BALD EAGLE NEST MONITORING PROGRAM AT LAKE JAMES

2022 ANNUAL REPORT

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INTRODUCTION

The Bald Eagle (*Haliaeetus leucocephalus*) is a national symbol and conservation icon in the United States. In the lower 48 states, Bald Eagles were particularly threatened by DDT (dichloro-diphenyl-trichloroethane) and persecution (Buehler 2020). However, this once endangered species has recovered through the protection of nesting sites, ban of DDT related pesticides, captive breeding, and reintroduction programs, among other actions (Buehler 2020). Bald Eagle populations have grown since their 1963 nadir of only 417 nesting pairs, and the U.S. Fish and Wildlife Service (2020) estimates that there are now over 71,000 nesting pairs in the lower 48 states. Consistent with national trends, Bald Eagle nesting in western North Carolina has also been increasing (personal communication 2022, Avery Clifton of North Carolina Wildlife Resources Commission [NCWRC]).

Five Bald Eagle nests have been documented at Lake James located in Burke and McDowell Counties, North Carolina (Table 1, Figures 1 – 4). The first nest was found in February 1999, and its outcome for that breeding season is unknown (Blanc & Carter 2000). The same nest was used again in December 1999 – March 2000, but it failed (Blanc & Carter 2000). At the time, the area around this nest was undeveloped (Blanc & Carter 2000), but it has since been developed with residential housing. In 2002, this nest was blown out of its tree (personal communication 2022, Clifton Avery of NCWRC).

Nest #2 was active from 2002 – 2014 (Tompkins 2021). During the summer of 2008, this nest was also destroyed by high winds, but it was rebuilt in the same tree and continued to be used by the eagles (Mullin 1997). The immediate area around this tree is a protected mitigation site as part of Habitat Conservation Plan for Bald Eagles at the lake (Mullin 1997), but the

surrounding area has been increasingly developed with residential housing (personal communication 2021, Martha Whitfield). This nest was no longer present as of November 2021 at the latest (personal observations Chip Whitfield, Martha Whitfield, J. Lindley McKay, and Olya Milenkaya) and it is unclear whether the Bald Eagles abandoned this nest site due to anthropogenic disturbance or natural causes.

Nest #3 was active from 2015 onwards (personal communication 2022, Clifton Avery of NCWRC; Tompkins 2021; Mullin 1997). In November 2021, it was unknown if this nest was continuing to be used for the 2021 – 2022 breeding season. We therefore monitored this nest during the 2021 – 2022 breeding season.

Nest #4 was strangely found independently on two occasions: once by Daniel Baron on November 13, 2021 and then by Martha Whitfield on November 27, 2021 when an adult Bald Eagle was observed sitting in the nest. It remains unclear when this nest was first built and if anyone else knew of this nest prior to 2021. We monitored this nest during the 2021 – 2022 breeding season.

Nest #5 was first reported to the NCWRC by the landowner in December 2020 (personal communication 2022, Clifton Avery of NCWRC) but we did not know about this nest until the end of the 2021 – 2022 breeding season. Hence, we did not monitor this nest during this breeding season, but we compiled observations about this nest made by others.

Here, we report on our activities during the 2021 – 2022 breeding season. Specifically, we monitored Nests #3 & 4 and compiled information about Nest #5, and we report on those findings here. We also solicited and compiled opportunistic Bald Eagle sightings from the local community and we searched for additional Bald Eagles and nests ourselves. We used these data

to create maps showing Bald Eagle nests, sightings, and flight paths, as well as our nest searching routes. Finally, we conclude this report with recommendations for ongoing Bald Eagle monitoring at Lake James.

METHODS

Nest Monitoring – Daniel Baron observed Nests #3 & 4 once monthly during the 2021 – 2022 breeding season. To watch Nest #3, they sat about 500 feet away from the nest, and across an inlet. They sat about 700 feet away from Nest #4, also across an inlet. Each observation lasted 2 – 3 hours and included unobtrusive and quiet observation of the nest using binoculars and a scope. They also scanned the surrounding area during each session, looking and listening for Bald Eagles. Daniel Baron recorded all Bald Eagle sightings and included behavioral observations and time stamps of each Bald Eagle sighting at the nests.

Nest #3 was observed on three occasions for a combined 7 hours and 26 minutes of observation across these three dates: December 20, 2021; January 15, 2022; and February 12, 2022. Nest #4 was observed five times on the following dates: December 20, 2021; January 15, 022; February 12, 2022; March 19, 2022; April 29, 2022 (total observation time = 14 hours and 32 minutes). We stopped monitoring these nests once we were confident that they were no longer active for this breeding season. We did not observe Nest #5, but we compiled information about that nest from others' observations.

