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PERSPECTIVES IN ORNITHOLOGY

IVORY-BILLED WOODPECKER (*CAMPEPHILUS PRINCIPALIS*): HOPE, AND THE INTERFACES OF SCIENCE, CONSERVATION, AND POLITICS

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IN 1986, THE U.S. Fish and Wildlife Service appointed an Advisory Committee to evaluate the status of the Ivory-billed Woodpecker (*Campephilus principalis*), a species that had been on U.S. endangered species lists since their inception. James Tanner, who was the foremost authority on the species, Lester Short, a leading authority on woodpeckers of the world, and I served on the committee. Other members included government biologists and long-time seekers of Ivory-billed Woodpeckers. We were told that we were being called an "Advisory Committee" because we could not be called a "Recovery Team," given that there were no birds to recover and, as such, there could be no Recovery Plan.

At our first meeting, held in Baton Rouge, Louisiana, we learned that our intended function was to serve as a sanctioning body to "officially" declare the Ivory-billed Woodpecker extinct. We reviewed published and unpublished reports of Ivory-billed Woodpeckers that had accumulated since the 1940s and agreed that the evidence for the Ivory-billed Woodpecker's continued existence was slim, though there had been a continuing stream of anecdotal reports of the species from across the Southeast. Both

Tanner and Short were prepared to declare the species extinct, given that more than 50 years had passed without confirmation of its existence. But there had not been a range-wide systematic survey of potential Ivory-billed Woodpecker habitats since Tanner's efforts in the 1930s. Thus, it was unreasonable, I argued, to declare the species extinct without making a serious effort to find it.

In part as a response to the Advisory Committee meeting, Michael Harwood (1986) wrote an article in *Audubon*, bemoaning the lack of attention given to the Ivory-billed Woodpecker and lambasting the "ornithological establishment" for doing nothing in response to the flow of anecdotal reports. In the article, titled "You Can't Protect What Isn't There," Harwood (1986:118) noted that "the ghostly Ivory-bill, lacking official sanction, might just as well have been extinct all these years...listing has led to virtually nothing in the way of federal rescue activity."

The Ivory-billed Woodpecker Advisory Committee concurred that we owed it to the species to make one last search. As the dissenter, and as one doing research on woodpeckers in the Southeast, the searching fell to me. The U.S. Fish and Wildlife Service provided a grant of \$60,000, and I used a sabbatical to conduct the search. Because of limited funding, I focused

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on the best prospects for the species, and the Advisory Committee collaborated in the selection of sites to be investigated. Regrettably, we considered the Big Woods of eastern Arkansas a low-priority area.

A BIG SECRET AND A NEW HOPE

I have long believed that Ivory-billed Woodpeckers could have survived into the late 20th and early 21st centuries (Jackson 1989, 2002, 2004, 2006) and was thus ecstatic to receive a call from John Fitzpatrick on 27 April 2005, informing me that evidence of at least one Ivory-billed Woodpecker had been found near the Cache River in eastern Arkansas, and that sounds like those characteristic of the Ivory-billed Woodpecker had been recorded along the White River, also in eastern Arkansas. The discovery would be announced the next day.

Early on 28 April I received a call from James Tate, Jr., Science Advisor to U.S. Secretary of the Interior, Gail Norton. Tate provided further information about the discovery on Cache River National Wildlife Refuge and invited me to sit in, via conference call, on the press conference later that morning.

The news galvanized ornithologists, birders, conservationists—indeed, the world. At a time rife with news of war and natural disasters, this good news inspired hope in life's resilience. That both the sightings and recordings occurred on national wildlife refuges (NWRs) reassured us that we had been doing something right.

Although there had been internet chatter for nearly a year about Ivory-billed Woodpeckers discovered in Arkansas, the effort there had largely been kept secret. All who were involved had to sign confidentiality agreements. Reasons given for the secrecy focused on the fear that birders might invade the area and negatively affect the birds, on the need to secure more habitat, and on the need to develop infrastructure to manage Ivory-billed Woodpeckers. The species was code-named "Elvis," and the Big Woods Conservation Partnership (BWCP)—a coalition of multiple governmental and nongovernmental agencies, universities, and private individuals—was formed. The BWCP recruited a paid and volunteer search team comprising professional colleagues, friends, relatives, and students, and the team logged more than 22,000 hours searching for the bird between February 2004 and the

announcement in April 2005. By the time of the announcement, a scientific article (Fitzpatrick et al. 2005a) and book (Gallagher 2005) had been written about the efforts, with timing of publication arranged to coincide with the announcement. In the end, one of the confidants made the information available ahead of schedule, and the Partnership decided to announce the discovery early. This meant that the announcement would not be made by First Lady Laura Bush as had been planned (J. Fitzpatrick pers. comm.), and it also meant a rapid path to publication for the *Science* article.

Evidence put forth to support the conclusion that the Ivory-billed Woodpecker persists in Arkansas included (1) a de-interlaced, zoomed-in, and cropped portion of a poor-quality four-second video captured fortuitously on 25 April 2004 by David Luneau, an engineering professor from Arkansas, of a bird as it flew from behind a tree and away from the camera into the woods along Bayou de View on Cache River NWR, Monroe County; (2) seven brief sightings, none closer or of longer duration than the video, made between 11 February 2004 and 15 February 2005; (3) several additional sightings that were considered inadequate as scientific evidence; and (4) acoustic signals believed to be possible Ivory-billed Woodpecker vocalizations and double raps recorded by autonomous recording units (ARUs) placed around the White River NWR ~130 km (~80 miles) to the south (Charif et al. 2005, Fitzpatrick et al. 2005a, Rosenberg et al. 2005).

