

Update on the Ivory-billed Woodpecker (*Campephilus principalis*) Scandal

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The Ivory-billed Woodpecker (*Campephilus principalis*) is an elusive bird that has repeatedly been feared extinct only to be rediscovered during the past hundred years. The most recent rediscovery, which took place in Arkansas, was announced in an article that was featured on the cover of *Science* in 2005. Despite published reports of sightings in Florida and Louisiana in the years that followed, the issue became controversial when nobody managed to obtain a clear photo and critics attacked relatively weak video evidence that was presented in the original article. The issue began to develop into a science scandal when the critics used specious arguments to delay the publication of the strongest evidence, which consists of three videos that were obtained during encounters with birds that were identified in the field as Ivory-billed Woodpeckers and that show field marks, body proportions, flights, and other behaviors that are consistent with that species but no other species of the region. The scandal culminated in a decision by the U.S. Fish & Wildlife Service to declare the species extinct in 2021, which was made without addressing the strongest evidence. An update is given here on recent developments. The decision to declare the species extinct was based on a five-year review of evidence for persistence. During an interview, it came to light that the person who performed the review was unaware of basic facts about the strongest evidence. Evidence that was obtained at another site in Louisiana [Latta *et al.*, “Multiple lines of evidence suggest the persistence of the Ivory-billed Woodpecker (*Campephilus principalis*) in Louisiana,” *Ecology and Evolution* (2023)] is discussed and compared with the strongest evidence. Videos obtained with a drone on a sunny day often show white markings that do not correspond to actual field marks. It is demonstrated that a video that was purported to show an Ivory-billed Woodpecker on the basis of apparent white markings is apparently a Pileated Woodpecker (*Dryocopus pileatus*). The bird in that video appears to have black trailing edges on the dorsal surfaces of the wings, which are consistent with the Pileated Woodpecker, not the Ivory-billed Woodpecker. The wingbeat frequency and an upward swooping landing also seem to be consistent with the Pileated Woodpecker but are not consistent with historical accounts of the Ivory-billed Woodpecker or flights appearing in videos that contain the strongest evidence.

Keywords: Ivory-billed Woodpecker; bioacoustics; kent calls; avian conservation; avian flight mechanics; wingbeat frequency; flight speed.

1. Introduction

The Ivory-billed Woodpecker (*Campephilus principalis*) has been hanging on in barely detectable numbers for about a hundred years. Although it cannot be ruled out that the species recently became extinct, there were published reports of dozens of sightings in Arkansas,¹ Florida,² and Louisiana^{3–9} in the first decade of this century. This issue became controversial when nobody managed to obtain a clear photo, but it should be possible to establish persistence with a different type of evidence, such as video footage that shows characteristics that are consistent with the Ivory-billed Woodpecker but no other species and for those characteristics to be sufficient in number to rule out the plausibility of any alternative explanation. I obtained videos that meet those criteria during three encounters with birds that were identified in the field as Ivory-billed Woodpeckers.^{3–9} Two of those videos contain sounds that are consistent with the Ivory-billed Woodpecker.

The issue started to evolve into a science scandal when critics, who had previously attacked relatively weak evidence and made it the focus, became entrenched in the position that the Ivory-billed Woodpecker is extinct and anonymously used specious arguments to delay publication of the strongest evidence for a decade without ever addressing it out in the open after its eventual publication.⁹ Some of the leading science journals helped to enable the scandal by publishing reports that made no mention of the strongest evidence but provided high-profile platforms for unsupported opinions.^{10,11} The lack of diligence by editors of *Science*, *Nature*, and the *Proceedings of the National Academy of Sciences* in handling submissions of the strongest evidence brings into question whether those institutions are dedicated to seeking the truth and shielding it from being trampled by ignorance and shenanigans.⁹ The scandal culminated in a decision by the U.S. Fish & Wildlife Service to declare the Ivory-billed Woodpecker extinct,¹² which was made without addressing the strongest evidence.

