

DRIFT FENCE ANIMAL SURVEY OF  
JOE BUDD WILDLIFE MANAGEMENT AREA  
AND LAKE TALQUIN STATE FOREST



Final Report to Florida Fish  
and Wildlife Conservation  
Commission



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FLORIDA  
*Natural Areas*  
INVENTORY

**Cover Photographs:**

- top:           Scarletsnake (*Cemophora coccinea*) photographed on 5 May 2018 by Robert Gundy
- center:       Southern two-lined salamander (*Eurycea cirrigera*) photographed on 20 February 2018 by Robert Gundy
- bottom:       Rough greensnake (*Opheodrys aestivus*) photographed on 10 October 2017 by Robert Gundy

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## ABSTRACT

A drift fence survey was conducted to document the amphibian and reptile species present on Joe Budd Wildlife Management Area and Lake Talquin State Forest in Leon and Gadsden counties, Florida. The drift fence survey was conducted to establish baseline data for Florida Fish and Wildlife Conservation Commission from September 2017 through May 2018. A total of 484 individuals were captured in funnel or box traps belonging to 46 species. Overall, a total of 650 individuals belonging to 67 species were observed by all survey methods. Seven rare species were observed during the survey.

## INTRODUCTION

Florida Natural Areas Inventory (FNAI) was contracted by Florida Fish and Wildlife Conservation Commission (FWC) to conduct a drift fence survey to document the amphibian and reptile species present on Joe Budd Wildlife Management Area (JBWMA) and on the portions of Lake Talquin State Forest (LTSF) where FWC is the co-lead manager. The study takes place on approximately 1,929 hectares (4,767 acres) located in western Leon County and southeastern Gadsden County, Florida. The study site consists of JBWMA as well as the Highway 20, Rocky Comfort, Midway, North Ochlockonee, South Ochlockonee and Joe Budd Tracts of Lake Talquin State Forest. Lake Talquin forms the southern boundary of the Rocky Comfort, Joe Budd and Midway Tracts, and the northern boundary of the Highway 20 Tract of Lake Talquin State Forest. The western boundaries of the North Ochlockonee and South Ochlockonee Tracts abut the Ochlockonee River. The latter two adjacent units are split by Interstate 10. The multiple parcels of JBWMA are mostly surrounded by LTSF property. Joe Budd Wildlife Management Area was first established in 1975 with 794 acres of land, then expanded to the present area in 1981 and 1998 (FWC 2015).

In 2017 and 2018 FNAI conducted natural community mapping on JBWMA and LTSF. The natural and altered communities present include: alluvial forest (250.9 acres), artificial pond (15.3 acres), basin swamp (89.9 acres), baygall (183.7 acres), bottomland forest (4,263.4 acres), clearing/regeneration (225.4 acres), depression marsh (78.6 acres), developed area (59.9 acres), dome swamp (6.2 acres), floodplain marsh (4.1 acres), floodplain swamp (1,576.1 acres), mesic flatwoods (1,403.2 acres), pine plantation (629 acres), restoration mesic flatwoods (35.2 acres), restoration sandhill (983.9 acres), restoration upland pine (544.2 acres), sandhill (614.2 acres), shrub bog (46.4 acres), successional hardwood forest (544 acres), upland hardwood forest (5,201.7 acres), upland mixed woodland (113.1 acres), upland pine (6,673.2 acres), utility corridor (120.2 acres), wet flatwoods (451.2 acres), and wildlife food plots (268.5 acres). Additional communities not mapped by FNAI include seepage streams and rivers (FNAI 2018). Drift fence sampling arrays were constructed in areas representative of the natural communities found on the study site and were periodically sampled between September 2017 and May 2018.

## METHODS

Fourteen drift fence sampling arrays were installed in upland pine, mesic flatwoods, wet flatwoods, upland mixed woodland, sandhill, upland hardwood forest, floodplain swamp, and



depression marsh (Figure 1, Table 1, Table 2). The selected sites were considered to be representative of the available habitat with special focus on fire-managed communities. Within a natural community, specific drift fence array locations were selected in areas thought to provide the best opportunity for capturing amphibians and reptiles (e.g., ecotones between upland and wetland areas) and ease of access. Each array consisted of three arms that were each 15 m in length. Arrays were arranged in the shape of a “Y” or a “T”. The silt fence was made of black woven plastic 91 cm wide with wooden stakes attached every 3 m. The bottoms of all fences were buried approximately 10 cm into the substrate to inhibit animals from finding gaps under the fence material. Funnel traps were constructed using aluminum window screen and were approximately 88 cm long and approximately 25 cm in diameter. The funnel opening at the narrow end was typically 8-10 cm in diameter (see Enge 1997). Large box traps (approximately 120 cm x 120 cm x 45 cm) were constructed using ¼” plywood and galvanized steel hardware cloth. Each box trap had three funnel entrances. All 14 arrays included single-opening funnel traps placed on either side of the fencing material at the open ends of the sampling arrays. Seven of the arrays had large box traps placed in their centers where all arms converged. The remaining seven arrays had double-ended funnel traps placed midway along each side of each arm in addition to the funnel traps at the ends, resulting in 12 total funnel traps per array that did not have a box trap. Funnel traps and box traps located in areas exposed to the sun were covered with vegetative debris to provide shade for captured organisms. Cotton cloths were placed inside each trap and moistened as need to prevent desiccation.

Funnel traps were set for a total of 48 trap-nights and checked once per day. Funnel traps were pressed against the side of the fencing material and often held in place with a small stake. Captured animals were immediately released and were not marked in any fashion. At each array the total number of captures for any amphibian or reptile species not captured, but observed in PVC pipe traps, under cover boards or within 50 m of each array, was also recorded as being part of the array. Box and funnel traps were closed outside survey periods. Funnel trap surveys were conducted periodically from September 2017 through May 2018.

Seven sets of tin cover boards were set as artificial refuges in order to attract amphibian and reptile species. Each set of cover boards contained two pieces of overlapping corrugated tin roofing material approximately 75 cm x 122 cm in size each. Cover boards were checked once per day and, because animals were free to escape, they were left in place outside survey dates. Cover boards were checked for a total of 59 trap-nights. Six PVC pipe traps were placed in the immediate vicinity of array numbers 3, 6, 8, 9, 10, and 11. These passive traps were made using a standardized design (Boughton et al, 2000) and hung 1-2 m above ground on the trunks of trees. PVC traps were checked once per day and, because animals were free to escape, they

were left in place outside survey dates. PVC traps were checked for a total of 59 trap-nights. Commercially available fish traps were deployed in shallow water of depression marshes at arrays 6 and 13, and along the shore of Lake Talquin at array 9. The collapsible fish traps were approximately 1 m long by 30 cm wide. Fish traps were checked once per day and removed from the water outside the survey period. Dipnet surveys were conducted periodically in depression marshes. A long handled dipnet was swept through the water with focus on sampling emergent aquatic vegetation. Pedestrian surveys were conducted by walking through areas of promising habitat and flipping logs or other debris. Driving surveys occurred en route to drift fence arrays by driving slowly along the dirt roads within the study site. Amphibian or reptile species found during pedestrian surveys, driving surveys, aural surveys and opportunistic observations were also recorded.

### Habitat Descriptions and Vegetation Composition of JBWMA and LTSF 2017-2018 Drift Fence Arrays

The following is a description of the habitat and vegetation structure at the 14 drift fence array sites located at JBWM and LTSF. Table 1 shows the identifiers, geographic coordinates, layout and number of traps at each drift fence array site. Figure 1 shows a map of all 14 drift fence array sites on the study site. Plant community structure measurements were conducted between May 1<sup>st</sup>, 2018 and May 8<sup>th</sup>, 2018. Plant diversity was noted throughout the duration of the survey. The following descriptions may include species present only seasonally. Tables 2 and 3 at the end of this subsection provide detailed descriptions of the habitat characteristics and vegetation measurements within 20 m of each array.

#### Array #1

Array #1 consisted of a “T” shaped array with a box trap located in upland pine with adjacent upland hardwood forest sloping down to the shore of Lake Talquin. The canopy layer included longleaf pine (*Pinus palustris*), live oak (*Quercus virginiana*) and laurel oak (*Quercus hemisphaerica*). The subcanopy layer included laurel oak and sweetgum (*Liquidambar styraciflua*). The shrub layer included American beautyberry (*Callicarpa americana*), needle palm (*Rhapidophyllum hystrix*), and hickory (*Carya* sp.). The herbaceous groundcover layer included slender woodoats (*Chasmanthium laxum*), elephantsfoot (*Elephantopus* sp.), snakeroot (*Ageratina* sp.), witchgrass (*Dichanthelium* sp.), greenbrier (*Smilax* sp.), angle pod (*Gonolobus suberosus*), Virginia creeper (*Parthenocissus quinquefolia*) and redring milkweed (*Asclepias variegata*).