The recordings drew attention to another area of the more than 150-km-long ribbon of bottom-land forest along the Cache and White rivers. With more than 17,000 hours (Charif et al. 2005) (by August 2005, more than 18,000 hours; Bruce 2005) of ambient sound recorded at 153 sites in forest habitat in the Cache–White river region since the spring of 2004, it is not surprising that recordings were obtained that are similar to the vocalizations and double raps of Ivory-billed Woodpeckers. At least some of these recordings were captured by ARUs positioned near a well-used road and a campground on White River NWR. Blue Jays (*Cyanocitta cristata*) and White-breasted Nuthatches (*Sitta carolinensis*) utter similar vocalizations, and the voices of birds vary among individuals. It is also possible that vocalizations recorded were from a playback of a recording being used or someone

using a clarinet or saxophone mouthpiece to imitate the calls. (Tanner [1942, J. T. Tanner pers. comm.] had used a clarinet mouthpiece to imitate Ivory-billed Woodpecker *kent* calls, and I found that either a clarinet or saxophone mouthpiece could make a very convincing imitation of the calls recorded by Arthur Allen.) Double raps could have been made by someone searching for Ivory-billed Woodpeckers; or by Pileated (*Drycopus pileatus*), Red-bellied (*Melanerpes carolinus*), or other woodpeckers; or they could be sounds produced mechanically by tree branches striking one another. We cannot know for sure. I have watched both Pileated and Red-bellied woodpeckers making such raps. Some raps recorded by the ARUs differ from the description given by Tanner (1942), in that they include a soft blow followed by a hard blow. Tanner described the sounds as beginning with a hard blow followed quickly by a softer blow that sounded almost like an echo. He demonstrated this to me several times by rapping on wood with his knuckles and had me repeat his demonstration so that I might possibly use the raps during my own searches. Scientists at Cornell University have acknowledged that these recorded vocalizations and double raps do not constitute evidence confirming the presence of Ivory-billed Woodpeckers (Charif et al. 2005, Fitzpatrick et al. 2005a).

WHY SHOULD IVORY-BILLED WOODPECKERS NOT BE IN EASTERN ARKANSAS?

There are many reasons why eastern Arkansas seems an unlikely place for Ivory-billed Woodpeckers to have survived undetected for nearly 100 years. (1) Except for small stands and individual trees, the virgin forests of eastern Arkansas were cut by the early 20th century. (2) Small stands of remaining virgin forest and second-growth forest along the lower White River were protected as White River Waterfowl Refuge in 1935, and wildlife biologists and foresters have worked in the field there ever since without any reports of Ivory-billed Woodpeckers. (3) James Tanner spent eight days on the White River Waterfowl Refuge (now NWR) in 1938 and found "no indications of the birds still being there." He noted that "there are a few virgin tracts of sweet gum and oak timber but too small and scattered to make really good Ivory-bill territory" (Tanner

1942:25). (4) Ornithologist Brooke Meanley (1972) lived near and worked on the refuge for five years (1950–1955) and returned to the area frequently until 1970. He also visited the bottomland forests along the Cache River, noting the size of the baldcypresses (*Taxodium distichum*). Meanley was specifically aware of the possibility of Ivory-billed Woodpeckers in the region and was "always on the lookout" for them (Meanley 1972:52), yet he found no evidence of the birds. (5) For many decades, White River NWR has been used as a study area by researchers from several universities, resulting in numerous graduate theses and dissertations. (6) White River NWR is heavily used for hunting and fishing by the public each year. (7) By the early 1950s, birding had become popular in the mid-South, and White River NWR is frequently visited by birders and birding groups. Since 1939, there have been 48 Christmas Bird Counts centered at White River NWR. In 1994, the Arkansas Audubon Society initiated a breeding bird atlas project for the state (Arkansas Breeding Bird Survey; see Acknowledgments) that would include some of the forest habitat (K. G. Smith pers. comm.). (8) Although the forests near the mouth of the Arkansas and White rivers were prominently mentioned for their Ivory-billed Woodpeckers by John James Audubon (Audubon and Chevalier 1840–1844), the heart of Ivory-billed Woodpecker range and density seems to have been farther to the south, perhaps because of better food availability and more rapidly growing trees.

The 1986 Advisory Committee concluded that Ivory-billed Woodpeckers had disappeared from the region by about 1915. Second-hand reports had suggested that Ivory-billed Woodpeckers persisted in Arkansas until about 1910 (Howell 1911), and perhaps until 1915 (Tanner 1942, James and Neal 1986).

Tanner (1942:20) referred to his efforts in searching for Ivory-billed Woodpeckers as being akin to "searching for an animated needle in a haystack." This has been used to help explain why Ivory-billed Woodpeckers could be there, in what is now referred to as the "Big Woods" of eastern Arkansas, and yet not be found during more than 22,000 hours of search time since the spring of 2005 (Rosenberg et al. 2005). I agree that there is difficulty in locating Ivory-billed Woodpeckers, and I have used Tanner's analogy myself. But I feel that the analogy has limits.

Just as a big magnet might greatly facilitate finding an “animated needle,” the roost or nest cavity of an Ivory-billed Woodpecker would be like a magnet in repeatedly “pulling” a bird back to the same area. In addition, the Ivory-billed Woodpecker is a social species that is well known for traveling in pairs and family groups. Finding a group of vocal, rapping “needles” should be much easier than finding a lone “needle.” The inability (as of early December 2005) to locate and document with a reasonably good photograph or video even a single Ivory-billed Woodpecker is not suggestive of the existence of a breeding population in the Big Woods.

WHY SHOULD IVORY-BILLED WOODPECKERS BE IN EASTERN ARKANSAS?

Perhaps the assessment that Ivory-billed Woodpeckers disappeared from eastern Arkansas in the early years of the 20th century was wrong. There was an anecdotal report of Ivory-billed Woodpeckers in southeast Arkansas of which Tanner apparently was unaware, and of which I was unaware until recently. In the early 1950s, Lloyd MacAdams, an assistant to the White River Waterfowl Refuge manager, told Brooke Meanley (1972) that he had found a nest of the Ivory-billed Woodpecker in the bottomland forest of the White River in the years before the refuge had been created in 1935.

