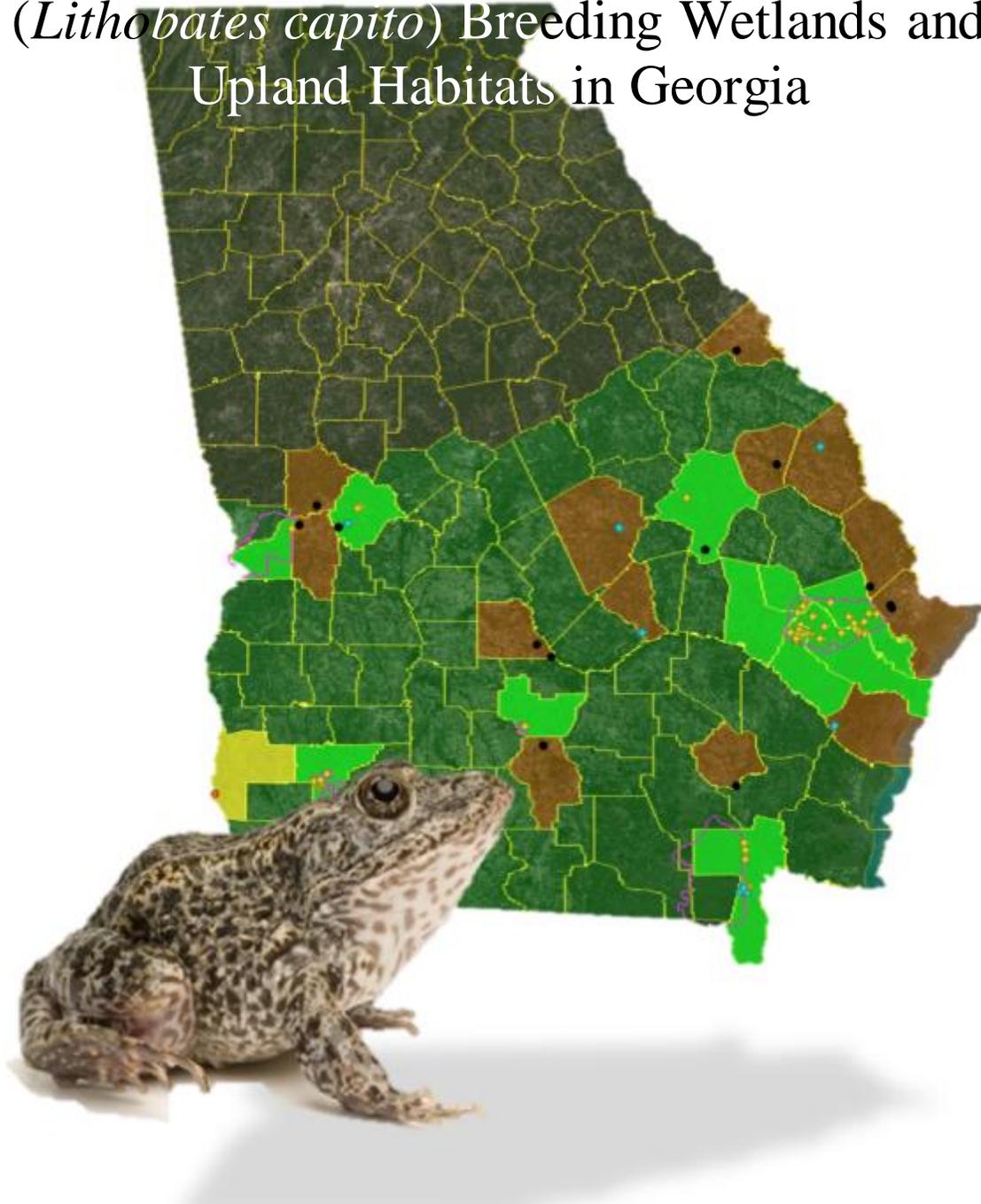


Status Assessment of Known Gopher Frog (*Lithobates capito*) Breeding Wetlands and Upland Habitats in Georgia



A Final Report to the Georgia Department of
Natural Resources

Mrs. Vanessa Kinney Terrell
Dr. John C. Maerz

Final Performance Report

State: Georgia

Grant No.:

Grant Title: Statewide Imperiled Species

Grant Duration: 2 years

Start Date: July 15, 2013

End Date: July 31, 2015

Period Covering Report: Final Report

Project Costs:

Federal:

State:

Total: \$4,500

Study/Project Title: Status assessment of known Gopher Frog (*Lithobates capito*) breeding wetlands and upland habitats in Georgia.

GPRA Goals: N/A

***Deviations:** Several of the Gopher frog sites that are not located in the site clusters of Ft. Stewart, Ft. Benning, and Ichauway are located on private property. We have visited a subset of these private sites from public roads to obtain GPS coordinates and to visually see the condition of the pond and upland. However, we have not obtained access to dip net these historic sites.

Acknowledgements

This status assessment relied heavily on the generous collaboration of John Jensen (GA DNR), Lora Smith (Joseph W. Jones Ecological Research Center), Anna McKee (USGS), Beth Schlimm (Orianna Society), Dirk Stevenson (Orianna Society), and Roy King (Ft. Stewart). William Booker and Emily Jolly assisted with ground-truthing of field sites.

Prepared By: John C Maerz and Vanessa C. K. Terrell

Date: 3/1/2016

Study/Project Objective: The objective of this project was to update the known status of Gopher frogs (*Lithobates capito*) in Georgia by coalescing data on known extant populations from state experts and evaluating wetland and upland habitat conditions at historic and extant localities to determine whether the sites are suitable for sustaining Gopher frog populations. These data will update the 1994 status report of the distribution and status of Gopher Frogs in Georgia that was completed by Win Seyle and funded by the U.S. Fish and Wildlife Service (USFWS). Specific research efforts included collecting data from professionals that monitor Gopher frog populations at known sites or have added new observations, and evaluate of the suitability of breeding and upland habitat at historic sites using satellite land-cover data coupled with ground-truthing at a subset of sites.

Summary

The Gopher frog is listed as a species of special concern in Georgia and is currently a candidate for Federal listing under the Endangered Species Act of 1973. In 1994, Seyle conducted an assessment of historic Gopher frog sites in Georgia. Using Seyle's report, the Rare Species and Natural Community Heritage database, and feedback from local experts, we assessed the status of Gopher frogs at 26 "sites" [areas], which included all 19 sites assessed in 1994. Collectively, our assessment covered approximately 70 wetlands representing potentially 24-30 disjunct, historic breeding populations/sub-populations and an additional translocated population. To date, Gopher frogs have been documented in 24 counties in Georgia; however, since 1994, extant Gopher frog populations are known in only 9 historic counties, and have been documented in two (potentially three) new counties. New populations were identified in Irwin (Lentile Tract) and a translocated population was established in Early County (Williams Bluff Preserve; Fig. 1). Ohoopsee Dunes located in Emmanuel County is the site of a potentially third new documented county for Gopher frogs. Only one of three replicate eDNA samples from site were positive, therefore additional verification should be sought before confirming this as new site locality. The Lentile Tract and Ohoopsee Dunes were distinct from any historic locals prior to 1994. Of the 19 historic sites assessed, Seyle judged that 13 sites were suitable and likely to still support Gopher frogs, 3 sites were marginally suitable and might still support Gopher

