TARGETED SPECIES SURVEYS: 2005-2008
NONGAME CONSERVATION SECTION

INTRODUCTION AND RATIONALE:

Over the four summers from 2005-2008 targeted species surveys for Swainson's Warbler (*Limnothlypis swainsonii*) and Bachman's Sparrows (*Aimophila aestivalis*) (hereafter SWWA and BACS) were conducted on state lands. These two species were selected because they rank among the highest conservation priority in the southeast based on Partners in Flight conservation scores in all physiographic regions in Georgia (Figure 1). Both are uncommon enough that they are not regularly found on Breeding Bird Survey Routes in the state, and SWWA habitat selection tends to make it even less detectible with BBS routes, as roads rarely are located in prime habitat, or only cross it perpendicularly. Trend data for SWWA in Georgia from the Breeding Bird Survey (BBS) are considered significantly deficient due to extremely low numbers. Over the course of the BBS, SWWA has only occurred on 15 routes statewide with detection at 0.05 birds per route (Sauer et al. 2008). While their numbers are higher, BACS trends are also considered deficient due to low numbers of routes and low detection (Sauer et al. 2008).

	Appalachian BCR	Piedmont BCR	Coastal Plain BCR
BACS	20	18	21
SWWA	16	18	18

Figure 1: Conservation scores by Bird Conservation Region (BCR). Determined by combining Population size, population trend, threats to breeding ground, threats to wintering ground, and breeding and wintering distributions scores. (Panjabi et al. 2005)

Swainson's Warbler background:

The SWWA has experienced significant declines and extirpation in some areas of its range including West Virginia and Missouri (Brown and Dickson 1994). Trends in Georgia are unclear, as they are not well documented by BBS. Within Georgia, SWWA use two distinct habitat types. Mountain populations use thick rhododendron (*Rhododendron major*) thickets along both streams and ridge tops (*R. minor* at Tallula Gorge State Park). Overstory varies between these two types from yellow poplar (*Liriodendron tulipifera*), black birch (*Betula lenta*), yellow birch (*Betula alleghaniensis*), and eastern hemlock (*Tsuga canadensis*) along the streams, to a pine (*Pinus sp*.) canopy on the ridges. Piedmont and Coastal Plain populations inhabit a very different habitat, favoring damp bottomland hardwoods, with dense stands of cane (*Arundinaria* spp.) or other thick understory vegetation and vines (Brown and Dickson 1994). Extensive canebrakes have largely disappeared from the landscape a change linked to the extinction of the Bachman's Warbler (*Vermivora bachmanii*) (Remsen 1986).

Several studies have attempted to quantify habitat characteristics for this species: two in Mississippi floodplain thicket in the mid-west (Eddleman et al. 1980, Thomas et al. 1996) and several in Georgia (Meanley 1966, Somershoe et al. 2003). These studies

agree that SWWA require areas of low basal area, which allows a thick mid and understory. Occupied stands in Missouri had basal areas of approximately 80 ft^2/ha (Thomas et al. 1980). Percent canopy cover consistently has been found to be approximately 80%.

Most occupied sites have sparse herbaceous cover, however Thomas et al. (1996) found variable results for herbaceous cover across years. As leaf-litter foragers, extensive herbaceous cover is detrimental to SWWA foraging. The common theme throughout these studies is a lowered basal area necessary to create very dense stands of woody cover (preferably giant cane) without lowering basal area to the point that herbaceous cover is drastically increased. Tree species composition in Georgia was composed of sugarberry (*Celtis laevigata*), American elm (*Ulmus americana*), swamp chestnut oak (*Quercus michauxii*), water oak (*Quercus nigra*) and box elder (*Acer negundo*). At Big Hammock WMA, SWWA were positively associated with higher cane stem density, higher cane stem height, higher shrub stem count, higher percent vine tangles, higher percent dead ground cover, greater leaf litter depth, more canopy gaps and had negative associations with open water, percent canopy cover, tree basal area, and max tree dbh. (Somershoe et al. 2003). The dense thickets mentioned in all studies provide nesting, foraging and song perch sites for SWWA (Eddleman et al. 1980, Thomas et al. 1996). Territory size ranges from 0.3 – 0.8 acres in the Ocmulgee and Savannah River corridors in Georgia to 5 acres in Great Dismal Swamp VA (Meanley 1969). Territories are generally larger with isolated pairs, and smaller when clusters of pairs exist in loose "colonies".

Flooding of high frequency or long duration during the nesting period reduces occupancy as it covers and washes away leaf litter where SWWA forage. Long duration flooding also kills cane. Most studies have found SWWA abandon sites when they become flooded, though there are reports of SWWA foraging in the canopy of a flooded Missouri forest. Due to flooding regimes, flood plain micro-topography is often an important determinant of suitable vegetative cover and bird presence. Occupied territories rarely were found adjacent to water, however virtually all occupied territories were within 200 m of water.

Suitable stem densities for SWWA can occur at several times during the development of a bottomland hardwood forest. Young regenerating stands between 6 and 20 years old can provide the dense vegetation required, with virtually no overstory. Conditions will gradually decline as the forest ages, canopy closes entirely, and sites with dense enough vegetation will only be left along roads, openings and river channel where lateral light allows for dense growth. At this point natural disturbance such as wind damage can open the canopy enough to generate the stem density required for SWWA. Eventually as stands age, natural tree mortality will create a mosaic of various ages, and SWWA will be able to persist through time in these tree fall gaps that create suitable habitat (Twedt and Wilson 2007).

Bachman's Sparrow Overview:

BACS was presumably an abundant species during the era of extensive fire maintained southern pine forests stretching across most of the southeastern coastal plain. With the extensive harvesting of southern pine forests, and the suppression of fire in the forests that remained, BACS numbers have declined along with a suite of species

dependant on open pine savanna. BACS are essentially a grassland species, preferring dense grasses and forbs up to about 3 feet, and little woody vegetation above that (Dunning 1993). In Georgia this requirement is met in some young regenerating pine stands, and in open pine savanna and pine flatwood habitats.

BACS nest on the ground in well-hidden nests formed within clumps of grass. They require perches to sing from, which can be lower branches of canopy pine trees, of tops of smaller bushes and regenerating pine. In Georgia BACS are found in both regenerating and mature open pine stands. Suitability of regenerating stands depends on pine tree species. In the Piedmont in loblolly pine (*Pinus taeda*) stands, BACS tend to use stands larger than 100 acres, and they only use them for 2-3 years before the canopy closes and the grasses are shaded out (Keyes unpublished). In regenerating longleaf pine (*Pinus palustris*) stands, BACS use sites as small as 18 acres and use them for up to 6 years (Keyes unpublished). The temporal and spatial window of availability is quite narrow in regenerating stands, especially in Loblolly and presumably Slash Pine (*Pinus elliottii*) stands. The unique growth form of Longleaf Pine delays canopy closure when compared to other commonly planted species. Some studies have found BACS using pine stands in mid-rotation after they are thinned, though unless the thinning is heavy and accompanied by an aggressive burn program the canopy closes quickly and suitable habitat is lost. Without fire in open pine stands, BACS habitat suitability is typically lost between 4 and 7 years. Cox (pers. comm.) has found that even if singing males are present 3-4 years post fire, they only nest within about an 18 month window following fire.

Scale and timing of burning may affect nesting BACS. Cox and Jones (2008) found no difference in BACS densities, home ranges, male site fidelity and survival between large scale (70-100ha.) and small-scale (15 ha.) burns. This study was in a landscape dominated by suitable habitat, which is not the case in most of Georgia. They did find evidence that fires after mid June where more disruptive than earlier summer fires. BACS have a long breeding season and are well adapted to traveling long distances to find patches of suitable habitat. These are likely adaptations to living in a natural system with frequent “growing season” or “lightning season” fires. In areas where there is little available habitat on the landscape, more concern may be warranted regarding large-scale fires as BACS may have trouble locating small patches of suitable habitat (Dunning et al. 1995). “Growing” or “lightning-season” fires are better able to control hard woods and promote native grasses both of which improve habitat quality for BACS.

DATA COLLECTION:

While BACS and SWWA are of high conservation concern, no systematic surveys or management efforts were in place (unlike Bald Eagle, Red-cockaded Woodpecker, Wood Stork, Swallow-tailed Kite). They also exist in significant enough numbers that management efforts at selected state lands are warranted. Management tools exist to promote these species, from thinning and burning pine stands for BACS, to canebrake restoration for SWWA. In order to most effectively employ these techniques, a good understanding of their distribution and numbers on state lands is critical.

Sites for these survey efforts were selected based on known presence from Breeding Bird Atlas data, PIF point-counts, reports to GABO, and knowledge of the presence of suitable habitat based on personal experience, land-cover maps and

discussions with area managers and regional Game Management staff. While the sites visited are not complete, I feel confident that we visited sites with the greatest likelihood of providing significant populations of these priority species. The purpose of this survey work was to locate state lands with these priority species, and determine where significant populations currently exist. Secondly, it will hopefully allow us to target important sites for management actions to help promote these species continued presence and growth on state lands.

This was a "quick and dirty" survey effort to rapidly assess presence, absence and relative abundance on state lands. Line transects were defined through suitable habitat on select state lands. As we were attempting to cover all suitable habitat on selected WMA's we didn't randomize site selection. See protocol guidelines below:

Target Bird Survey Protocol

1) Define suitable habitat for target species. Use our suggestions from land cover maps, or your own knowledge of the site.
    a. Bachmans Sparrow – Pine Savanna or recent clearcut (<= 7 years). They prefer a well-developed grass and herbaceous cover with limited shrub/hardwood midstory, though do require some perches for singing.
    b. Swainson's Warbler – Bottomland Hardwoods with cane or shrub thickets (2-5 m tall). Typically areas above the regular spring flood level, as they forage on dry ground, with significant leaf litter, but little groundcover.
2) Survey Time should start as close to sunrise as possible, and wrap up by 10:00 to 10:30 AM depending on how hot it gets and how quite the birds get.
3) Walk (if road goes through suitable habitat - drive) a transect through suitable habitat. Every 200 meters (1/4 mile if driving) stop listen for 2 minutes, and then play the song of the target species. Play the species track for 2 minutes and listen for a response for at least 2 minutes.
4) Record whether there was any response from a target species. If you are not sure of a call, please try to track it down (continue playback if necessary) to confirm species presence.
5) If you have access to a GPS unit, please take a coordinate in decimal degrees for each point on your transect. If you don't have access to a GPS try to document your transect so that someone else could find the points again, especially if you locate a target bird. Pace your transect and give a compass bearing, or mark points on an area map.
6) Keep your eyes and ears open for other priority species on your transects.
    a. Bachman Sparrow sites: Prairie Warbler, Loggerhead Shrike, American Kestrel, Field Sparrow
    b. Swainson's Warbler sites: Prothonotary Warbler, Louisiana Waterthrush

Most of the survey effort was conducted by Tim Keyes and Bill Blackburn, though we received significant help from Linda Guy, Alan Isler, Walter Lane, Chris Bauman, Brandon Anderson, Allison Reid, Brady Matteson, Nico Dauphiné and Georgann Schmalz.

RESULTS: *Also see Excel Spreadsheet Summary and maps.*

During direct surveys for SWWA, 691 points were visited over the survey period, and 150 Swainson's Warblers were detected. During surveys for BACS, 260 points were surveyed and 128 birds were located.

BACS –

Region 2

- Dawson Forest – confirmed presence 2006 & 2008
    - Trying to move forward with a timber thinning to create habitat

Region 3

- Yuchi WMA (several BACS)
- Di-Lane WMA (many BACS)
- Clarks Hill (Many BACS located)
    - 1,200 acres of recent thinning – excellent for BACS
- Tuckahoe WMA (No BACS located)

Region 4

- West Point WMA (none located)
    - Minimal habitat – pursuing the Corps for more thinning
- Ocmulgee WMA (one located)
    - Minimal habitat – not sure worth pursuing
- Fall Line Sand Hill NA (BACS located)
    - Jim Cox banded several to monitor response to land management
- Black Creek NA (one BACS)
- Rum Creek WMA (BACS located)

Region 5

- Chickasawatchee WMA (Several BACS)
    - Habitat suitability has declined since survey
- Mayhaw WMA (several BACS)
- Doerun NA (Several BACS)
- River Creek WMA (BACS located)
- Silver Lake WMA (BACS located)

Region 6

- Moody Forest NA – limited survey (BACS located)

SWWA –

Region 2

- Tallulah Gorge State Park (several SWWA located)
    - Are we burning up SWWA habitat for Table Mt Pine management?
- Coopers Creek WMA (1 SWWA located)

Region 3

- Redlands WMA (high numbers)
    - Primarily using privet stands

- Tuckahoe WMA (numerous SWWA)

Region 4

- Big Lazer WMA (none located)
- Joe Kurz WMA (SWWA located)
- Ocmulgee WMA (many SWWA located)
    - Potential for management
- Oakey Woods WMA (many SWWA located)
    - Potential for management
- Standing Boy WMA (several SWWA)
- Cedar Creek WMA (Several SWWA – declining from 10 yrs ago)
    - Talking with FS about cane restoration work
    - Proposal already been written
- Panola MT SP (none located)
    - GOS grant cane restoration project

Region 6

- Beaverdam WMA (Several located – most habitat declining)
    - Chance to do cane restoration on tornado damage sites
    - Even without cane work, hardwood regeneration should provide good habitat within a few years
- Horse Creek WMA (None located)
    - Very little suitable habitat
- Flat Tub WMA (none located – limited survey)
- Bullard Creek WMA (Some SWWA)
    - North track – very nice habitat
- Big Hammock WMA (Many SWWA)
    - Cane work in Pine clearcut
    - Tons of other potential
- Riverbend WMA South (Highest numbers – poss exception of Big Hammock)
    - GOS grant cane restoration project
    - Banded 32 male SWWA in 2009
- Riverbend WMA – North (decent numbers)
    - Less cane potential

Region 7

- Penholloway Swamp WMA (none located – good looking habitat)
- Sansavilla WMA (none located)
- Clayhole Swamp WMA (SWWA located)
- Paulk's Pasture (no systematic survey – but records of breeding SWWA)

MANAGEMENT EFFORTS INITIATED:

Canebrake restoration efforts are beginning at Panola Mt State Park, River Bend WMA (South Tract), and discussion of management at Beaver Dam WMA and Big Hammock has started. We are assisting with management at Clark's Hill WMA for BACS by providing herbicide for hardwood control in recently thinned pine stands. We

are also working with GFC on thinning, burning and potentially conducting hardwood control at Dawson Forest (City of Atlanta Tract) to hopefully hold onto a small BACS population.

Current Research: 32 SWWA were banded on Riverbend South Tract during the summer of 2009. Follow up efforts may include color banding these birds and conducting a mark recapture study to determine number of birds using the site as well as survival/returns.

FUTURE EFFORTS:

Hopefully the results of this survey help promote future management for these priority species. This work can be funded through GOS annual grants, SWG bird grant, and SWG LL Pine grant (for BACS). There is likely significant potential on several WMA's along the Savannah River, like Tuckahoe WMA. There is also potential to combine management projects taking into consideration American Woodcock and Bobwhite Quail for SWWA and BACS respectively. Focus on sites with significant populations and either extensive bottomland forest for SWWA or extensive uplands that can be maintained with regular fire for BACS.

Swainson's Warbler Considerations:

Only one study concludes with management recommendations for SWWA. Eddleman (1980) found that sites occupied by SWWA during his study historically had been field edges or other openings 30 years earlier. He suggests that low intensity timber harvests may suffice to open the canopy sufficiently to allow cane regeneration. Cane reproduces largely by vegetative means, so this practice will be most effective in sites with pre-existing decadent cane stands (Hughes 1951). Selective cutting in patch sizes of approximately 4 ha or more that maintain canopy cover at or above 70 percent may suffice to improve Swainson's warbler habitat. Since cowbirds have been shown to parasitize SWWA (Meanley 1966), care should be taken to avoid exacerbating cowbird problems in any management scheme. Klaus (unpublished) has also experimented with cane restoration by creating light gaps in the canopy.

Most of the SWWA on state lands are using relatively young hardwood forest stands where dense stems of cane, hardwoods and vines provide the impenetrable habitat they prefer (Riverbend WMA South). Regenerating hardwood stands tend to peak in stem density at about 20 years. Beyond that, stem density begins to decline as canopy heightens and closes. As this occurs, SWWA becomes confined to areas along river channels and roads where lateral light provides dense growth they require. Over all area suitability declines significantly despite the fact that birds may still be commonly found singing along roads, giving a false sense of large population. In these areas, extensive but sparse cane can often be found in the understory, awaiting a forest disturbance such as a windstorm to increase the light reaching the forest floor and allowing for rapid growth. (Gagnon et al. 2007).

Parts of Oakey Woods WMA, particularly along lower stretches of Big Grocery Creek, has older forest stands that seem to be desired future conditions, where natural tree fall gaps in an older forest provide suitable understory growth for SWWA.