Perhaps the birds did not survive the devastation of the eastern Arkansas forests in the early 20th century, but survived nearby for a time and only later moved into the Big Woods as those earlier refugia disappeared. As I examined Ivory-billed Woodpecker specimens in the Philadelphia Academy of Natural Sciences, I discovered a letter tucked beneath one of the study skins. It was from M. G. Vaiden of Rosedale, Mississippi, and addressed to James Bond, a former curator at the museum. None of the curators at the time I found the letter had known it existed. The letter indicated that Vaiden knew of six pairs of Ivory-billed Woodpeckers in old-growth forest ~15 km (~9 miles) south of Rosedale at the beginning of World War II. Vaiden wondered where they had gone when the forests were cut to provide wood for the decks of patrol boats. Perhaps now we know. Bottomland forests between the mouths of the Arkansas and White rivers are right across the Mississippi; the forests of White River NWR are little more than 40 km (~25 miles) away.

White River NWR is also only ~240 km (150 miles) from the Singer Tract near Tallulah, Louisiana, and the Singer Tract was only ~50 km (30 miles) from the Mississippi. Assuming that the Ivory-billed Woodpeckers from the Singer Tract did not die there, they might well have dispersed along forested corridors north into Arkansas, or east to the Mississippi River and then north to the Arkansas and White rivers.

If Ivory-billed Woodpeckers survived the devastation of the Southeastern bottomland forests in the first half of the 20th century, they may be with us today. During the second half of that century, the surviving forests had a chance to recover. Habitats have improved dramatically, and large areas have been protected by state and federal agencies, conservation organizations, and numerous hunting clubs.

DÉJÀ “DE VIEW”?

There have been several other widely publicized reports of Ivory-billed Woodpeckers in North America in the past half-century. All made national news; one involved a coalition of public and private entities in the establishment of a refuge for the birds; two accompanied conservation campaigns that were successful in setting aside habitat as national preserves.

The earliest of these “post-Singer Tract” Ivory-billed Woodpecker reports provides a parallel to the Arkansas situation. A single Ivory-billed Woodpecker was sighted along the Chipola River in the Florida Panhandle in 1950 by Muriel Kelso, who contacted Whitney Eastman (1958), a long-time Ivory-billed Woodpecker searcher and vice president of General Mills. Another searcher, Davis Crompton (1950) of the Massachusetts Audubon Society, also reported seeing the bird in the area. Through Eastman’s influence, a coalition was pulled together in an effort to protect the species. The National Audubon Society, St. Joe Paper Company, the Florida Game and Fresh Water Fish Commission, and local landowners established a 526-ha (1,300-acre) refuge surrounding a reported roost tree (Baker 1950). In the absence of additional sightings or documentation, within two years the refuge status was abandoned (Dennis 1967).

Several other Ivory-billed Woodpecker reports drew attention during the 1960s and 1970s. Reports from central Florida between

1967 and 1969 (Agey and Heinzmann 1971) were not linked to efforts to protect habitat, nor do they seem to have been followed-up by extensive independent searches. Reports from the Big Thicket in Texas (Hardy 1975, Jackson 2004) and Congaree Swamp in South Carolina (Hoose 2004, Jackson 2004) contributed to efforts that culminated in protection of both these areas by the National Park Service. The Big Thicket reports, in particular, were extensively publicized in the media and stimulated considerable search efforts by the birding community.

In May 1971, an initially unidentified Louisiana dog trainer, Fielding Lewis, took photographs of what he said was an Ivory-billed Woodpecker clinging to a tree trunk. Ornithologist George Lowery presented the photographs to the American Ornithologists' Union and they were met with skepticism, because the bird seemed to be in the same position in each photo and neither its bill nor feet could be seen. The record was not accepted, and there was no organized effort to follow up on that particular report. Interest, however, had been generated, and there were other reports in the Atchafalaya that attracted students and birders to the swamp (Jackson 2004, Gallagher 2005).

An elaborate, well-organized follow-up occurred for a sighting made by David Kulivan, a forestry student at Louisiana State University (LSU), in the Pearl River Swamp in southeast Louisiana on 1 April 1999. The report was considered credible by J. Van Remsen, Jr., an ornithologist at LSU, and the result was an intensive search by birders and organized groups, including a well-publicized search by a team of birders sponsored by Zeiss Optics. Simultaneously, a team of bioacoustic researchers from the Cornell Laboratory of Ornithology placed ARUs in the area in hopes of fortuitously capturing the vocalizations or double-rap sounds of the Ivory-billed Woodpecker. Those efforts were unsuccessful in documenting the presence of Ivory-billed Woodpeckers (Knight et al. 2002).

There are important lessons to be learned from these and other Ivory-billed Woodpecker sightings of recent decades. First, a very practical one in relation to "dealing with the aftermath of a reported discovery": none of these publicized "sightings" resulted in hordes of birders descending on the habitat, and birders who arrived generally limited their activities to well-trodden areas.

Second, what makes the recent sightings from Bayou de View in Arkansas any different from these earlier sightings? For that matter, what makes them different from the almost annual handful of sightings with descriptions that cannot readily be dismissed as "certainly a Pileated"? The answer, I believe, is that it is not necessarily the quality of the evidence, but the attendant publicity and aura of authority associated with the announcement, that has raised the profile of the Arkansas reports. The Cornell Laboratory of Ornithology, The Nature Conservancy, and high-level government endorsements of this "Ivory-billed event" have given it credibility. With such endorsements, the public perception is that it must be true. But what will happen two years from now if researchers fail to provide unquestionable documentation of Ivory-billed Woodpeckers in the Big Woods? Will the public remember two years from now that the reports were ever made? Will conservation funding for the region be withdrawn? And what about the next time? Will those involved be so jaundiced by the experience that future reports of Ivory-billed Woodpeckers or other rare species will be ignored?