Nest Searching – Daniel Baron searched for additional Bald Eagle nests on four occasions throughout the breeding season (March 5, March 29, May 27, and August 9). They surveyed the

shoreline from the lake by kayaking or boating some parts of the lake (Figure 1) to search for emergent trees and large raptor nests.

Bald Eagle Sightings – Daniel Baron always documented their Bald Eagle sightings while they were at the lake, whether during nest observations or nest searching. To gather additional Bald Eagle sightings and to engage the local community in Bald Eagle awareness and conservation, Olya Milenkaya employed a citizen science approach by inviting the public to submit their Bald Eagle observations. She developed an online survey tool (https://forms.gle/NDuSmLQtnwZ2JXmu7) that was publicized by the Lake James Environmental Association.

To be clear, we did not systematically survey the entire lake for Bald Eagle activity. Instead, the Bald Eagle sightings reported through the citizen science survey, as well as those by Daniel Baron, were opportunistic and do not reflect true abundance or location preferences of Bald Eagles at the lake. Therefore, areas with no sightings cannot be interpreted as having no Bald Eagles, but areas with sightings serve as documentation of Bald Eagles utilizing at least those areas of the lake.

Mapping – Daniel Baron mapped Bald Eagle nests, sightings, and their nest searching tracks (Figures 1 – 4). Some Bald Eagle sightings included information about the direction that the eagles were flying, and Daniel Baron mapped these flight paths as well (Figure 5). Mapping was performed using QGIS version 3.10.13 with GRASS version 7.8.4. Hydrology vector layers, as well as road characteristics vector layers, were acquired from the NC OneMap database. Google satellite raster layers were acquired from Google's Tile Maps Service (TMS) and added as a New Connection in XYZ Tiles. Eagle nest search route vector layers were projected by a handheld

GPS model: Garmin GPSMAP® 64st and were edited using feature expressions to cut out extraneous paths. Bald Eagle sightings and nest locations were loaded into QGIS as .csv files and then converted to vector shape files. These vector point locations were determined using longitude and latitude values. The CRS used for these vector layers was EPSG:4326 - WGS 84. Bald Eagle flight paths (Figure 5) were added during the final image editing in the Print Layout tool and were oriented and sized based on observer's notes.

OUTCOMES

Summary – Lake James had two known active Bald Eagle nests during the 2021 – 2022 breeding season, of which one failed (Nest #4) and the other seems to have fledged at least one young (Nest #5). These two active nests are located at opposite sides of the lake (Figure 1), and most of the lake in between these nests has not yet been systematically searched for additional nests.

Nest #3 – We observed no Bald Eagles at this nest and conclude that this nest was not being used by Bald Eagles during the 2021 – 2022 breeding season.

Nest #4 – Two adult Bald Eagles used this nest during the 2021 – 2022 breeding season but failed to fledge any young. They were first observed sitting on the nest in late November 2021, which resembled incubation behavior. During each of the December, January, and February monitoring sessions, the Bald Eagle pair was seen at the nest taking turns to sit in the nest, behaviors again consistent with incubation. The nest was usually attended by one of the Bald Eagles which only left when its partner came to take their turn. The nest was unattended for a few minutes on just a few occasions before an eagle returned to the nest.

Unfortunately, no Bald Eagles were seen at the nest during the March or April observations even though each observation session lasted for three consecutive hours. We therefore concluded that the nest had failed for unknown reasons (e.g., egg or nestling predation, inclement weather, infertility, death of the parents, abandonment by the parents, etc.). We have no evidence that the eggs had hatched because we never saw food delivery to the nest or heard nestling vocalizations, but our gap of about a month between monitoring sessions means that they could have hatched and died during that interim.

Nest #5 – Bald Eagles used this nest and likely fledged at least one young during the 2021 – 2022 breeding season. The landowner reported seeing adult Bald Eagles adding sticks to this nest on November 13, 2021 (personal communication 2022, Clifton Avery of NCWRC). Clifton Avery confirmed the presence of this nest and saw two adult Bald Eagles in courtship near the nest on January 26 (personal communication 2022, Clifton Avery of NCWRC). The landowner continued to report that the nest was active throughout the breeding season and that the Bald Eagles brought food to the nest as late as May or June (personal communication 2022, Clifton Avery of NCWRC). Clifton Avery suspects that they fledged at least one young, which is supported by a sighting of one juvenile Bald Eagle accompanied by an adult near the nest location on July 11 (personal communication 2022, Jack Raker). We conclude that this nest was active and successfully fledged at least one young, but it remains unknown precisely how many young fledged or their survival post-fledging.

Additional Nest Searching – We did not find any additional active Bald Eagle nests, but Daniel Baron found an old raptor nest of unknown age or origins (Figure 1, Table 1). Daniel Baron searched parts of the lake that seemed promising, but most of the shoreline remains to be

explored. Along the shoreline of the Lake James State Park where they searched (Figure 1), Daniel Baron observed few emergent pines suggesting that the lack of suitable nest sites may be limiting Bald Eagle nesting along that undeveloped shoreline.