#### Array #2

Array #2 consisted of a “T” shaped array with a box trap located in upland pine with an open canopy and scattered herbaceous cover. Immediately adjacent was upland hardwood forest

sloping down to Lake Talquin. The canopy layer included pine (*Pinus* sp.), laurel oak (*Quercus hemisphaerica*), and live oak (*Quercus virginiana*). The subcanopy layer consisted solely of sweetgum (*Liquidambar styraciflua*). The shrub layer included American beautyberry (*Callicarpa americana*), hickory (*Carya* sp.), and red bay (*Persea borbonia*). The herbaceous groundcover layer included slender woodoats (*Chasmanthium laxum*), witchgrass (*Dichanthelium* sp.), greenbrier (*Smilax* sp.), elephantsfoot (*Elephantopus* sp.), Virginia creeper (*Parthenocissus quinquefolia*), Adam's needle (*Yucca filamentosa*), and yellow jessamine (*Gelsemium sempervirens*). This area has been heavily affected by redbay ambrosia beetle (*Xyleborus glabratus*) as evidenced by senescing leaves on nearly all red bay plants present. A set of cover boards was set in the immediate vicinity. This area was burned in the winter during this survey.

#### Array #3

Array #3 consisted of a "T" shaped array with a box trap located in upland hardwood forest with one arm extending to the edge of a seepage stream. The canopy layer included elm (*Ulmus* sp.), water oak (*Quercus nigra*), sweetgum (*Liquidambar styraciflua*), slash pine (*Pinus elliottii*), red bay (*Persea borbonia*), tulip tree (*Liriodendron tulipifera*), and sugar maple (*Acer saccharum*). The subcanopy layer included sweetgum, American holly (*Ilex opaca*), sparkleberry (*Vaccinium arboreum*) and sugar maple (*Acer saccharum*). The shrub layer included American beautyberry (*Callicarpa americana*), needle palm (*Rhapidophyllum hystrix*), hickory (*Carya* sp.), and the invasive species coral ardisia (*Ardisia crenata*). The herbaceous groundcover layer included Virginia chain fern (*Woodwardia virginica*), Virginia creeper (*Parthenocissus quinquefolia*), early blue violet (*Viola palmata*), greenbrier (*Smilax* sp.), butterweed (*Packera glabella*), poison ivy (*Toxicodendron radicans*), and partridgeberry (*Mitchella repens*). A set of cover boards and 6 PVC pipe traps were also set in the immediate vicinity. The area immediately upland of this array is upland pine that was brush-hogged in February 2018.

#### Array #4

Array #4 consisted of a "Y" shaped array located in upland pine with one arm extending to the edge of a depression marsh. The canopy layer included longleaf pine (*Pinus palustris*), and water oak (*Quercus nigra*). The subcanopy layer included titi (*Cyrilla racemiflora*), myrtle-leaved holly (*Ilex myrtifolia*), and wax myrtle (*Morella cerifera*). The shrub layer included titi (*Cyrilla racemiflora*), fetterbush (*Lyonia lucida*), sweet pepperbush (*Clethra alnifolia*), gallberry (*Ilex glabra*), shiny blueberry (*Vaccinium myrsinites*), gopherweed (*Baptisia lanceolata*), myrtle-leaved holly (*Ilex myrtifolia*), dwarf huckleberry (*Gaylussacia nana*), and sweetgum (*Liquidambar styraciflua*). The herbaceous groundcover included wiregrass (*Aristida stricta*), earleaf greenbrier (*Smilax auriculata*), blazing star (*Liatris* sp.), Florida greeneyes (*Berlandiera subacaulis*), sensitive briar (*Mimosa quadrivalvis*), and broomsedge bluestem (*Andropogon virginicus*).

#### Array #5

Array #5 consisted of a “Y” shaped array located in upland hardwood forest. The canopy layer included sweetgum (*Liquidambar styraciflua*), water oak (*Quercus nigra*), hickory (*Carya* sp.), and southern magnolia (*Magnolia grandiflora*). The subcanopy layer included sweetgum, water oak, hickory, sugar maple (*Acer saccharum*), wax myrtle (*Morella cerifera*), laurel oak (*Quercus hemisphaerica*), and swamp chestnut oak (*Quercus michauxii*). The shrub layer included needle palm (*Rhapidophyllum hystrix*), switchcane (*Arundinaria gigantea*), American beautyberry (*Callicarpa americana*), hickory, sweetgum, and water oak. The herbaceous groundcover layer included Virginia creeper (*Parthenocissus quinquefolia*), poison ivy (*Toxicodendron radicans*), witchgrass (*Dichanthelium* sp.), early blue violet (*Viola palmata*), hairyflower spiderwort (*Tradescantia hirsuta*), longbract wakerobin (*Trillium underwoodii*), summer grape (*Vitis aestivalis*), and green dragon (*Arisaema dracontium*). A set of cover boards was placed in the immediate vicinity.

#### Array #6

Array #6 consisted of a “Y” shaped array with a box trap located in mesic flatwoods with one arm nearing a depression. The canopy layer included slash pine (*Pinus elliottii*), swamp laurel oak (*Quercus laurifolia*), and water oak (*Quercus nigra*). The subcanopy layer included titi (*Cyrilla racemiflora*) and swamp laurel oak. The shrub layer included red bay (*Persea borbonia*), sweet pepperbush (*Clethra alnifolia*), fetterbush (*Lyonia lucida*), dwarf huckleberry (*Gaylussacia nana*), saw palmetto (*Serenoa repens*), and titi. The herbaceous groundcover layer included bracken fern (*Pteridium aquilinum*), laurel greenbrier (*Smilax laurifolia*), flatwoods St. John’s wort (*Hypericum microsepalum*), and American dodder (*Cuscuta americana*). A set of cover boards and 6 PVC pipe traps were also set in the immediate vicinity. Additionally, two fish traps were placed in the interior of the adjacent depression marsh. This area has been negatively affected by redbay ambrosia beetle (*Xyleborus glabratus*) as evidenced by senescing leaves on nearly all red bay plants present.

#### Array #7

Array #7 consisted of a “T” shaped array with a box trap located in upland pine. The canopy layer included longleaf pine (*Pinus palustris*), turkey oak (*Quercus laevis*) and water oak (*Quercus nigra*). The subcanopy layer included longleaf pine and water oak. The shrub layer included black cherry (*Prunus serotina*), Darrow’s blueberry (*Vaccinium darrowii*), woolly huckleberry (*Gaylussacia mosieri*), paw paw (*Asimina spatulata*), young oaks (*Quercus* sp.), and saw palmetto (*Serenoa repens*). The herbaceous groundcover included wiregrass (*Aristida stricta*), bracken fern (*Pteridium aquilinum*), gopher apple (*Geobalanus oblongifolius*), earleaf greenbrier (*Smilax auriculata*), Carolina elephantsfoot (*Elephantopus carolinianus*), and sensitive briar (*Mimosa quadrivalvis*). This site was burned in the winter during this survey.

#### Array #8

Array #8 consisted of a “Y” shaped array located in upland pine with one arm extending into depression marsh. The canopy layer included longleaf pine (*Pinus palustris*) and slash pine (*Pinus elliottii*). The subcanopy layer included red bay (*Persea borbonia*) and swamp laurel oak (*Quercus laurifolia*). The shrub layer included red bay, fetterbush (*Lyonia lucida*), Darrow’s blueberry (*Vaccinium darrowii*), dwarf huckleberry (*Gaylussacia nana*), gallberry (*Ilex glabra*), saw palmetto (*Serenoa repens*), and young oaks (*Quercus* sp.). The herbaceous groundcover layer included bracken fern (*Pteridium aquilinum*), cinnamon fern (*Osmunda cinnamomum*), earleaf greenbrier (*Smilax auriculata*), saw greenbrier (*Smilax bona-nox*), flatwoods St. John’s wort (*Hypericum microsepalum*), small butterwort (*Pinguicula pumila*), combleaf mermaidweed (*Proserpinaca pectinata*), and sphagnum moss (*Sphagnum* sp.). A set of cover boards and 6 PVC pipe traps were also set in the immediate vicinity. This site was burned in the winter during this survey.