frogs, and 3 were no longer suitable for Gopher frogs. In 2015, we judged that only 8 of those 19 sites were likely suitable to support Gopher frog populations, and 11 were unlikely to support Gopher frog populations. This represents a likely loss of 1/3 of historic sites, all on private lands, over the past decade. Many of these sites underwent complete canopy closure of the wetland, or had significant upland conversion to agriculture or residential development. Overall among the 26 sites that we assessed, we judged 10 to be suitable and likely to support Gopher frog populations. This does not include the new locals at Ochoopee Dunes, the Lentile Tract, and a private Agroforestry tract where we did not conduct habitat assessments, and Ft. Stewart, Ichauway, Ft. Benning, Fall Line Sandhills WMA, and the eastern boundary of ONWR represented half of the 10 sites. The 5 other suitable locations were on private lands, and we could not confirm the species' status on those properties, and note that two of the sites are directly adjacent to Interstate 16. We judged 16 of the 26 sites as likely unsuitable for Gopher frogs. All 16 sites were on private property and had degraded wetland or upland conditions. During the time of this study, 2014–2015, Gopher frogs were confirmed at 9 properties: Lentile Track (Private), Ochoopee Dunes (WMA), Fall Line Sandhills (WMA), Fort Benning (Army Base), Okefenokee Swamp (NWR), Fort Stewart (Army Base), Ichauway (Private), a Silviculture Property near Okefenokee (Private), and Williams Bluffs Nature Preserve (TNC). Using recent telemetry observations on gopher frog movements, we judge that there may be 4-5 distinct population/sub-populations with three additional isolated breeding populations at Ft. Stewart, which likely functions as a larger metapopulation. We judge there is one large core population at JERC breeding among 7-9 wetlands, with a single isolated breeding site in the northeast portion of the property. Overall, Gopher frogs in Georgia appear largely sustained by 2-4 disjunct populations with Ft. Stewart, Ichauway, Ft. Benning, and the eastern boundary of ONWR. Populations on other lands including Fall Line Sandhills WMA, Lentile, and Ochoopee Dunes appear restricted to a single breeding site with unknown numbers of animals. A majority of historic locals on private lands are likely no longer suitable for Gopher frogs because of increasing wetland succession and upland conversion.

Details

The projected distribution of Gopher frogs (*Lithobates capito*) in Georgia includes the entire coastal plain of Georgia south of the fall line (Fig. 1). The Gopher frog is listed as a species of special concern in Georgia and is currently a candidate for Federal listing under the Endangered Species Act of 1973. Given the status of Gopher frogs in Georgia and throughout most of the species range, Georgia's Department of Natural Resources Nongame Conservation Section was granted monies from the U.S. Fish and Wildlife Service to review the status of Gopher frogs in the state. Habitat degradation has been proposed as one of the main reasons for Gopher frog population declines and is a continued threat to the species, in particular the loss of open canopy ephemeral wetlands with longleaf pine and turkey oak uplands (Jensen and Richter 2005). Degradation of habitat can result from land-use change such as conversion to residential or agricultural land, as well as fire suppression, which can result in canopy closure and shorter hydroperiods for wetlands and the loss of suitable upland habitat that supports Gopher tortoises (*Gopherus polyphemus*). Identifying the distribution and status of extant Gopher frog populations and determining whether or not wetland and upland habitats are still suitable for Gopher frogs at historic and extant localities is needed for assessing the status of the species in the state. Here we evaluate how historic and extant sites have changed in their habitat suitability for hosting the species.

Methods

Georgia DNR provided initial data for the Gopher frog state assessment through their Rare Species and Natural Community Heritage database. The database included 63 records of Gopher frogs including 33 records outside Ft. Stewart, Ichauway, and Ft. Benning. Georgia DNR also provided a copy of the last state assessment completed in 1994 by Win Seyle. In 1994 Seyle assessed 23 historic Gopher frog records, which represented 19 sites including 1 site on Ichauway and 1 site on Ft. Benning. Seyle's assessment did not include 23 known sites on Ft. Stewart, which represented the largest concentration of known breeding sites in Georgia. We assessed the status of Gopher frogs at 26 "sites", which included all 19 sites assessed by Seyle in addition to Ft. Stewart and a cluster of observations along the eastern boundary of Okefenokee National Wildlife Refuge (ONWR) that likely represent more than a single "site" but for which specific breeding locations were not available. We did not conduct habitat assessments for sites on Ft. Stewart, Ichauway, or Ft. Benning. Biologists employed at each of these locations provided site locality information and current status of Gopher frog activity. We asked those biologists whether Gopher frogs bred at the site since the 1994 status report, in what years was breeding detected between 1994-2014, and for the last year breeding was detected how would they characterize the breeding population size. We reached out to personnel at Ft. Stewart, Joseph W. Jones Ecological Research Center at Ichauway, USGS, The Nature Conservancy, The Orianne Society, GA DNR, and private consultants. For sites not located on Ft. Stewart, Ft. Benning, and Ichauway,

we used the local information provided in the database and Seyle's report to locate the site, obtain GPS coordinates, and evaluate the current suitability of breeding and upland habitat using satellite land-cover data. We found it challenging to locate several historic sites due to the poor locality information. In most cases, local data was vague and only referred to a road or road crossing. Two sites were evaluated based on conditions in the general area identified using historic site descriptions, and seven sites were not assessed in 1994 or for this update due to poor local data at the time of collection.

Results

Collectively, our assessment covered the status of 26 "sites" [areas] composed of approximately 70 wetlands representing potentially 24-30 disjunct, historic breeding populations/sub-populations and an additional translocated population. To date, Gopher frogs have been documented in 24 counties in Georgia; however, since 1994, extant Gopher frog populations are known in only 9 historic counties, and have been documented in three new counties. New populations were identified in Irwin (Lentile Tract) and Emanuel County (Oohoopee Dunes), and a translocated population was established in Early County (Williams Bluff Preserve; Fig. 1). The Lentile Tract and Oohoopee Dunes were distinct from any historic locals prior to 1994. The Gopher frog population at the Williams Bluff Preserve was established by the annual introduction of captive reared metamorphs from 2007 through present. To date approximately 3000 metamorphs have been released at the site. In 2012 males were heard calling at the site and a single egg mass was detected. Males were heard calling in 2013, 2014, and 2015 and two naturally occurring metamorphs were observed in 2015.

Of the 19 historic sites assessed, Seyle judged that 13 sites were suitable and likely to still support Gopher frogs, 3 sites were marginally suitable and might still support Gopher frogs, and 3 were no longer suitable for Gopher frogs due to wetland degradation or loss of suitable upland habitat. In 2015, we judged that only 8 of those 19 sites were likely suitable to support Gopher frog populations, and 11 were unlikely to support Gopher frog populations. This represents a likely loss of 1/3 of historic sites, all on private lands, over the past decade. Many of these sites underwent complete canopy closure of the wetland, or had significant upland conversion to agriculture or residential development.

Overall among the 26 "sites" that we assessed, we judged 10 to be suitable and likely to support Gopher frog populations. This does not include the new locals at Oohoopee Dunes, the Lentile Tract, and a private Agroforestry tract where we did not conduct habitat assessments. Half of the 10 sites were represented by Ft. Stewart, Ichauway, Ft. Benning, Fall Line Sandhills WMA, and the eastern boundary of ONWR (Fig. 1). The 5 other locations were on private lands, and we could not confirm the species' status on those properties, and note that two of the sites are directly adjacent to Interstate 16. We judged 16 of the 26 sites as likely unsuitable for Gopher frogs. All 16 sites were on private property and had degraded wetland or upland conditions.