Bald Eagle Sightings & Mapping – Opportunistic Bald Eagle sightings were concentrated in just three areas (Figure 1). Most Bald Eagles were seen in the north-eastern part of the lake near Nests #2 – 4 (Figure 1). There was also a concentration of sightings at the center of the lake near the Marion Country Club, and another few observations in the far western part of the lake near Nest #5 (Figure 1).

Sightings were mostly of adult Bald Eagles, but immature and juveniles were also reported (Figure 1). However, it may be difficult for the lay person to distinguish immature and juvenile Bald Eagles, so these age class designations should be interpreted with caution. Some sightings of these young Bald Eagles occurred early in the breeding season, meaning that they were fledglings from the previous breeding season (or earlier) rather than the current breeding season. The only juvenile sighting that we attribute to successful breeding from the 2021 – 2022 breeding season was one juvenile reported by Jack Raker near Nest #5.

Directional flight paths of Bald Eagles (Figure 5) reveal that Bald Eagles are indeed using parts of the shoreline where we did not search and where they are not being opportunistically sighted. Specifically, the far north-eastern part of the lake includes shoreline along the lake's western side that is overwhelmingly forested (across the lake from Nests #3 & 4), but where we did not search and where it seems possible that few people visit. However, three Bald Eagles were seen flying toward or over that shoreline (Figure 5).

Other Outcomes – After compiling information about all the known Bald Eagle nests at Lake James, we suggest that the Bald Eagle pair from Nests #1 – 4 may indeed be the same pair. Of course, banding and resighting are needed to know for certain the identity of individual birds. However, it is intriguing that Nests #1 – 4 were sequentially active with no temporal overlap (Figure 6). They are also located near each other (Figure 1) and are located sequentially with Nest #1 being the furthest south, and each subsequent nest being a short distance further north along the same shoreline. Anecdotal evidence suggests that anthropogenic disturbance may have caused this nest abandonment because increased housing development near each nest coincided with the timing that these nests were abandoned. Finally, we conclude that the breeding pair at Nest #5 is a different set of birds from those at Nest #4 because these nests were located far apart from each other, and used at the same time during the 2021 – 2022 breeding season (Figure 6).

RECOMMENDATIONS

1. Systematically monitor Nests #3, 4, & 5 during the upcoming 2022 – 2023 breeding season. Although it seems likely that the pair from Nest #3 is the same that is now nesting at nest #4 (due to their proximity and timing), it may still be worthwhile to watch Nest #3 for at least a few sessions during the upcoming breeding season to confirm whether that nest has indeed been completely abandoned.
2. Conduct outreach to the private landowners of Nests #4 & 5. These landowners should be encouraged and supported in using best practices to ensure the safety and well-being of nesting eagles during the upcoming breeding season. The abandonment of earlier nests

coincided with increased housing development near the nest sites. We do not know the precise reason for those nests being abandoned, but anthropogenic disturbance may have contributed. This possibility should serve as a cautionary tale for the two currently active nests which are both located on private property. Their landowners should be encouraged and supported to protect those nests from anthropogenic disturbances.

3. Search for additional Bald Eagle nests along the Lake James shoreline. Although we did not find any additional nests, we were not able to search the entire lake. We suggest that the rest of the shoreline should be systematically searched. If that is not possible, then targeted searches near the Marion Country Club should be conducted because that is where several adult Bald Eagle sightings were reported this year. Another area worth searching is the western shoreline in the far north-eastern part of the lake where a few Bald Eagles were seen flying toward, and over, that shoreline.
4. Given the lack of emergent pines that Daniel Baron notes along some of the shoreline, managers should consider the option of constructing nesting platforms for Bald Eagles in otherwise suitable habitat.
5. Continue to solicit Bald Eagle sightings from the local community. Although these are opportunistic and imperfect observations, they can inform us as to where we should focus our nest searching efforts. Furthermore, sightings of young birds may indicate dispersal of immature Bald Eagles to the lake or successful fledging at the lake. Such citizen science also has additional benefits, such as engaging and educating the public about wildlife conservation.

6. Survey the mitigation sites and existing platforms that were established as part of the Habitat Conservation Plan for Bald Eagles at Lake James (Mullin 1997). These locations should be checked for Bald Eagle presence and nesting activity, and the platforms should be checked and maintained in good condition. If these sites have not been used by Bald Eagles, then that suggests that these mitigation efforts were ineffective and should be done differently in the future.

Table 1. Bald Eagle nests at Lake James in North Carolina, USA.