#### Array #9

Array #9 consisted of a “T” shaped array located in upland hardwood forest with one arm extending into floodplain swamp. The canopy layer included water oak (*Quercus nigra*) and slash pine (*Pinus elliottii*). The subcanopy layer included sweetgum (*Liquidambar styraciflua*), hickory (*Carya* sp.), American holly (*Ilex opaca*) and water oak. The shrub layer included sweetgum, hickory, southern bayberry (*Morella cerifera*), and black cherry (*Prunus serotina*). The herbaceous groundcover layer included switchcane (*Arundinaria gigantea*), partridgeberry (*Mitchella repens*), earleaf greenbrier (*Smilax auriculata*), and muscadine (*Vitis rotundifolia*). A set of cover boards and 6 PVC pipe traps were also set in the immediate vicinity. Additionally, two fish traps were placed along the shoreline of Lake Talquin.

#### Array #10

Array #10 consisted of a “T” shaped array located in wet flatwoods. The canopy layer included slash pine (*Pinus elliottii*). There was no subcanopy layer. The shrub layer included sweet pepperbush (*Clethra alnifolia*), gallberry (*Ilex glabra*), and red bay (*Persea borbonia*). The herbaceous groundcover layer included cinnamon fern (*Osmunda cinnamomum*), witchgrass (*Dichanthelium* sp.), orange milkwort (*Polygala lutea*), small butterwort (*Pinguicula pumila*), bogbutton (*Lachnocaulon* sp.), pink sundew (*Drosera capillaris*), and sphagnum moss (*Sphagnum* sp.). A set of cover boards and 6 PVC pipe traps were also set in the immediate vicinity.

#### Array #11

Array #11 consisted of a “T” shaped array with a box trap located in sandhill. The canopy layer included longleaf pine (*Pinus palustris*). The subcanopy layer included sparkleberry (*Vaccinium arboreum*), water oak (*Quercus nigra*), and turkey oak (*Quercus laevis*). The shrub layer

included water oak. The herbaceous groundcover layer included yellow jessamine (*Gelsemium sempervirens*), earleaf greenbrier (*Smilax auriculata*), wiregrass (*Aristida stricta*), dogtongue wild buckwheat (*Eriogonum tomentosum*), manyflower beardtongue (*Penstemon multiflorus*), yankeeweed (*Eupatorium compositifolium*), and coastal sand spurge (*Euphorbia exserta*). A set of cover boards and 6 PVC pipe traps were also set in the immediate vicinity. An active gopher tortoise burrow (*Gopherus polyphemus*) was within 10 m of this array. This site was burned on April 2<sup>nd</sup>, 2018.

#### Array #12

Array #12 consisted of a “Y” shaped array with a box trap located in sandhill. The canopy layer included longleaf pine (*Pinus palustris*). The subcanopy layer included sparkleberry (*Vaccinium arboreum*), water oak (*Quercus nigra*), and sweetgum (*Liquidambar styraciflua*). The shrub layer included water oak, sand live oak (*Quercus geminata*), sparkleberry, winged sumac (*Rhus copallinum*), black cherry (*Prunus serotina*), and deerberry (*Vaccinium stamineum*). The herbaceous groundcover layer included yellow jessamine (*Gelsemium sempervirens*), earleaf greenbrier (*Smilax auriculata*), wiregrass (*Aristida stricta*), dogtongue wild buckwheat (*Eriogonum tomentosum*), manyflower beardtongue (*Penstemon multiflorus*), yankeeweed (*Eupatorium compositifolium*), and paw paw (*Asimina spatulata*). This site was burned on April 2<sup>nd</sup>, 2018.

#### Array #13

Array #13 consisted of a “Y” shaped array located in upland pine between two depression marshes. The canopy layer included slash pine (*Pinus elliotii*), water oak (*Quercus nigra*) and turkey oak (*Quercus laevis*). The subcanopy layer included water oak. The shrub layer included sweetgum (*Liquidambar styraciflua*), myrtle-leaved holly (*Ilex myrtifolia*), titi (*Cyrilla racemiflora*), dwarf huckleberry (*Gaylussacia nana*), gallberry (*Ilex glabra*), woolly huckleberry (*Gaylussacia mosieri*), water oak, red bay (*Persea borbonia*), and sweet pepperbush (*Clethra alnifolia*). The herbaceous groundcover layer included cinnamon fern (*Osmunda cinnamomum*), American dodder (*Cuscuta americana*), yellow jessamine (*Gelsemium sempervirens*), earleaf greenbrier (*Smilax auriculata*), wiregrass (*Aristida stricta*), and bluestem broomsedge (*Andropogon virginicus*). One fish trap was placed along the shoreline of the depression marsh south of the array.

#### Array #14

Array #14 consisted of a “T” shaped array located in upland mixed woodlands with one arm extending into upland pine. The canopy layer included laurel oak (*Quercus hemisphaerica*), water oak (*Quercus nigra*), and pine (*Pinus* sp.). The subcanopy layer included water oak (*Quercus nigra*), sweetgum (*Liquidambar styraciflua*), hickory (*Carya* sp.), and sparkleberry (*Vaccinium arboreum*). The shrub layer included wax myrtle (*Morella cerifera*), American

beautyberry (*Callicarpa americana*), deerberry (*Vaccinium stamineum*), and American holly (*Ilex opaca*). The herbaceous groundcover layer is mostly leaf litter but included poison ivy (*Toxicodendron radicans*), earleaf greenbrier (*Smilax auriculata*), muscadine (*Vitis rotundifolia*), yellow jessamine (*Gelsemium sempervirens*), and partridgeberry (*Mitchella repens*). A set of cover boards and 6 PVC pipe traps were also set in the immediate vicinity