The purpose of this article is to discuss further developments. The decision to declare the species extinct was based on a five-year review of evidence for persistence. During an interview, it came to light that the person who performed the five-year review was unaware of basic facts about the strongest evidence. The blogger who conducted the interview has not released the recording, but the U.S. Fish & Wildlife Service could call for its release in the interest of transparency. A more recent report of evidence by Latta *et al.*¹³ is discussed here, with the focus on video evidence, which has the advantages of potentially providing rich information (e.g., field marks, body proportions, flights, other behaviors, audio, and the series of events during an encounter) and being easy to validate as genuine (e.g., through motion, context, and metadata). Video evidence is not immune to assertions of fraud, but it was easy to debunk an assertion that one video actually shows a different *Campephilus* woodpecker that was filmed in the tropics and an assertion that the speed of another video was altered in order to increase the apparent flight speed and wingbeat frequency.⁸ Before considering the recently reported video evidence, let us briefly consider what constitutes strong evidence.

It may be difficult or impossible to validate a still photo. When two photos of an apparent Ivory-billed Woodpecker emerged in the 1970s, for example, it was noted that too much

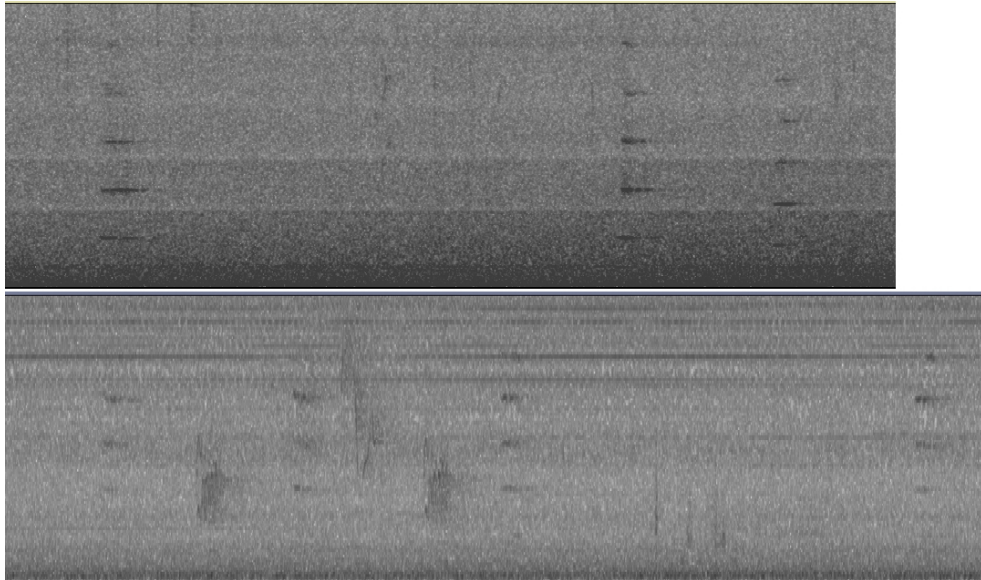


Fig. 1. Spectrograms of putative kent calls that were recorded in Florida² (top) and calls of a Blue Jay that were recorded by the author in Louisiana in 2008 (bottom). The vertical axes span 0 to 5 kHz for each case. The horizontal axes span 10 s (top) and 11 s (bottom). In both cases, the calls consist of simultaneously excited harmonics.

white appears on the wings, the posture seems identical in both photos, and no signs of the bill, tarsi, feet, or claws are present. It was widely believed among ornithologists that those photos show a specimen mounted on two different trees.^{14,15} More recently, it came to light that a photo appearing to show a key field mark of the Ivory-billed Woodpecker had been altered.¹¹ When conducting a search, audio recordings are useful for trying to determine if Ivory-billed Woodpeckers might be present, but the sounds of this species lack sufficient complexity and uniqueness to serve as proof. Appearing in Fig. 1, for example, are spectrograms of putative ‘kent’ calls of the Ivory-billed Woodpecker that were obtained in Florida² and calls from a Blue Jay (*Cyanocitta cristata*) that were obtained in Louisiana. Both of those recordings, as well as known recordings of kents that were obtained in 1935, show similar patterns of simultaneously excited harmonics.