Nests	Lat (North)	Long (West)	Nest Active Dates	Notes	Was this nest monitored during 2021-22 breeding season?	Outcome from 2021-22 Breeding Season
Bald Eagle Nest #1	35.760352	-81.83601	1999 - 2001[1,2]	Nest found in February 1999 and its outcome for that breeding season is unknown[1]. This nest was used again in December 1999 - March 2000, but it failed (likely due to cold weather)[1]. NCWRC reports this nest being active through 2001[2]. Nest was active before the area was developed with housing[1]. Nest blew out of tree in 2002[2].	No, N/A	N/A

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Nests	Lat (North)	Long (West)	Nest Active Dates	Notes	Was this nest monitored during 2021-22 breeding season?	Outcome from 2021-22 Breeding Season
Bald Eagle Nest #2	35.764897	-81.848951	2002 - 2014[3,4] or 2015[2]	Nest was used from 2002 - 2003 and again from 2005 - 2007, before being destroyed by high winds in summer 2008[4]. However, Bald Eagles built a new nest in the same tree and nested there from 2009 - 2014[4]. (For the purposes of this table, both nests are summarized as "Bald Eagle Nest #2" since they are at the same location.) Martha Whitfield reported this nest was actively being used by Bald Eagles and fledged young from at least 2006 (when she purchased a home nearby) onwards[5]. She also reported that while the immediate area around the nest is protected from development by HOA rules (presumably because it is a HCP mitigation site[4]), the broader area has been increasingly developed since 2006[5]. Nest is missing as of November 2021 at the latest[5,6]. Unclear if the Bald Eagles abandoned this nest site due to anthropogenic disturbance or natural causes.	No, N/A	N/A

(Table continued on next page)

Nests	Lat (North)	Long (West)	Nest Active Dates	Notes	Was this nest monitored during 2021-22 breeding season?	Outcome from 2021-22 Breeding Season
Bald Eagle Nest #3	35.771987	-81.846991	2015 - 2020[2,3]	Nest was actively used from 2015 onward[2,3,4]. Martha Whitfield reported often seeing Bald Eagles in this area since at least 2017, and also reported that several new homes were built near this nest site since then[5]. Monitoring during 2021 - 2022 breeding season concluded that it was no longer being used by then[7]. A home was being constructed nearby during the 2021 - 2022 breeding season[7]. Unclear if Bald Eagles abandoned this nest site due to anthropogenic disturbance or natural reasons.	Yes, Daniel Baron observed this nest once monthly for 2 - 3 hours each time in December – February.	Nest present but it was never used by Bald Eagles[7].
Bald Eagle Nest #4	35.782283	-81.856209	2021 - Present (maybe earlier)	Nest found in November 2021 on two different occasions, independently. First, by Olya Milenkaya, Martha & Chip Whitfield, and J. Lindley McKay. And also, independently, by Daniel Baron. Unclear if anyone else knew of this nest prior to 2021.	Yes, Daniel Baron observed this nest once monthly for 2 - 3 hours each time in December - April.	Nest active, incubation behaviors observed, but no chicks ever observed7. Seems to have failed during incubation stage for unknown reasons.

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Nests	Lat (North)	Long (West)	Nest Active Dates	Notes	Was this nest monitored during 2021-22 breeding season?	Outcome from 2021-22 Breeding Season
Bald Eagle Nest #5	35.710706	-81.997745	2020 - Present[2] (maybe earlier)	Nest was first reported to NCWRC by landowner in December 2020 and confirmed by NCWRC on January 26, 2022[2]. Nest is located inland, on private property[2]. Nest may have been active earlier because Jack Raker reported that he has seen Bald Eagles in this area "for several years"[8].	Not systematically monitored, but opportunistically monitored by landowner, NCWRC, and Jack Raker.	Nest active based on reporting to NCWRC by landowner who saw adult Bald Eagles adding sticks to the nest on November 13, 2021[2]. Clifton Avery confirmed the presence of this nest with two adult Bald Eagles near the nest on January 26, 2022 and interpreted them as being in courtship[2]. The landowner continued to report that the nest was active throughout the breeding season and that the Bald Eagles brought food to the nest as late as May or June[2]. Clifton Avery suspects that they fledged 1+ young[2]. Supporting that conclusion is that Jack Raker saw 1 juvenile Bald Eagle accompanied by an adult near the nest location on July 11, 2022[8]. Conclusion is that this nest was active and successfully fledged at least one young, but it remains unknown precisely how many young fledged.