THE SELLING OF THE IVORY-BILLED WOODPECKER

The recent Ivory-billed Woodpecker saga in eastern Arkansas began with a possible sighting by kayaker Gene Sparling, who posted his sighting experience on the internet. Tim Gallagher, editor of the *Living Bird*, saw the posting, and he and Bobby Harrison, an art professor and Ivory-billed Woodpecker seeker from Alabama, joined Sparling to search for the bird. In his book *The Grail Bird*, Gallagher (2005:152) wrote of the sighting that he and Bobby Harrison had of a bird they identified as an Ivory-billed Woodpecker at Bayou de View in February 2004:

Less than eighty feet away, a large black-and-white bird that had been flying toward us from a side channel of the bayou to the right came out into the sunshine and flew across the open stretch of water directly in front of us. It started to bank, giving us a superb view of its back and both wings for a moment as it pulled up, as if it were going to land on a tree trunk. [Italics mine.]

Two months after the book's release, Gallagher's wife (Dickinson 2005:42) wrote in *Audubon*:

Suddenly a huge black-and-white woodpecker came flying up from a side slough to the right and then crossed the open bayou in front of them, *less than 70 feet away....* [Italics mine.]

Four months later, on 16 October, Gallagher spoke of the sighting on the television program *60 Minutes* (Anonymous 2005a): "And then this bird just burst across in front of us at close range, *about 65 feet away* [italics mine]."

Earlier, at the news conference announcing the report from Arkansas, John Fitzpatrick had suggested that if Gallagher and Harrison had not shouted, the Ivory-billed Woodpecker "might even have landed on the canoe" (Schmid 2005). This statement, which suggests the possibility of a highly unlikely event, was picked up by the media and permutated into a diversity of accounts embellishing the sighting.

These were not efforts at deception; they were moments of exuberance and of reveling in discovery. Indeed, the difference of no more than 5 m between Gallagher's own reports is scientifically meaningless. But the decreasing distances in the reports I have just quoted make one pause to reflect. How many of us could accurately judge the distance to a bird flying across an open space, having seen it for mere seconds and from a moving canoe? Observations can become more and more "real" with the passing of time, as we forget the minor details and focus inwardly on the "important" memory.

In his review of Gallagher's book, Lynch (2005) asks: "Will [the Ivory-billed Woodpecker] be the poster child for new fund-raising efforts for Cornell and The Nature Conservancy?" It certainly has been. Within days of news releases or radio or television interviews, I received solicitations from the Cornell Laboratory of Ornithology and The Nature Conservancy. Other groups, such as the National Audubon Society, American Bird Conservancy, and American Birding Association, have also taken advantage of the solicitation opportunities. This is good marketing, and it may help build a conservation consensus among the general public. As a strategy for fundraising, it keeps conservation in the public eye through carefully timed release of small bits of new information. But I do not believe it is good science.

The original report in *Science* (Fitzpatrick et al. 2005a) and press conferences and news releases from Cornell, The Nature Conservancy, and the

U.S. Department of the Interior have implied or specifically stated confirmation of the discovery of the Ivory-billed Woodpecker. These pronouncements have been followed by a media frenzy. The U.S. Department of the Interior has done an exceptional job of "selling" the Ivory-billed Woodpecker. It has presented several stories in their news magazine, *People, Land & Water*, recounting the "dramatic discovery and confirmation of the Ivory-billed Woodpecker" (Anonymous 2005b, c, d), and established an Ivory-billed Woodpecker website for the public (U.S. Fish and Wildlife Service 2005a) that assures us that "the Ivory-billed Woodpecker has cheated extinction."

Simple changes have been made in "all things Ivory-billed Woodpecker" as the story has been retold by researchers, government agencies, politicians, and media. The story "gets better." Unfortunately, it appears from the Ivory-billed Woodpecker events of the past year that public opinion is molded more by sound bites than by science. As seems inevitable, given the news media's need for spontaneity and reporters covering subjects they know little about, bizarre and often misleading news articles have been widespread in both the general and birding-specific popular media. In a *USA Today* article, Perri (2005) tells us that the Ivory-billed Woodpecker "has no jawbone or teeth, and no vertebrae in its tail." A news story in the September 2005 issue of *World BirdWatch* (Anonymous 2005e), a publication of BirdLife International, proclaims in its title: "Agreement over Ivory-billed Woodpecker Sightings." This idea has been fostered by several news stories that seem to be trying to solidify the notion that the presence of the Ivory-billed Woodpecker has been confirmed. Saying so does not make it so.

Sound bites must not pass as science, and science demands more than mere observation for documentation of extraordinary records. Scientific truth is not decided by a consensus of public opinion, but by the quality of data presented and rigorous independent review of those data. I address the data from Arkansas below.

RECOVERY?

Official acceptance of the rediscovery of the Ivory-billed Woodpecker was evident in the quick appointment, by the U.S. Secretary of the

Interior, of perhaps the nation's largest endangered species recovery team. The team includes about 50 members. It differs from other recovery teams in including not only research biologists and foresters, but several agency administrators, representatives from each state game commission where Ivory-billed Woodpeckers were known, industry representatives, a Brigadier General, a political scientist, two U.S. Senators, four members of the U.S. House of Representatives, and a number of local and state politicians.

Although such a diverse and politically based recovery team may seem somewhat "ceremonial," and cumbersome to deal with in making sound biological decisions, conservation is a human endeavor that requires public acceptance, cooperation, and funding—as well as sound biology. If a breeding population of Ivory-billed Woodpeckers is found in the Big Woods, the magnitude and diversity of the tasks needed to recover the species will require such a collaborative effort. The key is not so much the diversity of team membership, but whether or not that diversity is appropriately matched to the tasks ahead (Clark and Cragun 1994).

Announcement of the report of Ivory-billed Woodpeckers in Arkansas came with the spectacular news that \$10.2 million had been allocated by the federal government for the recovery effort, \$5 million from the Department of the Interior and \$5.2 million from the Department of Agriculture (U.S. Fish and Wildlife Service 2005b). Then reality set in. Proposed expenditures for land acquisition and habitat protection are mostly a continuation of efforts under the North American Waterfowl Management Plan and by The Nature Conservancy that were already in progress when the presence of the Ivory-billed Woodpecker was reported (U.S. Fish and Wildlife Service 2005b; Allan Mueller, U.S. Fish and Wildlife Service, pers. comm.). In addition, the funding was not a new appropriation, but a re-allocation of funds from other budgeted projects, including ongoing efforts on behalf of other endangered species (Dalton 2005), resulting in cutbacks to those projects.