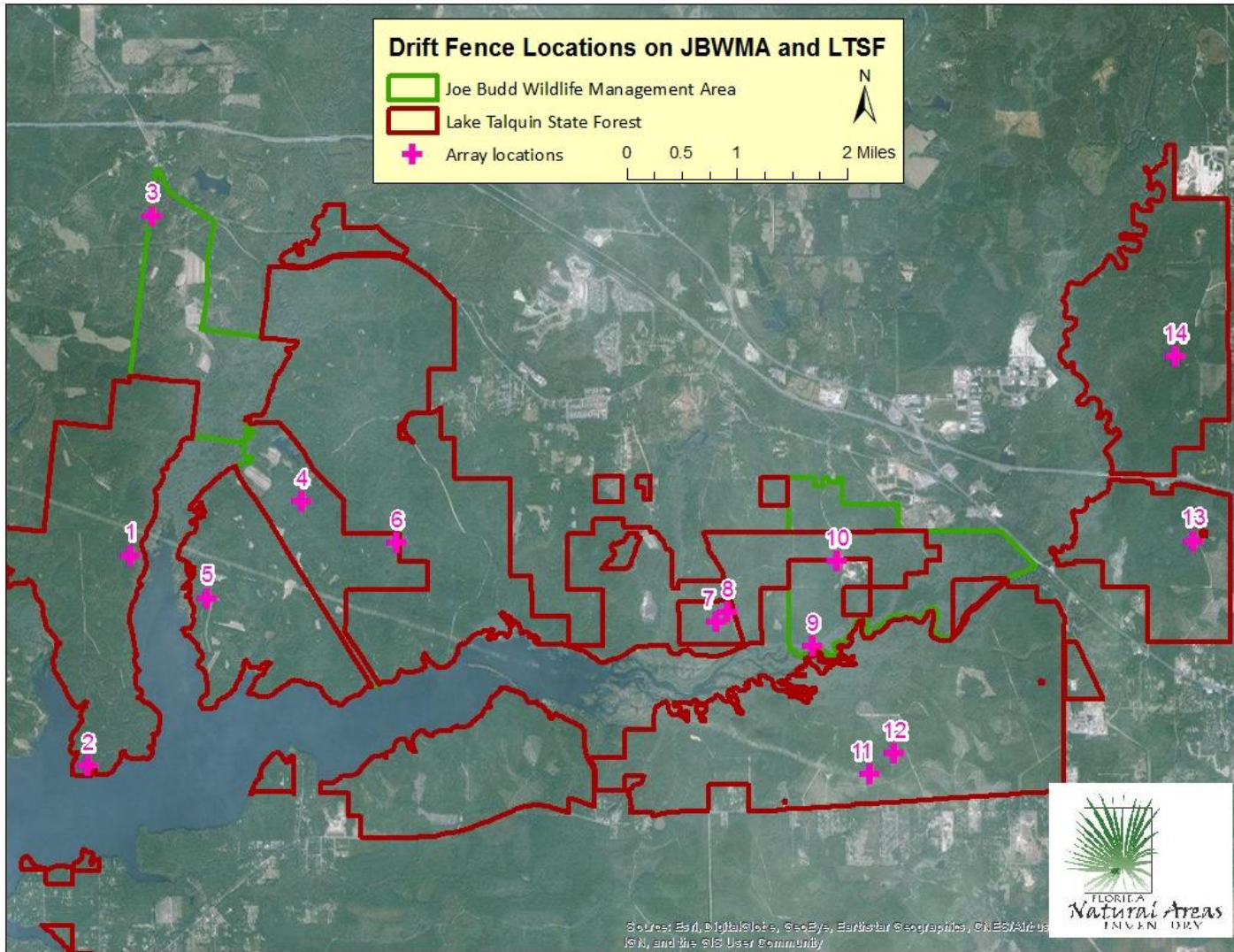


Figure 1. Drift fence locations on JBWMA and LTSF for the 2017-2018 FNAI animal survey.



Table 1. The geographic coordinates, arrangement, and the number of traps used at the 2017-2018 drift fence array sites on JBWMA and LTSF.

Array ID	Latitude	Longitude	Shape	No. of funnel traps	No. of box traps
#1	30.473959	-84.546209	T	6	1
#2	30.446457	-84.552165	T	6	1
#3	30.51876	-84.542835	T	6	1
#4	30.481323	-84.519906	Y	12	0
#5	30.468521	-84.53423	Y	12	0
#6	30.475921	-84.505467	Y	6	1
#7	30.465598	-84.456524	T	6	1
#8	30.466959	-84.454918	Y	12	0
#9	30.462458	-84.441917	T	12	0
#10	30.473692	-84.438305	T	12	0
#11	30.445719	-84.43327	T	6	1
#12	30.448429	-84.429542	Y	6	1
#13	30.476512	-84.383986	Y	12	0
#14	30.500764	-84.386895	T	12	0



Figure 2. Drift fence array 7 at Lake Talquin State Forest. Photographed on 27 November 2017 by Robert Gundy.



Figure 3. Drift fence array 13 at Lake Talquin State Forest. Photographed on 27 November 2017 by Robert Gundy.

Table 2. Habitat characteristics within 20 m of the JBWMA and LTSF 2017-2018 drift fence arrays.

Array	Natural Community	Pine B. A.	Non-pine B. A.	Fire Ant Mounds	Logs (>4" width)	Last Fire	Distance to Wetland (m)
1	Upland Pine	50	20	0	2	2-5 years	200
2	Upland Pine	110	0	0	0	<6 mos	125
3	Upland Hardwood Forest/Seepage Stream	10	130	0	13	>20 years	0
4	Upland Pine/Depression Marsh	40	0	0	3	<2 years	0
5	Upland Hardwood Forest	0	80	0	2	>20 years	100
6	Mesic Flatwoods	60	0	0	0	<2 years	1
7	Upland Pine	50	10	0	0	<6 mos	100
8	Upland Pine/Depression Marsh	50	0	0	4	<6 mos	0
9	Upland Hardwood Forest	70	30	0	11	>20 years	3
10	Wet Flatwoods	60	0	0	1	<2 years	85
11	Sandhill	30	0	0	0	<6 mos	150
12	Sandhill	50	0	0	5	<6 mos	300
13	Upland Pine	50	10	0	2	<2 years	20
14	Upland Mixed Woodland/Upland Pine	0	40	0	6	5-20 years	350

B.A. = basal area

Table 3. Vegetation structure within 20 m of JBWMA and LTSF 2017-2018 drift fence arrays.

Array	Canopy	Subcanopy	Tall Shrub	Short Shrub	Total Shrub	Herbaceous	Litter	Bare Soil
1	66-75%	16-25%	6-15%	26-35%	26-35%	46-55%	66-75%	<1%
2	66-75%	1-5%	<1%	16-25%	26-35%	36-45%	76-85%	<1%
3	86-95%	56-65%	<1%	6-15%	6-15%	56-65%	76-85%	<1%
4	16-25%	6-15%	<1%	76-85%	76-85%	6-15%	16-25%	<1%
5	76-85%	36-45%	6-15%	36-45%	46-55%	76-85%	46-55%	<1%
6	26-35%	6-15%	<1%	76-85%	76-85%	<1%	16-25%	<1%
7	26-35%	<1%	<1%	76-85%	76-85%	26-35%	6-15%	6-15%
8	26-35%	6-15%	6-15%	56-65%	56-65%	6-15%	26-35%	6-15%
9	76-85%	36-45%	6-15%	6-15%	16-25%	6-15%	86-95%	<1%
10	16-25%	<1%	<1%	86-95%	86-95%	6-15%	6-15%	<1%
11	16-25%	1-5%	<1%	6-15%	6-15%	6-15%	1-5%	76-85%
12	16-25%	16-25%	<1%	16-25%	16-25%	1-5%	6-15%	76-85%
13	36-45%	6-15%	<1%	56-65%	56-65%	1-5%	16-25%	<1%
14	86-95%	26-35%	<1%	36-45%	36-45%	1-5%	66-75%	<1%

## RESULTS

The drift fence arrays were sampled over 48 trap-nights during the following dates in 2017 and 2018: 26 September to 30 September; 2 October to 6 October; 9 October to 13 October; 16 October to 20 October; 30 October to 3 November; 27 November to 1 December; 19 February to 23 February; 19 March to 23 March; 9 April to 13 April; 1 May to 5 May; 7 May to 11 May; 14 May to 18 May.

Table 4 shows all of the amphibian species (n=23) and reptile species (n=38) on JBWMA and LTSF during the current survey. Overall, a total of 648 vertebrates belonging to 67 species were observed by all survey methods. Seven rare species were observed during the survey and are discussed in the Rare Species Notes section below. The only non-native species observed was the Cuban flat-headed frog (*Eleutherodactylus planirostris*). There were 15 amphibian and reptile species not captured in a funnel trap or box trap. Six species were encountered during the survey but not observed within 50 m of a drift fence array site. These were squirrel treefrog (*Hyla squirella*), Apalachicola dusky salamander (*Desmognathus apalachicola*), three-lined salamander (*Eurycea guttolineata*), eastern diamond-backed rattlesnake (*Crotalus adamanteus*), plain-bellied watersnake (*Nerodia erythrogaster*), and Florida softshell turtle (*Apalone ferox*).

Table 5 shows the number of individual vertebrates captured or observed within 50 m of each drift fence array site. A species marked 'X' in Table 5 was not captured in a funnel or box trap, but was observed incidentally within 50 m, under cover boards, in fish traps or in PVC pipe traps. There were 484 individual vertebrate captures in funnel traps or box traps which included 18 amphibian species (n=218), 28 reptile species (n=259), two bird species (n=3) and three mammal species (n=4). The only non-native species captured was the Cuban flat-headed frog (*Eleutherodactylus planirostris*). Invertebrate captures were not tallied.

The vertebrate species richness observed at each drift fence array site ranged from 6 species to 20 species. Array #8, array #4, and array #9 had the highest vertebrate species richness recorded; 20, 19 and 19 species, respectively. Array #12 had the lowest vertebrate species richness recorded with 6 species. The total number of vertebrate captures at each drift fence array site ranged from 9 to 77 individuals. The three array sites with the most individual vertebrates captured were array #8 (n=77), array #4 (n=62) and array #5 (n=51). The site with the lowest number of individual vertebrates was array #12 with 9 individuals.