Sightings can be a compelling component of a body of evidence. During the searches led by ornithologists in Arkansas and Florida,^{1,2} for example, there were sightings by several ‘well-prepared’ observers, which are defined here to be observers who are experienced and skilled at identifying birds in the field, cognizant of the field marks and sounds of the Ivory-billed Woodpecker, and acclimated to southern swamp forest habitats and the species that regularly occur in them. It is not plausible to dismiss all of those sightings (of a large bird with distinctive and prominent field marks) as a series of mistakes. Nor is it plausible to dismiss as a series of mistakes my ten sightings (three of which are supported by video evidence that nobody has been able to refute) in Louisiana and Florida,^{3–9} which involved observations of definitive field marks and remarkable flights consistent with historical ac-

counts. Perhaps the most notable fact about the sightings reported by Latta *et al.* is that two of the observers (Erik Hendrickson and Mark Michaels) saw no field marks.

The evidence presented by Latta *et al.* includes a video that was promoted as “among the clearest evidence to date of the survival” of the Ivory-billed Woodpecker.¹⁶ The interpretation of that video was challenged in a comments letter (the contents of which are the basis for the sections that follow), which the editor of *Ecology and Evolution* rejected without attempting to address the issues that were raised. That incident is part of an ongoing pattern of selectively suppressing and avoiding open discourse. The lack of an open discourse that includes the most relevant information is the primary reason that this issue has not been resolved and that the fate of an iconic species continues to be stuck in limbo. The evidence that critics tried to keep from being published might have resolved this issue more than a decade ago if it had been included in the debate that took place at high levels within the science community in the years following the publication of the initial article in 2005.

2. Materials and Methods

In this article, evidence presented by Latta *et al.* is compared with video footage that was obtained during encounters with birds that were identified in the field as Ivory-billed Woodpeckers. The comparisons are based on supplementary movies that may be accessed at an archive.¹⁷ Detailed analyses of the videos are available in Refs. 3–9. Brief summaries are provided in this section. Two of the videos were obtained along English Bayou in the Pearl River swamp in Louisiana. The other video was obtained in an area where Geoff Hill and his colleagues had recently reported a series of sightings in the Choctawhatchee River swamp in Florida.² The videos show field marks, body proportions, flights, and other behaviors that are consistent with the Ivory-billed Woodpecker but no other species. No flights appear in the only existing historical film of the Ivory-billed Woodpecker, which was obtained in 1935. The videos show several types of flight, all of which are remarkable in their own ways and consistent with accounts of the Ivory-billed Woodpecker. A cruising flight with rapid wingbeats, takeoffs with deep and rapid wingbeats and ‘wooden’ wing sounds, and a short flight between limbs with a deep and rapid flap are consistent with accounts by Tanner.¹⁸ There are remarkable swooping flights, including landings with long vertical ascents, that are consistent with an account by Eckleberry¹⁹ of a landing with a “magnificent upward swoop” and an account by Audubon²⁰ of a flight that is “graceful in the extreme.”

The first video was obtained in Louisiana during the last of seven encounters during a five-day period in February 2006. During five sightings that week, Ivory-billed Woodpeckers were identified on the basis of definitive field marks and flight characteristics that were well seen from close range. Kents were heard during two of the encounters, once coming from two directions at the same time. The 2006 video shows a large woodpecker perched on a tree, part of which was collected for a size comparison with a specimen of the Ivory-billed Woodpecker that is near the maximum size (about 50 cm from tip of bill to tip of tail) for that species and a specimen of the Pileated Woodpecker (*Dryocopus pileatus*), which

is the only other large woodpecker that occurs north of the Rio Grande. As illustrated in Document S1,¹⁷ the woodpecker in the video dwarfs the Pileated Woodpecker specimen, is comparable in size to the Ivory-billed Woodpecker specimen, and would get stuck if it were to try to enter the largest Pileated Woodpecker cavity. It is therefore larger than any Pileated Woodpecker, and it has several characteristics and behaviors consistent with the Ivory-billed Woodpecker but not the Pileated Woodpecker.

