service 2010).

Much of what we know about the IBWO comes from James Tanner's and Arthur Allen's work in the Singer Tract in Louisiana during the late 1930s (Service 2010). Suitable habitat for the IBWO is thought to be extensive forested areas with old-growth characteristics and a naturally high volume of dead and dying wood, particularly virgin bottomland hardwoods that is needed to sustain the

species between disturbance events (e.g., fires, storms, or other events expected to kill or stress trees) (Tanner 1942). It is said that they preferred this type of habitat due to the food source abundance available in the dying or dead trees (Service 2010). While much of the more modern literature refers to the larvae of large beetles as the most important component of this species diet (Service 2010), Tanner (1942) actually emphasized the importance locally and temporarily abundant small beetle larvae as a food source for raising young. Tanner (1942) observed these small larvae being acquired through the IBWO stripping large pieces of bark from dying or recently dead tree trunks and branches as well as some large larvae by excavating still hard but partly- rotted wood (he never observed IBWO feeding from long-dead fully rotten wood, he only observed Pileated woodpeckers feeding on the most rotten wood). Also found in the stomach contents of specimens collected were seeds and fruit (Service 2010). While much of the extirpation of the species can be attributed to the loss of virgin forests, many of the forests once lost have been restored or are currently being restored (e.g., the Cache River NWR and other areas acquired for conservation). However, unoccupied suitable habitat continues to be negatively impacted by incompatible timber harvest practices.

Although this information is limited to Tanner's study (1942), the home range for the IBWO is thought to be fairly large due to their ability to fly long distances, up to at least several kilometers a day between favored roost sites and feeding areas. The estimated IBWO density ranged from one breeding pair per 15.5 square kilometers to 1 breeding pair per 44 square kilometers (Tanner 1942). Using these density estimates, 50 breeding pairs of IBWOs existing in the late 1930s would need anywhere from 750 to 2,200 square kilometers of habitat; however, Snyder (2007) argues that these are inaccurate estimates because Tanner's study was based on only a few birds in an altered landscape.

Breeding is thought to occur between January and April (Tanner 1942). It has been reported that clutch size ranges from 1-5 eggs with an estimated incubation period of approximately 20 days (Service 2010). Tanner (1942) documented that both sexes of IBWO incubate the eggs as well as feed the young for a period of about 35 days until the young fledge. The young may be fed by the parents for an addition two months and roost near and forage with the parents into the next breeding season. Dead or dying portions of live trees, and sometimes dead trees may be excavated for nest cavities. These cavities ranged from 4.6 meters (m) to over 21 m up a nest tree although rarely below 9 m from a tree's base. Characteristically oval with an irregularly shaped rim and taller than wide, nest opening range in size between 10.2-14.6 cm wide and 15.2-17.1 cm tall (Service 2010). The commonly found oval shape of the cavity entrance of the IBWO is thought to be an adaptation to accommodate the crest of the bird (Jackson 2004 in Service 2010). IBWOs not only use nest cavities but excavate roost cavities as well, which are similar in appearance to nest cavities. Tanner (1942) and Allen and Kellogg (1937) suggested that single male IBWO individuals use the roost cavities; however, that may not always be the case. Through their observations, they found that pairs or group members tend to roost in trees within a few

hundred meters of each other and that they also are reported to leave the roost after sunrise. Tanner (1942) noted that individuals have a tendency to exhibit high fidelity to the same roost cavity for approximately a year and a half. The roosting area is known to be the center of activity for IBWOs.

b. Abundance, population trends, demographic features, or demographic trends:

Any population numbers for the IBWO previous to European settlement will never be known. The population decline of the species closely corresponds with European settlement and the clearing and demolition of forests (Service 2010). The last commonly agreed upon sighting of the IBWO was in April 1944 on the Singer Tract in the Tensas River region of northeast Louisiana. Since that last sighting there have been numerous reports of possible sightings, photographs, feathers claimed to be found from cavities, and recordings of potential IBWO vocalizations or knocks across the historical range throughout the years; however, these observations while they can be evaluated, none to date have confirmed that the species persists.