During the time of this study, 2014–2015, Gopher frogs were confirmed at 9 properties: Lentile Tract (Private), Oohoopee Dunes (WMA), Fall Line Sandhills (WMA), Fort Benning (Army Base), Okefenokee Swamp (NWR), Fort Stewart (Army Base), Ichauway (Private), a silviculture property near Okefenokee (Private), and Williams Bluffs Nature Preserve (TNC).

A complete table of all Gopher frog historic and extant locals is included in this report (Table 2). This table includes information on location, prior status, current status, and additional notes about the current status. All locales now include GPS coordinates to facilitate future assessments. In addition, we discuss the status of four "key" sites in greater detail: Ft. Stewart, Ichauway, Ft. Benning, and the eastern boundary of ONWR.

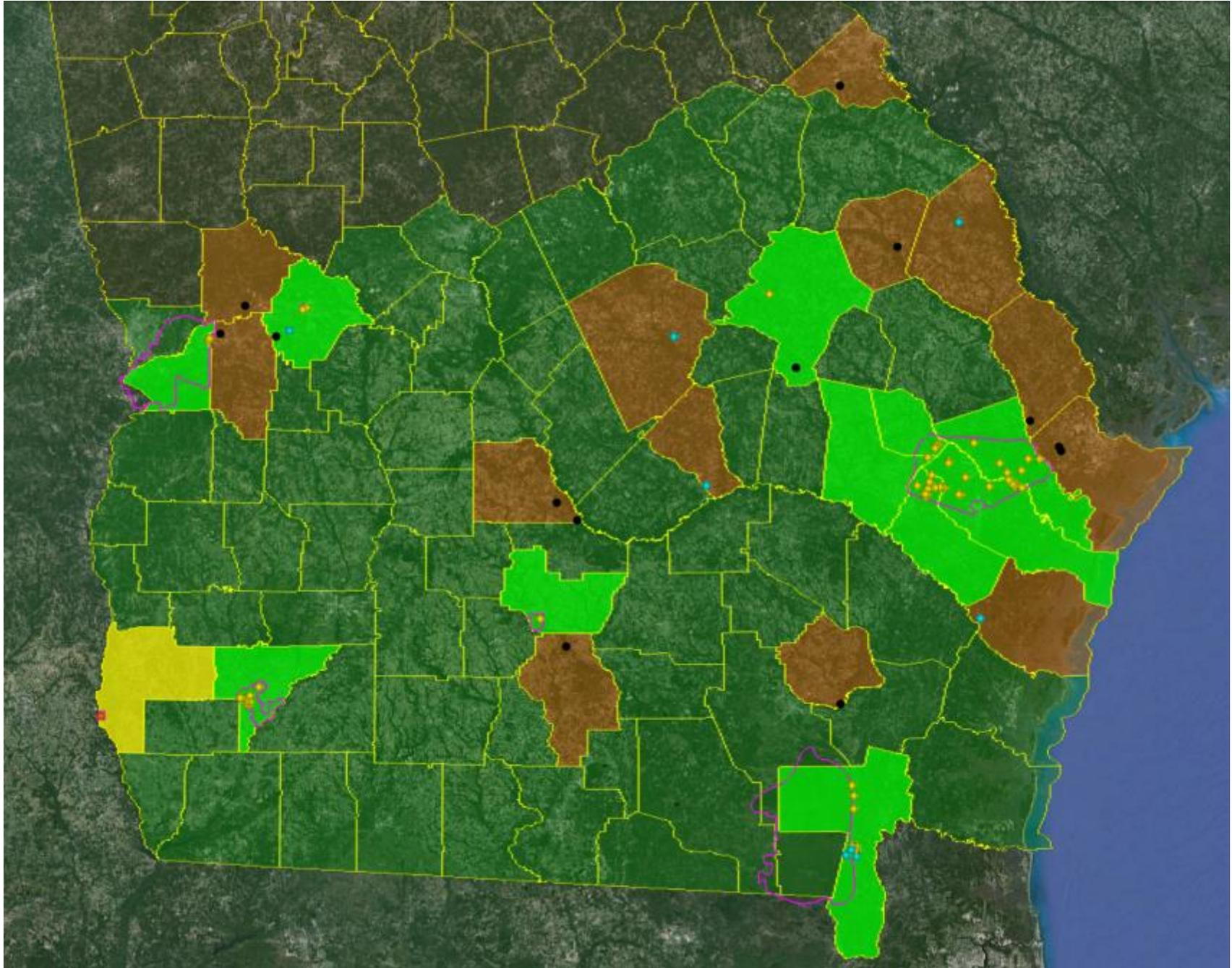


Figure 1. Map of projected, current, and historic county distribution of Gopher frogs in Georgia. Dark green counties are within the projected range but have no documented occurrences of Gopher frogs. Orange counties are those with historic records of Gopher frogs but the current status is unknown, lime-green counties are those with extant populations documented in 2014 or more recently, and yellow is the county where a translocated population was established (there were no known records of Gopher frogs in this county). Points show the locals of breeding wetlands or animals observed in uplands in tortoise burrow surveys, funnel traps, drift fences, or dead on roads. Yellow points are extant breeding populations or live animals observed since 2014, the orange point represents the translocated population, blue dots are historic observations where habitat conditions in 2015 still appear suitable for Gopher frogs but the current population status is unknown, and black dots represent historic locals where conditions in 2015 seem unsuitable for Gopher frogs but the population status is unknown. Purple lines denote boundaries of important properties including Ft. Stewart, Ichauway, Ft. Benning, Okefenokee National Wildlife Refuge, and the Lentile Tract.

Fort Stewart

Roy King, the wildlife biologist at Ft. Stewart who oversees the herptofauna program, provided a shape file of Gopher frog sightings on the property. The file contained 40 sighting locations for Gopher frogs (Fig. 2). Unfortunately the Gopher frog local data for Ft. Stewart lacks site information including dates, times, observer identification, and voucher type (i.e. dead on road, frog scoped in Gopher tortoise burrow, frog calls); however personnel at Ft. Stewart consider the Gopher frog population fairly robust. Gopher frog sightings on Ft. Stewart span five counties in Georgia, including Bryan, Evans, Liberty, Long, and Tattnall counties. Of the 40 sightings, 13 (32%) were road or road edge, 12 (30%) in the upland, and 15 (38%) were at wetlands or at the edge of a wetland. We were interested in the distance between the sighting locations to determine if property potentially hosts subpopulations. We used the circular tool in Google Earth Pro to create a 3.5km buffer around each sighting. A radio telemetry study found that adult Gopher frogs can travel up to 3.5km from their burrows to wetlands and researchers in surrounding states are using 3.5km as a rough guideline to distinguish Gopher frog populations. After applying the 3.5km buffer to each sighting we estimate 5 distinct populations on the property (Fig. 2).