In March 2008, another video was obtained a short distance up the same bayou from 23 m up in a tree that was used as an observation platform for keeping watch for Ivory-billed Woodpeckers flying over the treetops in the distance. The 2008 video documents that I tracked the bird in flight for about 10 s and that I had an ideal vantage point from close range and directly above for observing the definitive dorsal field marks. As the bird passed below and continued up the bayou, I had a clear view of the dorsal stripes and the black leading edges and white trailing edges on the dorsal surfaces of the wings. It is not generally possible to determine the distance to an object in a video. Since the bird and its reflection from the still surface of the bayou both appear in the 2008 video, however, it was possible to pinpoint positions of the bird along its flight path and estimate the wingspan (well over 24 inches) and the flight speed (well above the range for the Pileated Woodpecker). During several wingbeat cycles, the video clearly shows the wings folding closed in the middle of each upstroke. The combination of the wingspan and the distinctive wing motion are consistent with the two large woodpeckers but no other species of the region. The main conclusion follows from the wingbeat frequency, which is about ten standard deviations greater than the mean wingbeat frequency of the Pileated Woodpecker. The high flight speed, swept-back appearance of the wings, narrow wings, and the black leading edges and white trailing edges on the dorsal surfaces of the wings are also consistent with the Ivory-billed Woodpecker but not the Pileated Woodpecker.

The other video was obtained in Florida in January 2007 during a follow-up to a report of a pair of Ivory-billed Woodpeckers by a member of Geoff Hill's search team the previous day. I came upon a pair of birds that were repeatedly making spectacular swooping flights in the distance. I had an excellent view through binoculars of the black leading edge and white trailing edge of the dorsal surface of the right wing of one of the birds, which was held fixed during a swooping flight. The 2007 video contains dialogue with a member of Hill's search team (who arrived on the scene during the encounter) in which I mention seeing the swooping flights and the white trailing edge. The encounter lasted for more than 20 minutes, and the video captured several remarkable swooping flights that are consistent with historical accounts and other events involving characteristics that are consistent with the Ivory-billed Woodpecker but no other species. Both of the birds are visible simultaneously at one point. One of them appears perched and then diving behind a tree (or perhaps into a cavity). At the same time, the other bird swoops upward in a landing that is consistent with Eckleberry's account of a "magnificent upward swoop" and shows field marks consistent with the Ivory-billed Woodpecker. The event ends with both birds taking off with deep and rapid wingbeats and 'wooden' wing sounds that are consistent with an account by Tanner.

3. Results

Each appendix discussed here is from Ref. 13. Each supplementary movie discussed here may be accessed in Ref. 17. The video of a bird in flight in Appendix 6 was obtained with a drone looking down on the forest on a sunny day. Under those conditions, it is easy to be misled by features that appear white. In the image appearing in Fig. 2, for example, solar glare causes the tail and trailing edges of the dorsal surfaces of the wings of a Turkey Vulture (*Cathartes aura*) to appear bright white. Appearing in Fig. 3 is an image from 34 s into the video in Appendix 9, which was also obtained with a drone on a sunny day. It shows a large woodpecker that appears to have prominent white patches on the dorsal surfaces of the wings and on the tail. Since both of the large woodpeckers have black tails, this image illustrates the perils of attributing apparent white markings in such videos to actual field marks. When discussing the video in Appendix 6, Latta *et al.* focus on apparent white markings but do not mention that, as indicated in Fig. 4, the trailing edges of the dorsal surfaces of the wings appear to be black in several frames when the bird was swooping upward to land. In the video in Appendix 11, which is darker than the video in Appendix 6, a Pileated Woodpecker swoops upward to land. The field marks are well defined in that video, which was apparently obtained in the absence of solar glare.