The most ubiquitous amphibian species were eastern spadefoot (*Scaphiopus holbrookii*) and southern cricket frog (*Acris gryllus*). Southern cricket frog was observed at 8 array sites: numbers 1, 4, 5, 8, 9, 10, 11, and 14. Eastern spadefoot was observed at 7 array sites: numbers 1, 3, 4, 5, 7, 9, and 14. The most ubiquitous reptile species was the North American racer (*Coluber constrictor*). North American racer was found at every drift fence array site except site number 12. The most commonly observed amphibian species were river frog (*Lithobates hecksheri*), southern leopard frog (*Lithobates sphenoccephalus*) and southern cricket frog (*Acris gryllus*) with 38, 36 and 34 encounters, respectively. The most commonly observed reptile species were eastern fence lizard (*Sceloporus undulatus*) and black racer (*Coluber constrictor*) with 63 and 42 encounters, respectively. Nine species of amphibians and reptiles were represented by only a single encounter. These were four-toed salamander (*Hemidactylium scutatum*), two-toed amphiuma (*Amphiuma means*), scarlet kingsnake (*Lampropeltis elapsoides*), plain-bellied watersnake (*Nerodia erythrogaster*), rough greensnake (*Opheodrys aestivus*), common gartersnake (*Thamnophis sirtalis*), chicken turtle (*Deirochelys reticularia*), eastern mud turtle (*Kinosternon subrubrum*), and striped musk turtle (*Sternotherus odoratus*).

Table 6 shows the number of captures for each species by natural community type. Because some arrays were placed along ecotones, captures are attributed to different natural communities based on where the individual trap was located as opposed to attributing an entire array to one natural community type. The upland pine community had the most vertebrate captures with 202 individuals of 38 species. This community was represented by six different drift fence array sites, the most of any natural community. No vertebrates were captured at the two funnel traps placed in seepage stream. Eight individual vertebrates

belonging to seven species were captured in floodplain swamp, also represented by just two funnel traps.

One amphibian species, four-toed salamander (*Hemidactylium scutatum*) and zero reptile species that are considered rare were captured in box or funnel traps. Additionally, one amphibian species and four reptile species that are considered rare were encountered by other methods. Apalachicola dusky salamanders (*Desmognathus apalachicola*) were observed by flipping logs and debris in steephead ravines. Gopher tortoise (*Gopherus polyphemus*) burrows were observed while driving along sandy roads. One Alligator snapping turtle (*Macrochelys temminckii*) was captured in a fish trap along the northern shore of Lake Talquin near array #9. One river cooter (*Pseudemys concinna*) was visually observed basking on a log near array #9. One eastern diamond-backed rattlesnake (*Crotalus adamanteus*) was observed crossing a dirt road along the Highway 20 Tract just east of the cemetery.

Table 4. The amphibian and reptile species observed on JBWMA and LTSF during the 2017-2018 FNAI animal survey.

TAXONOMY	COMMON NAMES
<b>AMPHIBIA</b>	
<b>ORDER CAUDATA</b>	
AMBYSTOMATIDAE	
<i>Ambystoma talpoideum</i>	Mole Salamander
AMPHIUMIDAE	
<i>Amphiuma means</i>	Two-toed Amphiuma
PLETHODONTIDAE	
<i>Desmognathus apalachicola</i>	Apalachicola Dusky Salamander
<i>Eurycea cirrigera</i>	Southern Two-lined Salamander
<i>Eurycea guttolineata</i>	Three-lined Salamander
<i>Eurycea quadridigitata</i>	Dwarf Salamander
<i>Hemidactylum scutatum</i>	Four-toed Salamander
<i>Plethodon grobmani</i>	Southeastern Slimy Salamander
SALAMANDRIDAE	
<i>Notophthalmus viridescens</i>	Eastern Newt
<b>ORDER ANURA</b>	
BUFONIDAE	
<i>Anaxyrus terrestris</i>	Southern Toad
ELEUTHERODACTYLIDAE	
<i>Eleutherodactylus planirostris</i>	Cuban Flat-headed Frog (non-native)
HYLIDAE	
<i>Acris gryllus</i>	Southern Cricket Frog
<i>Hyla cinerea</i>	Green Treefrog
<i>Hyla femoralis</i>	Pine Woods Treefrog
<i>Hyla squirella</i>	Squirrel Treefrog
<i>Pseudacris crucifer</i>	Spring Peeper
<i>Pseudacris ocularis</i>	Little Grass Frog
MICROHYLIDAE	
<i>Gastrophryne carolinensis</i>	Eastern Narrow-mouthed Frog
RANIDAE	
<i>Lithobates clamitans</i>	Green Frog
<i>Lithobates grylio</i>	Pig Frog
<i>Lithobates hecksheri</i>	River Frog



<b>TAXONOMY</b>	<b>COMMON NAMES</b>
<i>Lithobates sphenoccephalus</i>	Southern Leopard Frog
SCAPHIOPIDAE	
<i>Scaphiopus holbrookii</i>	Eastern Spadefoot
<b>REPTILIA</b>	
ORDER SQUAMATA	
SUBORDER SAURIA	
ANGUIDAE	
<i>Ophisaurus ventralis</i>	Eastern Glass Lizard
PHRYNOSOMATIDAE	
<i>Sceloporus undulatus</i>	Eastern Fence Lizard
POLYCHROTIDAE	
<i>Anolis carolinensis</i>	Green Anole
SCINCIDAE	
<i>Plestiodon egregius</i>	Mole Skink
<i>Plestiodon fasciatus</i>	Common Five-lined Skink
<i>Plestiodon inexpectatus</i>	Southeastern Five-lined Skink
<i>Plestiodon laticeps</i>	Broad-headed Skink
<i>Scincella lateralis</i>	Little Brown Skink
TEIIDAE	
<i>Aspidoscelis sexlineata</i>	Six-lined Racerunner
SUBORDER SERPENTES	
COLUBRIDAE	
<i>Cemophora coccinea</i>	Scarletsnake
<i>Coluber constrictor</i>	North American Racer
<i>Coluber flagellum</i>	Eastern Coachwhip
<i>Diadophis punctatus</i>	Ring-necked Snake
<i>Farancia abacura</i>	Red-bellied Mudsnake
<i>Lampropeltis elapsoides</i>	Scarlet Kingsnake
<i>Nerodia erythrogaster</i>	Plain-bellied Watersnake
<i>Nerodia fasciata</i>	Southern Watersnake
<i>Opheodrys aestivus</i>	Rough Greensnake
<i>Pantherophis guttatus</i>	Red Cornsnake
<i>Pantherophis alleghaniensis</i>	Eastern Ratsnake
<i>Storeria occipitomaculata</i>	Red-bellied Snake



<b>TAXONOMY</b>	<b>COMMON NAMES</b>
<i>Thamnophis sauritus</i>	Eastern Ribbonsnake
<i>Thamnophis sirtalis</i>	Common Gartersnake
<i>Virginia valeriae</i>	Smooth Earth Snake
CROTALIDAE	
<i>Agkistrodon conanti</i>	Florida Cottonmouth
<i>Crotalus adamanteus</i>	Eastern Diamond-backed Rattlesnake
<i>Sistrurus miliarius</i>	Pygmy Rattlesnake
ELAPIDAE	
<i>Micrurus fulvius</i>	Harlequin Coral Snake
ORDER TESTUDINES	
CHELYDRIDAE	
<i>Macrochelys temminckii</i>	Alligator Snapping Turtle
EMYDIDAE	
<i>Deirochelys reticularia</i>	Chicken Turtle
<i>Pseudemys concinna</i>	River Cooter
<i>Terrapene carolina</i>	Eastern Box Turtle
<i>Trachemys scripta scripta</i>	Yellow-bellied Slider
KINOSTERNIDAE	
<i>Kinosternon subrubrum</i>	Eastern Mud Turtle
<i>Sternotherus minor</i>	Loggerhead Musk Turtle
<i>Sternotherus odoratus</i>	Common Musk Turtle
TESTUDINIDAE	
<i>Gopherus polyphemus</i>	Gopher Tortoise
TRIONICHIDAE	
<i>Apalone ferox</i>	Florida Softshell