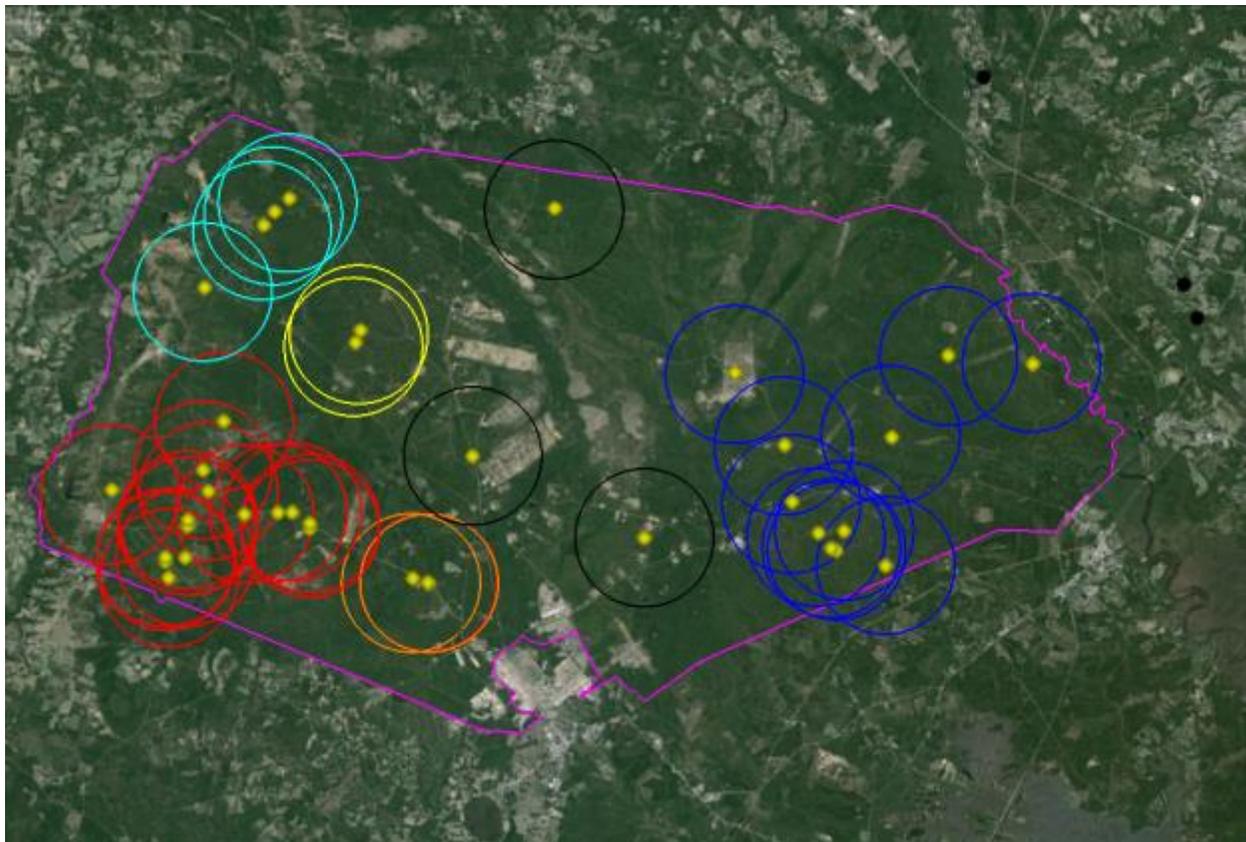


Figure 2. Locations of Gopher frogs on Ft. Stewart between 1994-2014. Yellow points are locations of individual animals or observed breeding sites. Circles are 3.5 km buffer areas that encompass potential long-distance movements of animals from each location. Based on these distances, it appears that there may be up to 4-5 subpopulations of Gopher frogs on Ft. Stewart, with three points (indicated by black circles) representing relatively isolated sites.

Ichauway

Gopher frogs are also known historically from sightings on the Ichauway property located in Baker County. As part of the state assessment we reached out to Dr. Lora Smith an associate scientist over the Herpetology Lab at the Joseph W. Jones Ecological Research Center at Ichauway. Dr. Smith provided us with 10 years of data on Gopher frog [and other amphibian monitoring] between 1994-2014. Since 1994, Gopher frogs have been detected at 12 different wetlands by either dip-netting or call surveys (Fig. 2, Table 2). Eleven of these wetlands likely represent one core breeding population along the western portion of the property, with a single isolated breeding population in the northeastern portion of the property (Fig. 2). The northeastern population is isolated from the core population by 6.5 km and Ichawaynochaway Creek. Over the recent 11 year period, there has been consistent Gopher frog breeding at Ichauway, but breeding has been irregular among sites, ranging from as few as 1 site in some years to 5-6 sites in other years. In 2013, Gopher frogs were observed breeding at 9 of 12 sites. Of the three sites where breeding did not occur in 2013, two sites (W37 and W40) have had no detections since 2002, and W48 since 2003. No information is available to judge whether these represent local extinctions of Gopher frogs from those wetlands. The wetlands are proximate to other sites where breeding occurred, but W37 and W40 are proximate to a road and the property boundary.