The most compelling evidence of the existence of the species was in 2004 when an IBWO was observed in Arkansas (Fitzpatrick et al. 2005). From 2004 to 2005, within the same area of Bayou DeView located in the Cache River NWR in Arkansas, observers reported sightings, audio recordings and a video interpreted to be an IBWO (Service 2010). The original 2004 encounter as well as the other reports and video from Arkansas spurred an extensive search effort led by the Cornell Laboratory of Ornithology and the Arkansas Nature Conservancy in 2005. Although the bird in the video was first interpreted as an IBWO, there is dispute among the ornithological community as to whether it was an actual IBWO or instead a Pileated woodpecker (*Dryocopus pileatus*). Despite the ongoing dispute regarding the species recorded in the video, there have been no conclusive videos gathered since then that confirm the persistence of the species.

The audio recordings obtained during this search effort were examined, and the vocalizations were evaluated and, in some cases, were not found to be distinguishable from other species of birds, such as blue jays (*Cyanocitta* cristata), or other ambient sounds (e.g. tree limbs rubbing, other mechanical sounds, etc.) (Jackson 2006). Recordings of "double knocks" attained during this effort are thought to possibly be anything from tree branches rubbing together, mechanical sounds, gunshots, colliding duck wings, to other species of woodpeckers producing those sounds. It was acknowledged by the scientists at Cornell that these recordings do not constitute as evidence in confirming the presence of IBWOs (Charif et al. 2005, Fitzpatrick et al. 2005, and Jackson 2006). The Service uses the best available science to make determinations on the persistence and conservation efforts for any given species. Thus, we agree with Cornell's scientists that the audio recordings do not present verifiable evidence of IBWO presence in the study area.

c. Genetics, genetic variation, or trends in genetic variation:

Much is unknown about the genetics of the IBWO; however, Fleischer et al (2006) used ancient DNA analysis of seven specimens of the North American IBWO from museums and three specimens of the Cuban IBWO to document the differences between the two, if any, and the relationship to other *Campephilus* species. The analysis concluded that the North American IBWO and the Cuban IWBO should be considered separate species due to a split between the lineages occurring in the Mid-Pleistocene period, one million years ago.

d. Taxonomic classification or changes in nomenclature:

First described by Mark Catesby in 1731 as the Largest White-bill Woodpecker, *Picus maximus rostro albo*, it was later changed to *Picus principalis* by Linnaeus in 1758 (Tanner 1942). The genus *Campephilus* was then erected by G.R. Gray in the 1940s, giving the IBWO its present name, *Campephilus principalis*. The IBWO belongs to the family Picidae, within the subfamily Picinae.

e. Spatial distribution, trends in spatial distribution, or historical range:

Prior to European settlement, it appears that the IBWO was widespread throughout the southeastern United States (Figure 1), from forests in the coastal plain of Texas and eastern Oklahoma into North Carolina, southward to include all of Florida, and the Mississippi Alluvial Valley northward to the confluence with the Ohio River and then eastward on the Ohio River bordering Kentucky and Illinois (Hasbrouck 1891 in Service 2010). Pre-European settlement archaeological evidence (leg bones found as likely food items in middens of Native Americans) suggests the species occurred formerly north of the Ohio River and along the Mississippi River upriver of the Alluvial Valley (Wetmore 1943, Parmelee 1958, 1967). The disappearance of this species coincided with the systematic obliteration of virgin forests throughout the southeastern United States between the 1880s and 1940s (Fitzpatrick et al. 2005). In addition, the pursuit of this species by local hunters and professional collectors from 1890 to the early 1920s also contributed to the accelerated decline in at least some locations (Tanner 1942) with some authors presenting arguments that shooting may have contributed to declines more than habitat loss (Snyder 2007).