Table 5. The number of captures of each vertebrate species by drift fence array site during the 2017-2018 FNAI animal survey at JBWMA and LTSF.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Total
<b>AMPHIBIA</b>															
<b>ANURA</b>															
<i>Acris gryllus</i>	1			3	5			12	4	3	1			1	<b>30</b>
<i>Anaxyrus terrestris</i>								3	1	2			1		<b>7</b>
<i>Eleutherodactylus planirostris</i>			18						1		4		2	3	<b>28</b>
<i>Gastrophryne carolinensis</i>		1		3	3			2						1	<b>10</b>
<i>Hyla cinerea</i>							1		1						<b>2</b>
<i>Hyla femoralis</i>				1		X							2		<b>3</b>
<i>Hyla squirella</i>															<b>0</b>
<i>Lithobates clamitans</i>			1		1										<b>2</b>
<i>Lithobates grylio</i>													1		<b>1</b>
<i>Lithobates heckscheri</i>	3	1		25	4	3							1		<b>37</b>
<i>Lithobates sphenoccephalus</i>				11		3	1	13	1				3	3	<b>35</b>
<i>Pseudacris crucifer</i>				1	4										<b>5</b>
<i>Pseudacris ocularis</i>				X		X									<b>0</b>
<i>Scaphiopus holbrookii</i>	2		1	1	1		1		2					2	<b>10</b>
<b>CAUDATA</b>															
<i>Ambystoma talpoideum</i>				1			1	15						1	<b>18</b>
<i>Amphiuma means</i>													X		<b>0</b>
<i>Desmognathus apalachicola</i>															<b>0</b>
<i>Eurycea cirrigera</i>			3												<b>3</b>
<i>Eurycea guttolineata</i>															<b>0</b>
<i>Eurycea quadridigitata</i>	2							2							<b>4</b>
<i>Hemidactylium scutatum</i>					1										<b>1</b>
<i>Notophthalmus viridescens</i>				3	16			X							<b>19</b>
<i>Plethodon grobmani</i>					1				2						<b>3</b>
<b>REPTILIA</b>															
<b>SAURIA</b>															
<i>Anolis carolinensis</i>	2	3	1	1	3	X		X		2	2			4	<b>18</b>

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Total
<i>Aspidoscelis sexlineata</i>				2						5	4	2	8	4	25
<i>Ophisaurus ventralis</i>						1		1							2
<i>Plestiodon egregius</i>												2			2
<i>Plestiodon fasciatus</i>	4	X	1		1	1				4				3	14
<i>Plestiodon inexpectatus</i>						1	2	2							5
<i>Plestiodon laticeps</i>	1		1	1	1	5	3		1	2				3	18
<i>Sceloporus undulatus</i>				2			2	5		2	4	2	11	4	32
<i>Scincella lateralis</i>	1	2				1							1		5
SERPENTES															
<i>Agkistrodon conanti</i>								1	1				1	1	4
<i>Cemophora coccinea</i>	3						1	6		2	1	1	4	8	26
<i>Coluber constrictor</i>	2	1	3	3	3	2	2	6	3	1	3		3	2	34
<i>Coluber flagellum</i>							1				2	1			4
<i>Crotalus adamanteus</i>															0
<i>Diadophis punctatus</i>		1	1		1			1	4					1	9
<i>Farancia abacura</i>													2		2
<i>Lampropeltis elapsoides</i>		X													0
<i>Micrurus fulvius</i>						1									1
<i>Nerodia erythrogaster</i>															0
<i>Nerodia fasciata</i>				1		1							1		3
<i>Ophedrys aestivus</i>				1											1
<i>Pantherophis guttatus</i>		2						2		1					5
<i>Pantherophis alleghaniensis</i>					2				5					1	8
<i>Sistrurus miliarius</i>				2		2	1								5
<i>Storeria occipitomaculata</i>	2	3			2			1	2						10
<i>Thamnophis sauritus</i>								3	1				3		7
<i>Thamnophis sirtalis</i>														1	1
<i>Virginia valeriae</i>							2		6		2	1	2		13
TESTUDINES															
<i>Apalone ferox</i>															0
<i>Deirochelys reticularia</i>								1							1
<i>Gopherus polyphemus</i>											X				0
<i>Kinosternon subrubrum</i>				X											0
<i>Macrochelys temminckii</i>									X						0
<i>Pseudemys concinna</i>									X						0

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Total
<i>Sternotherus minor</i>									X						0
<i>Sternotherus odoratus</i>													X		0
<i>Terrapene carolina</i>					1	X				1				1	3
<i>Trachemys scripta scripta</i>					1										1
Actinopterygii															
<i>Esox sp.</i>									X				X		
<i>Gambusia sp.</i>								X	X						
<i>Lepisosteus platyrhincus</i>									X						
<i>Lepomis gulosus</i>									X						
<i>Lepomis macrochirus</i>									X						
<i>Notemigonus crysoleucas</i>									X						
AVES															
PASSERIFORMES															
<i>Thryothorus ludovicianus</i>	1						1								2
<i>Troglodytes aedon</i>							1								1
MAMMALIA															
DIDELPHIMORPHIA															
<i>Didelphis virginiana</i>			1				1								2
EULIPOTYPHLA															
<i>Blarina sp.</i>									X						0
RODENTIA															
<i>Sigmodon hispidus</i>								1							1
<i>Peromyscus gossypinus</i>		1													1
<b>Total Vertebrate Captures</b>	<b>24</b>	<b>15</b>	<b>31</b>	<b>62</b>	<b>51</b>	<b>21</b>	<b>21</b>	<b>77</b>	<b>35</b>	<b>25</b>	<b>23</b>	<b>9</b>	<b>46</b>	<b>44</b>	<b>484</b>
<b>Species Richness</b>	<b>12</b>	<b>11</b>	<b>10</b>	<b>19</b>	<b>18</b>	<b>15</b>	<b>15</b>	<b>20</b>	<b>19</b>	<b>11</b>	<b>10</b>	<b>6</b>	<b>18</b>	<b>18</b>	<b>61</b>

Table 6. The number of captures of each vertebrate species by natural community type during the 2017-2018 FNAI drift fence animal survey of JBWMA and LTSF.

Habitat Type	Depression Marsh	Floodplain Swamp	Seepage Stream	Mesic Flatwoods	Wet Flatwoods	Upland Hardwood Forest	Upland Mixed Woodland	Upland Pine	Sandhill
Number of Array Sites	[4]	[1]	[1]	[1]	[1]	[3]	[1]	[6]	[2]
<b>AMPHIBIA</b>									
ANURA									
<i>Acris gryllus</i>	6	1			1	8		11	1
<i>Anaxyrus terrestris</i>	1				2	1		3	
<i>Eleutherodactylus planirostris</i>						19	2	3	4
<i>Gastrophryne carolinensis</i>						3	1	6	
<i>Hyla cinerea</i>						1		1	
<i>Hyla femoralis</i>								2	
<i>Hyla squirella</i>									
<i>Lithobates clamitans</i>						2			
<i>Lithobates grylio</i>								1	
<i>Lithobates heckscheri</i>	14			2		4		16	
<i>Lithobates sphenoccephalus</i>	4			3		1	3	24	
<i>Pseudacris crucifer</i>	1					4			
<i>Pseudacris ocularis</i>									
<i>Scaphiopus holbrookii</i>		1				3	2	3	
<b>CAUDATA</b>									
<i>Ambystoma talpoideum</i>	5						1	12	
<i>Amphiuma means</i>									
<i>Desmognathus apalachicola</i>									

Habitat Type	Depression Marsh	Floodplain Swamp	Seepage Stream	Mesic Flatwoods	Wet Flatwoods	Upland Hardwood Forest	Upland Mixed Woodland	Upland Pine	Sandhill
<i>Eurycea cirrigera</i>						3			
<i>Eurycea guttolineata</i>									
<i>Eurycea quadridigitata</i>	2							2	
<i>Hemidactylum scutatum</i>						1			
<i>Notophthalmus viridescens</i>						19			
<i>Plethodon grobmani</i>		1				2			
<b>REPTILIA</b>									
<b>SAURIA</b>									
<i>Anolis carolinensis</i>					2	4	2	7	2
<i>Aspidoscelis sexlineata</i>					5		4	10	6
<i>Ophisaurus ventralis</i>	1								
<i>Plestiodon egregius</i>									2
<i>Plestiodon fasciatus</i>				1	4	2	3	4	
<i>Plestiodon inexpectatus</i>				1				4	
<i>Plestiodon laticeps</i>				4	2	3	3	6	
<i>Sceloporus undulatus</i>	2				2		3	18	6
<i>Scincella lateralis</i>				1				4	
<b>SERPENTES</b>									
<i>Agkistrodon conanti</i>		1					1	2	
<i>Cemophora coccinea</i>					2		5	17	2
<i>Coluber constrictor</i>	1	2		2	1	6	1	17	3
<i>Coluber flagellum</i>								1	3
<i>Crotalus adamanteus</i>									
<i>Diadophis punctatus</i>	1	1				5	1	1	