Big Hammock has a large population of Swainson's Warbler. As the forest matures, populations will be squeezed into areas along roads and the river where lateral light supports the dense stands of cane they use. There is also potential to manage areas of regenerating clearcuts where can is prevalent by using herbicide to reduce hardwood competition. If herbicide movement issues can be suitably addressed, Velpar L applied on a grid is the best way to go, as the cane will be unaffected, while the hardwood competition should be significantly reduced. Further possibilities include selective HW removal or girdling in areas where dense cane is becoming light suppressed. A potential for this management exists along the Pine Loop road in the western portion of the WMA.

Rivebend South track has high numbers of SWWA, and we have experimented with several techniques to promote cane growth as the canopy matures. We have mulched the overstory, used Velpar L on a grid, and used "hack-and-squirt" with Glyphosate. Work there is ongoing, but mulched site has come back strongly with cane, though there are several sites where Chinaberry is also coming in and should be treated.

Site selection for management:

- Best done in areas adjacent to or near (within 1mile) occupied sites
- Preference for wide bottomlands (> 50 meters to a side)
- Preference for extensive bottomlands (1000 acres or more)
- Preference for sites with pre-existing cane stands
- Preferable sites would also have buffers of forest (any type) that is sapling or older so that the total forested distance from water to forest edge is 200 m or more.
- Prefer sites without invasive that will benefit from management (privet, chinaberry, Japanese climbing fern, microstegium) though in some cases if cane is present it should out-compete these.

Objective:

- Promote patches of dense native understory vegetation with preference for cane, palmetto (*Sabal minor*) and greenbriar (*Smilax spp.)*
- Plan a patchwork such that there are always multiple sites in suitable stages of growth as these gaps will be only be suitable until stem densities begin to drop off. Could target 10% of bottomland to be in suitable habitat for example.

Techniques

- 1/4-1 acre group selection cuts
- Selectively cutting patches about 4 ha or more while maintaining canopy cover at or above 70% - this sort of work could dovetail with efforts mentioned in the plan to reduce amount of light seeded tree species in favor of mast producing oaks.
- Herbicide or mulch gaps in the canopy
    - Hexazinone has least damaging affect on cane, second best is Garlon (Klaus in press)
- Help promote canebrake growth in areas recently clearcut either with chemical or mechanical (rollerchopping) competition control. (sites at Big Hammock WMA)

- Help promote cane in areas damaged by wind storms (Beaverdam WMA)
- Consider widening roads by thinning or herbiciding small undesired hard-wood where dense cane is growing along roadsides
- Transplanting cane is very energy intensive work and only feasible in places with significant volunteer labor.
- Potential for containerized cane plugs becoming available within the next year for planting.

Possible benefits to other species:
- Bird species associated with understory shrub cover will benefit from this management scheme including Kentucky warbler (*Oporornis formosus*), hooded warbler (*Wilsonia citrina*), and Carolina wren (*Thryothorus ludovicianus*).
- Species found in canebrakes including insects and small mammals would benefit from this management. Canebrakes were once considerably more extensive and may have benefited an entire community of animals now either extinct or declining (Hughes 1951, Meanley 1971, Remsen 1986)
- Retaining extensive riparian areas may serve as refuges for a wide variety of species with poor dispersal (including some reptiles and amphibians, small mammals, and bird species) during nearby harvests. Later stages of pine plantations may be re-colonized from these source populations.
- American Woodcock (*Scolopax minor*) also use cane thickets, especially if there are some wildlife openings in the area as well.

Bachman's Sparrow Considerations:

The best sites for BACS surveyed were Clark's Hill WMA and the newly acquired Silver Lake Tract. Both sites would be excellent candidates for follow up with banding to monitor populations and productivity. BACS are often present and singing in areas they are not actually nesting in. This means that simply documenting presence is not sufficient to determine habitat suitability.

At Clarks Hill 2,000 acres of pine has been heavily thinned. This site, as long as regular fire regime, and possible hardwood control is continued, should provide a significant population of BACS into the future. We are providing some help for herbicide for hardwood control through a grant from the Georgia Ornithological Society in 2009.

Sites where LL pine is being restored through LL SWG grants should have ongoing monitoring to determine success.

An excellent opportunity to address the overlap of Bobwhite Quail and BACS management exists at Piedmont National Wildlife Refuge, where approximately 2,000 acres is being managed for Quail, by using smaller burn units. It would be interesting to compare BACS response to this management in comparison to the traditional RCW management carried out at Piedmont with much larger burn units. These questions are especially important as efforts to merge conservation efforts between SEPIF and NBCI move forward.

Regenerating Pine Stands: Research carried out on Plum Creek Timber sites showed that in the Georgia Piedmont, BACSs only use large and very young clearcuts.

The implication for this on state lands should be to maintain a diversity of sized clearcuts on the landscape. The general trend has been towards smaller and smaller cuts. We found BACS very rarely used regenerating stands less than 90 acres in size and older than 3 years. Where Longleaf Pine is planted this area sensitivity doesn't exist, as we found BACS in stands as small as 18 acres. LL Pine stands also don't show the time sensitivity that Loblolly stands do, and we routinely found BACS in stands up to 6 years old. Where soils are suitable, we encourage the growth of LL pine not just for BACS but also for a whole suite of grassland and shrub scrub species of high conservation priority including Prairie Warbler (*Dendroica discolor*), Field Sparrow (*Spizella pusilla*), Yellow-breasted Chat (*Icteria virens*).

Site selection for management:

- Preference for sites that can be maintained with fire every 2-3 years, preferably including growing season burns
- Preference for sites where 500 acres or more can be kept in suitable habitat
- Preference for sites with a strong native grass component, either wiregrass in the Coastal Plain or Bluestems and others in the Piedmont
- Preference for Longleaf Pine stands

Objectives:

- Pine stands
  - Maintain open grassy pine savanna or pine flatwood habitat
- Regenerating stands
  - Larger stands are more likely to attract birds, especially if there is a significant grass component
  - Longleaf regenerating stands provide habitat for BACS across a larger size and time scale than Loblolly and Slash (presumably).

Techniques:

- Thinning existing pine stands to a maximum of 70 ba, preferably lower
- Burn to control hardwoods and encourage native grasses
- Spot treat hardwoods that aren't controlled by fire
- Plant longleaf pine

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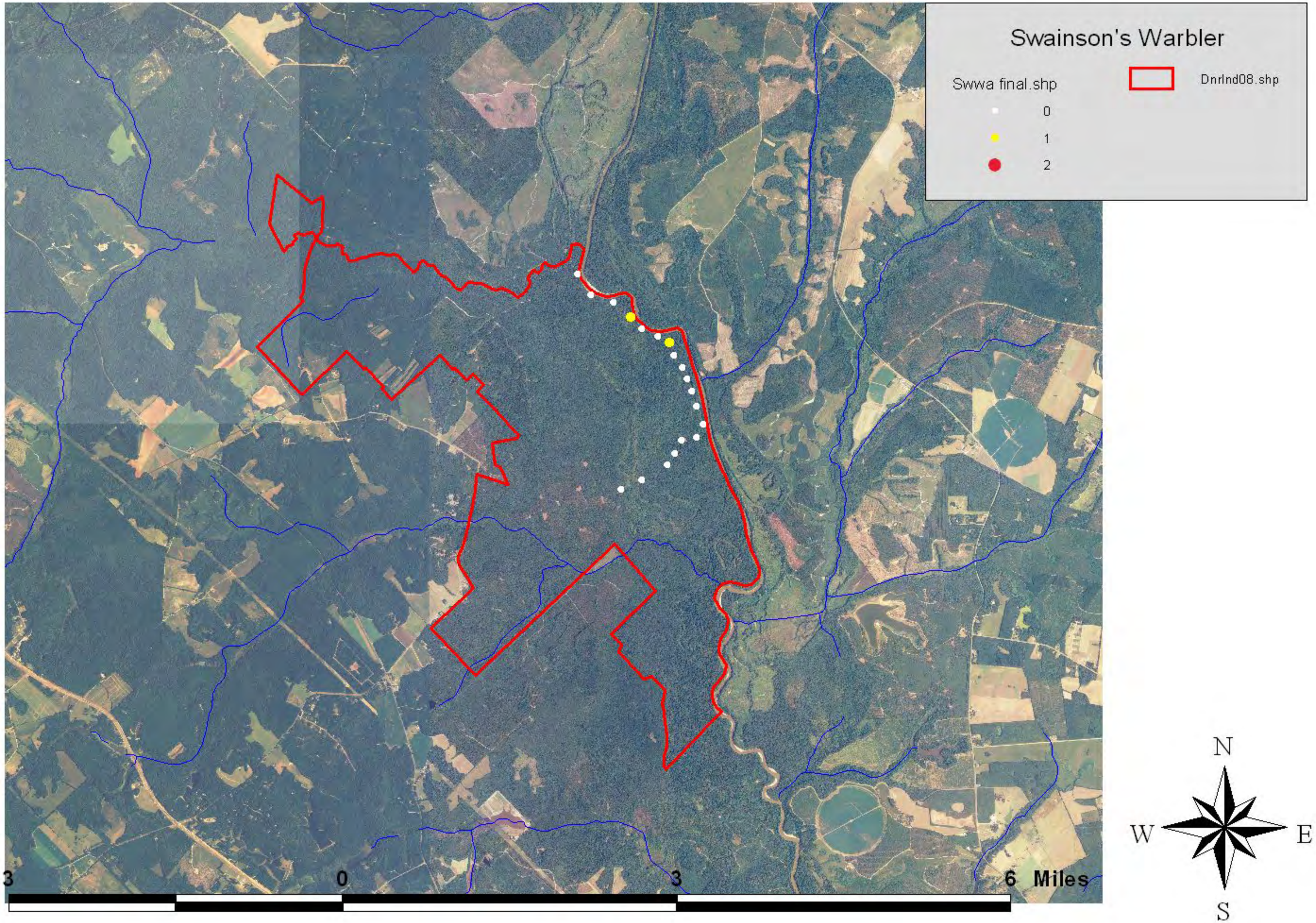
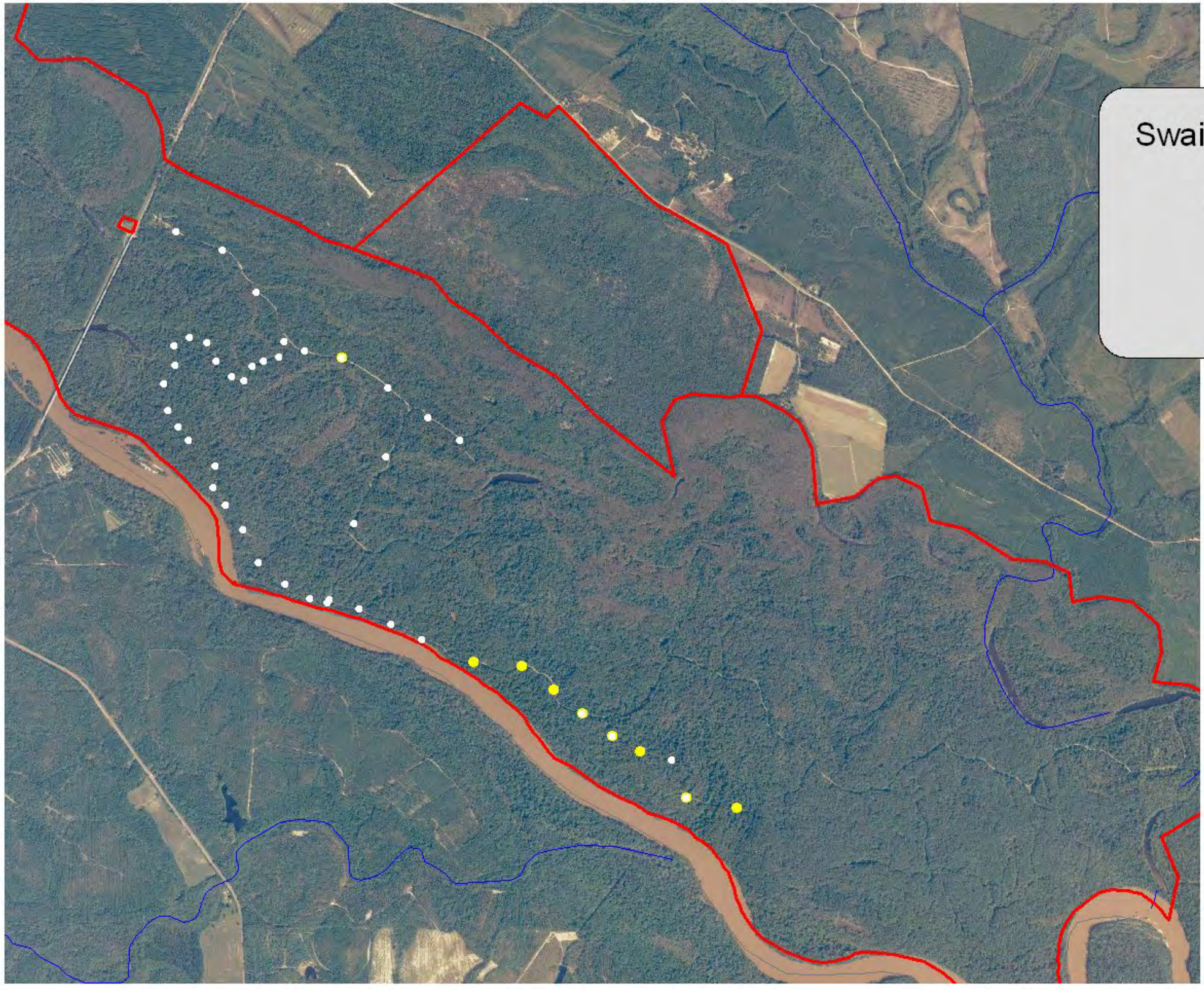
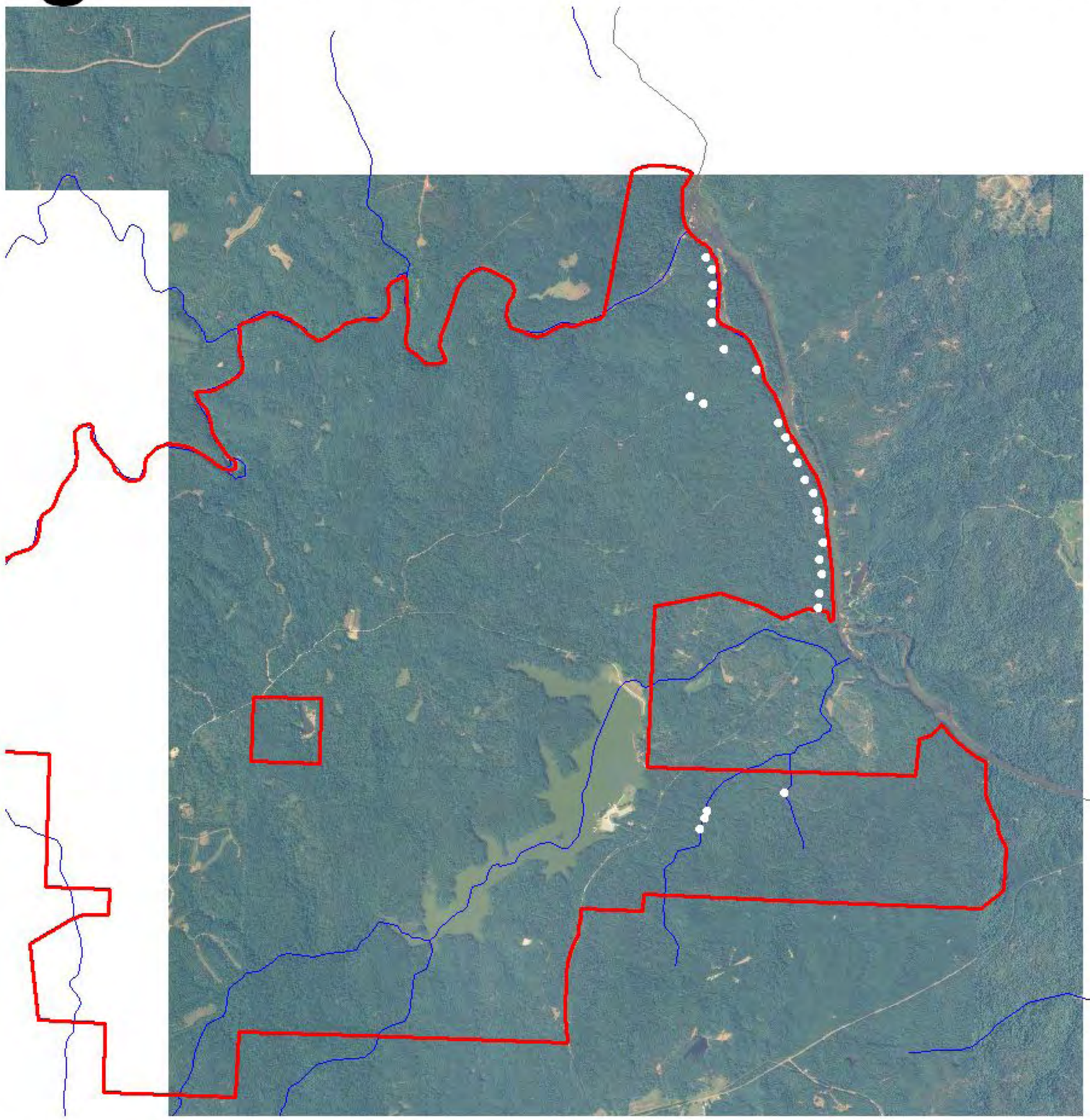
Beaverdam WMA Swainson's Warbler Survey