Saving the Ivory-billed Woodpecker and its habitat could well "become the showcase" (Blockstein 2005:107) of the environmental commitment of the U.S. administration, but a closer look suggests a difficult road ahead for recovery efforts. The stage has been lit by the spotlight on the Ivory-billed Woodpecker; but in the wings,

the Endangered Species Act is in danger of being weakened (e.g. Beier 2005), and the NWR system that has protected the habitat where the Ivory-billed Woodpecker was reported has a backlog of maintenance projects and faces serious cuts. Funding was cut for the Land and Water Conservation Fund that would add land to the Cache River NWR, and funds for the Farm Bill's Conservation Reserve Program, Wetland Reserve Program, and Wildlife Habitat Improvement Program that would support creation and protection of habitat for endangered species on private lands (U.S. Fish and Wildlife Service 2005c) are threatened by budget cuts (Blockstein 2005, Defenders of Wildlife 2005).

Recovery efforts for the Ivory-billed Woodpecker will focus first on areas in Arkansas where the bird has been "seen." They will also focus particularly on habitat within the Mississippi alluvial valley. Other areas of recent "credible" reports will have some recovery priority. The intent of the Fish and Wildlife Service is "to recover the Ivory-billed Woodpecker range-wide" (U.S. Fish and Wildlife Service 2005b). Interestingly, the latter statement was not followed by "within the United States." Specific acknowledgment was made of the Cuban subspecies (*C. p. bairdii*) and its uncertain status following reports from eastern Cuba in the 1980s and early 1990s (Estrada and Alayon Garcia 1986, Short 1987). If only international relations were such that collaborative and parallel efforts could include serious intensive searches and meaningful habitat protection for the Cuban birds.

A NEED FOR SOUND SCIENCE AND ROOM FOR SKEPTICISM

Endangered species recovery efforts can fail because of information control and acceptance of specific interpretations of data. Clark and Cragun (1994:11), without reference to a particular species, describe this as "'intelligence failure', in which high-quality, accurate, and reliable data... [are] simply dismissed...when the data [run] counter to...preferred policy." Within a month of the announcement of the possible rediscovery of the Ivory-billed Woodpecker, scientists began to question the validity of the interpretation of the data presented. Among the first to question the discovery were two Brazilian ornithologists who believed an alternative hypothesis (i.e. the bird in the Luneau video was an abnormal Pileated

Woodpecker) had not been adequately considered and that the possibility that it was an Ivory-billed Woodpecker should only be considered a hypothesis (Nemésio and Rodrigues 2005). Serious questions have been raised concerning the quality of the data presented to support the contention that Ivory-billed Woodpeckers exist in the Big Woods, yet these seem to have been ignored and countered with abundant positive news releases.

More than a year elapsed between the time of the first sighting and the announcement that an Ivory-billed Woodpecker had been documented in Arkansas. This was time enough to get the science right, but the secrecy policy of the BWCP led to involvement of only a few biologists who work with woodpeckers, and the rush to publication led to a quick peer review by *Science* (J. Fitzpatrick pers. comm.).

Reed Noss (in Gross 2005) discusses the limits of peer review and its failure in relation to another endangered species, the Florida panther (*Felis concolor coryi*). In the case of the reported rediscovery of the Ivory-billed Woodpecker, the "data" were within the Luneau video, the only physical evidence offered to support the conclusions in the paper. This video is not amenable to quick independent analysis, and such an analysis would not be considered a part of the normal peer-review process. As Noss (in Gross 2005:6) noted, "Peer reviewers have to rely on what the authors report.... Ultimately the onus is on the authors...."

Bureaucratic decisions in conservation should be based on sound science, but they are often made on the basis of scientific authority. The Cornell Laboratory of Ornithology is a respected institution, and *Science* carries the maximum weight of scientific authority in North America, though not generally in the realm of conservation or ornithology. I believe, with Nemésio and Rodrigues (2005), that mistakes were made with the scientific process in the Ivory-billed Woodpecker case and that these mistakes have been compounded at multiple levels as a result of scientists, government, media, and the public relying on the combined authority of the Cornell Laboratory and *Science*.

Matters have been made worse, secondarily, by erroneous information that has appeared in other scientific journals. A commentary in *BioScience*, for example, stated that "the existence of only a pair of birds has been confirmed"

(Koenig 2005; *italics mine*). This error was likely a result of media reports regarding tapes from ARUs; those involved with the project have not claimed confirmation of a pair of Ivory-billed Woodpeckers. There is also an error in the online supplementary material that accompanies Fitzpatrick et al. (2005a). Figure S5A is likely a branch stub (J. Fitzpatrick pers. comm., 29 July 2005), rather than a perched Ivory-billed Woodpecker as suggested by Fitzpatrick et al. (2005b). That error was still in the online material through mid-December 2005.

On the same day as the press release regarding the discovery of Ivory-billed Woodpeckers in Arkansas, the scientific report of the discovery appeared in *Scienceexpress* online; on 3 June, it appeared in the pages of *Science*. While the world rejoiced, my elation turned to disbelief. I had seen the "confirming" video in news releases and recognized its poor quality, but I had believed. Then I saw figure 1 from Fitzpatrick et al. (2005a) and seriously doubted that this evidence was confirmation of an Ivory-billed Woodpecker. Even a cursory comparison of this figure with the photographs by Arthur Allen and James Tanner or the art by Audubon or Wilson shows that the white on the wing of the bird, said to be perched behind the tree with only a portion of its right wing and tail exposed, is too extensive to be that of an Ivory-billed Woodpecker.