The IBWO had been presumed to be extinct several times during the preceding century. Many ornithologists considered the species had disappeared during the first decade of the 1900s before Arthur Allen found the species in east-central Florida in 1924, but after that it was presumed extirpated again until a legally collected specimen was produced from the Singer tract in northern Louisiana (Allen and Kellogg 1937). By 1935 a small population was documented thoroughly with film and recordings (Allen and Kellogg 1937, Tanner 1942). Tanner (1942) followed up on this discovery as part of his dissertation work and based on habitat conditions and sightings believed at least a few IBWOs also persisted in the Santee Swamp of South Carolina, and in Florida within the Apalachicola River basin, the Suwanee River basin, Highlands Hammock in south-central Florida, and Big Cypress regions. However, soon after Tanner's monograph was published, the number of generally accepted sight reports began

to dwindle and most ornithologists again presumed the species was extirpated from the U.S. after the 1950s.

There have been numerous reports of possible sightings and photographs as well as recordings of possible vocalizations and knocks of IBWOs throughout the historical range. A report that a single IBWO was sighted in the Florida Panhandle in 1950 led to a search effort of the area; however, after two years of searching, no additional confirmation was reported in the area (Jackson 2006). Also, during the 1960s and 1970s, reports were made from central Florida (including the finding of a confirmed IBWO secondary feather but it was not clear how old the feather was when found), the Big Thicket area in Texas, and the Congaree Swamp in South Carolina that contributed to search efforts in attempts to confirm persistence of the species. Jackson (2006) discussed further sightings and search efforts throughout the historical range including the Atchafalaya and Pearl River Swamps in Louisiana; Congaree National Park, Wambaw Creek Wilderness, and Pee Dee River Basin in South Carolina; and the Choctawhatchee River in northwest Florida. A sighting in 1999 in the Pearl River Wildlife Management Area in Louisiana, lead to search efforts in 2002 by the Louisiana Department of Wildlife and Fisheries, Louisiana State University, Cornell Laboratory of Ornithology and a six-person search team with again no evidence being produced confirming that IBWO had been present (Jackson 2006 and LDWF 2004). Other survey efforts discussed in the Recovery Criteria Section under Criteria 1 had similar conclusions with either no evidence in some search areas that IBWOs were present at all or no conclusive evidence (Collins 2017, Donahue 2017, Lammertink and Rohrbaugh 2016, Michaels 2018, and McClelland 2016). In sum, none of these searches, including the surveys discussed in the Recovery Criteria Section under Criterion 1, resulted in any irrefutable or undisputed evidence of the continued existence of the IBWO.

The original 2004 Arkansas encounter, discussed in Section C. 1. b., spurred an extensive search effort over a five-year period attempting to confirm the species' presence. After the unsuccessful survey efforts, hope of a population of IBWOs in Arkansas diminished (Lammertink and Rohrbaugh 2016).

For the last 70 years, the existence or extirpation of the IBWO has been debated among wildlife professionals and the public. Extensive, exhaustive search efforts have been conducted in the historic range of the species prompted by anecdotal evidence such as reports from the public and wildlife professionals alike. These reports have often been accompanied by inconclusive physical evidence such as indistinct photographs, videos, and sound recordings. Although not certain, many of these unverified records have been used by researchers to model or calculate the probability of the continued existence or extinction of the IBWO. Gotelli et al. (2011) analyzed the temporal pattern of the collection dates of museum specimens that were collected throughout the historical range from 1853 to 1932 to estimate the probability of the persistence of the species into the 21st century, as well as the probability that the species will be found at survey sites with continued efforts. The study resulted in a probability of persistence in 2011 of $< 10^{-5}$ and

estimated the probable extinction date to be between 1960 and 1980. While differing in assumptions, treatment of data, and statistical methods used, Roberts el al. (2009) and Solow et al. (2011) had qualitatively similar conclusions to Gotelli et al.'s (2011) analysis.

f. Habitat:

Habitat needs have been described above and in the 2010 Recovery Plan. However, there is no habitat known to support IBWO.

2. Five-Factor Analysis

No new information is available on the five listing factors identified in the ESA due to failure to find populations or live individuals.

D. Synthesis

For decades, many individuals and organizations have searched for the IBWO in its historic range throughout the southeastern United States. This review of the status of IBWO revealed no conclusive evidence that a population of IBWOs survived within the historic range of the species. Decline of mature forested habitat with a high percentage of recently dead or dying trees and widespread collection of the species led to the extirpation of the population sometime after the 1940s. Although there have been many sightings reported over the years since the last agreed upon sighting in 1944, there is much debate over the validity of these reports. Furthermore, there is no objective evidence (e.g., clear photographs, feathers of demonstrated recent origin, specimens, etc.) of the continued existence of the species. Thus, we recommend that the ivory-billed woodpecker (*Campephilus principalis*), as originally listed in 1967, be delisted based on extinction.