(Table continued on next page)

Nests	Lat (North)	Long (West)	Nest Active Dates	Notes	Was this nest monitored during 2021-22 breeding season?	Outcome from 2021-22 Breeding Season
Old Raptor Nest	35.76406	-81.85993	Unknown	Nest found by Daniel Baron on March 5, 2022. Potentially an old Bald Eagle nest, but the nest is too degraded to know for certain. The nest tree is leaning over the lake and looks likely to fall soon. Seems too old to be active during 2021 - 2022 breeding season.	No	N/A

Table Abbreviations:
NCWRC - North Carolina Wildlife Resources Commission
USFWS - United States Fish & Wildlife Service
LJEA - Lake James Environmental Association
N/A - Not Applicable
WWC - Warren Wilson College
HCP - Habitat Conservation Plan

Affiliations of People Included in Table:
Clifton Avery - NCWRC
Bryan Tompkins - USFWS
Martha Whitfield - LJEA
Chip Whitfield - LJEA
Olya Milenkaya - WWC
Daniel Baron - WWC
Jack Raker - LJEA
James Lindley McKay - Unaffiliated

Table References:

[1] Blanc L & JH Carter. 2000. "American Bald Eagle Habitat Conservation Plan for the Lake James Project Burke and McDowell Counties, North Carolina." Dr. J.H. Carter III and Associates, Inc. Environmental Consultants.
[2] Clifton Avery (personal communication 2022)
[3] Tompkins B. 2021. “Bald Eagle: Recovering a National Symbol.” Oral presentation to the Lake James Environmental Association.
[4] Mullin W. 1997. “Lake James Bald Eagle Mitigation Program 2017 Annual Report Burke & McDowell Counties, North Carolina." Dr. J.H. Carter III and Associates, Inc. Environmental Consultants.
[5] Martha Whitfield (personal communication 2021)
[6] Martha Whitfield, Chip Whitfield and Olya Milenkaya looked for this nest but couldn't find it in November 2021
[7] Daniel Baron (personal observations)
[8] Jack Racker (personal communication 2022)