Big Hammock WMA Swainson's Warbler Survey



Big Lazer Swainson's Warbler Survey



Swainson's Warbler

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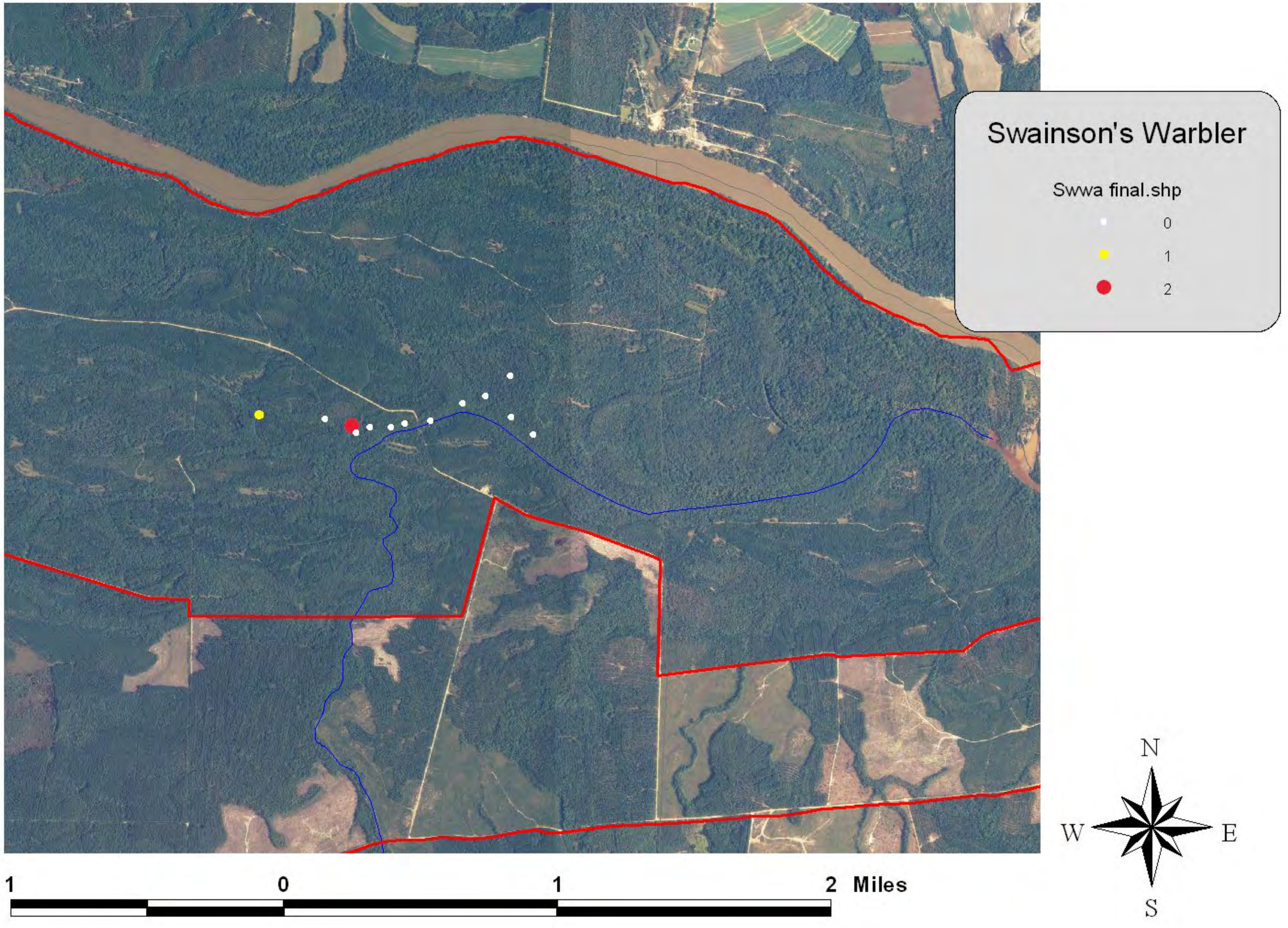
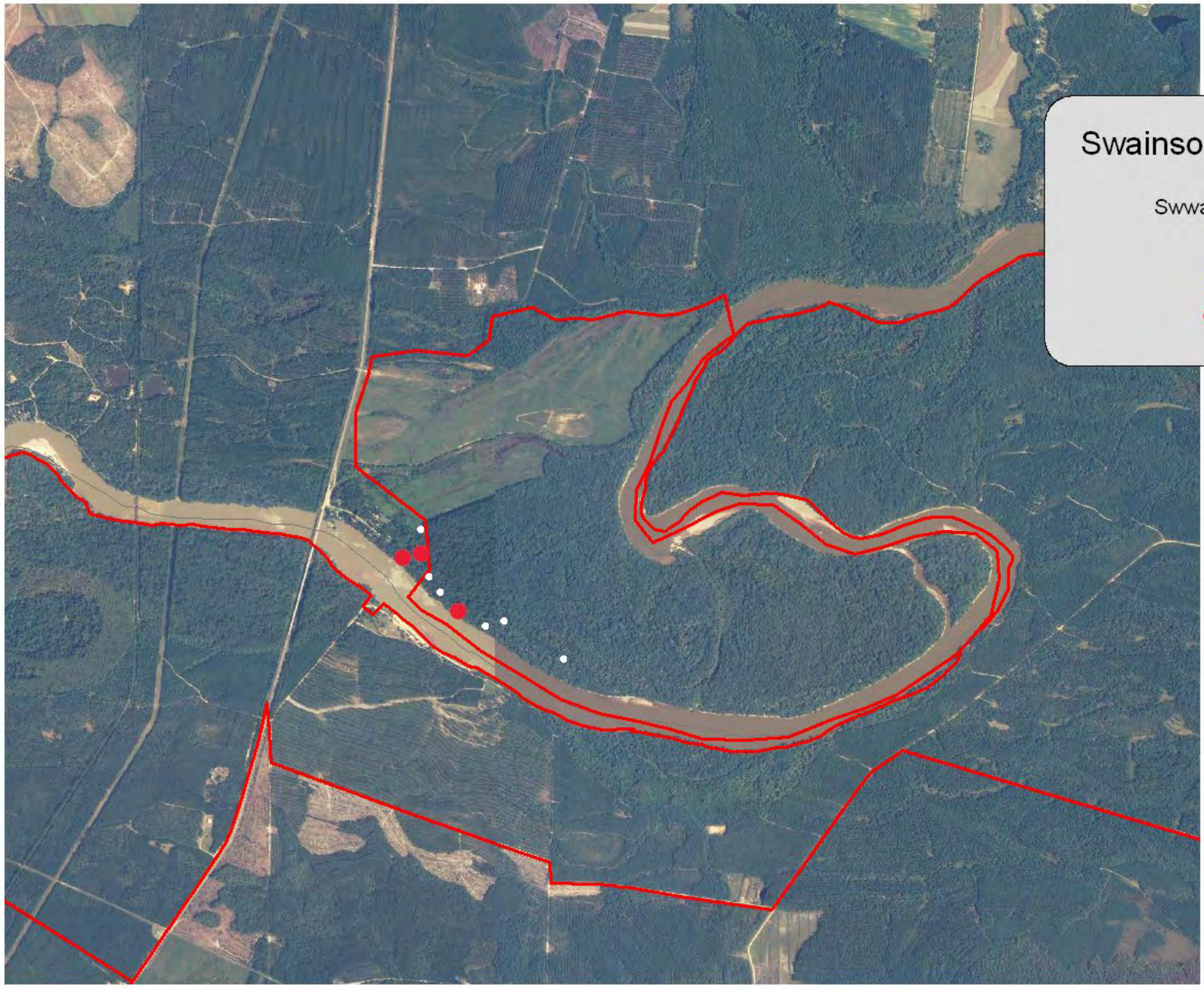
Bullard Creek - East - Swainson's Warbler



Bullard Creek West Swainson's Warbler Survey



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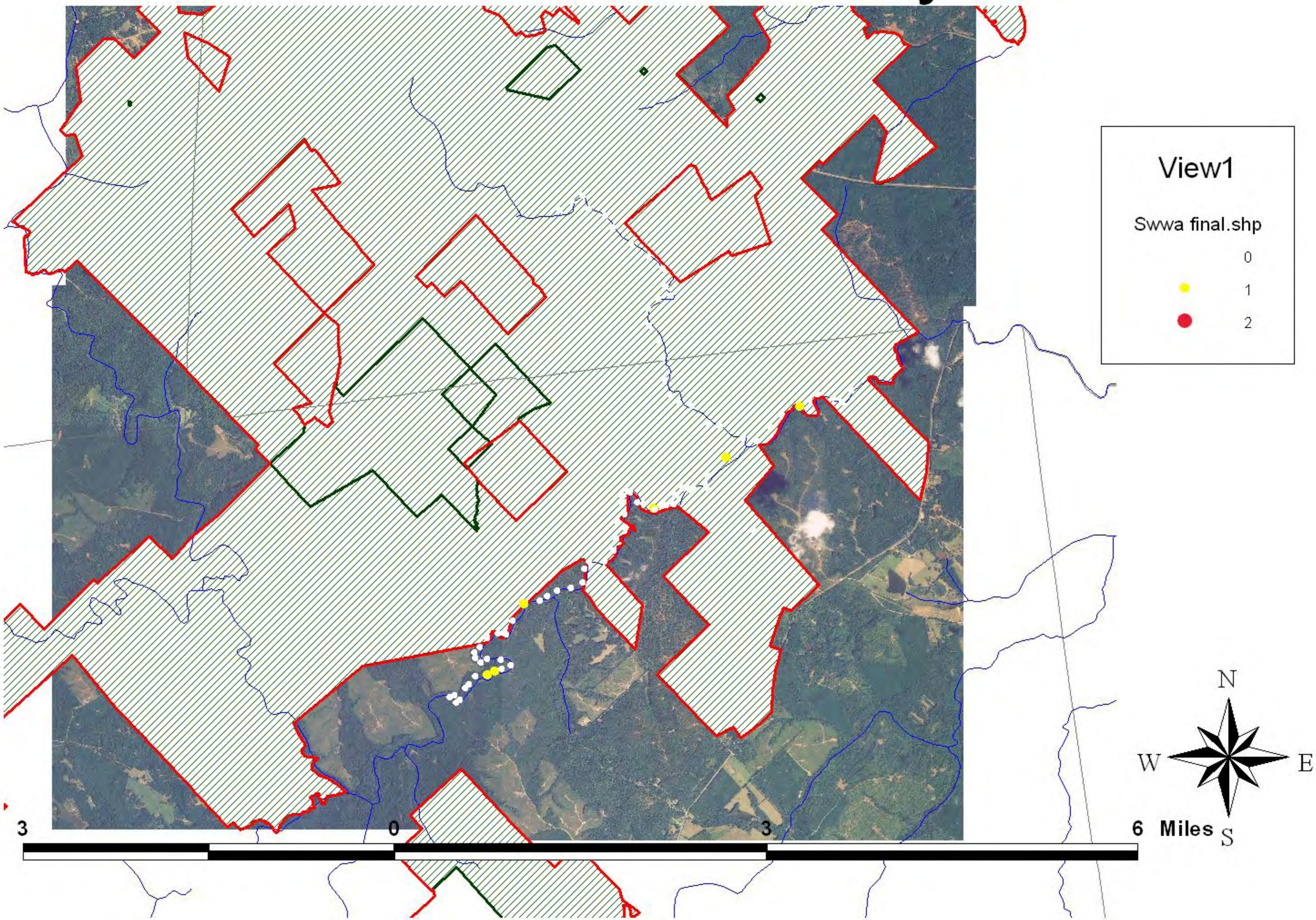
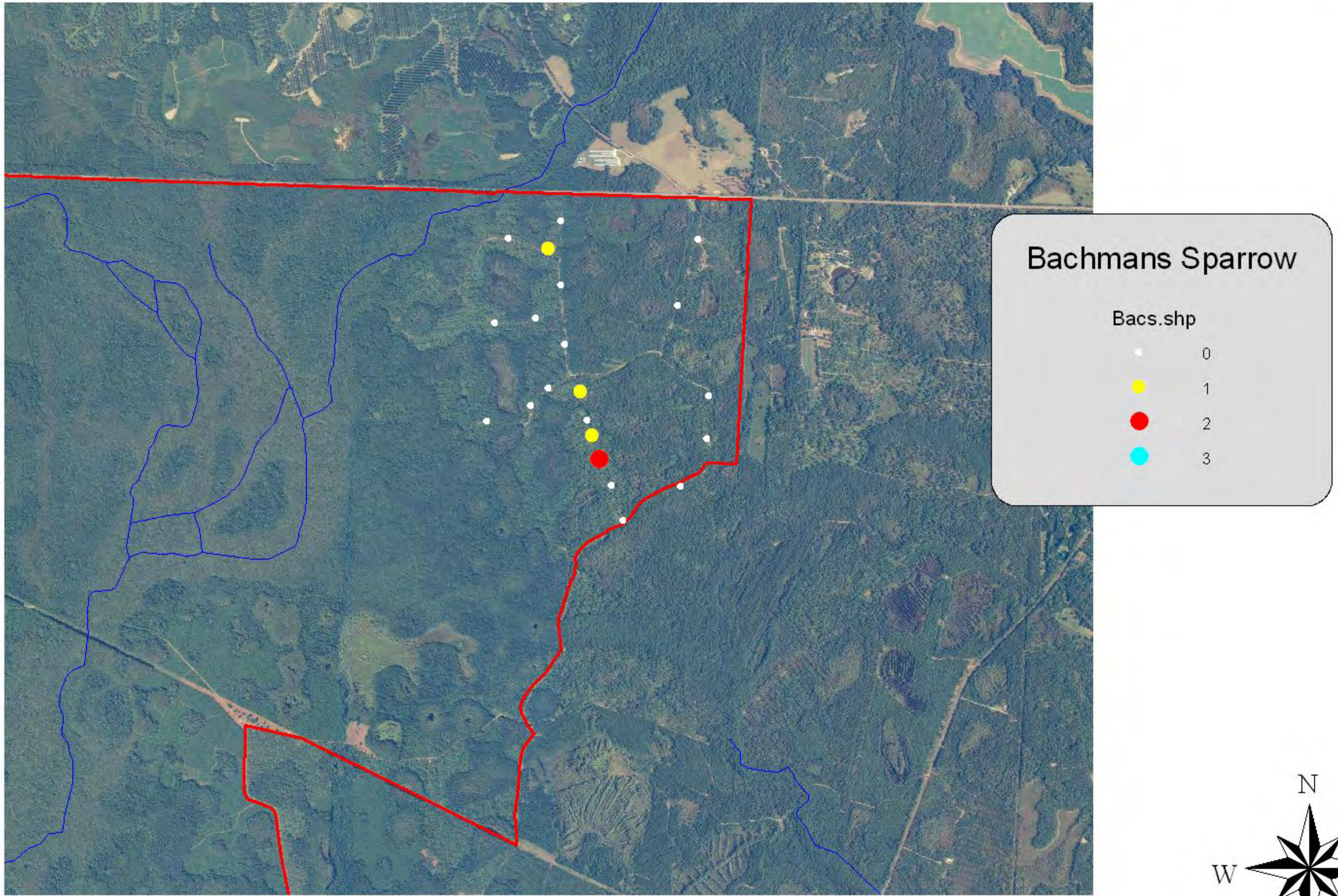
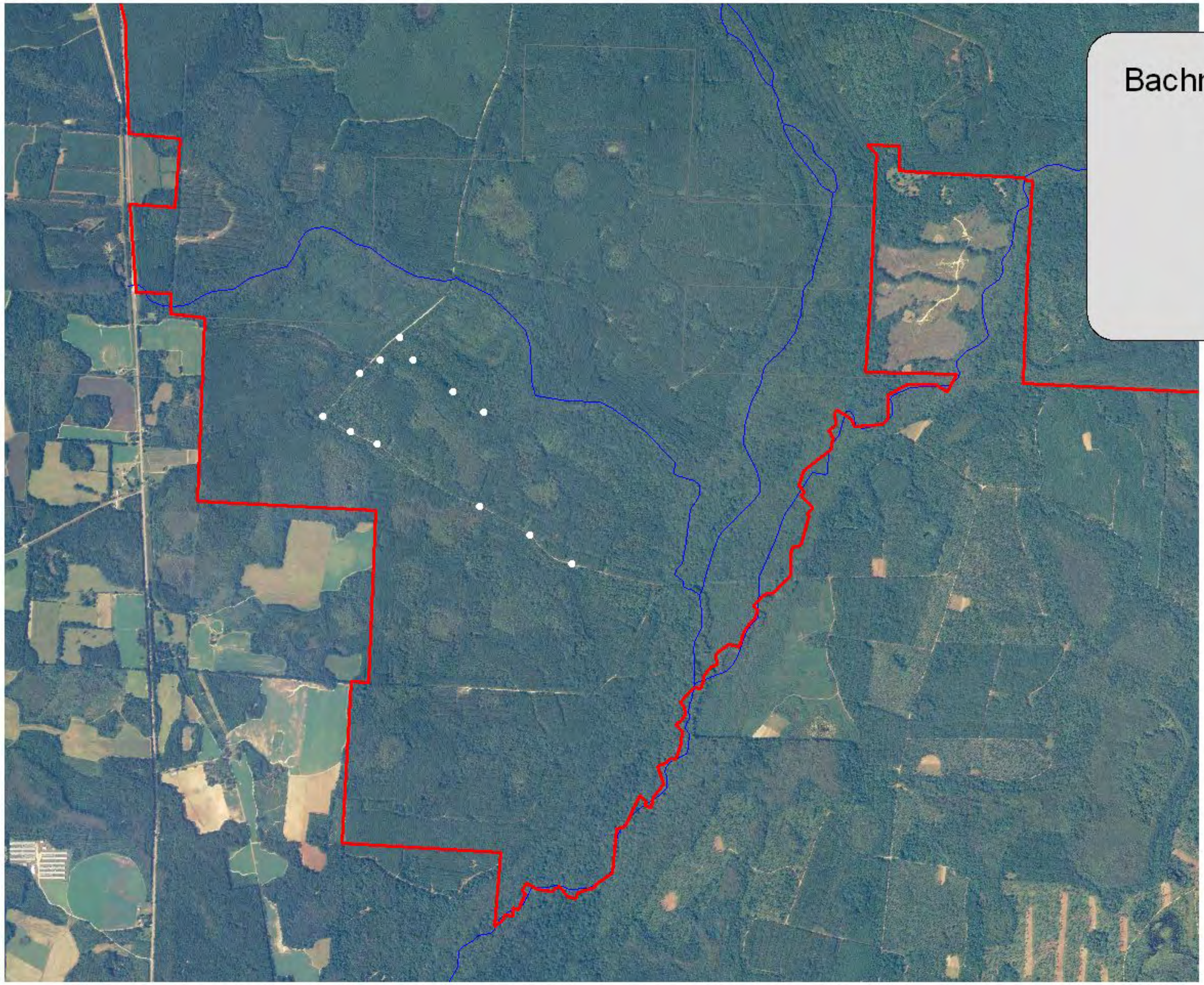
Cedar Creek WMA
Swainson's Warbler Survey