Other aspects of the *Science* report troubled me as well. I had seen several photographs of Pileated Woodpeckers with aberrant white on the wings and, indeed, within a week of the Ivory-billed Woodpecker announcement, I received such a photo from the U.S. Fish and Wildlife Service, the sender asking, "Why isn't this an Ivory-bill?" Snyder (2004) had described an incident in which he nearly misidentified such an aberrant Pileated Woodpecker as an Ivory-billed Woodpecker. Fitzpatrick et al. (2005a) were aware of this report, but discounted it because Snyder had observed that the white feathers were cream-colored instead of pure white and that there were two normally pigmented black feathers among the white ones on the left wing. Snyder (pers. comm., e-mail of 29 November 2005) clarified his observation, noting that

the bird appeared fully Ivory-bill-like in white of the secondaries as it flew up to a tree trunk.

I only was able to detect that the secondaries were somewhat cream-colored and that there were two black secondaries mixed with the white ones when the bird was perched in front of me and I could get my binoculars on it.

Indeed, Gene Sparling, who first reported a bird from Bayou de View, described the white of the bird he saw as having “an ‘odd yellowish’ color to the white” (Rosenberg et al. 2005: 198). Although the hypothesis that the bird in question was an aberrant Pileated Woodpecker was rejected, I do not believe that it should have been (cf. Nemésio and Rodrigues 2005).

My opinion is that the bird in the Luneau video is a normal Pileated Woodpecker. I believe that the white shown extending from behind the tree is the large white patch present on the underside of the wing of a Pileated Woodpecker, held vertically, with the bird already in flight. Several other characteristics of this video are also consistent with Pileated Woodpeckers and not consistent with Ivory-billed Woodpeckers, but I will not elaborate on those here, in fairness to colleagues who have collaborated with me in analyzing the Luneau video. The conclusion that the bird in the video is a normal Pileated Woodpecker was reached by four of us in a manuscript (R. O. Prum et al. unpubl. data 2005) that was provisionally accepted for publication in the on-line, peer-reviewed journal *Public Library of Science—Biology*. Just days before publication, and following preparation of a rebuttal to the manuscript by John Fitzpatrick and his colleagues (J. Fitzpatrick et al. unpubl. data 2005), Cornell Laboratory personnel called my colleagues and shared with them the recordings that had been made by the ARUs on the White River NWR. Prum and Mark Robbins, as senior authors, decided to withdraw the manuscript “so as not to muddy the conservation waters” (R. O. Prum pers. comm.). They had not analyzed the audio, but made the decision on the basis of their familiarity with the recordings made by Arthur Allen and with the double raps of other *Campephilus* woodpeckers. Researchers who claim confirmation of the Ivory-billed Woodpecker later stated that “we maintain that the acoustic information, while interesting, does not reach the level we require for ‘proof’” (Luneau 2005). Prum, Robbins, Brett Benz, and I remain steadfast in our belief that the bird in the Luneau video is a normal Pileated Woodpecker.

Others have independently come to the same conclusion, and publication of independent analyses may be forthcoming.

Our manuscript included a figure portraying the position we believed a Pileated Woodpecker’s right wing was in when the bird, partially behind a tree, was captured on the Luneau video. At the 2005 annual meeting of the American Ornithologists’ Union, Fitzpatrick presented a paper in which he addressed our hypothesis (without mentioning our unpublished manuscript; for video of Fitzpatrick’s presentation, see Acknowledgments). But instead of showing a Pileated Woodpecker wing in the vertical position of a bird in full flight as in our figure, he showed the audience the underside of a Pileated Woodpecker wing with the broad white patch extending horizontally from the tree. His horizontal image of a Pileated wing lining did not resemble that in the Luneau video—or our illustration.

The observations of Gene Sparling, Tim Gallagher, Bobby Harrison, and others may be valid. So may similar observations of dozens of observers made over the past few decades almost literally throughout the historical range of the Ivory-billed Woodpecker. And they may not be valid. I do not question the sincerity, integrity, or passion of these observers. We simply cannot know what they saw. We all want there to be Ivory-billed Woodpeckers out there. We all have hope.

In addition to the Luneau video, the bird in another video made by Bobby Harrison in the same area in September 2004 and shown to me on 3 November 2005 is equally problematic with regard to species identification. It shows an extensively black-and-white bird flying behind a tree on which an Ivory-billed Woodpecker decoy had been fastened, but the flying bird is masked by vegetation and there is no size reference. Video and sound evidence of Ivory-billed Woodpeckers in the Big Woods of eastern Arkansas are inconclusive, and sight reports cannot be verified. Advocates for the presence of Ivory-billed Woodpeckers in the Big Woods added multiple bits of inconclusive evidence, and the sum, somehow, became confirmation of the existence of the Ivory-billed Woodpecker.

The report of “confirmation” by scientists is often accepted at face value by nonscientists. As one reader (Bodner 2005) of the popular magazine *WildBird* put it, “The Ivory-billed Woodpecker has grabbed my soul....” For

scientists to label sight reports and questionable photographs as “proof” of such an extraordinary record is delving into “faith-based” ornithology and doing a disservice to science.

GOOD CONSERVATION

While admonishing my colleagues for what I consider failures resulting in a breach of scientific process, I also congratulate them on their success in the effort to gain public support for what could become one of the greatest conservation triumphs of our time: the resurrection of old-growth bottomland hardwood forest ecosystems of the lower Mississippi Valley. However, I adhere to the premise that good conservation must go hand in hand with good science and cannot condone actions that are otherwise. But one must ask: how many major donors, how many granting agencies, how many government officials would contribute to the more than \$10 million associated with this effort, if the message had been only “There might be Ivory-billed Woodpeckers out there”?

Others have proposed landscape-level conservation efforts such as we see happening in Arkansas. These can link isolated populations and provide continuity of habitat for the widest-ranging species. One example is the Yellowstone to Yukon conservation initiative (Locke 1994, 1996). In discussing that initiative, Clark and Gaillard (2001) described possible strategies varying along a continuum from persuasion to coercion and correctly noted that proceeding “without the support of the public is futile because conservation ultimately relies on public tolerance and support for the natural environment.” Certainly, the Big Woods Conservation Partnership understands this and is working hard to gain public support. But public support requires public trust. If no Ivory-billed Woodpeckers are “found” in the Big Woods, will we have lost public trust and support for future conservation efforts? The broader benefits of the efforts underway need to be emphasized more.