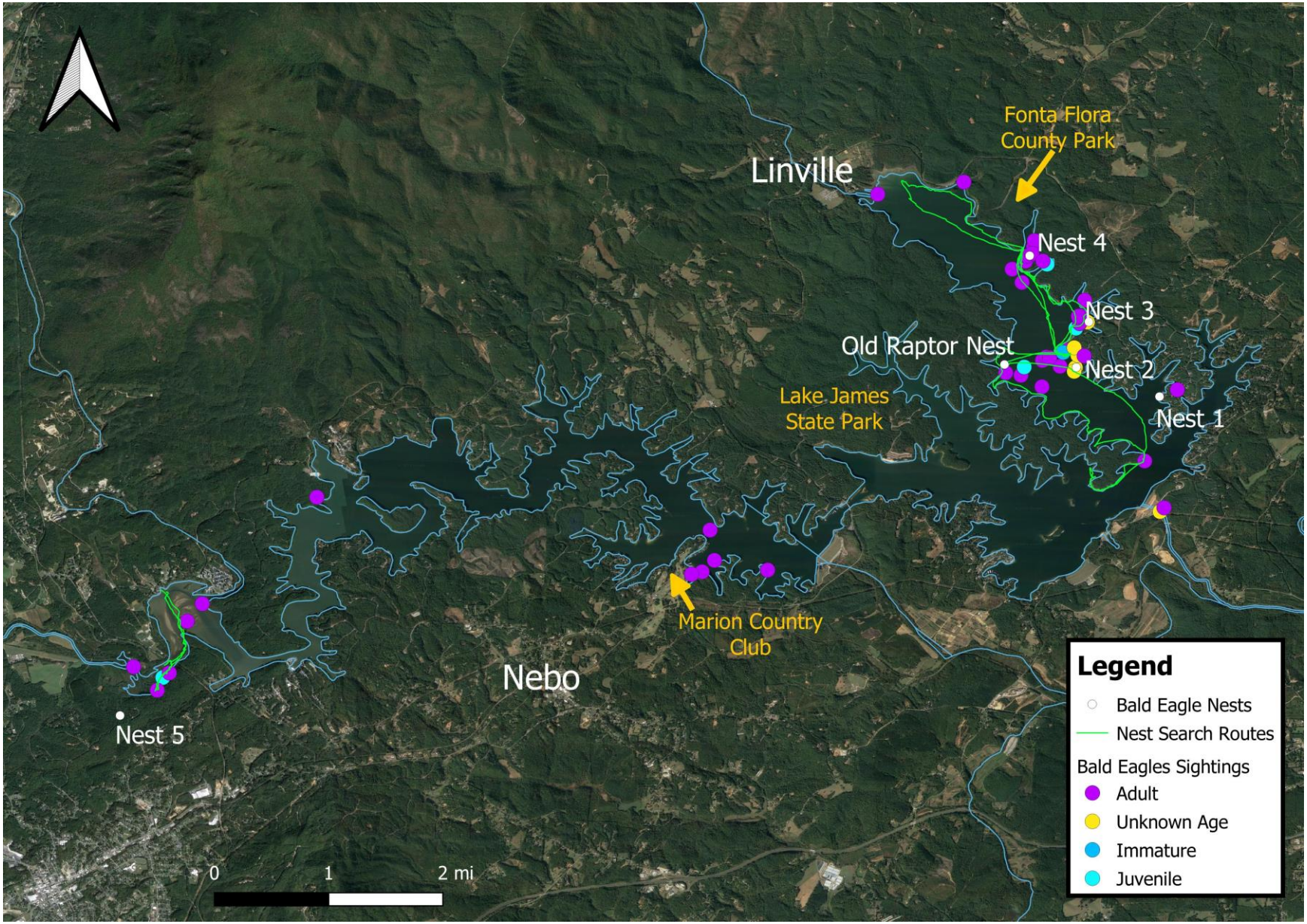

Figure 1. Lake James including the five known Bald Eagle nests, an additional old raptor nest, Daniel Baron's nest searching routes, and Bald Eagle sightings during the 2021 – 2022 breeding season. Map made by Daniel Baron, September 2022.

Figure 2. Part of Lake James showing locations of Nests #1 – 3, and an additional old raptor nest. Map made by Daniel Baron, September 2022.

Figure 3. Part of Lake James showing location of Nests #4. Map made by Daniel Baron, September 2022.

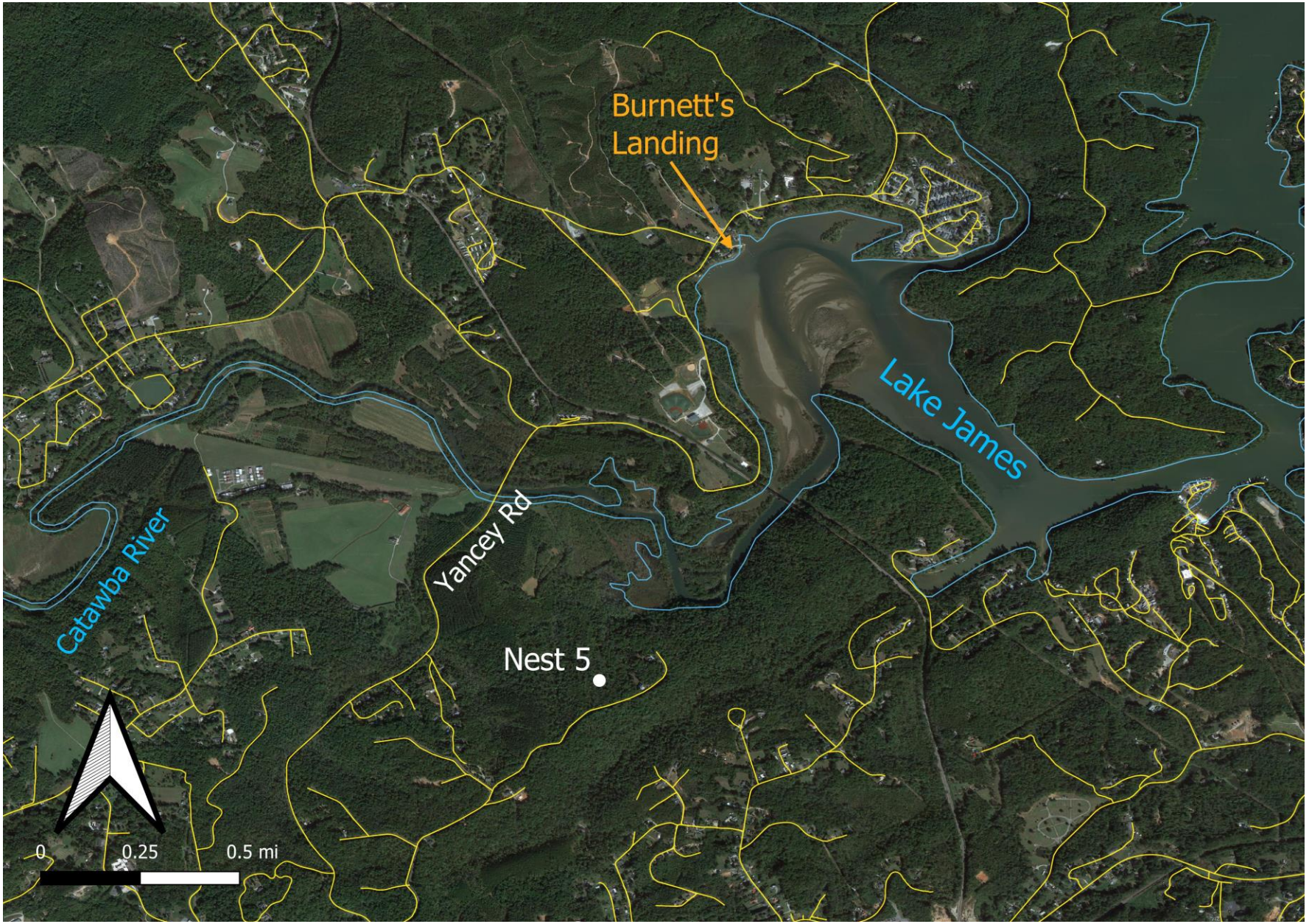

Figure 4. Part of Lake James showing location of Nests #5. Map made by Daniel Baron, September 2022.