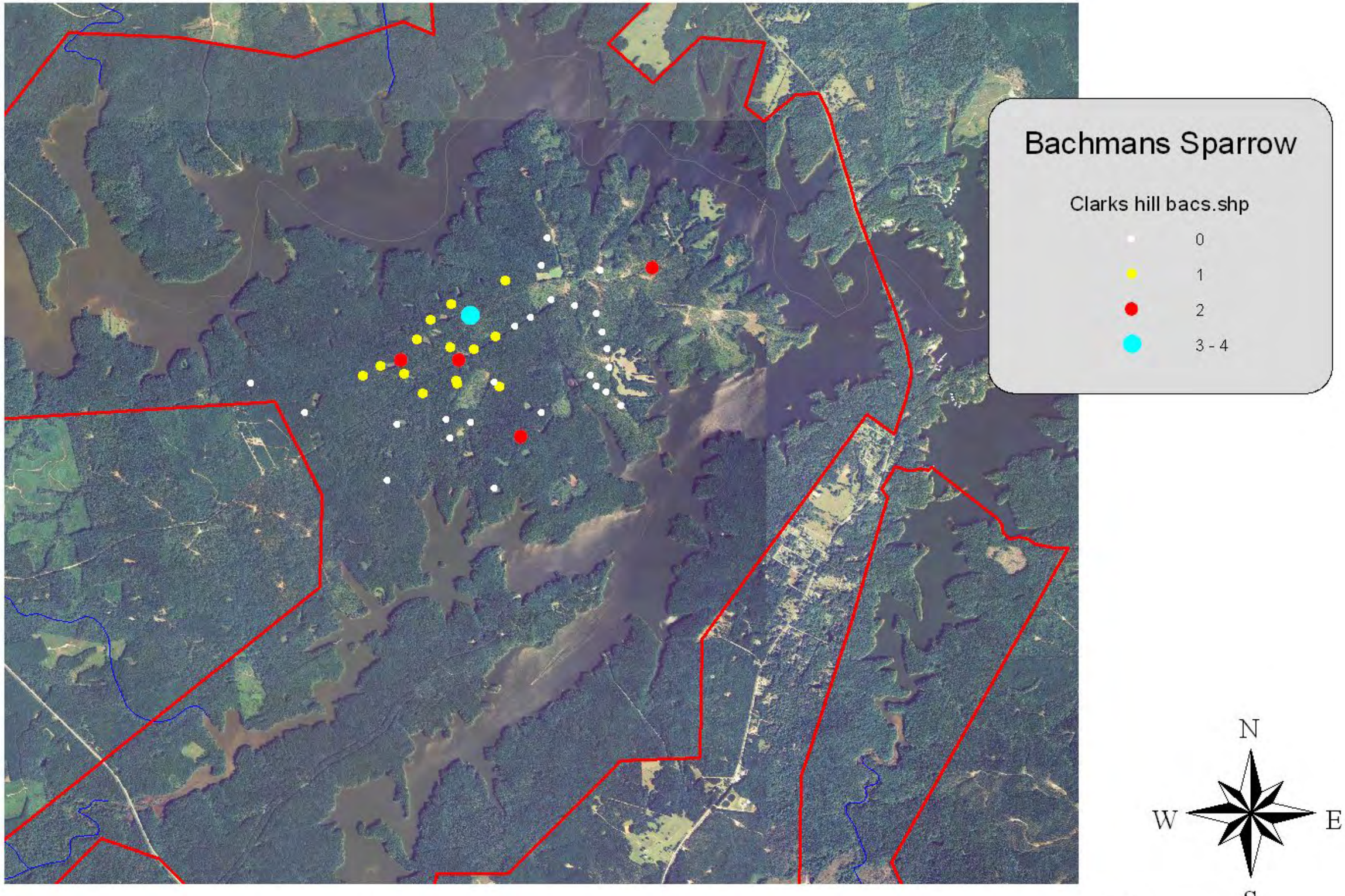
Chickasawatchee WMA East Bachmans Sparrow



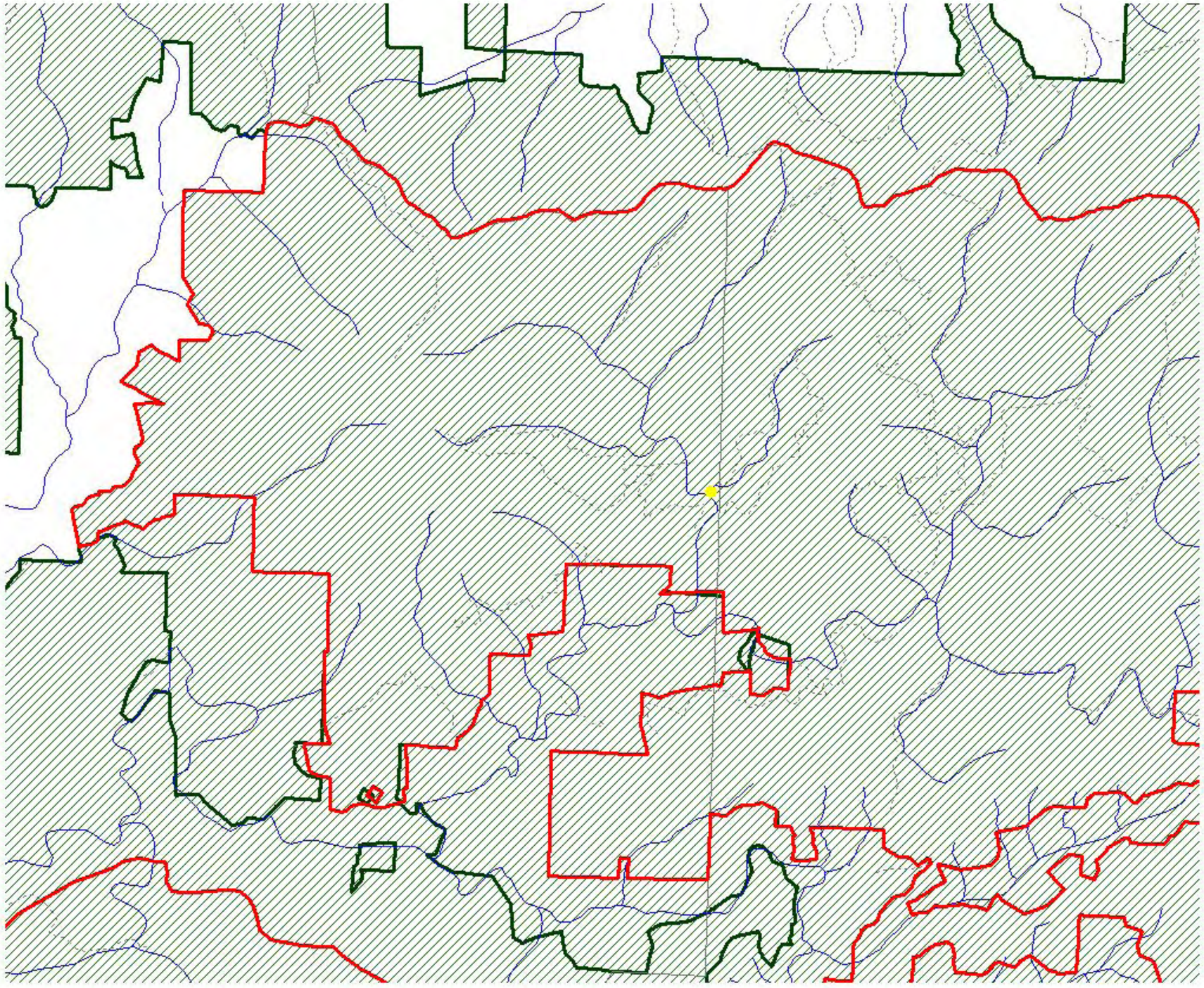
Chickasawatchee WMA West Bachmans Sparrow



Clark Hill WMA Bachmans Sparrow



Coopers Creek Swainsons Warbler

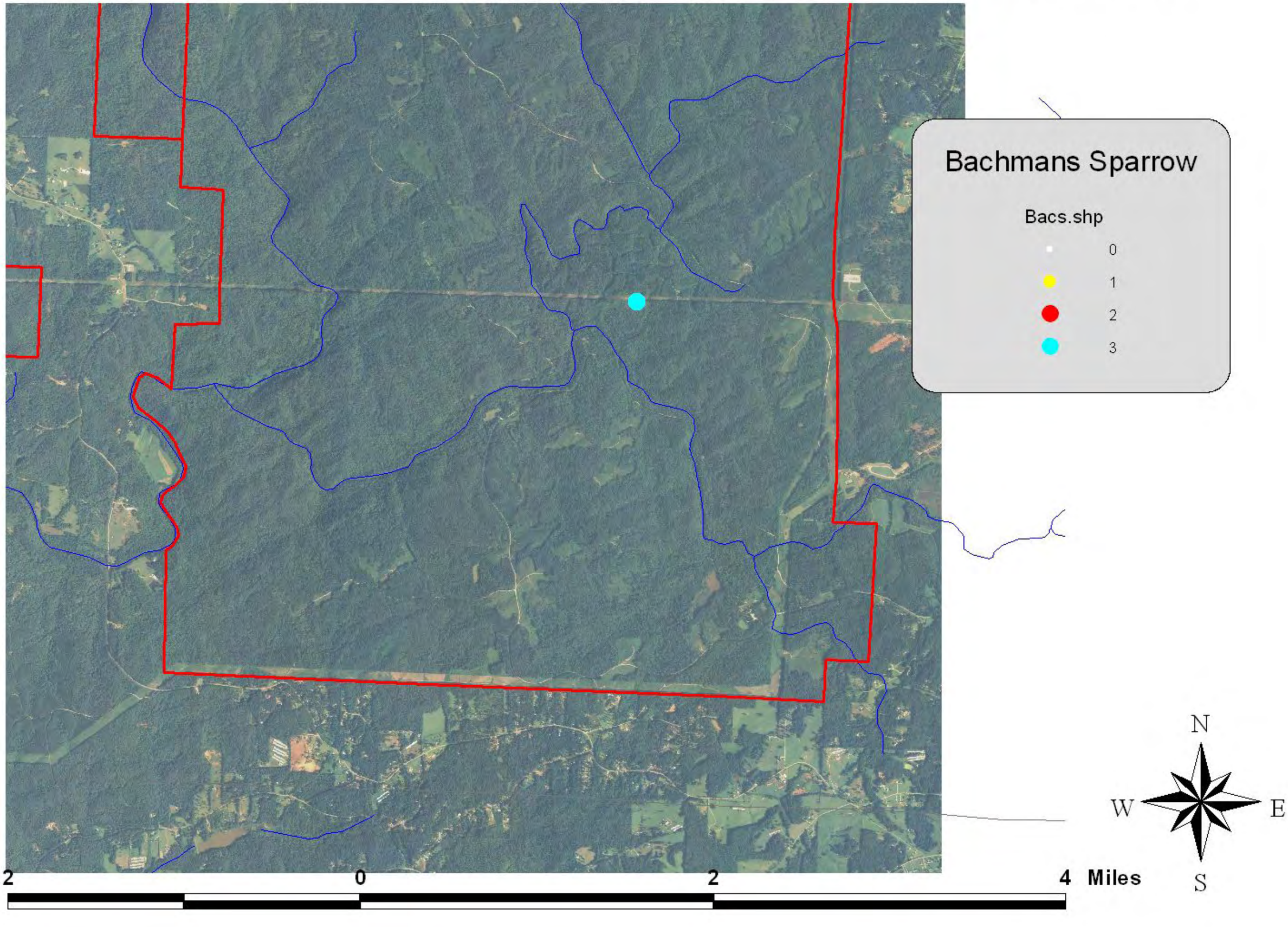


Rds5.shp
Swwa final.shp
0
1
2
Dnrlnd08.shp
Garivers.shp
Cnty100.shp
Usfws03.shp
Usfs03.shp
Nps03.shp