III. RESULTS

A. Recommended Classification:

_____ Downlist to Threatened
_____ Uplist to Endangered
_X_ Delist based on extinction
_____ No change needed

IV. RECOMMENDATIONS FOR FUTURE ACTIONS

- The only recommended action is to prepare a proposed rule to delist the ivory-billed woodpecker due to presumed extinction.

V. REFERENCES

Allen, A.A. 1939. Ivory-billed Woodpecker. Pages 1-12 in Life Histories of North American Woodpeckers (A.C. Bent, ed). U.S. National Museum Bulletin 174.

Allen, A.A. and Kellogg, P.P. 1937. Recent Observations on the Ivory-billed Woodpekcer. Auk 54:164-184.

Charif, R.A., K.A. Cortopassi, H.K. Figueroa, J.W. Fitzpatrick, K.M. Fristrup, M. Lammertink, M. David Luneau, Jr., M.E. Powers, and K.V. Rosenberg. 2005. Notes and double knocks from Arkansas. Science 309:1489.

Collins, M.D. 2017. Video Evidence and Other Information Relevant to the Conservation of the Ivory-Billed Woodpecker (*Campephilus principalis*). Heliyon (online publication).

Donahue, M. 2017. Possible Ivory-Billed Woodpecker Footage Breathes Life into Extinction Debate. Audubon (online publication).

Fitzpatrick, J.W., M. Lammertink, M.D. Luneau, Jr., T.W. Gallagher, B.R. Harrison, G.M. Sparling, K.V. Rosenberg, R.W. Rohrbaugh, E.C.H. Swarthout, P.H. Wrege, S.B. Swarthout, M.S. Dantzker, R.A. Charif, R.R. Barksdale, J.V. Remsen, Jr., S.D. Simon, and D. Zollner. 2005. Ivory-billed Woodpecker (*Campephilus principalis*) persists in continental North America. Science 308:1460-1462.

Fleischer, R.C., J.J. Kirchman, J.P. Dumbacher, L. Bevier, C. Dove, N.C. Rotzel, S.V. Edwards, M. Lammertink, K.J. Miglia, and W.S. Moore. 2006. Mid-Pleistocene Divergence of Cuban and North American Ivory-billed Woodpeckers. Biol. Lett. Doi:10.1098/rsbl.2006.0490. (Online pub.)

Gotelli, N.J., A. Chao, R.K. Colwell, W.H. Hwang, and G.R. Graves. 2011. Specimen-Based Modeling, Stopping Rules, and the Extinction of the Ivory-billed Woodpecker. Conservation Biology 26(1):47-56.

Hasbrouck, E.M. 1891. The Present Status of the Ivory-billed Woodpecker (*Campephilus principalis*). Auk 8(2):174-186.

Jackson, J.A. 1989. Past History, Habitats, and Present Status of the Ivory-Billed Woodpecker (*Campephilus principalis*) in North America: A Final Report to the U.S. Fish and Wildlife Service of Work Completed. U.S. Fish and Wildlife Service, Atlanta, Georgia. 199pp +ill.

Jackson, J.A. 2004. In Search of the Ivory-billed Wookpecker. Smithsonian Books, Washington, D.C., 294pp.

Jackson, J.A. 2006. Ivory-billed Woodpecker (*Campephilus principalis*): Hope, and the Interfaces of Science, Conservation, and Politics. Auk 123(1):1-15.

Lammertink, M. and R. Rohrbaugh. 2016. Research and Development of Publications in the Search for the Ivory-Billed Woodpecker (*Campephilus principalis*) in the Southeastern U.S: Final Technical Report. Cornell Laboratory of Ornithology, Ithaca, New York. 120pp.

Louisiana Department of Wildlife and Fisheries. Report: Status Report of the Ivory-Billed Woodpecker (*Campephilus pricipalis*). Baton Rouge, Louisiana. 4pp.