Movie S1 is a version of the video in Appendix 6 that was cropped from the raw footage²¹ for use in comparisons here. No flights of the Pileated Woodpecker are consistent with Eckleberry's account of a landing with a "magnificent upward swoop" or Audubon's account of a flight that is "graceful in the extreme," but several swooping flights in the 2007 video are consistent with those accounts, including the upward swooping landings with long vertical ascents that appear in Movies S2 and S3. The landing in Movie S1 is neither consistent

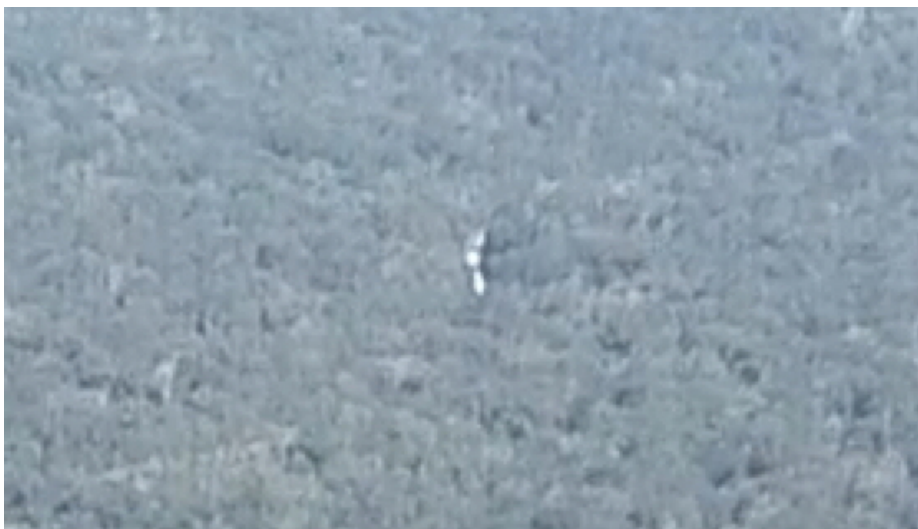


Fig. 2. Drone footage of a Turkey Vulture. Solar glare causes the trailing edges of the wings and the tail to appear bright white.



Fig. 3. Image from a video that Latta *et al.* obtained with a drone on a sunny day. Solar glare causes a white patch to appear on the tail.

with Eckleberry's account nor comparable to the landings in Movies S2 and S3, but it is similar to the landing of a Pileated Woodpecker in the video in Appendix 11. According to historical accounts, the Ivory-billed Woodpecker has rapid wingbeats during takeoffs and in cruising flight. In Movie S4, one of the takeoffs with deep and rapid wingbeats in the 2007 video is compared with takeoffs by the closely related Imperial Woodpecker (*Campephilus imperialis*) and by Pileated Woodpeckers. In terms of frequency, the wingbeats during the takeoff in the video in Movie S1 appear to be similar to the wingbeats during the takeoffs of Pileated Woodpeckers in Movie S4.

Appearing in Movie S5 is a Pileated Woodpecker in flight with a wingbeat frequency that appears to be similar to the wingbeat frequency of the bird in Movie S1. Appearing in Movie S6 is another video of a Pileated Woodpecker in flight that was obtained from