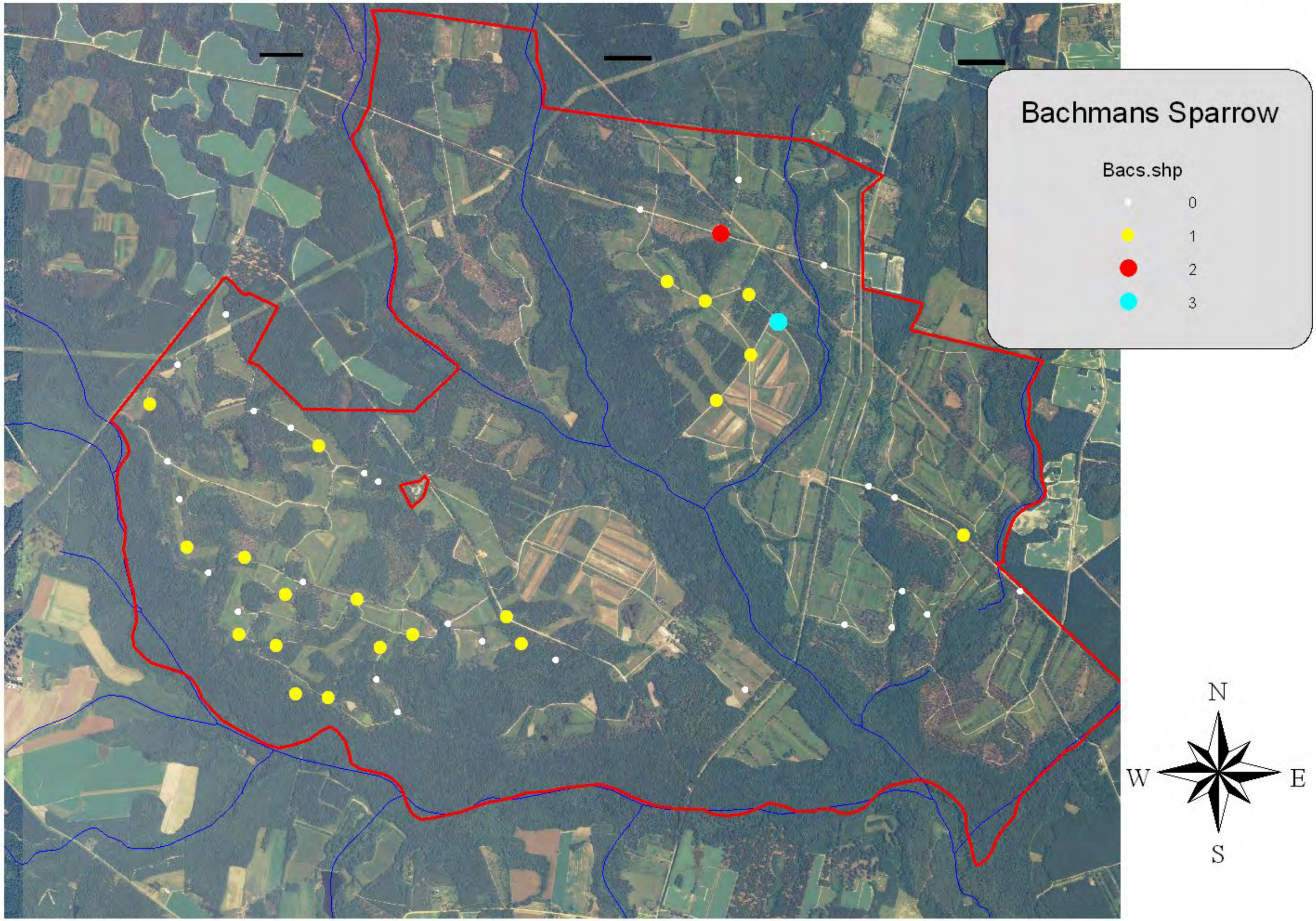
N
W
E
S

2 0 2 4 Miles

Dawson Forest Bachmans Sparrow



Di-Lane WMA Bachman's Sparrow



Doe Run NA Bachmans Sparrow

Bachmans Sparrow

Bacs.shp

0

1

2

3

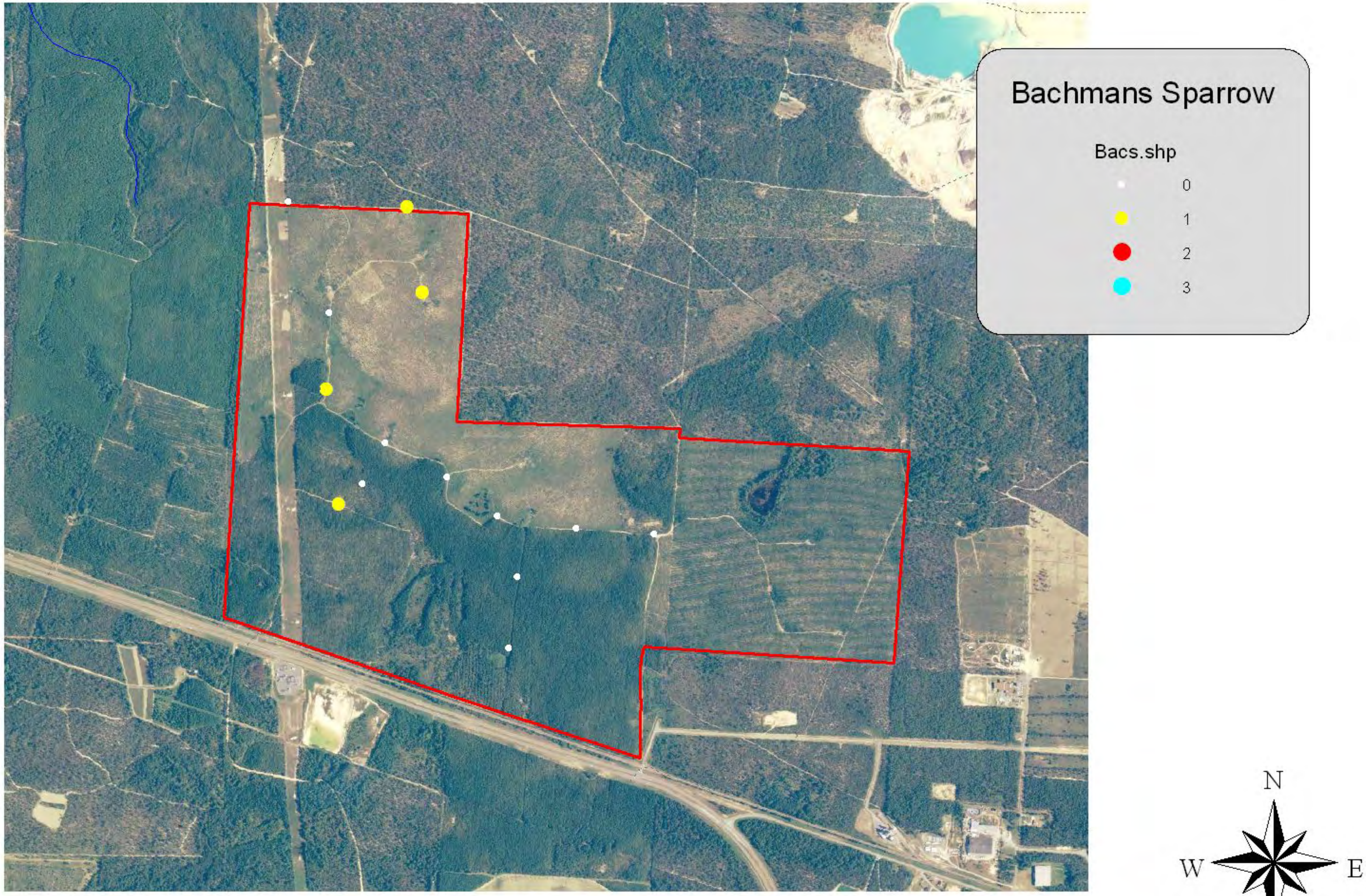
0.5 0 0.5 1 Miles

N

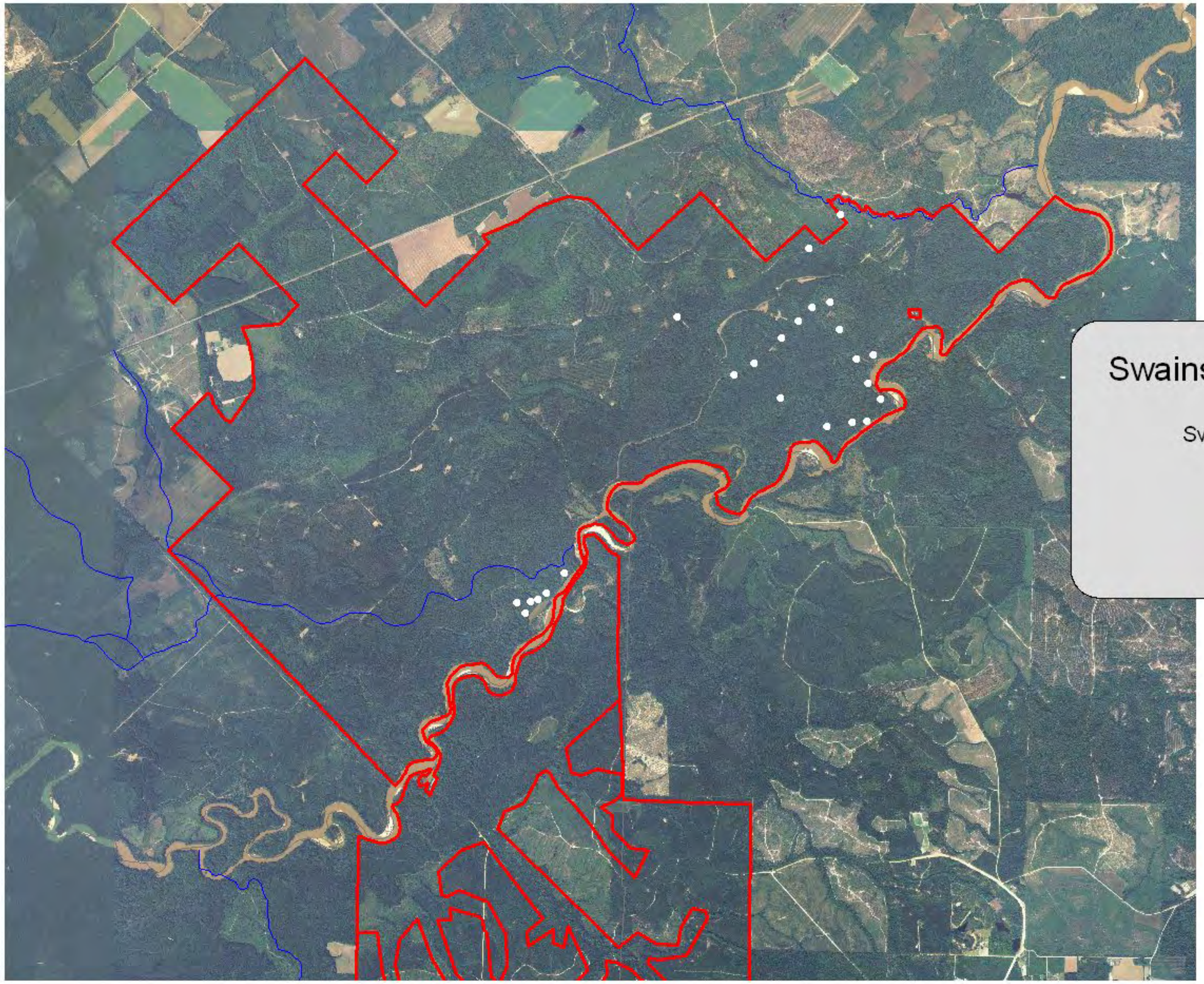
W E

S

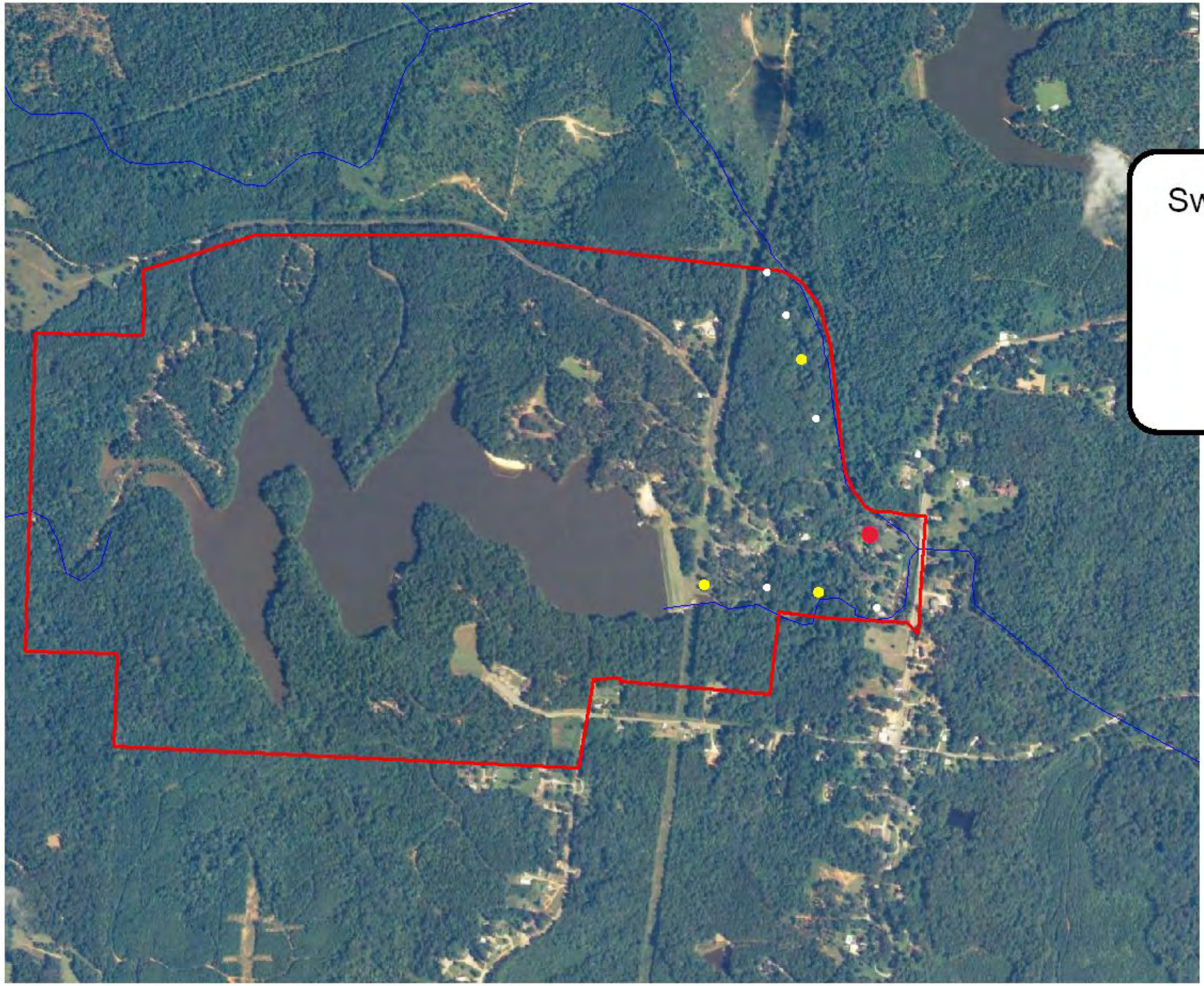
Fall Line Sand Hill NA Bachmans Sparrow



Horse Creek WMA Swainson's Warbler