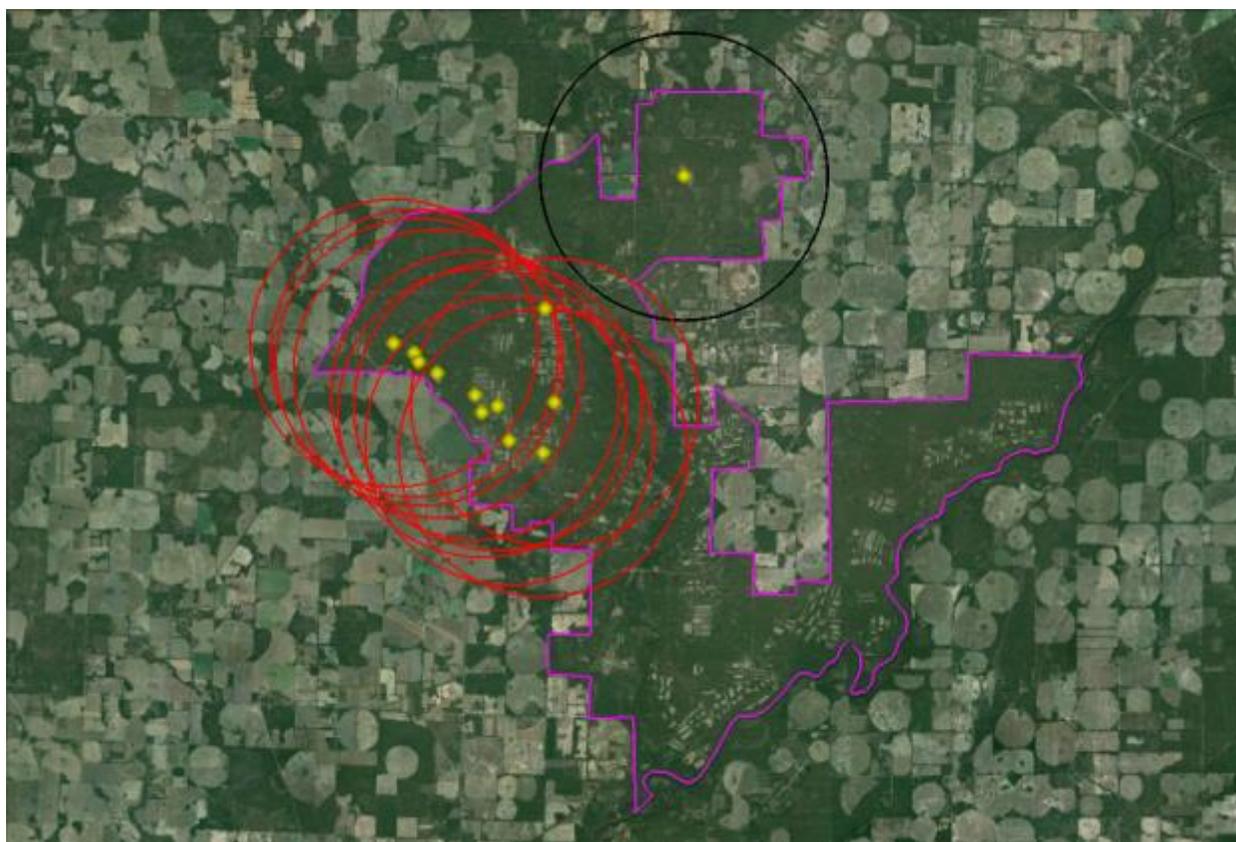


Figure 3. Locations of Gopher frogs on Ichauway, Baker County, GA, between 1994-2014. Yellow points are locations of observed breeding sites. Circles are 3.5 km buffer areas that encompass potential long-distance movements of animals from each location. Based on these distances, it appears that there is one core Gopher frog population on Ichauway, with an isolated breeding site in the northeast corner of the property. The purple line indicates the property boundary. The pale areas are agriculture, largely center-pivot irrigation fields.

Table 2. Detections of *Lithobates capito* breeding at 12 wetlands at Ichauway between 1994 and 2014 (data provided by L. Smith). Data from 1994 come from field notes of J. Palis; 1998 from a report by S. A. Johnson to the JERC; 2002-2004 from JERC dipnet surveys at staff gauge wetlands when ponded (A. Limer); 2002-2011 drift fence data from W51; 2004-2005 species richness sampling by JERC staff when staff gauge wetlands were ponded; 2010 sampling of 10 wetlands when ponded; 2013-2014 from long term monitoring via frog loggers of 30 staff gauge wetlands when ponded (additional *L. capito* larvae were collected for S. Richter).

Wetland	Year														
	1994	1998	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
W15	x													x	x
W37			x												
W40		x													
W41														x	
W42				x										x	x
W46							x							x	x
W48				x											
W49	x		x	x	x					x				x	
W50							x							x	x
W51			x	x		x	x	x	x	x		x		x	
W53		x		x			x				x			x	x
W55				x			x							x	
Total	2	2	3	6	1	1	5	1	1	2	1	1	not monitored	9	5

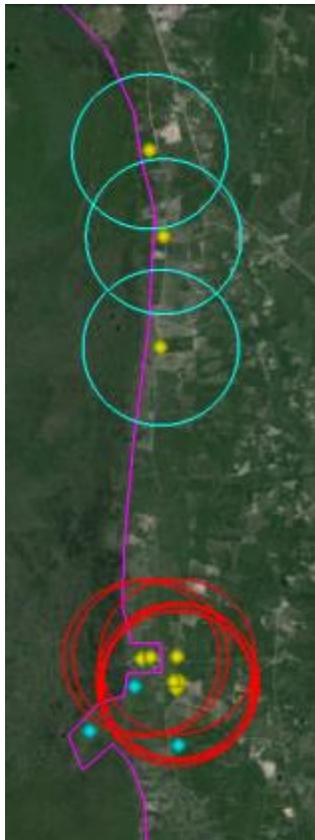
Fort Benning

The W. Seyle report contained one record (site GF 43) of a Gopher frog found at the mouth of a tortoise burrow in 1992 in Muscogee County on Fort Benning property, and the GA DNR Heritage database contained one entry for Gopher frog egg masses found at a wetland on the Chattahoochee County side of property in 1994. Gopher frogs are known to breed in small borrow pits and one natural wetland at Ft. Benning and are believed to have a stable population at the site. In 2014, USGS personnel confirmed the presence of Gopher frogs through eDNA and physical capture methods at Borrow Pit 1 and through eDNA at Borrow Pit 2. Roderick Thornton, a biologist at Ft. Benning, reported 3 Gopher frog localities in 2014 where individuals were observed while scoping Gopher tortoise burrows.

Eastern Boundary of Okefenokee National Wildlife Refuge

Seyle's 1994 status assessment included three locales along the eastern boundary to ONWR. These were sites stemming from historical records from the 1940s with vague site data reporting larvae found at Chesser's Island and some additional sites reported east of the Chesser School. We located several wetlands that fit these geographic descriptions, and all remain relatively open and appear suitable for Gopher frogs (Fig. 4). One site east of Chesser School along Chesser's Island Road has two adjacent wetlands, one large and one small. In 1993, these wetlands were surrounded by open habitat with a large area of what appears to be unmanaged forest within 300 m to the south and east. Today this wetland is surrounded by extensive plantation forestry, and we did not assess whether there is suitable tortoise presence. In 2001 an adult frog was captured in a funnel trap near the ONWR Headquarters and approximately 3 km from the historic site, and in 2015, 6 additional adult frogs were detected in Gopher tortoise burrows on silvicultural lands just east of the ONWR Headquarters. The areas around these observations have remained relatively unchanged since 1994 and the accumulation of observations in this area including several recent observations of adult Gopher frogs in burrows suggests a sustaining population.

There were three additional observations of adult Gopher frogs including a 2009 observation at Trail Ridge described as west of the area managed by the land trust, and two observations in 2015 further north of Trail Ridge along the eastern refuge boundary. These observations are sufficiently close to being within known migration



distances of Gopher frogs and may represent a second cluster of breeding sites, or there may be a continuum of breeding sites between the Chesser's Island/ONWR Headquarter cluster and these more northern observations. There appears to be suitable wetland habitat all along the refuge boundary between these sites, though some upland areas to the east are intensive plantation forestry and all sites are proximate to roads.

There were additional historical records we believe are from the same general area from the 1940s, as well as a recent record in 2008. The 2008 record includes observations of adult Gopher frogs observed in Gopher tortoise burrows and captured using a funnel trap at a burrow, and egg masses and tadpoles found at a borrow pit a nearby open depression pond. Notes from the original observation describe the site as an open-canopied depression wetland embedded in a mature mixed hardwood-pine hammock community. The site name is Ocean Pond and it is described as being located east of Barrel Head Swamp and north of Forestview. We were unable to locate these specific sites because the site descriptions were inadequate, GPS coordinates were not provided, and site and pond names were not present on any maps. Therefore, we could not assess the current status of the site; however, given the recent records and status of other wetlands in the general area, it is likely the site remains suitable, and that these represent additional breeding sites within an extensive network of sites along the eastern ONWR boundary.

Figure 4. Locations of Gopher frogs along the eastern boundary of Okefenokee National Wildlife Refuge. Blue points are historic locations of Gopher frog breeding wetlands, and yellow points are locations of observed adult Gopher frogs between 2001 and 2015. Circles are 3.5 km buffer areas that encompass potential long-distance movements of animals from each location. Based on these distances, it appears that there is a core Gopher frog

population on near the ONWR Headquarters that straddles the refuge, Chesser's Island, and private silvicultural lands to the east. Observations to the north may represent a second population, though there may be a continuum of breeding sites from the southern cluster to those northern locations. The purple line "loosely" indicates the refuge boundary.

Table 2. Complete list of known historic and extant Gopher frog localities in Georgia as of 2015 and status updates of site conditions and likelihood that the site is still suitable to support Gopher frogs.