McClelland, M. 2016. Can the Ivory-Billed Woodpecker Be Found in Cuba? Audubon (online publication).

Michaels, M.A. 2018. Project Coyote: Ivory-Billed Woodpecker Evidnece from Louisiana, 2009-2018. 79pp.

Moskwik, M., T. Thom, L.M. Barnhill, C. Watson, J. Koches, J. Dilgo, B. Hulslander, C. Degarady, and G. Peters. 2013. Search Efforts for Ivory-billed Woodpecker in South Carolina. Southeastern Naturalist 12(1):73-84.

Parmalee, P. W. 1958. Remains of rare and extinct birds from Illinois Indian sites. Auk 75:169–176.

Parmalee, P. W. 1967. Additional noteworthy records of birds archaeological sites. Wilson Bull. 79:155–162.

Roberts, D.L., C.S. Elphick, and J.M. Reed. 2009. Identifying Anomalous Reports of Putatively Extinct Species and Why It Matters. Conservation Biology 24(1):189-196.

Solow, A., W. Smith, M. Burgman, T. Rout, B. Wintle, and D. Roberts. 2011. Uncertain Sightings and the Extinction of the Ivory-billed Woodpecker. Conservation Biology 26(1):180-184.

Snyder, N.F.R. 2007. An Alternative Hypothesis for the Cause of the Ivory-billed Woodpecker's Decline. Monograph No. 2 Western Foundation of Vertebrate Zoology, Camirillo, California.

Tanner, J.T. 1942. The Ivory-billed Woodpecker. Research Report No. 1. National Audubon Society, New York. 11pp. +ill.

U.S. Fish and Wildlife Service. 2010. Recovery Plan for the Ivory-billed Woodpecker. Southeast Region, Atlanta, Georgia.

Wetmore, A. 1943. Evidence of the former occurrence of the Ivory-billed Woodpecker in Ohio. Wilson Bull. 55:55.