Indian Springs SP Swainson's Warbler Survey



Swainson's Warbler

Swwa final.shp

0

1

2

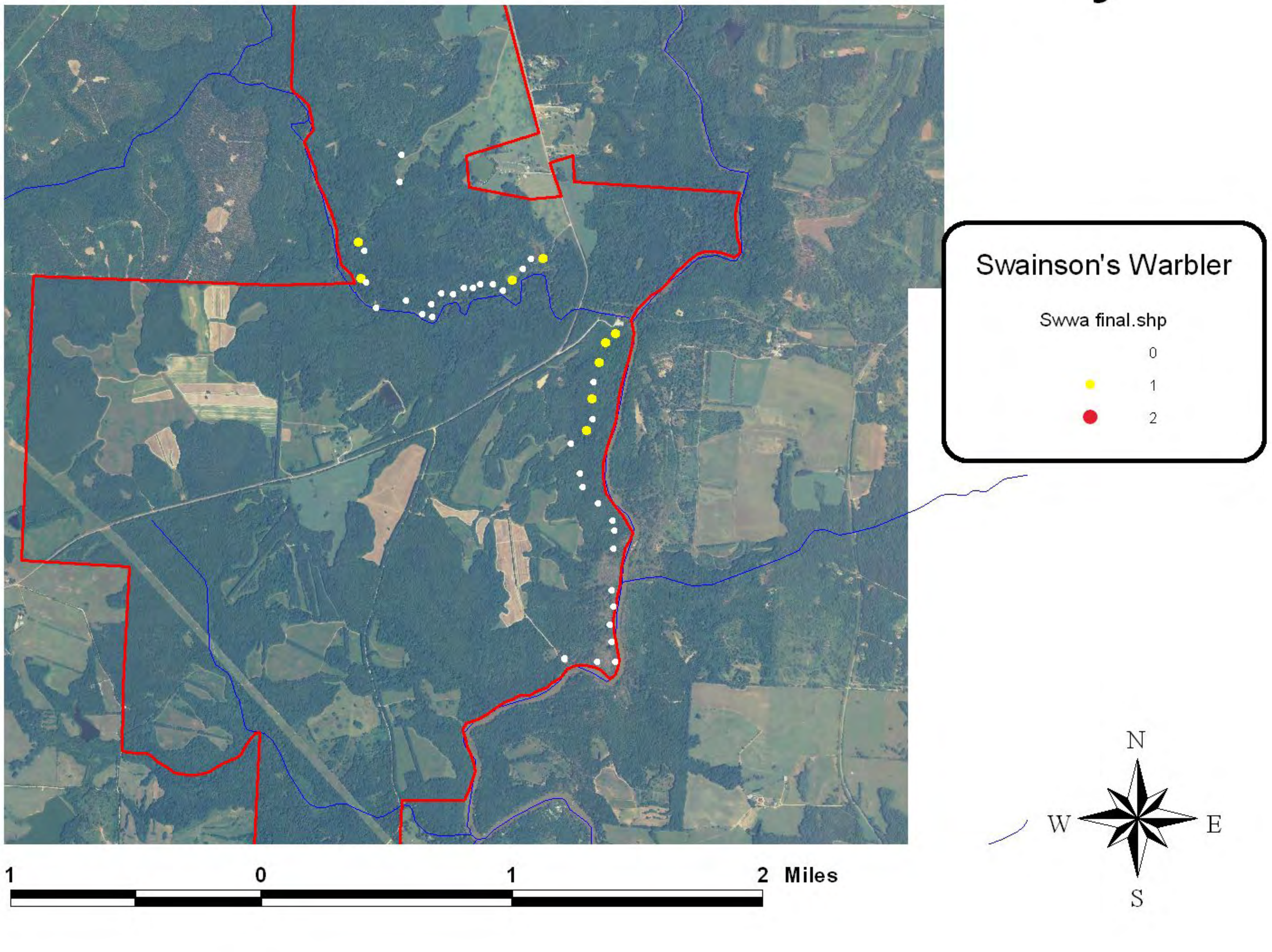
0.5 0 0.5 1 Miles

N

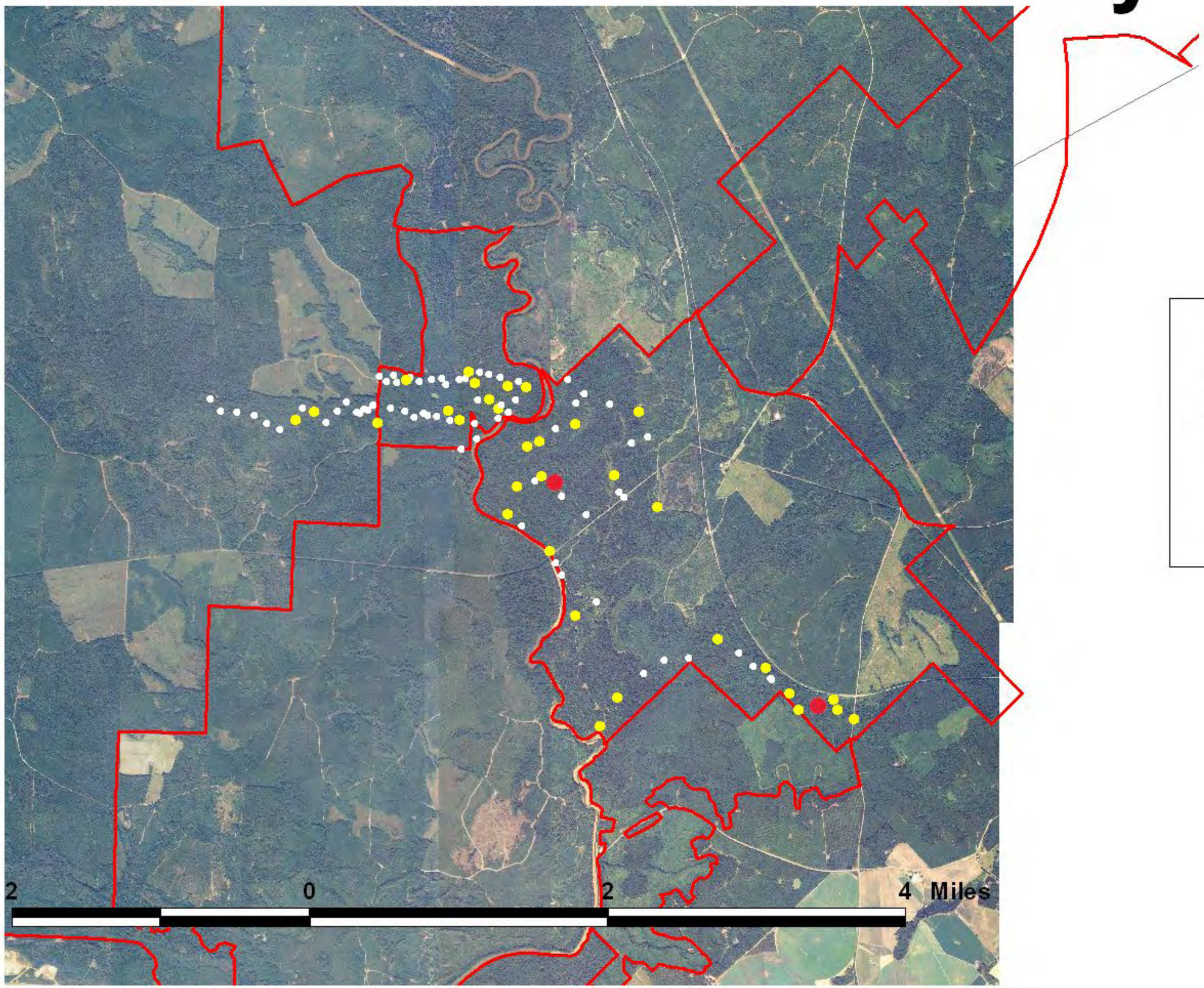
W E

S

Joe Kurz Swainson's Warbler Survey



Oaky Woods/Ocmulgee WMA
Swainson's Survey



View1

Swwa final.shp

0

1

2

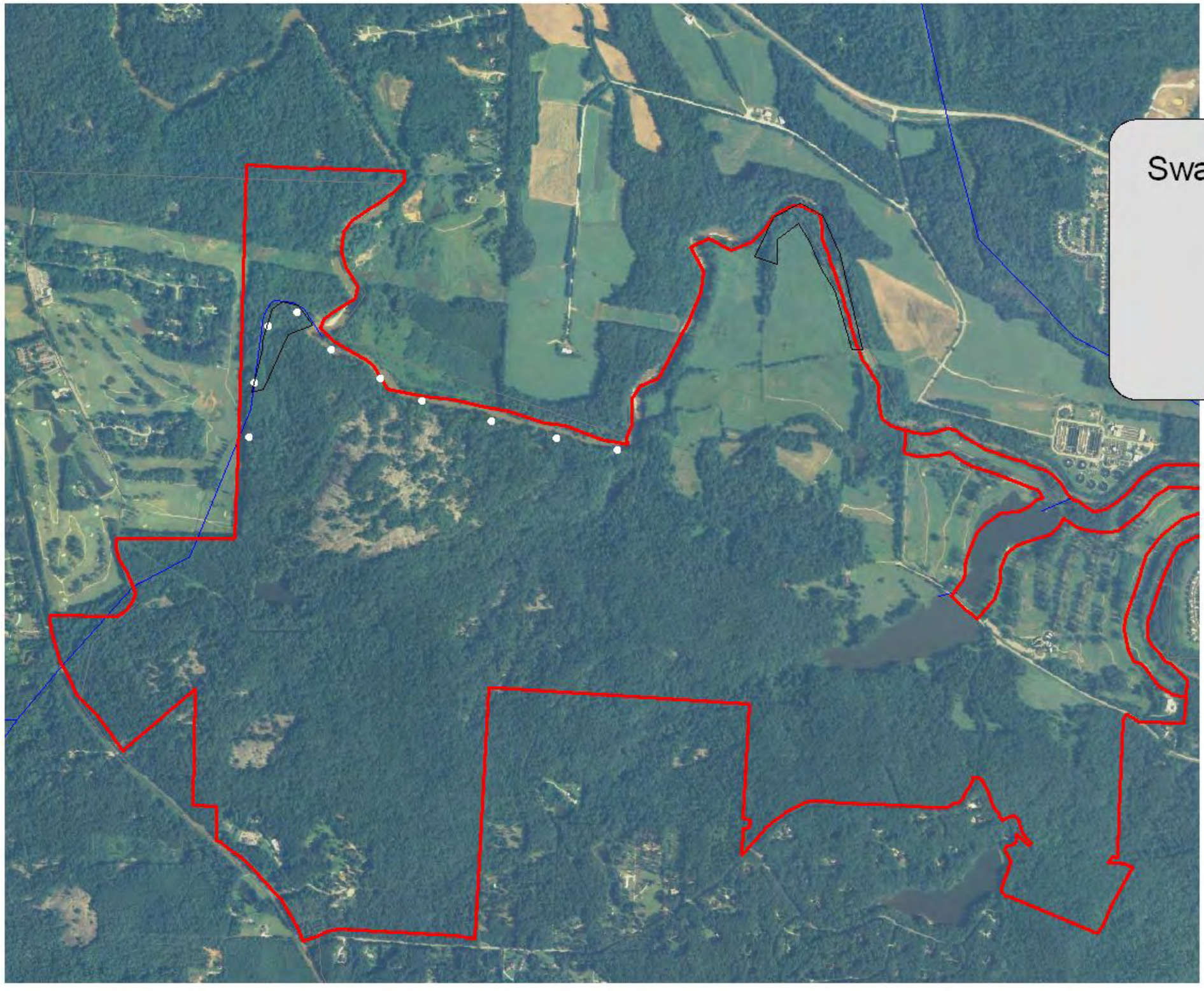
N

W

E

S

Panola MT SP Swainson's Warbler Survey



Swainson's Warbler

Swwa final.shp

0

1

2