RECOVERING A GHOST: TRUTHS, MYTHS, AND EVIDENCE

As efforts to find the Ivory-billed Woodpecker and prepare a recovery plan have proceeded, an abundance of opinions has been expressed as to what constitutes positive evidence of Ivory-billed

Woodpecker presence. Some problems have resulted from ignoring or selectively accepting information provided by those of earlier generations who knew Ivory-billed Woodpeckers. Other problems have resulted from using minimal information from other species to make assumptions regarding Ivory-billed Woodpeckers and reporting those assumptions as facts. These problems have contributed to widespread misunderstanding of behavioral and ecological characteristics of this species. Certainly, fresh ideas can provide breakthroughs, but only when couched in understanding. Among the myths and uncertainties that have been presented as facts in the search for the Ivory-billed Woodpecker are the following.

The Ivory-billed Woodpecker is “much larger” than a Pileated Woodpecker, such that the larger size can be recognized by an observer at 100 meters.—Several of the observers of the Ivory-billed Woodpecker in the Bayou de View area have exclaimed that the bird they saw was “much larger” than a Pileated Woodpecker when they saw it at “about a hundred yards” or more (Niskanen 2005, Rosenberg et al. 2005). The Ivory-billed Woodpecker *is* indeed larger; its wing span may or may not be 5 cm (2 inches) greater; and its total length may or may not be as much as 7.5 cm (2–3 inches) greater (Audubon and Chevalier 1840–1844). No truly useful data (e.g. well-defined measurements, reasonable sample size, known locality, sex of birds, etc.) have been presented, few Arkansas Ivory-billed Woodpecker specimens are available (Jackson 2004), and birds vary geographically and as individuals. Furthermore, “wing span” and “total length” are not measurements that can be taken from study skins. When taken from fresh specimens, these measurements depend on how much the person measuring them pulls on the wings or the neck in making the measurements. Assuming that bird measurements made by John James Audubon (Audubon and Chevalier 1840–1844) are reasonably correct, for an individual to be able to say that an Ivory-billed Woodpecker in flight, at 100 meters, is much larger than a Pileated Woodpecker implies an ability to easily distinguish between a meter stick and a yard stick down the length of a football field. It also implies a correct judgment of the distance to a moving object the size of an Ivory-billed Woodpecker from a moving boat in an environment with no easy markers for judging relative distance.

Ivory-billed Woodpeckers exhibit straight and level flight, whereas Pileated Woodpeckers exhibit undulating flight.—This has been stated by Cornell Laboratory of Ornithology (2005), Fitzpatrick et al. (2005a), and Gallagher (2005). According to Tanner and Audubon, flight pattern cannot be used to distinguish between Ivory-billed and Pileated woodpeckers. Audubon (Audubon and Chevalier 1840–1844:229), in speaking of the Pileated Woodpecker, noted: “The flight of this well known bird is powerful, and, on occasion, greatly protracted, resembling in all respects that of the Ivory-billed Woodpecker.” Tanner (1942:1) addressed the question directly:

Much has been written and said on how the Ivory-billed Woodpecker flies directly and straight while the Pileated’s flight undulates, but I have frequently seen Pileateds fly directly, in no way different from the flight of the larger bird.

As I have discussed elsewhere, the nature of flight varies with the purpose of the flight (Jackson 2006).

The life spans of large woodpeckers rarely exceed 15 years.—This has been stated by Fitzpatrick et al. (2005a) and Swarthout and Rohrbaugh (2005). In fact, we simply do not know the range, variability, or mean of woodpecker life spans. What information we have is based on very small sample sizes of banded birds of other woodpecker species. A captive injured Red-cockaded Woodpecker (*Picoides borealis*) that I kept lived to the age of 17 years. Might not larger woodpeckers live longer? Why shouldn’t some approach the decades-greater longevity of similar-sized gulls or parrots? Certainly, any modeling of Ivory-billed Woodpecker populations will need to include reasonable consideration of this parameter, and we should not lock ourselves into an estimate based on minimal evidence.

We can recover the Ivory-billed Woodpecker.—Certainly, we hope so. But saying “can” is taking a giant leap of faith. If one or more of the tantalizing reports of an Ivory-billed Woodpecker in the Big Woods is real, we still have evidence of only a single bird—a disturbing statistic, because this species is known for traveling in pairs or family groups. The argument has been made that if there is one, there must be others and, yes, it is safest from a conservation

perspective to assume that there is a small population, but it is possible that, if an Ivory-billed Woodpecker has been seen, it is the last of its species. Other species, such as the Laysan Duck (*Anas laysanensis*), have been brought back from the brink of extinction, but humans have a long history of being able to breed ducks in captivity. California Condors (*Gymnogyps californianus*) or Whooping Cranes (*Grus americana*) may be a closer match in terms of the difficult road to recovery, but even these still precariously endangered species have surrogates with which aviculturists had experience breeding.

Woodpeckers have rarely been bred in captivity, and captive breeding of Ivory-billed Woodpeckers would present formidable, although conquerable, challenges. Captive breeding, if it is attempted, may be (and perhaps should be) a long way off. We know too little of the species’ behavioral ecology to squander precious genes on a quick attempt at a “techno-fix.” If the species has survived our actions to this point, providing it with additional protection and habitat is certainly the first, best thing we can do.