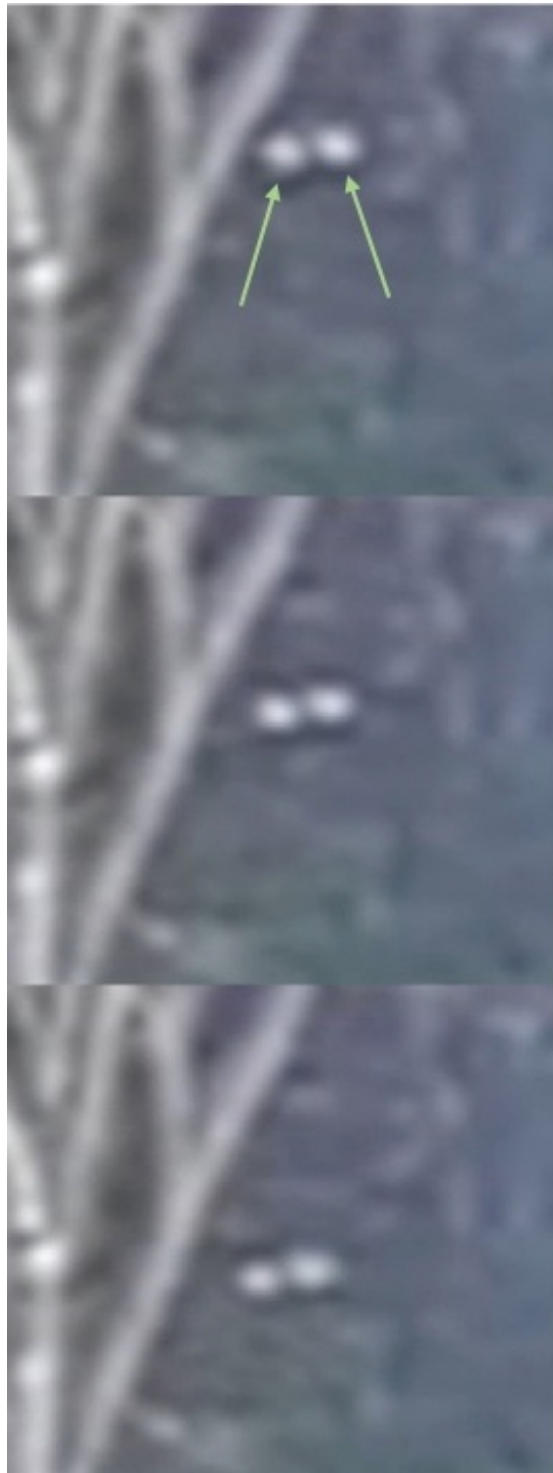


Fig. 4. Images from a video that Latta *et al.* obtained with a drone. The apparent black trailing edges on the dorsal surfaces of the wings (which are visible in several frames) are consistent with the Pileated Woodpecker but not the Ivory-billed Woodpecker.

a drone on a sunny day. The apparent white markings on that bird might seem to be more extensive than would be expected for a Pileated Woodpecker, but this is typical of video footage obtained under those conditions. The wingbeat frequency of the Pileated Woodpecker in that video appears to be similar to the wingbeat frequency of the bird in Movie S1. The large woodpecker in the 2008 video has a wingbeat frequency that is about double the wingbeat frequency of the Pileated Woodpecker. Such a large difference in wingbeat frequency is obvious to an experienced observer. While obtaining the 2008 video, I was attached to a rope high in a tree and was unable to pan the camera smoothly. It is difficult to follow the rapid wingbeats at full speed in the raw footage, but they are easy to follow as the bird approaches from down the bayou in the first half of Movie S7, which was stabilized using DaVinci Resolve so that the flight path appears as a smooth curve. The wingbeats of the bird in Movie S7 are much more rapid than the wingbeats of the bird in Movie S1.

The woodpecker in Movie S1 has wingbeats and an upward swooping landing that are consistent with the Pileated Woodpecker. The apparent amount of white might seem to be excessive for that species, but this is typical in footage that is obtained with a drone on a sunny day. There appear to be black trailing edges on the dorsal surfaces of the wings, which are consistent with the Pileated Woodpecker but not the Ivory-billed Woodpecker. There does not appear to be anything consistent with the Ivory-billed Woodpecker about the woodpecker in that video, which is apparently a Pileated Woodpecker.

Latta *et al.* present a still photo of an oval-shaped black object with a white patch. That isolated image, which is not part of a video and was not associated with a sighting, provides no information on the direction the object was moving or how it appeared or what it was doing before or after that instant in time. As an example of the advantages of video footage, an image of a similar oval-shaped black object with a white patch is discussed in Ref. 9. That image shows field marks consistent with the Ivory-billed Woodpecker, but it is just one frame from a video that also shows behaviors and other field marks consistent with the Ivory-billed Woodpecker. That frame shows the bird just after it took off with deep and rapid wingbeats and wooden wing sounds. Prior to that frame, the bird came in for a landing with a magnificent upward swoop and showed a black body (including the belly) and mostly white underwings. That event is embedded in a video that contains several other events consistent with the Ivory-billed Woodpecker and that was obtained during an encounter in which definitive field marks were observed through binoculars.