Ownership	County	Latitude	Longitude	Heritage Database No.	1994 W. Seyle Site No.	Ground-truthed in 2015?	Likely GF are still present?	Notes
<i>Heritage Database Occurrences</i>								
Private	Emanuel	32.355103	-82.31754	61	—	Yes	No	Site local data from 2008 was vague and noted as Emanuel County near Oak Park. In 2014 we located two wetlands near Oak Park. One wetland was surrounded by mixed hardwood and dense scrubs with a new road constructed to the immediate NE of the wetland between 2011 & 2012. There is a nearby wetland that could also be the site locality (32.354207, -82.329508); however, intensive agriculture fields border that wetland. Not suitable breeding or upland habitat for Gopher frogs.
Private	Jenkins	32.75616	-81.899593	3	GF 16	Yes	No	Potential locality of historic site where larvae of neotenic mole salamanders (<i>Ambystoma talpoideum</i>) and striped newt larvae (<i>Notophthalmus perstriatus</i>) were collected in 1987. Property previously privately owned. In 2014 site visit the wetland had an open canopy with grassy edges, but was extremely murky due to runoff from ceramics plant in the immediate upland. Taped posted around the wetland stated "danger."
Private	Laurens	32.467646	-82.798982	56a	GF 17	Yes	possible, but unlikely	Potential locality of historic Gopher frog collection site from 1973. Site was noted as a medium sized cypress pond with heavy agricultural uplands located along Interstate Hwy 16. In 1994 the site was visited and a nearby wetland (noted as site 56b) located on a secondary paved road approximately a half-mile east of S.R. 199 exit off I-16 was also surveyed. Southern leopard (<i>Lithobates sphenoccephalus</i>) frog tadpoles were found at the site. In 2014 we visited both sites; we found the site located on HWY 16 (site 56a) to

								have open deep water with shallow grassy areas. The pond appeared to have been dredged and was surrounded by dense mixed pine in the upland and HWY 16 on one side. The second locality (56b) has an open canopy but appears heavily altered, possibility for recreation purposes. A cabin with a dock was constructed on the property around 2005. It is possible that Gopher frogs still persist in the area, but unlikely.
Private	Laurens	32.467609	-82.802698	56b	—	Yes	possible, but unlikely	see above
Private	Marion	32.51078	-84.56055	8 and 18	GF 31-33	Yes	Yes	Historic Gopher frog locality from 1960s and 1970s. In the 1994 survey was noted as having a good possibility of Gopher frogs using the site for breeding even though the upland at the site was described as overgrown with agriculture/pine monoculture in the surrounding area. In 2008, 4 Gopher frog eggs masses were observed at the site. The site was visited in 2014 and was full of water and had dense vegetation up to the wetlands edge, however the site appeared relatively unchanged since 2008. Satellite imagery shows that the site periodically dries.
Private	Screven	32.835653	-81.649492	12	GF 38	Yes	Yes	Historical record from 1976 described as a large cypress bay. 1994 survey suggested that the breeding site was suitable for Gopher frogs, but that upland was overgrown. In 2014 we visited the site (32.84051, -81.649422) and heard bullfrogs calling. While at the site we found a large open canopy wetland (32.835653, -81.649492) less than 100-m SW of the cypress bay. The pond was open with shallow grassy edges, pine upland, and we found evidence of Gopher tortoise activity near the pond. However, the upland pine stand is dense and in need of thinning and burning to be more characteristic of ideal Gopher frog habitat.

Private	Richmond	33.305519	-82.113319	47	GF 37	Yes	possible, but unlikely	Historical record from 1969. In 1994 the large, open Carolina bay was surveyed and found to be severely polluted due the conversion of the upland to cattle farming. The site was deemed unsuitable for Gopher frogs, but noted as being close to Fort Gordon Army Reservation where Gopher tortoises are present. In 2014 we visited the area and found the uplands converted to pine stands. The bay periodically dries and remains open and could possibly be used by Gopher frogs to breed, but unlikely due to past pollution and heavy agriculture practices in the surround upland.
Private	Taylor	32.50053	-84.338264	38	—	Yes	possibly	Locality is from a 2009 when a former University of Georgia student found a roadkil specimen on Phelps Road. The site local is somewhat vague with directions provided as off Currington Road and west of Little Whitewater Creek. In 2015 we attempted to groundtruth the site and found a ponded area at the end of H. Currington Rd. The area was heavily overgrown and not likely that Gopher frogs breed there, however Phelps Rd had a more open understory with turkey oak-pine mix. It is possible that Gopher frogs are still in the area but a breeding site has not been determined.
Private	Taylor	32.480539	-84.391634	63	—	Yes	unlikely	Potential locality of 1997 record from a cypress swamp. During our 2015 visit we found the large swamp to be mostly surrounded by a manicured landscape except on the SE border where there is residence and a dense pine stand. The site is also sandwiched between two roads. The upland is not suitable for Gopher frogs, however the area is relatively unchanged since the record of Gopher frogs in 1997, therefore we deem it unlikely that frogs are still using the site for breeding.
Private	Wheeler	31.965075	-82.682469	50	—	No	Yes	Locality from 2008 observation by Dirk Stevenson & John Jensen. An adult Gopher

								frog was shined in a tortoise burrow. This is a private tract.
USFWS	Charlton	30.711267°	-82.158713°	28	GF 7	No	Yes	Historical record from 1940s at Okefenokee site. Site data was vague, and noted as larvae found at Chesser's Island. Wetlands in the area remain open and ephemeral; site remains suitable for Gopher frogs.
USFWS	Charlton			49	GF 7	No	Likely	Historical record from the 1940s, as well as a recent record in 2008. The 2008 observations included adults observed in Gopher tortoise burrows and captured using a funnel trap at the burrow. Four egg masses were found at a borrow pit in the vicinity of the site and tadpoles were dipnetted at a nearby open depression pond. Site name given as Ocean Pond, located north of Forestview and east of Barrel Head Swamp. We were unable to locate the specific site, so we could not assess the current status of the site; however, given the recent records and status of other wetlands in the general area, it is likely the site remains suitable.
USFWS	Charlton	30.705396°	-82.116858°	54	GF 7	No	Potentially	Historical record from the 1940s at the Okefenokee NWR; site data was vague, Found wetlands fitting local description east of Chesser School along Chesser's Island Road. There are two adjacent wetlands, one large and one small. In 1993, these wetlands were surrounded by open habitat with a large area of what appears to be unmanaged forest within 300 m to the south and east. Today this wetland is surrounded by extensive plantation forestry, and we did not assess whether there is suitable tortoise presence.
USFWS	Charlton			48	—	No	Likely	Observation from 2008 at Okefenokee NWR. Notes from original observation describe the site as an open-canopied depression wetland embedded in good-condition, fire-maintained longleaf pine-wiregrass community. Tadpoles were dipnetted from a small borrow pit and an