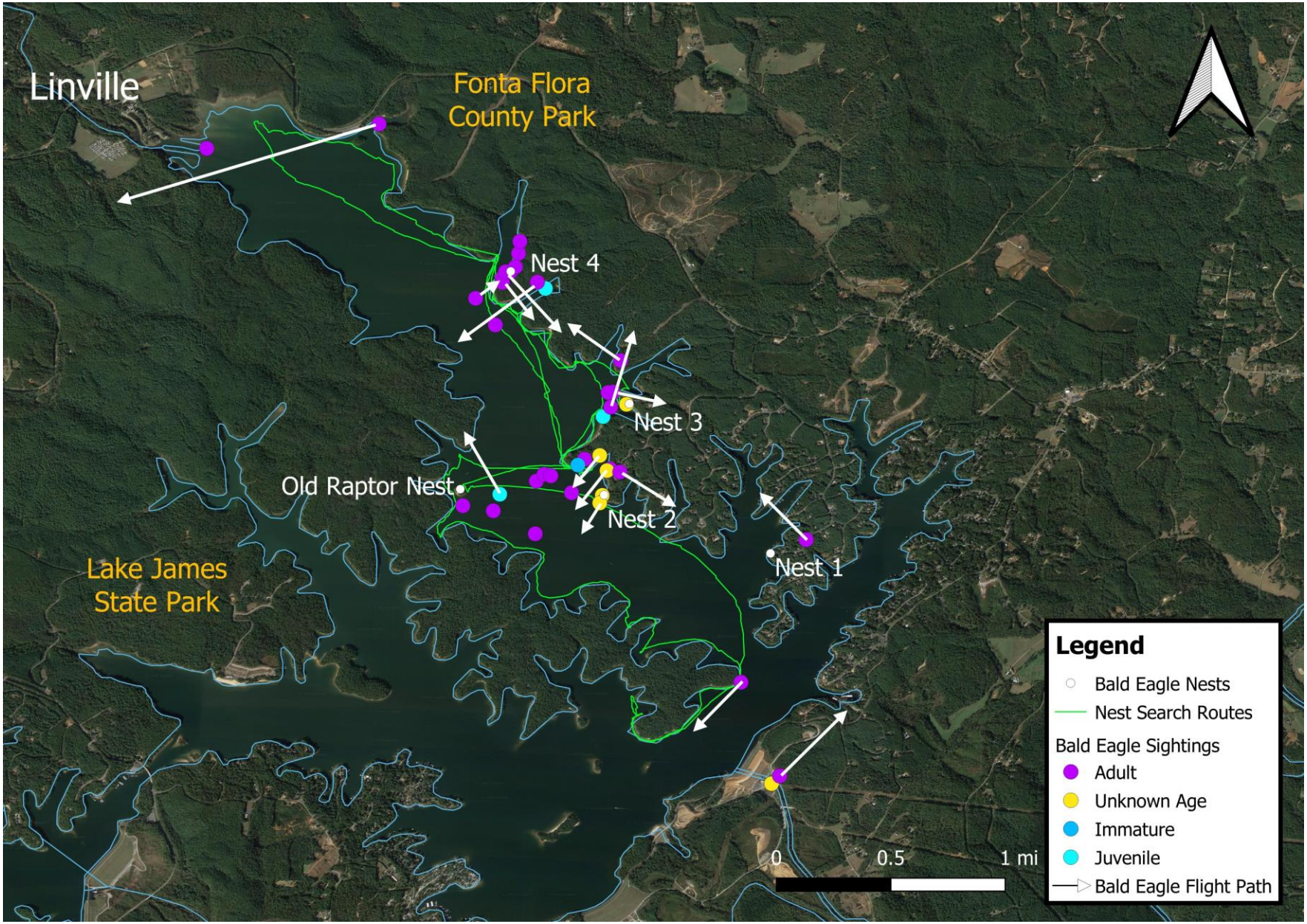

Figure 5. Part of Lake James showing locations of Nests #1 – 4, an additional old raptor nest, Daniel Baron's nest searching routes, and Bald Eagle sightings (with directional flight paths, when available) during the 2021 – 2022 breeding season. Map made by Daniel Baron, September 2022.