Latta *et al.* discuss the still photo in the context of bounding flight in which the wings are folded onto the body in the middle of the upstroke. They mention a photo obtained by Tanner in 1939 that sheds light on this behavior for the Ivory-billed Woodpecker, with no acknowledgment of a similar (but more extensive) discussion in Ref. 3 that involves the same Tanner photo and video footage of the bounding flight of an apparent Ivory-billed Woodpecker. As another example of the advantages of video footage, the 2008 video provides wingbeat frequency, flight speed, and additional information. Latta *et al.* state that Tanner “documented” the bounding flight of the Ivory-billed Woodpecker, but there does not seem to be any mention of this type of wing motion in Tanner’s works. Before the 2008 video

was obtained, it was widely believed that the Ivory-billed Woodpecker has a duck-like wing motion in which the wings remain extended throughout the entire flap cycle.

The misconception about the wing motion is represented in a painting by Julie Zickefoose of the two large woodpeckers in flight,²² which correctly shows the wings folding closed for the Pileated Woodpecker but shows the wings remaining extended throughout the entire flap cycle for the Ivory-billed Woodpecker (in accordance with conventional wisdom at the time). After the announcement of a series of sightings in Arkansas,¹ searches were initiated in several other states. According to a participant in one of those searches, Dalcio Dacol, a sighting was dismissed because the observer reported that the wings were folded closed. After obtaining the 2008 video, I was faced with an apparent paradox upon inspecting the video. In the field, I observed definitive field marks of the Ivory-billed Woodpecker, but the wing motion did not seem to be consistent with that species. The paradox was resolved when Dacol discovered that the 1939 photo contains a clue about the wing motion of the Ivory-billed Woodpecker that had apparently been overlooked for 69 years.

4. Discussion

There is a need for caution when interpreting apparent white markings in video footage obtained with a drone on a sunny day. In particular, the bird in the video in Appendix 6 is apparently a Pileated Woodpecker. The misinterpretation of that video does not shed light (one way or the other) on the possible presence of the Ivory-billed Woodpecker in the area where the video was obtained or within the range of the species, but it would not be surprising if critics try to use it to support their position. There have been indications that some of those who are entrenched in the position that the Ivory-billed Woodpecker is extinct may be motivated by something other than seeking the truth.⁹ After openly targeting relatively weak evidence from Arkansas, for example, they used specious arguments behind the scenes to delay the publication of the strongest evidence, which they never addressed after it was finally published. With the conservation of the Ivory-billed Woodpecker at stake, there is a need for a truth-seeking open discourse on all relevant evidence (including that presented by Latta *et al.*) that has nothing to do with supporting a position.

Perhaps the easiest evidence to understand is the series of sightings by well-prepared observers during searches that were led by ornithologists. Considering that the Ivory-billed Woodpecker is a large bird with bold black-and-white field marks, it is implausible to explain away those sightings as a series of mistakes. It is also implausible to dismiss as a series of mistakes ten sightings by a well-prepared observer who saw definitive field marks and remarkable flights that are consistent with the Ivory-billed Woodpecker. It is not difficult to understand the evidence in the videos that were obtained during three of those encounters. The 2006 video shows a woodpecker that is larger than any Pileated Woodpecker and has several characteristics and behaviors that are not consistent with that species but are consistent with the Ivory-billed Woodpecker. It follows from the wingspan and the distinctive wing motion that the bird in the 2008 video is a large woodpecker. After reaching that conclusion, the main conclusion follows from the wingbeat frequency. The flight speed, wing

shape, and field marks are also consistent with the Ivory-billed Woodpecker but not the Pileated Woodpecker. Several events in the 2007 video show multiple characteristics that are consistent with the Ivory-billed Woodpecker but no other species. As discussed in Ref. 6, it follows from basic concepts in probability that a series of such events in a continuous stream of video footage amounts to powerful evidence.

One of the keys to understanding this issue is to be aware of the long history of elusiveness, which includes multiple rediscoveries during the past hundred years. As discussed in Ref. 6, the elusiveness is due to a powerful concurrence of factors related to habitat (vast and remote swamp forests where visibility is limited to short distances) and behavior (wide ranging and extremely wary birds that lack conspicuous behaviors). Another key to understanding this issue is to be aware of the long history of folly and politics⁸ that has stood in the way of establishing a conservation program for the Ivory-billed Woodpecker. If the U.S. Fish & Wildlife Service had conducted a thorough review, such a program might have been established on the basis of the observations and evidence that were reported in Refs. 1–9.

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