								egg mass was observed. We were unable to locate the specific site, so we could not assess the current status of the site; however, given the recent records and status of other wetlands in the general area, it is likely the site remains suitable.
USFWS	Charlton	30.866738°	-82.125180°	20		No	Yes	Observation from 2009 at Trail Ridge described as west of the area managed by the land trust. Site seems still suitable for Gopher frogs.
Private	Chatham	32.068144°	-81.274825°	42	GF 13	No	No	Historical record from 1969. The site includes a 0.3 mile stretch of Quacco Road, an area where a series of collections happened for Gopher frogs and flatwoods salamanders. Coordinates are approximate; we were unable to locate the large cypress pond close to the road mentioned in the historical records likely due the heavy development in the area since 1994 survey. The area has undergone intense residential development no longer appears suitable for Gopher frogs.
Private	Chatham	32.053181°	-81.266850°	40	GF 14	No	No	Coordinates approximate (same as above as sites were 2 miles apart)
Private	Chatham	32.158233°	-81.387772°	60	GF 15	No	No	Historical record 1976. Gopher frog larvae were collected from a borrow pit along the road. While surveyed in 1994 the site had begun to be converted homesites and was deemed marginal habitat at that time. Satellite imagery show the area has been largely converted to subdivisions, and is no longer suitable for Gopher frogs.
Private	McIntosh	31.497922°	-81.607981°	17	—	No	Yes	Locality from 1994 when a Gopher frog tadpole was collected from a seasonal depression. Active and inactive Gopher tortoise burrows were found in the area. Upland was noted as a young sand pine plantation. In 2015 aerial photos reveal site relatively unchanged since 1994, thus it is likely to still support Gopher frog breeding.
Uncertain	Pierce	31.221169°	-82.168856°	46	GF 36	No	possible,	Historical record from 1976. The site was

Ownership							but unlikely	visited in 1994 and noted the site too close to the river and has the potential of fish predators entering the pond during flooding events, and has silviculture upland. In 2015 a review of satellite imagery shows the historic site dries periodically and is relatively unchanged, but based on comments from 1994 it is possible but unlikely to support Gopher frogs.
Uncertain Ownership	Berrien	31.430772	-83.245316	33	GF 1	No	No	Historic record from 1977 from larvae collected at a small borrow pit Alapaha River bridge. In 1994 the area was searched for Gopher frogs, but no wetlands appeared suitable and upland was intensive agriculture. In 2015 satellite imagery confirmed that the area is relatively unchanged and is unsuitable for Gopher frogs.
USFWS	Charlton	30.740317°	-82.133600°	11	—	No	Yes	Locality from 2001 near Okefenokee Headquarters. An adult frog was captured in a funnel trap. In 2014 we evaluated the site from satellite imagery and found it unchanged, thus we expect Gopher frogs are still present.
Private	Wilcox	31.85397222	-83.19589444	39	GF 41	Yes	possible, but unlikely	Historic record from 1946. In 1994 several temporary (sinkhole) ponds on the grounds of the fish hatchery were checked, no detections of Gopher frogs during search however the ponds seemed to be suitable for Gopher frogs; revisited in 2015 and the site was relatively unchanged.
Private	Wilcox	31.91423611	-83.27615	22	GF 40	Yes	unlikely	Historical record from 1970s, and due to vague local data the site was not visited in 1992. Noted as 10 mi south of Abbeville on Lebanon Church Road. In 2015 we located Lebanon Rd, and located what appears to be a permanent body of water north of the road. There are 2 sinkhole type wetlands approximately 650m south of the ponded area. Heavy silviculture uplands. The permanent ponded area has dense shrub all the way to the pond edge. Upland dense hardwood & loblolly pine. Likely not to occur here.

Private	Talbot	32.58437222	-84.51633611	41	GF 39	Yes	No	Historical record from 1979. An adult Gopher frog was regurgitated by a captured water snake (<i>Nerodia erythrogaster</i>). In the 1994 report the pond was deemed likely to continue to be of at least some use to Gopher frogs for a breeding site. In 2015 when visited, the borrow pit found did not appear suitable for Gopher frogs. A sunflower field was in the immediate upland north of pond and dense pine plantation in the area.
Private	Marion	32.49046	-84.615825	2	GF 34	No	No	Historical record from 1978-79. Review of satellite images in 2015 show the pond is still present, with reasonably open canopy and was clearly ditched. Wetland has 50-m wooded buffer on three sides. The entire surrounding upland NE and S is now cleared. Between 1995 & 2009 a home was built approximately 50m east of the pond, between the pond and S.R. 355. The pond dried in 2007 and 2012, however the wetland and upland are no longer suitable for Gopher frogs.
Private	Liberty	Not available	Not available	55	GF 18	Not assessed	Unknown	LeConte-Woodmanston Plantation- official site local is unknown was not surveyed in 1994 due to poor local data.
Private	Burke	Not available	Not available	43	GF 6	Not assessed	Unknown	Was not surveyed in 1994 due to poor local data, therefore was not surveyed in 2014 or 2015.
Uncertain Ownership	Berrien	Not available	Not available	34	GF 2	Not assessed	Unknown	Historical record from 1960; not surveyed in 1994 due to poor local data, therefore was not surveyed in 2014 or 2015.
Uncertain Ownership	Liberty	Not available	Not available	51	GF 19	Not assessed	Unknown	Historical record of unknown date; not surveyed in 1994 due to poor local data, therefore was not surveyed in 2014 or 2015.
Uncertain Ownership	McIntosh	Not available	Not available	62	GF 35	Not assessed	Unknown	Historical record from 1959. Site not surveyed in 1994 due to poor local data, therefore was not surveyed in 2014 or 2015.
Uncertain Ownership	Bleckley	Not available	Not available	52	—	Not assessed	Unknown	Historical record from 1953, noted as swamp south of Cochran in Bleckley county; no local data.

Uncertain Ownership	Brantley	Not available	Not available	53	—	Not assessed	Unknown	Historical record from 1932 from Hickox, GA; no local data.
State	Taylor	32.577800	-84.269744	13a	—	Yes	Yes	Locality from 1997 to present at Fall Line Sandhills WMA. In 2014 USGS surveyed two wetlands on the site and confirmed the presence of Gopher frogs. *coordinates reference Big Pond.
State	Taylor	32.571339	-84.284891	13b	—	Yes	Yes	Locality from 1997 to present at Fall Line Sandhills WMA. In 2014 USGS surveyed two wetlands on the site and confirmed the presence of Gopher frogs. *coordinates reference Railroad Pond.
<i>New sites or observations not listed in the Heritage database (note there is overlap with Ft. Stewart & Ichauway sites)</i>								
Private	Charlton	30.731339	-82.116655	—	—	Not assessed	Yes	Locality from 2015 found on silviculture property south of the Suwanee canal and the east entrance of Okefenokee NWR. Gopher frog encountered in Gopher tortoise burrow.
Private	Charlton	30.730404	-82.115867	—	—	Not assessed	Yes	Locality from 2015 found on silviculture property south of the Suwanee canal and the east entrance of Okefenokee NWR. Gopher frog encountered in Gopher tortoise burrow.
Private	Charlton	30.728505	-82.117598	—	—	Not assessed	Yes	Locality from 2015 found on silviculture property south of the Suwanee canal and the east entrance of Okefenokee NWR. Gopher frog encountered in Gopher tortoise burrow.
Private	Charlton	30.728482	-82.117907	—	—	Not assessed	Yes	Locality from 2015 found on silviculture property south of the Suwanee canal and the east entrance of Okefenokee NWR. Gopher frog encountered in Gopher tortoise burrow.
Private	Charlton	30.731234	-82.119001	—	—	Not assessed	Yes	Locality from 2015 found on silviculture property south of the Suwanee canal and the east entrance of Okefenokee NWR. Two Gopher frogs encountered in Gopher tortoise burrow.
Private	Irwin	31.524790	-83.347386	—	—	Not assessed	Yes	Locality from 2014 on the Hugh Lentile Property in Irwin County. Gopher frog was caught in a funnel trap.
TNC	Early	31.198519	-85.090969	—	—	Yes	Yes	Locality from 2009 to present at William's Bluffs Nature Preserve. Population of Gopher