Habitat Type	Depression Marsh	Floodplain Swamp	Seepage Stream	Mesic Flatwoods	Wet Flatwoods	Upland Hardwood Forest	Upland Mixed Woodland	Upland Pine	Sandhill
<i>Farancia abacura</i>								2	
<i>Lampropeltis elapsoides</i>									
<i>Micrurus fulvius</i>				1					
<i>Nerodia erythrogaster</i>									
<i>Nerodia fasciata</i>	1							1	
<i>Opheodrys aestivus</i>								1	
<i>Pantherophis guttatus</i>	1				1			3	
<i>Pantherophis alleghaniensis</i>		1				6	1		
<i>Sistrurus miliarius</i>	1			2				2	
<i>Storeria occipitomaculata</i>	1					3		4	
<i>Thamnophis sauritus</i>	3					1		3	
<i>Thamnophis sirtalis</i>							1		
<i>Virginia valeriae</i>						6		4	3
TESTUDINES									
<i>Apalone ferox</i>									
<i>Deirochelys reticularia</i>	1								
<i>Gopherus polyphemus</i>									
<i>Kinosternon subrubrum</i>									
<i>Macrochelys temminckii</i>									
<i>Pseudemys concinna</i>									
<i>Sternotherus minor</i>									
<i>Sternotherus odoratus</i>									
<i>Terrapene carolina</i>					1	1		1	
<i>Trachemys scripta scripta</i>						1			

Habitat Type	Depression Marsh	Floodplain Swamp	Seepage Stream	Mesic Flatwoods	Wet Flatwoods	Upland Hardwood Forest	Upland Mixed Woodland	Upland Pine	Sandhill
<b>AVES</b>									
PASSERIFORMES									
<i>Thryothorus ludovicianus</i>								2	
<i>Troglodytes aedon</i>								1	
<b>MAMMALIA</b>									
DIDELPHIMORPHIA									
<i>Didelphis virginiana</i>						1		1	
EULIPOTYPHLA									
<i>Blarina sp.</i>									
RODENTIA									
<i>Sigmodon hispidus</i>								1	
<i>Peromyscus gossypinus</i>								1	
<b>Total Vertebrate Captures</b>	<b>46</b>	<b>8</b>	<b>0</b>	<b>17</b>	<b>23</b>	<b>110</b>	<b>34</b>	<b>202</b>	<b>32</b>
<b>Species Richness</b>	<b>17</b>	<b>7</b>	<b>0</b>	<b>9</b>	<b>11</b>	<b>26</b>	<b>16</b>	<b>38</b>	<b>10</b>



## DISCUSSION

The natural communities on JBWMA and LTSF have the potential to support several rare amphibian and reptile species that were not observed during the 2017-2018 drift fence survey. Examples include ornate chorus frog (*Pseudacris ornata*), one-toed amphiuma (*Amphiuma pholeter*), Holbrook's dusky salamander (*Desmognathus auriculatus*), Barbour's map turtle (*Graptemys barbouri*), eastern indigo snake (*Drymarchon couperi*), pine snake (*Pituophis melanoleucus*), common kingsnake (*Lampropeltis getula*), mole kingsnake (*Lampropeltis rhombomaculata*), copperhead (*Agkistrodon contortrix*), American alligator (*Alligator mississippiensis*), spiny softshell turtle (*Apalone spinifera*), southern hognose snake (*Heterodon simus*), and southeastern crowned snake (*Tantilla coronata*). FNAI has records of occurrences of each of these species within 30 km of JBWMA and LTSF with the exception of southeastern crowned snake. The only record for southeastern crowned snake in the FNAI database is from Apalachee Wildlife Management Area in Jackson County. There are also species that are not considered rare that have the potential to be present on JBWMA and LTSF, but were not encountered during the survey. These include dwarf siren (*Pseudobranchius striatus*), lesser siren (*Siren intermedia*), greater siren (*Siren lacertina*), spotted salamander (*Ambystoma maculatum*), marbled salamander (*Ambystoma opacum*), southern dusky salamander (*Desmognathus auriculatus*), mud salamander (*Pseudotriton montanus*), red salamander (*Pseudotriton ruber*), bird-voiced treefrog (*Hyla avivoca*), barking treefrog (*Hyla gratiosa*), Cope's gray treefrog (*Hyla chrysoscelis*), southern chorus frog (*Pseudacris nigrita*), northern cricket frog (*Acris crepitans*), Fowler's toad (*Anaxyrus fowleri*), oak toad (*Anaxyrus quercicus*), black swampsnake (*Seminatrix pygaea*), green watersnake (*Nerodia floridana*), brown watersnake (*Nerodia taxispilota*), glossy swampsnake (*Regina rigida*), southern hognose snake (*Heterodon simus*), eastern hognose snake (*Heterodon platyrhinos*), rainbow snake (*Farancia erytrogramma*), Dekay's brown snake (*Storeria dekayi*), slender glass lizard (*Ophisaurus attenuatus*), mimic glass lizard (*Ophisaurus mimicus*), Florida cooter (*Pseudemys floridana*), and striped mud turtle (*Kinosternon baurii*).

On private property along Magnolia Farms Road on 19 October, 2017 a subadult eastern hognosed snake (*Heterodon platyrhinos*) was observed being killed and eaten by an immature red-headed woodpecker (*Melanerpes erythrocephalus*), suggesting that this species could be present on the study site. In a conversation with Clint Peters he mentioned that FWC employee Pierson Hill found ornate chorus frogs breeding in the depression marsh where array #8 was installed. Multiple dipnet survey efforts in fall, winter and spring by the author failed to detect this species. Pierson Hill (pers. comm.) has also found multiple eastern diamond-backed rattlesnakes during the time of this survey, suggesting that species is more common than the results of this survey might suggest. It is known that American alligators are present throughout

Lake Talquin and the Ochlockonee River. Limited time surveying open water could explain the lack of American alligator detection during this survey. More intensive aquatic survey efforts could detect many of the possible species listed above. Aquatic amphibians and reptiles are difficult to sample due to secretive habits and difficulty in trapping these species. Some species, such as bird-voiced treefrog, have patchy distributions and may be naturally absent from the study site. All cricket frogs encountered during this survey were listed as southern cricket frog (*Acris gryllus*), although several individuals captured at array #5 seemed to have characteristics of eastern cricket frog (*Acris crepitans*). These two species are particularly difficult to differentiate in areas where they are sympatric. Photos of one of these individuals are available in the supplementary material supplied with this report.

The author noted the quantity of little brown skink (*Scincella lateralis*) was unusually low. The number of little brown skinks was restricted to 5 encounters. In contrast, FNAI drift fence surveys at Apalachee Wildlife Management Area, Andrews Wildlife Management Area, Box R Wildlife Management Area and Triple N Ranch Wildlife Management Area had 226, 70, 39 and 31, respectively.

## RECOMMENDATIONS

At the request of FWC recommendations on management specific to JBWMA and LTSF are made here. The following are recommendations that may provide improvements to the habitats found on JBWMA and LTSF or improve conditions for most amphibian and reptile populations as well as entire natural communities. Several of the following recommendations are activities already utilized by FWC and are merely reiterations. The Partners in Amphibian and Reptile Conservation (PARC) provide an excellent technical bulletin describing habitat management guidelines for amphibians and reptiles of the southeast (Bailey et al. 2006) that should be utilized by all land managers.

Use prescribed fire on a frequency, seasonality, and intensity for each natural community that mimics what may have naturally occurred in pre-Columbian times. See FNAI (2010) for recommended burn period and fire frequency for each natural community type. Woody encroachment and organic sediment deposition, resulting from fire suppression or dormant season prescribed fires, has been shown to negatively affect pond breeding amphibians (Means 2008). Woody shrub growth is promoted by dormant-season fires (Jacqmain et al 1999) whereas growing season fires tend to promote regrowth of herbaceous plants. Once woody shrubs have established, growing season fire alone is not sufficient to reduce densities of

woody shrubs (Drewa et al 2002). However, dormant season burns followed by growing season burns can restore wetlands (Gorman et al 2009). Substituting mechanical removal with hand tools is less effective at reducing canopy cover than fire and does not necessarily increase the emergent herbaceous vegetation important for pond breeding amphibians. Burning through wetlands during dry hydroperiods can reduce organic sedimentation and increase emergent herbaceous (Gorman et al 2013). Seepage and spring-run streams, where the rare Apalachicola Dusky Salamander was found during this study, can be threatened by application of fertilizers and biocides, and deforestation of the surrounding uplands (FNAI 2010). The use of herbicides has been shown to increase woody species and have negative effects on reptile and bird assemblages (Steen et al 2013a,b).