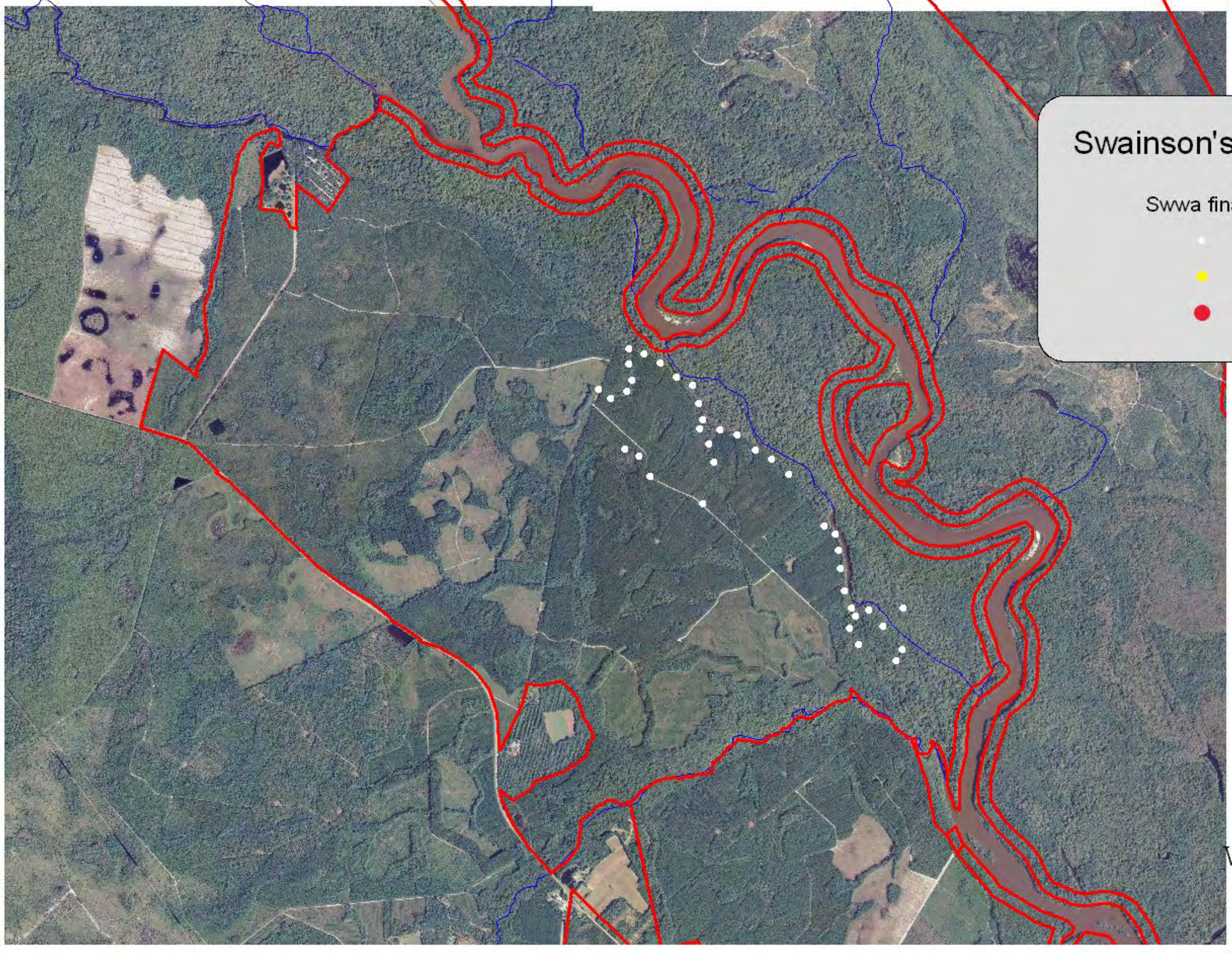
0.8 0 0.8 1.6 Miles

N

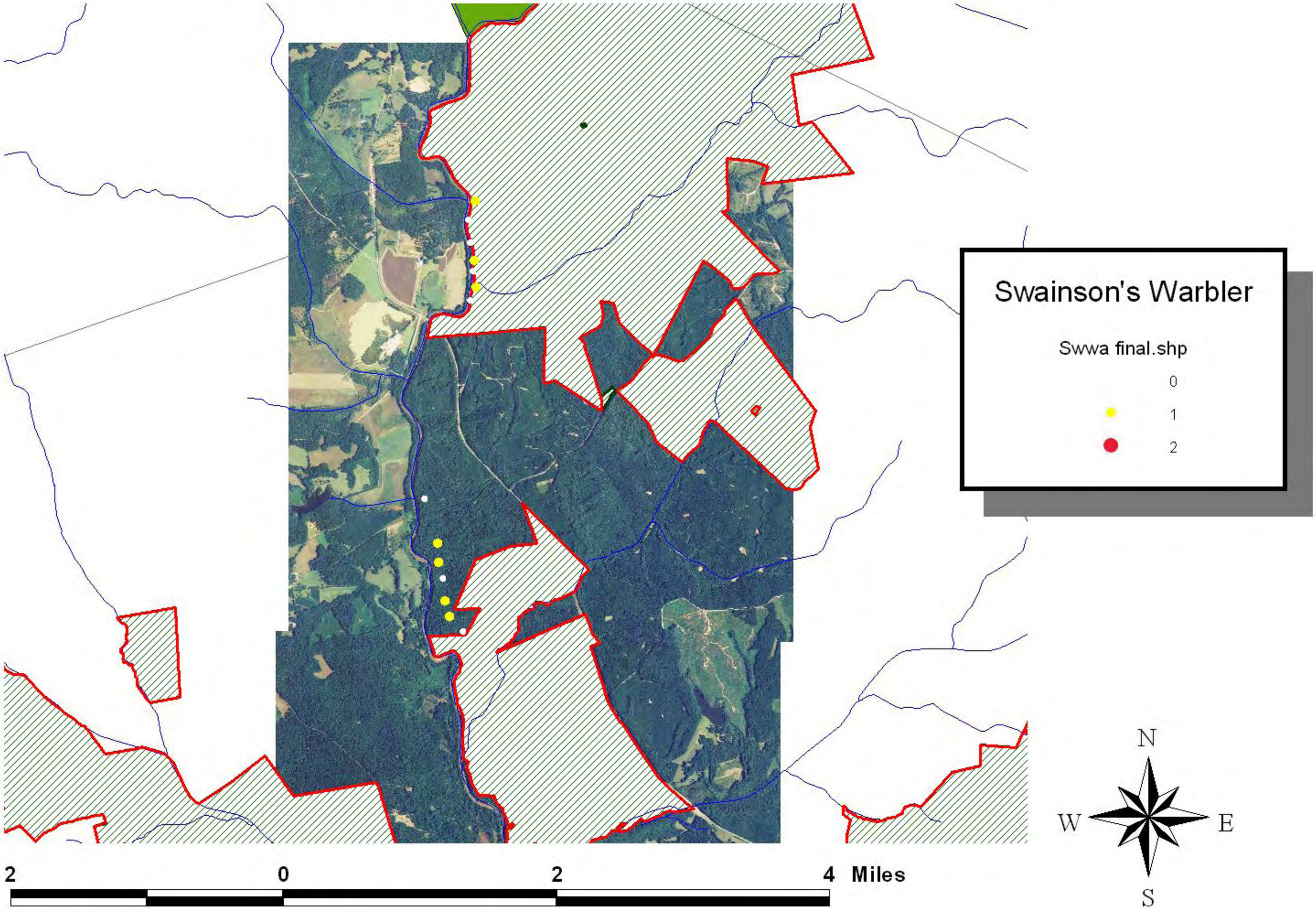
W E

S

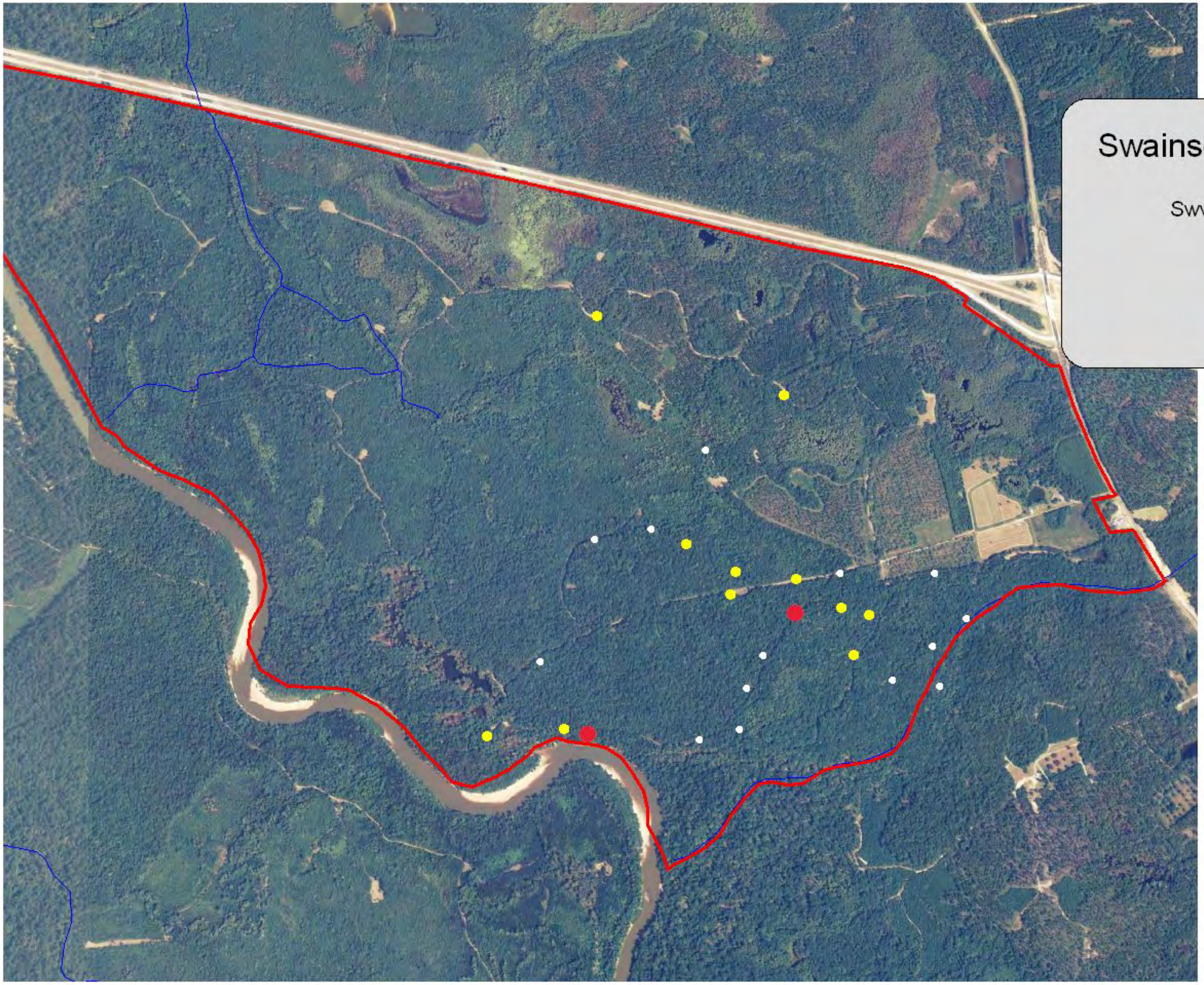
Penholloway Swainson's Warbler Survey



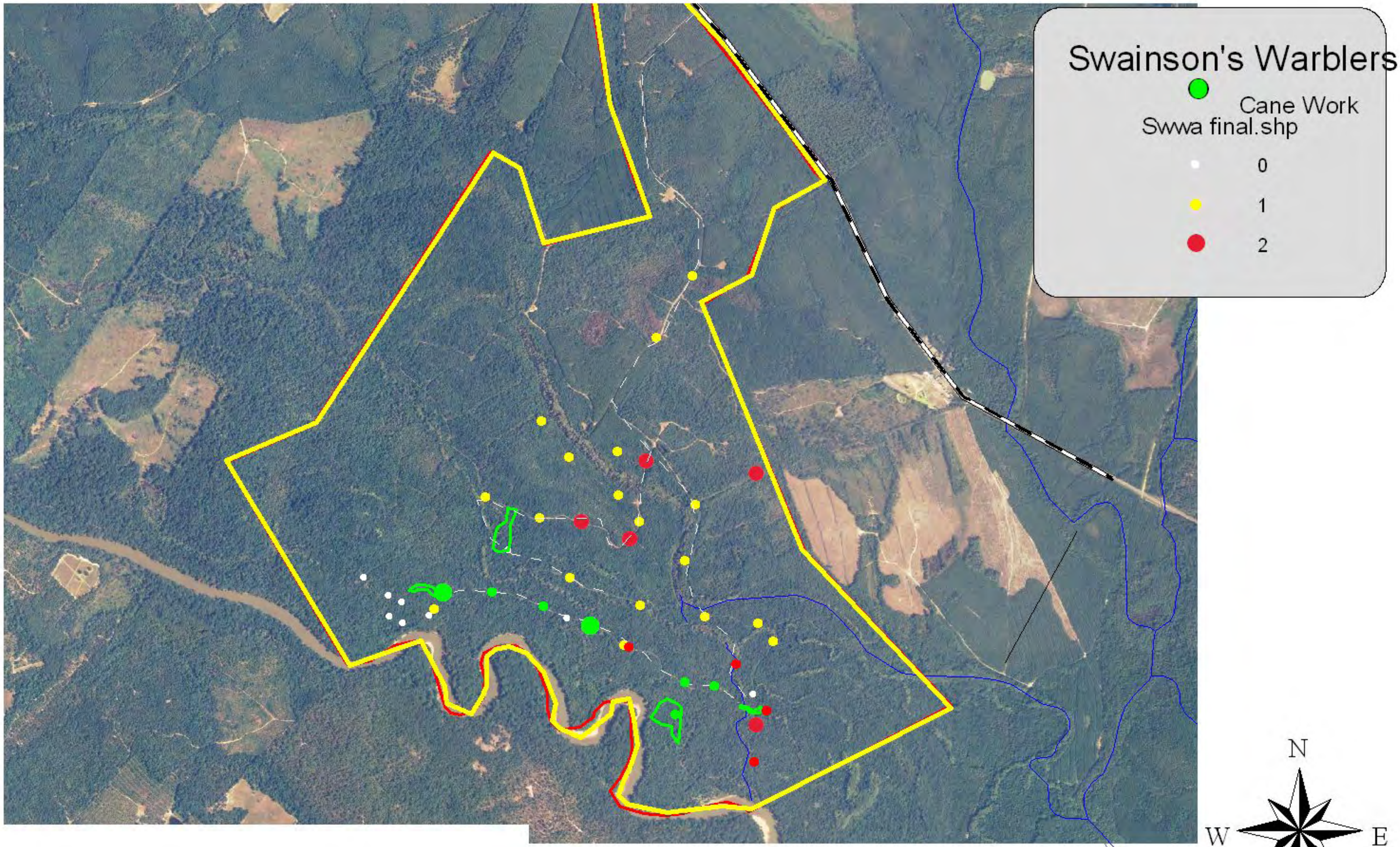
Redlands WMA Swainson's Warbler Survey



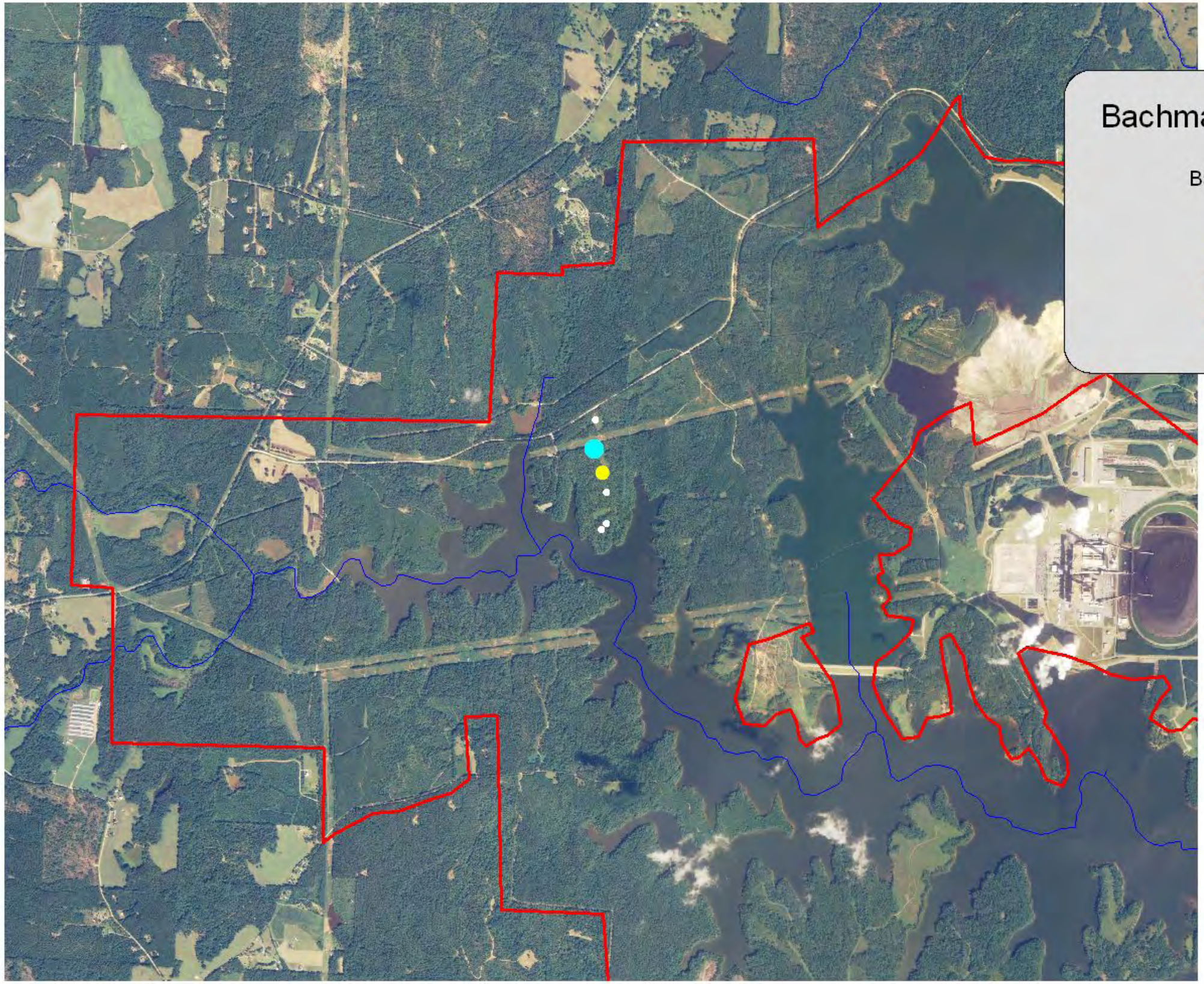
River Bend - North - Swainson's Warbler Survey



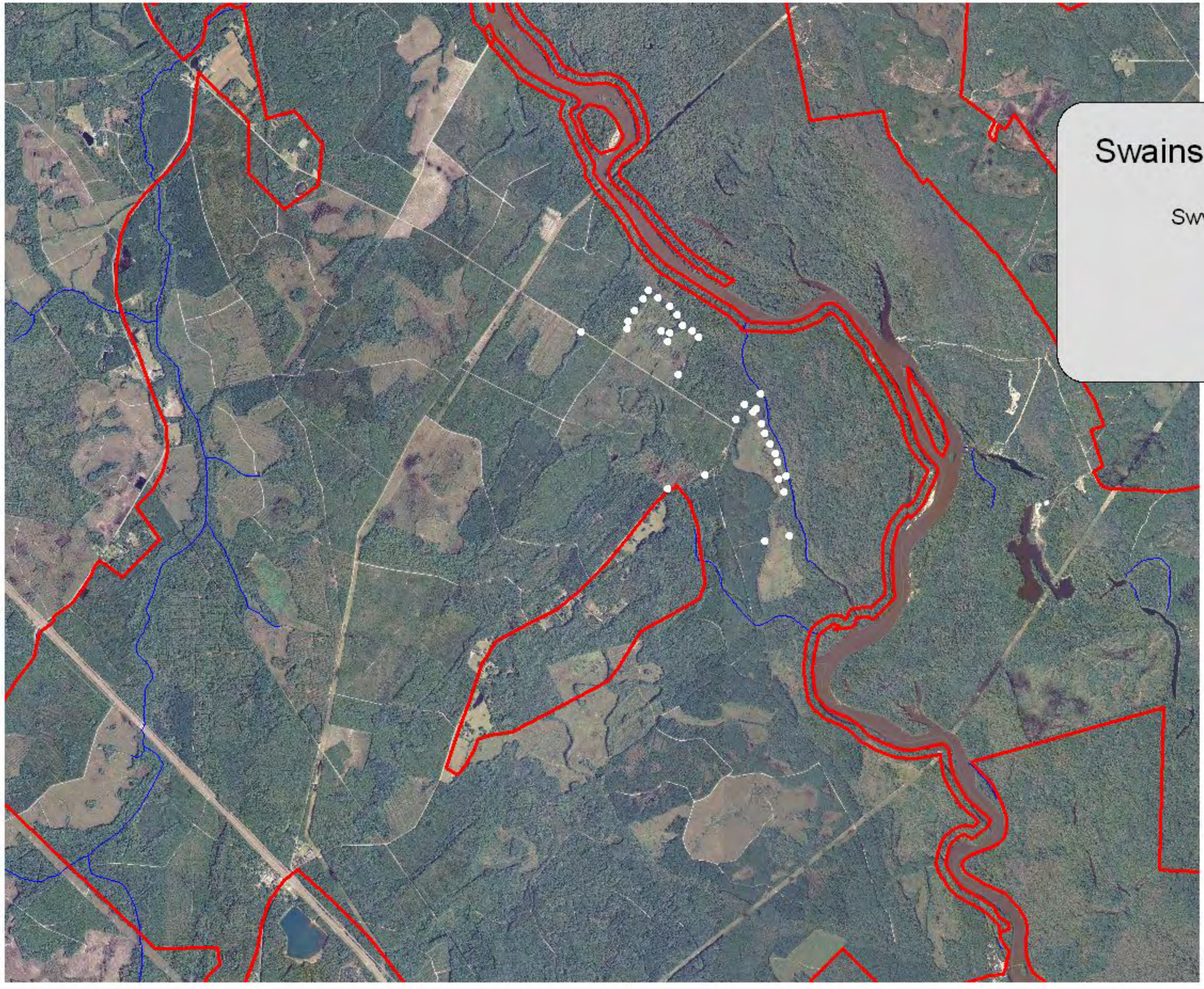
River Bend South - Swainson's Warbler Survey