There are so many things we do not know. If there is one wandering individual out there, where did it come from? Systematic searches should be made throughout the region. Enhancement of the local habitat may or may not be of significance to a wanderer. Just because Ivory-billed Woodpeckers have been reported in association with baldcypress in the past and in areas with large baldcypresses at Bayou de View, do they really depend on baldcypresses for foraging and cavities? Or have we made this association because the habitat is more open along waterways and we can see the birds more easily as they use these open corridors to travel to and from the habitats they really need? Are we really dealing with a species that has become reclusive and silent within the past century, as some have suggested? I do not think so. While game animals often become wary as a result of hunting pressure, I know of no evidence that suggests anything more than individual wariness as a result of negative interaction with humans. I believe that the integrity of the social system of the Ivory-billed Woodpecker, as evidenced by numerous historical reports of movement in pairs and family groups, vocal chatter, and exchange of double raps, would remain if the species has survived.

BUYING TIME, SEEKING KNOWLEDGE, REDEFINING HOPE

As the Ivory-billed Woodpecker Recovery Team (on which I serve) has begun its job of trying to prepare a first draft of a recovery plan for the Ivory-billed Woodpecker by the spring of 2006, it has become clear that there is an abundance of basic information that we do not have for the species. With good questions in mind that have arisen in the past year, we could quickly learn a great deal if we could only find and observe living Ivory-billed Woodpeckers. Search teams will be using multiple approaches in efforts to find birds through the coming spring.

Although use of ARUs has provided some tantalizing possibilities, the sounds recorded are only suggestive because of the simplicity of Ivory-billed Woodpecker vocalizations and the purely mechanical aspect of the raps. These data have, thus far, been of minimal value. Because of weeks (and often months) of delays associated with processing the thousands of hours of recordings, searchers could not take full advantage of the information collected. Many of the double raps were recorded very close to sunrise, at a time when any bird that might have been making the sounds was possibly still near, at, or even within its roost cavity. Woodpeckers typically roost in the same roost cavity night after night, and this observation should have stimulated an immediate search of potential roost cavities within sound range of the ARU.

A major concern related to possible rediscovery of the Ivory-billed Woodpecker has been that if the location of the species were revealed, the woods would be so inundated with birders that it could result in loss of what had been found. This was the rationale stated by the Cornell Laboratory for the year-long secrecy of their searches. Thus far, the response of the birding community has been far different than anticipated. The American Birding Association published a plea for birders to show restraint (Anonymous 2005f), and local chapters of the National Audubon Society passed resolutions "to promote protection of the Ivory-billed Woodpecker by urging members to take a voluntary pledge of non-intrusion" on the Ivory-billed Woodpecker's habitat so long as it remains in jeopardy (Anonymous 2005g). If Ivory-billed Woodpeckers are located such that they can dependably be seen, then we may have a problem.

Strategies change, and the pressure is on to find the Ivory-billed Woodpecker. By November 2005, the BWCP, risking the chance that excessive birding activity might have a negative effect on Ivory-billed Woodpeckers if they are present, was actively encouraging birders to "help in the search for Elvis" (U.S. Fish and Wildlife Service 2005d; e-mail message from S. Osborne, U.S. Fish and Wildlife Service, placed on the Arkansas birding listserv, arbird-l@listserv.uark.edu, 23 November 2005).

News of the possible discovery of Ivory-billed Woodpeckers in the Big Woods has given us hope for the species. The attendant media attention has brought economic hope to the small towns of eastern Arkansas. At a time when the world seems especially filled with negative news, there has been a collective smile of joy at the possibility of the survival of this iconic species. The hopes have been a beacon providing renewed focus on conservation, ecotourism, collaborative conservation efforts, endangered species laws, and the importance of large tracts of old-growth ecosystems around the world. Conservation organizations have been quick to capitalize on the opportunity for fundraising to further their conservation efforts. Politicians have been quick to use these hopes in their quest for political capital. Perhaps the Ivory-billed Woodpecker is in the Big Woods of eastern Arkansas. Perhaps it clings to survival in other such areas. Perhaps we can use this momentum to revive the Ivory-billed Woodpecker, its ecosystems, and other imperiled species. Perhaps we can change attitudes and increase understanding of the interdependence among species and between life and the physical world. Perhaps...

The conservation efforts taking place in the Big Woods of eastern Arkansas are of major significance, but they did not begin with a sighting of an Ivory-billed Woodpecker. They began with the concern of the people of Arkansas for wetlands and huntable populations of waterfowl, and for a local economy and human population that have been declining. Some local concerns over the announcement of the discovery of Ivory-billed Woodpeckers in eastern Arkansas have focused on the negative economic effect of possible closure of some lands to hunting (Stangel 2005). More recently, there has been a broader recognition of the importance of bottomland forest ecosystems for migrant birds, for biodiversity, for the human psyche.

I have waded and canoed the swamps of Bayou de View, the Cache River, and White River. The forests include many baldcypresses more than 2 m in diameter, and bottomland hardwoods of other species a meter in diameter that tower to more than 30 m. The forests are often less than 1.6 km (1 mile) wide; at Bayou de View, I was never out of hearing range of highway traffic. But there are much wider areas on the lower White River. Within some stands of swamp forest, along this great ribbon of green, a primeval aura wraps the human visitor with the sense that yes, Ivory-billed Woodpeckers could be in the Big Woods. We should continue to pursue Ivory-billed Woodpeckers across the Southeast, encouraging systematic search efforts in the best habitats available. But more importantly, we should refocus our attention on the grandeur of old-growth forests and the importance of those forests to migrant songbirds, wintering waterfowl, black bears (*Ursus americanus*), and a multitude of less-charismatic plants and animals.

In restoring and maintaining these ecosystems, we will provide a richer world for ourselves and hope for the future. The diverse ongoing plans and projects of The Nature Conservancy to restore bottomland forest ecosystems in Arkansas and across the Southeast should continue with vigor. Other conservation partnerships exist, and more should be formed. Together, with understanding, we can foster the healing of ecosystems. They have scars from our actions, but they may once again function to sustain the species that remain. Whether truth is in the presence of Ivory-billed Woodpeckers or in the perception of the presence of Ivory-billed Woodpeckers, we now have hope. But hope is not truth. It is only the fire that incites us to seek the truth. The truth is still out there.

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