Logging of upland communities, such as sandhill, invites weedy species to colonize the areas disturbed by heavy equipment. Mowing and burning can be effective at partially restoring sandhill. Hand removal of subcanopy hardwoods with chainsaws then quickly following with fire has been shown to be effective at sandhill restoration (Rickey et al 2007). Reptile and bird assemblages have shown the greatest positive response to fire-only management methods. While the more expensive mechanical removal of hardwoods can have similarly positive short-term effects on reptile assemblages, there may be no long term benefit over management solely focused on fire as a restoration technique (Steen et al 2013b).

Damage from wild boar (*Sus scrofa*) was observed at multiple locations throughout the study site. A small wild boar group was observed causing damage to a floodplain swamp and steephead ravine where the rare Apalachicola Dusky Salamander was found. Wild boar have been known to cause damage to amphibian breeding habitats (Jones et al 2017), predate native animals including reptile and amphibians (Jolley et al 2010), and have been implicated in amphibian declines (Maerz 2015). Hunting, which can provide recreational opportunities and conservation funding, is one way to control hogs. Trapping with cage- or corral-style metal traps is considered the most effective method (Giuliano 2010).

During the survey period three gopher tortoise burrows were observed to have been damaged by recent use of heavy agricultural equipment. Care should be taken to avoid any negative effects for this federally threatened species. FWC (2012) discusses management techniques and precautions to be taken to avoid damage to gopher tortoises and their burrows.

## RARE SPECIES NOTES

### Eastern Diamond-backed Rattlesnake – *Crotalus adamanteus*

Description: A large, heavy-bodied snake with a bold pattern of dark brown to black diamonds bordered by cream to yellow scales, running the length of the back; ground color tan to dark brown, tail usually lighter than body but with dark rings. Adults usually 4 - 6 feet (122 - 183 cm), newborn 12 - 15 inches (30 - 38 cm) (Powell et al 2016).

Habitat and Range: Broad range of habitats but most commonly associated with pines, especially longleaf, in sandhills, flatwoods, upland pine, and scrub. Also found in old fields, floodplains, hardwood hammocks, dry prairie, and coastal strand; can cross salt water to reach islands. Commonly uses gopher tortoise burrows and root holes for refuge. Found throughout Florida and much of the Atlantic and Gulf Coastal Plains.

Rarity Status: (G4S3; tracked by FNAI; not state listed; federal candidate species). There are currently 380 occurrences of eastern diamond-backed rattlesnake in the FNAI database.

Management Recommendations: Preserve large tracts of appropriate, unfragmented habitat rangewide. Avoid construction of roads within occupied habitats, and close unnecessary ones. Species is compatible with ecologically-sensitive forestry practices. Educate landowners, managers, and outdoorsmen to ecological value of species.



Figure 4. Eastern diamond-backed rattlesnake (*Crotalus adamanteus*) photographed in situ on 18 May 2018 by Robert Gundy



**Apalachicola Dusky Salamander – *Desmognathus apalachicolae***

Description: A small salamander up to 4 inches (10 cm) in total length. Dorsal color varying shades of brown, sometimes with rusty diamond-like blotches. Base of tail round with tip becoming laterally compressed. Belly is pale and splotchy (Powell et al 2016).

Habitat and Range: Restricted to steephead ravines along the Apalachicola, Ochlockonee and Chipola River drainages.

Rarity Status: (G4S2S3; tracked by FNAI; not state listed; not federally listed). There are currently 33 occurrences in the FNAI database.

Management Recommendations: Preserve seepage and spring-run streams. Avoid damage and pollution to surrounding uplands.



Figure 5. Apalachicola dusky salamander (*Desmognathus apalachicolae*) photographed on 19 February 2018 by Robert Gundy

### Gopher Tortoise – *Gopherus polyphemus*

Description: A medium-sized turtle to 10 in. (25 cm) fully adapted for life on land. Upper shell brown and relatively flat above, lower shell yellowish and without hinge. Skin brown to dark gray. Forelimbs greatly expanded for digging. Hind limbs reduced, stumpy, lacking any form of webbing between toes.

Habitat and Range: Typically found in dry upland habitats, including sandhills, scrub, xeric oak hammock, and dry pine flatwoods; also commonly uses disturbed habitats. Gopher tortoises occupy the entirety of Florida except the Everglades and Florida Keys. Outside of Florida they occupy southern South Carolina southward through lower Georgia and Florida and westward through southern Alabama, Mississippi and extreme southeastern Louisiana.

Rarity Status: (G3S3; tracked by FNAI; state threatened; federal candidate species). There are currently 1,390 occurrences in the FNAI database.

Management Recommendations: Large undivided tracts of upland habitat need to be managed with a goal of maintaining native vegetative conditions. Because of the risk of introducing tortoises infected with respiratory disease to uncontaminated populations, tortoises should only be relocated under strictly controlled programs. Avoid damage to gopher tortoise burrows during forestry activities.



Figure 6. Gopher tortoise (*Gopherus polyphemus*) photographed on Willow Oak Plantation on 12 September 2013 by Rebecca Zeroth



### Four-toed Salamander – *Hemidactylium scutatum*

Description: A small salamander up to 3.5 inches (9 cm) in total length. Dorsal color rufous to brown. Base of tail has a strong constriction. All four legs only have four toes on each foot. Belly is white with black spots (Powell et al 2016).

Habitat and Range: In Florida, found in seepage streams with ample *Sphagnum* moss. They occur in Florida in two discrete patches. One in Eglin Air Force Base and another between the Apalachicola and Ochlockonee Rivers. Outside Florida it is found from Nova Scotia west to Minnesota and south to the Gulf coast in Louisiana and the Florida panhandle. Their distribution is patchy and discontinuous west of the Appalachians and are absent from the coastal plain east of the Piedmonts.

Rarity Status: (G5S2; tracked by FNAI; not state listed; not federally listed). There are currently 12 occurrences in the FNAI database.

Management Recommendations: Preserve seepage and spring-run streams. Avoid damage and pollution to surrounding uplands.



Figure 7. Four-toed salamander (*Hemidactylium scutatum*) photographed on 20 March 2018 by Robert Gundy

*Alligator Snapping Turtle – Macrochelys temminckii*

Description: Largest freshwater turtle in North America. Carapace with three prominent dorsal keels. Head large with a strongly curved beak (Powell et al 2016).

Habitat and Range: In Florida, mostly restricted to deep rivers. This species occurs from the Wacissa River west into eastern Texas.

Rarity Status: (G3G4S3; tracked by FNAI; federal review species; state species of special concern). There are currently 21 occurrences in the FNAI database.

Management Recommendations: Protect river water quality, including surrounding uplands.



Figure 8. Alligator snapping turtle (*Macrochelys temminckii*) photographed on 11 April 2018 by Robert Gundy



Suwannee River Cooter – *Pseudemys concinna suwanniensis*

Description: A medium-sized turtle with a carapace length up to 14 inches (33 cm). Five light stripes between the eyes with no hairpins. Light C-shaped marks on second row of scutes (Powell et al 2016).

Habitat and Range: Found in rivers, streams and resulting reservoirs. From Maryland south to Florida and west to eastern Oklahoma. In Florida, this subspecies is found east of the Ochlockonee River as far south as Manatee County.

Rarity Status: (G5T3S3; tracked by FNAI; not federally listed; not state listed). There are currently 26 occurrences in the FNAI database.

Management Recommendations: Protect river water quality, including surrounding uplands.



Figure 9. River cooter (*Pseudemys concinna*) photographed on 23 September 2002 by Dale Jackson. Not photographed at study site.

### Hairy Woodpecker – *Picoides villosus*

Description: A medium-sized woodpecker about 9 inches (23 cm) long. Black crown, white above eye with black and eye and moustachial stripes that connect to upperparts. Belly is plain white. Outer tail feathers white without black spotting or barring. Bill approximately the same length as head.

Habitat and Range: Lives in mature mixed hardwood forests and more developed areas with mature shade trees. In Florida, occupies pine forests also. Ranges throughout the U.S. and Canada with gaps in arid areas of the country. Also in Central America and the Bahamas (Jackson et al 2002).

Rarity Status: (G5S3; tracked by FNAI; not federally listed; not state listed). There are currently 25 occurrences in the FNAI database.

Management Recommendations: Maintain high quality forest structure in large tracts. Do not remove dead snags.



Figure 10. Hairy woodpecker (*Picoides villosus*) photographed on 1 July 2012 by Jake Scott. Not photographed at study site.

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