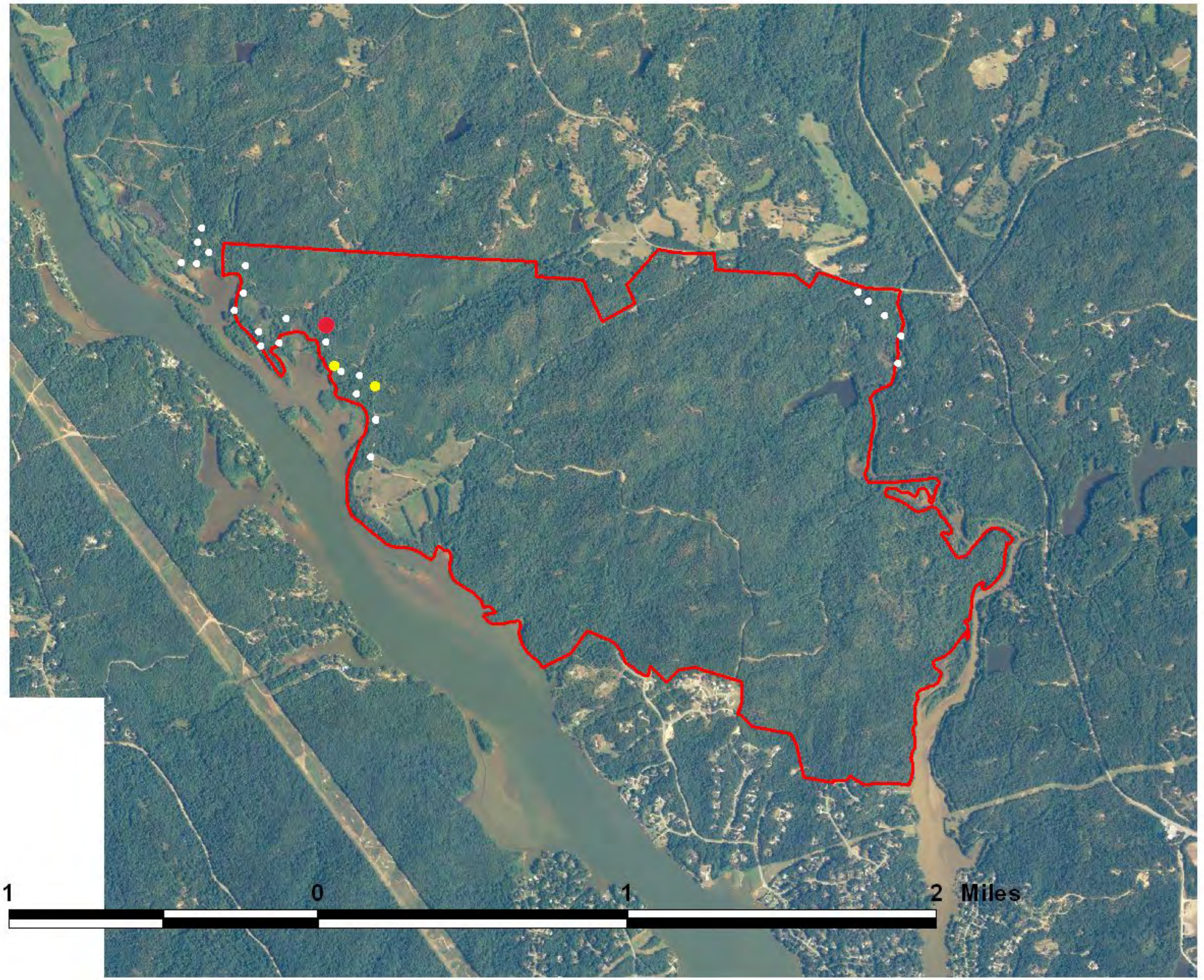
Rum Creek WMA Bachmans Sparrow



Sansavilla WMA Swainson's Warbler Survey



Standing Boy WMA
Swainson's Warbler Survey



View1

Swwa final.shp

0

1

2

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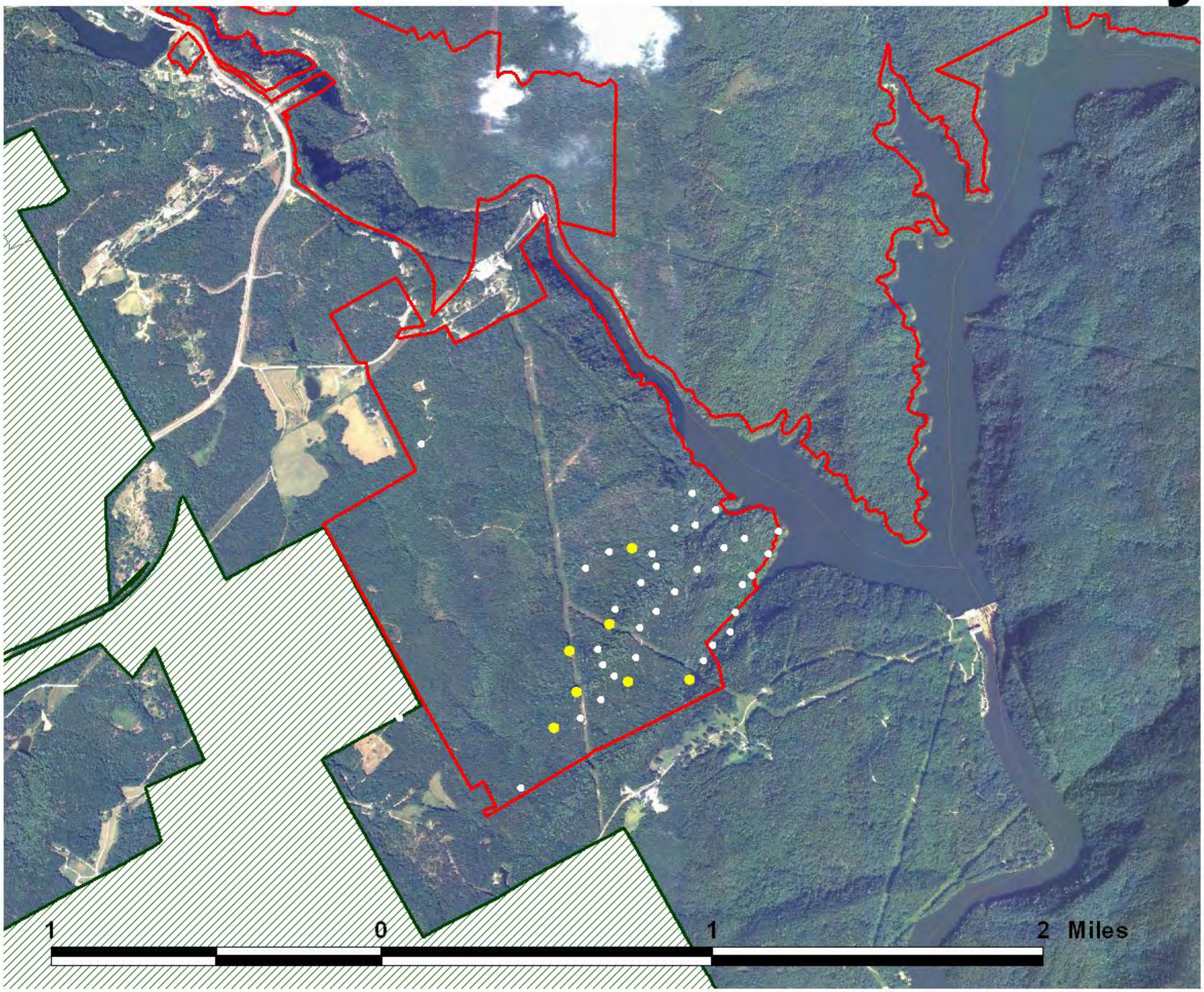
Tallulah Gorge State Park
Swainson's Warbler Survey



View1

Swwa final.shp

0

1

2

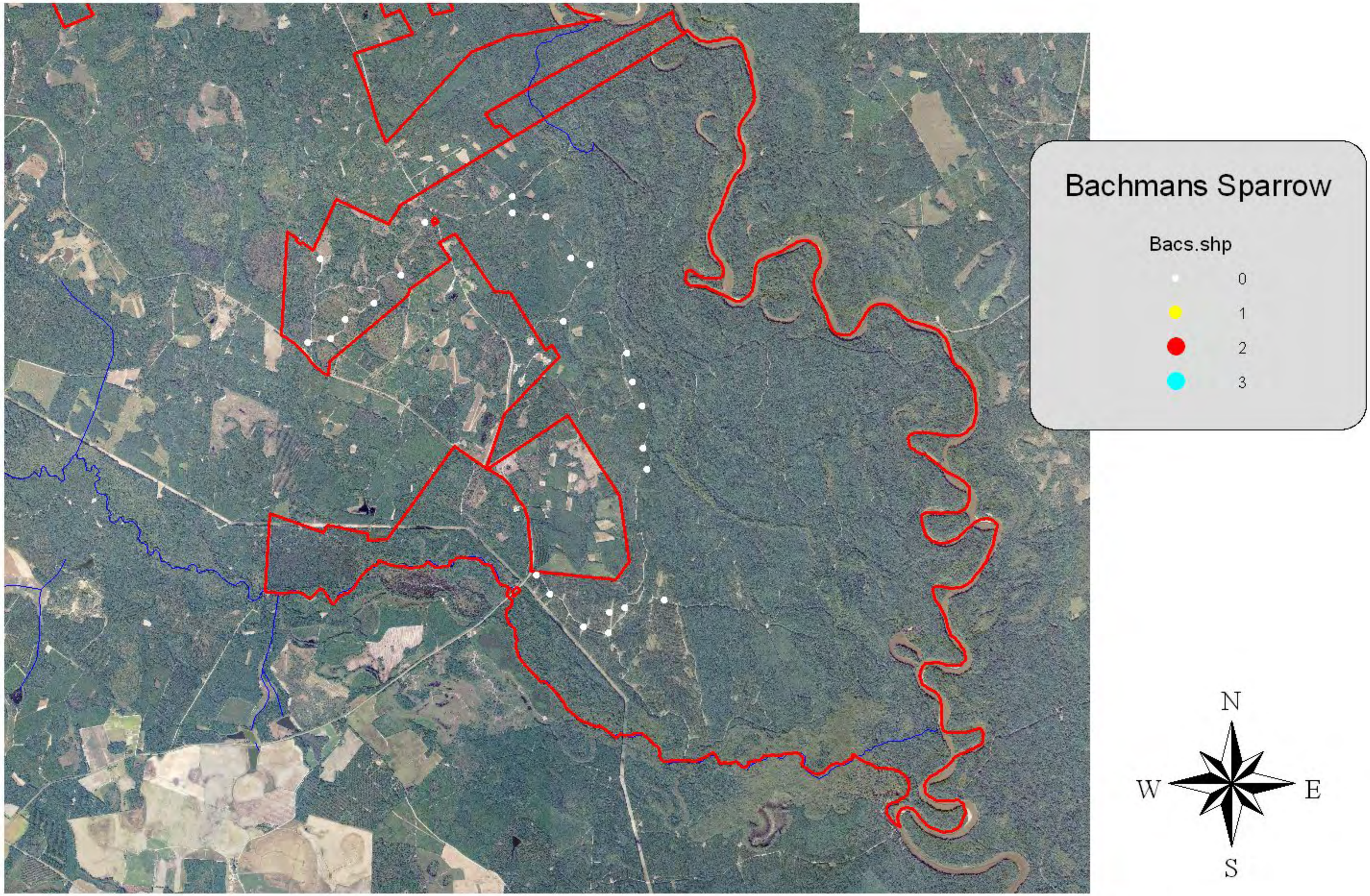
N

W

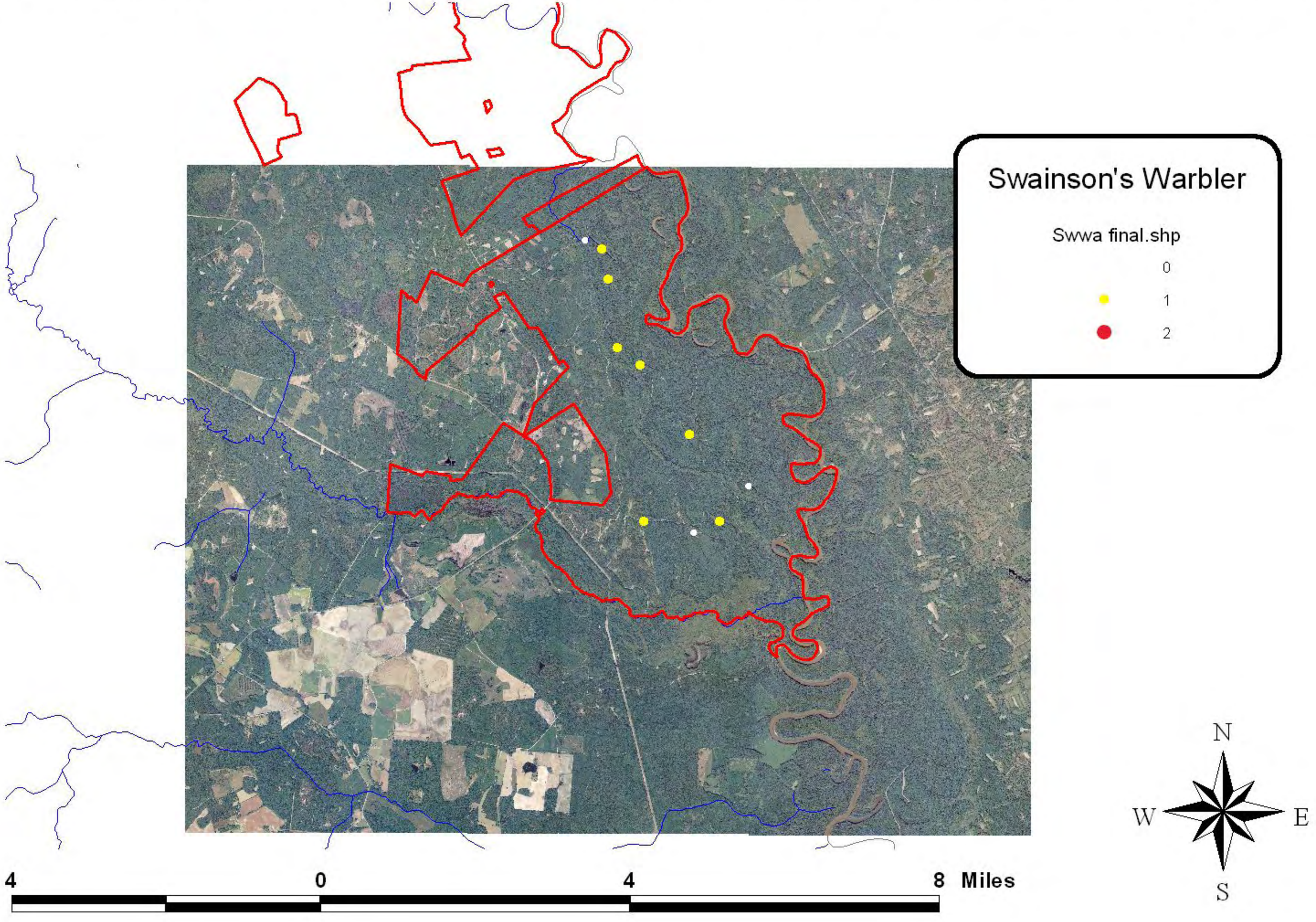
E

S

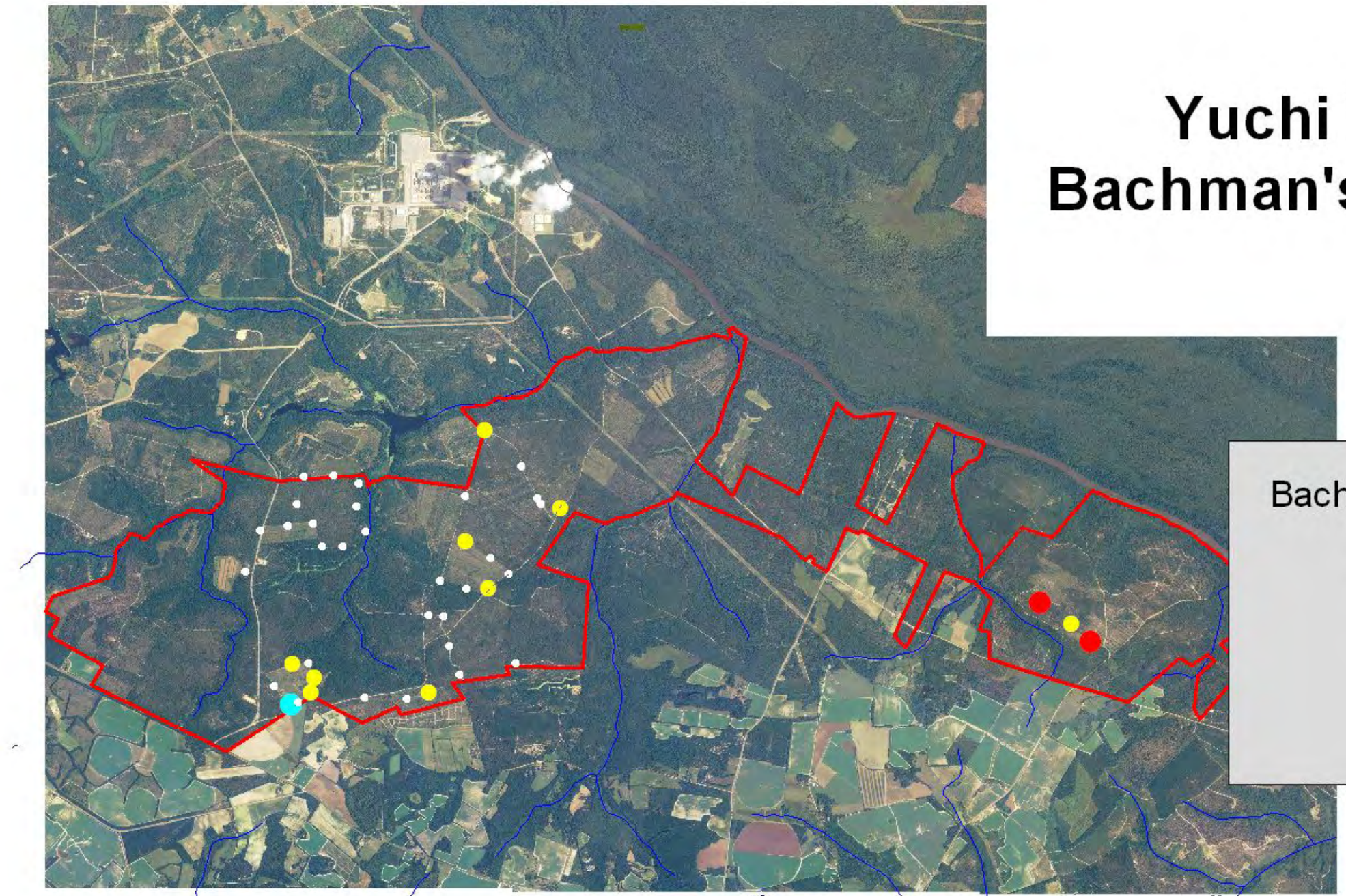
Tuckahoe WMA Bachmans Sparrow



Tuckahoe Swainson's Warbler Survey



Yuchi WMA
Bachman's Sparrow



Bachmans Sparrow

Bacs.shp

0

1

2

3

N

W

E

S

3 0 3 6 Miles