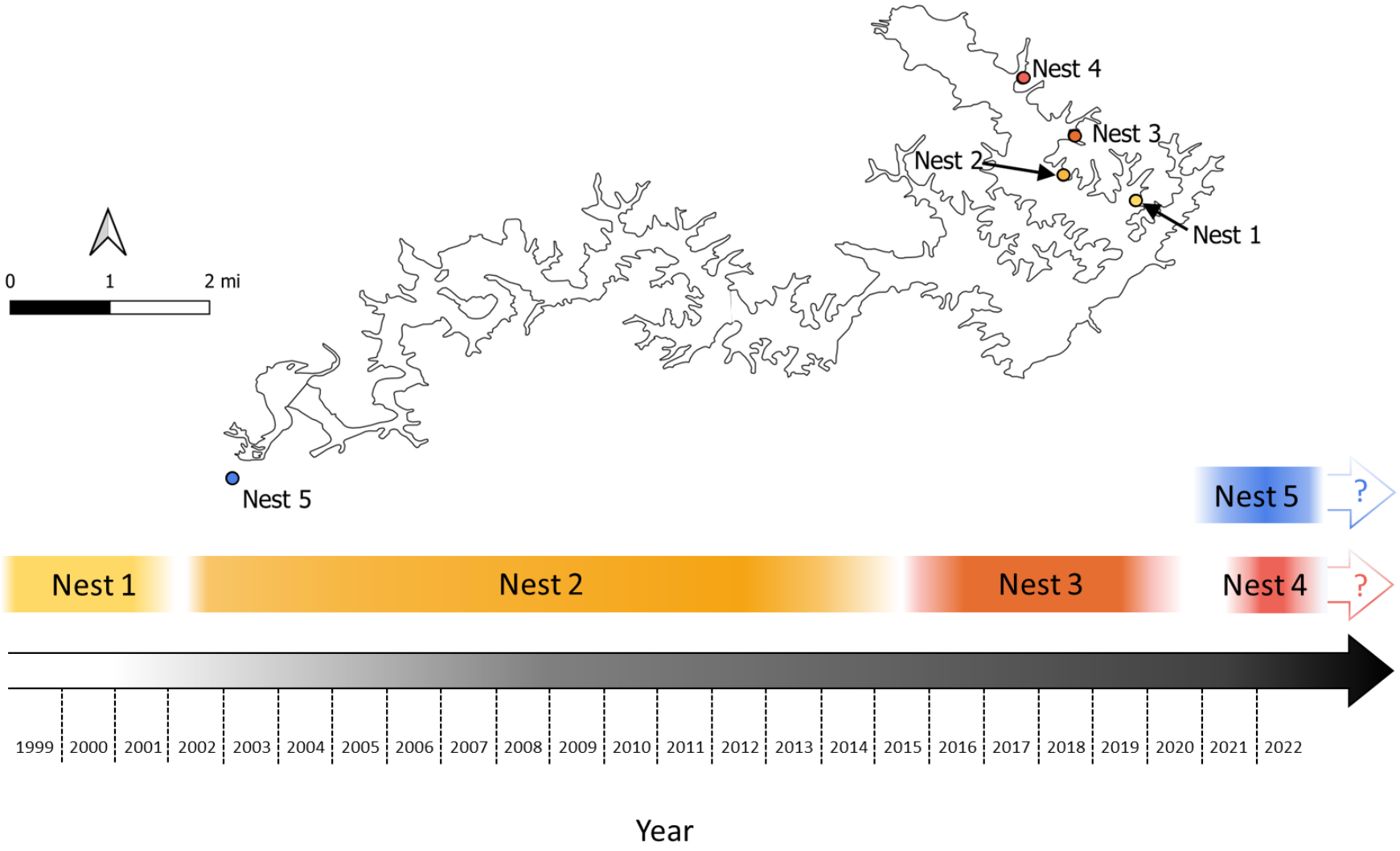

Figure 6. Bald Eagle nest activity over time at Lake James. Nests #1 – 4 are located near each other in the north-eastern part of the lake, and do not overlap temporally, suggesting that it may be the same breeding pair across all four nests. Nest #5 is located far from the other nests in the far western part of the lake. Both Nests #5 and #4 were active during the 2021 – 2022 breeding season, meaning that Lake James had at least two breeding pairs of Bald Eagles during that season, and these nests should be monitored in the upcoming 2022 – 2023 breeding season. The temporal boundaries of each nest are faded in the figure to represent that that the precise start and end dates for each nest are unknown.

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Blanc L & JH Carter. 2000. "American Bald Eagle Habitat Conservation Plan for the Lake James Project Burke and McDowell Counties, North Carolina." Dr. J.H. Carter III and Associates, Inc. Environmental Consultants.

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Mullin W. 1997. “Lake James Bald Eagle Mitigation Program 2017 Annual Report Burke & McDowell Counties, North Carolina." Dr. J.H. Carter III and Associates, Inc. Environmental Consultants.