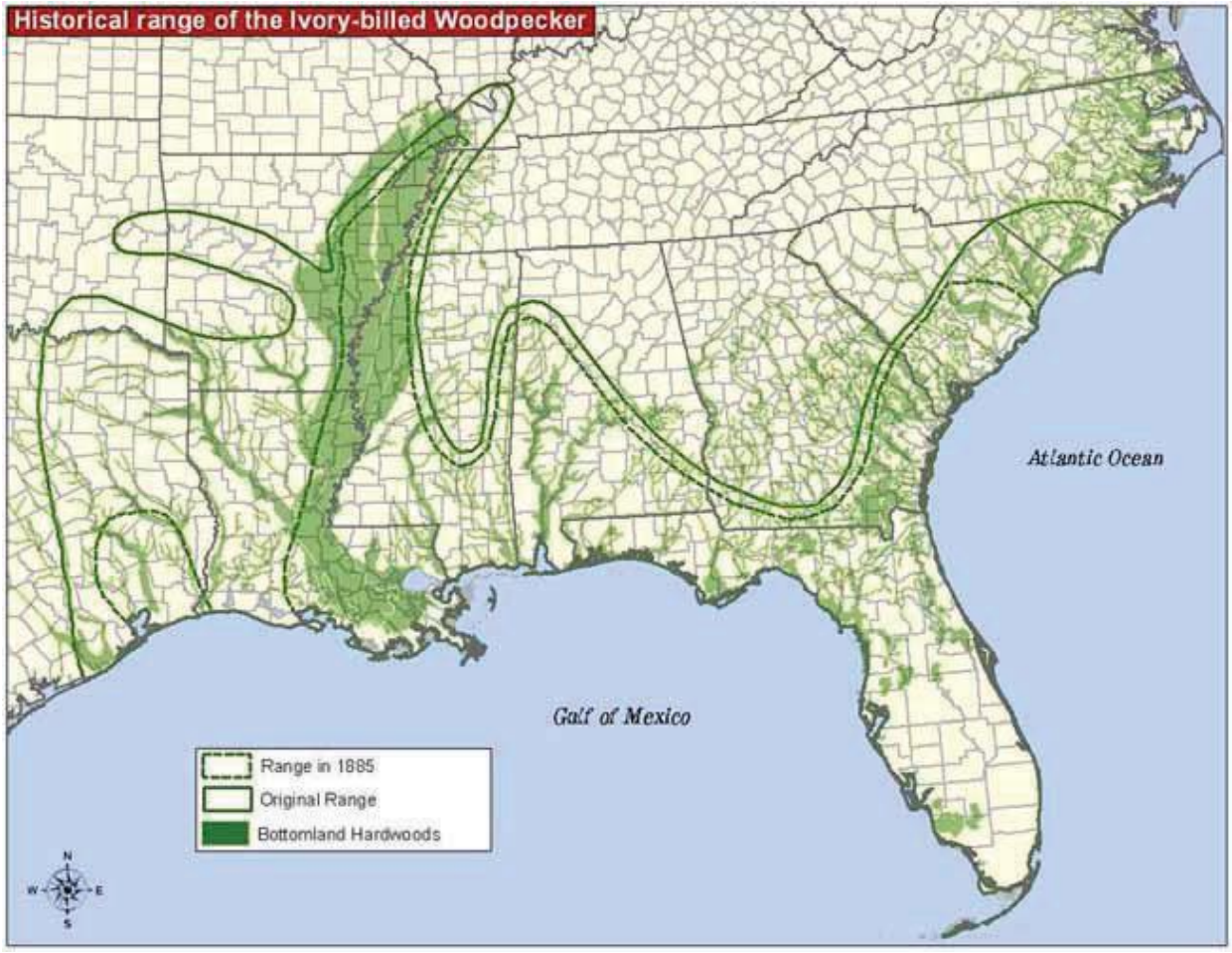


Figure 1. Historical Range of the Ivory-billed Woodpecker. Tanner 1942.

U.S. FISH AND WILDLIFE SERVICE
5-YEAR REVIEW of ivory-billed woodpecker (*Campephilus principalis*)
Current Classification: Endangered

Recommendation resulting from the 5-Year Review:

____ Downlist to Threatened
____ Uplist to Endangered
X___ Delist based on extinction
____ No change needed

Appropriate Listing/Reclassification Priority Number, if applicable: 6

Review Conducted By: Amy Trahan, Louisiana Ecological Services Field Office.

FIELD OFFICE APPROVAL:

Lead Field Supervisor, U.S. Fish and Wildlife Service

Approve: Joseph A. Pollard Date: 22 May 19

REGIONAL OFFICE APPROVAL:

Lead Regional Director, U.S. Fish and Wildlife Service, Southeast Region

Approve: Acting ARD-ES Date: 6/3/19

Appendix A. Summary of peer review for the 5-year review of the Ivory-billed woodpecker (*Campephilus principalis*)

A. Peer Review Method: Peer review was conducted in accordance with our July 1, 1994 peer review policy (59 FR 34270) and the Office of Management and Budget's December 16, 2004, Final Information Quality Bulletin for Peer Review. The Regional 4 Office selected four well-qualified individuals to solicit as independent peer reviewers. Peer reviewers were requested to review the 5-Year Review and comment specifically on the quality of any information and analyses used or relied on in the document; identify oversights, omissions, and inconsistencies; provide advice on reasonableness of judgments made from the scientific evidence; ensure that scientific uncertainties are clearly identified and characterized, and that potential implications of uncertainties for the technical conclusions drawn are clear; and provide advice on the overall strengths and limitations of the scientific data used in the document.

Peer Reviewers: Amity Bass, Louisiana Department of Wildlife and Fisheries abass@wlf.la.gov
Ron Rohrbaugh, Cornell Lab of Ornithology rwr8@cornell.edu
Wylie Barrow, USGS barroww@usgs.gov
Ken Rosenberg, Cornell University kvr2@cornell.edu

B. Peer Review Charge: None

C. Summary of Peer Review Comments: One comment was received from the Louisiana Department of Wildlife and Fisheries. They stated that they agree with our assessment of the species and that they have no additional information to provide.

D. Response to Peer Review: There was no response needed.