								frogs established through a captive rearing program with GA DNR, UGA, Atlanta Zoo and ABG.
State	Emanuel	32.605311	-82.417505	—	—	Not assessed	Yes	Locality from 2014 at Ohoopsee Dunes. Presence of Gopher frogs confirmed by eDNA sampling at a wetland by USGS staff.
Army	Chattahoochee	32.474915	-84.660433	—	—	Not assessed	Yes	Locality from 2014 at Ft. Benning. Gopher frog shined in a Gopher tortoise burrow, burrow i.d. B100.
Army	Chattahoochee	32.467927	-84.661237	—	—	Not assessed	Yes	Locality from 2014 at Ft. Benning. Gopher frog shined in a Gopher tortoise burrow, burrow i.d. B1.
Army	Chattahoochee	32.467691	-84.665027	—	—	Not assessed	Yes	Locality from 2014 at Ft. Benning. Gopher frog shined in a Gopher tortoise burrow, burrow i.d. B5.
Private	Baker	31.263272	-84.535777	—	—	Not assessed	Yes	Ichauway breeding wetland W37
Private	Baker	31.261154	-84.530530	—	—	Not assessed	Yes	Ichauway breeding wetland W40
Private	Baker	31.259211	-84.529326	—	—	Not assessed	Yes	Ichauway breeding wetland W41
Private	Baker	31.256729	-84.524630	—	—	Not assessed	Yes	Ichauway breeding wetland W42
Private	Baker	31.251953	-84.514942	—	—	Not assessed	Yes	Ichauway breeding wetland W46
Private	Baker	31.248175	-84.513207	—	—	Not assessed	Yes	Ichauway breeding wetland W49
Private	Baker	31.249545	-84.509195	—	—	Not assessed	Yes	Ichauway breeding wetland W48
Private	Baker	31.242012	-84.506221	—	—	Not assessed	Yes	Ichauway breeding wetland W50
Private	Baker	31.239393	-84.497528	—	—	Not assessed	Yes	Ichauway breeding wetland W55
Private	Baker	31.250399	-84.494669	—	—	Not assessed	Yes	Ichauway breeding wetland W51
Private	Baker	31.270835	-84.497026	—	—	Not assessed	Yes	Ichauway breeding wetland W53
Private	Baker	31.299816	-84.461511	—	—	Not assessed	Yes	Ichauway breeding wetland W15
Army	Bryan	32.028722	-81.354211	—	—	Not assessed	Yes	Fort Stewart, Gopher frog found on road
Army	Liberty	31.937603	-81.737667	—	—	Not assessed	Yes	Fort Stewart, Gopher frog found on road
Army	Liberty	31.915764	-81.672856	—	—	Not assessed	Yes	Fort Stewart, Gopher frog found on road
Army	Liberty	31.974261	-81.652403	—	—	Not assessed	Yes	Fort Stewart, Gopher frog found on road edge
Army	Bryan	32.028722	-81.354211	—	—	Not assessed	Yes	Fort Stewart, Gopher frog found on road
Army	Liberty	31.960686	-81.479753	—	—	Not assessed	Yes	Fort Stewart, Gopher frog found on road edge

Army	Bryan	32.018144	-81.513819	—	—	Not assessed	Yes	Fort Stewart Gopher frog wetland
Army	Bryan	31.986308	-81.485269	—	—	Not assessed	Yes	Fort Stewart Gopher frog wetland
Army	Evans	32.087367	-81.757689	—	—	Not assessed	Yes	Fort Stewart Gopher frog wetland
Army	Evans	32.074506	-81.770725	—	—	Not assessed	Yes	Fort Stewart Gopher frog wetland
Army	Evans	32.080975	-81.765244	—	—	Not assessed	Yes	Fort Stewart, frog found in upland
Army	Tattnall	32.044819	-81.800728	—	—	Not assessed	Yes	Fort Stewart Gopher frog wetland
Army	Liberty	32.028956	-81.715775	—	—	Not assessed	Yes	Fort Stewart, frog found in upland near wetland
Army	Liberty	32.023281	-81.718172	—	—	Not assessed	Yes	Fort Stewart Gopher frog wetland
Army	Liberty	31.984361	-81.786828	—	—	Not assessed	Yes	Fort Stewart Gopher frog wetland
Army	Long	31.961694	-81.796533	—	—	Not assessed	Yes	Fort Stewart, frog found in upland
Army	Long	31.952169	-81.793053	—	—	Not assessed	Yes	Fort Stewart Gopher frog wetland
Army	Long	31.938617	-81.803256	—	—	Not assessed	Yes	Fort Stewart Gopher frog wetland
Army	Long	31.935764	-81.803831	—	—	Not assessed	Yes	Fort Stewart, Gopher frog found on road
Army	Long	31.935836	-81.803244	—	—	Not assessed	Yes	Fort Stewart, Gopher frog found on road
Army	Long	31.950472	-81.845044	—	—	Not assessed	Yes	Fort Stewart, frog found in upland
Army	Long	31.911792	-81.812094	—	—	Not assessed	Yes	Fort Stewart Gopher frog wetland
Army	Long	31.921067	-81.814283	—	—	Not assessed	Yes	Fort Stewart, frog found in upland near wetland
Army	Long	31.919194	-81.814344	—	—	Not assessed	Yes	Fort Stewart, frog found in upland
Army	Long	31.942525	-81.773103	—	—	Not assessed	Yes	Fort Stewart, Gopher frog found on road
Army	Long	31.944514	-81.747483	—	—	Not assessed	Yes	Fort Stewart, Gopher frog found on road
Army	Liberty	31.937592	-81.738819	—	—	Not assessed	Yes	Fort Stewart, frog found in upland
Army	Liberty	31.915486	-81.672386	—	—	Not assessed	Yes	Fort Stewart, Gopher frog found on road
Army	Liberty	31.917244	-81.680986	—	—	Not assessed	Yes	Fort Stewart, frog found in upland
Army	Bryan	32.088969	-81.614897	—	—	Not assessed	Yes	Fort Stewart Gopher frog wetland
Army	Liberty	31.939411	-81.454892	—	—	Not assessed	Yes	Fort Stewart Gopher frog wetland
Army	Liberty	31.946981	-81.464839	—	—	Not assessed	Yes	Fort Stewart, frog found in upland
Army	Bryan	31.948508	-81.451219	—	—	Not assessed	Yes	Fort Stewart, Gopher frog found on road edge
Army	Liberty	31.940328	-81.457594	—	—	Not assessed	Yes	Fort Stewart, frog found in upland near wetland

Army	Liberty	31.933556	-81.428039	—	—	Not assessed	Yes	Fort Stewart, frog found in upland
Army	Bryan	31.992208	-81.42795	—	—	Not assessed	Yes	Fort Stewart Gopher frog wetland
Army	Long	31.921414	-81.8037	—	—	Not assessed	Yes	Fort Stewart Gopher frog wetland
Army	Bryan	32.030686	-81.399814	—	—	Not assessed	Yes	Fort Stewart, Gopher frog found on road edge
Army	Long	31.944053	-81.755153	—	—	Not assessed	Yes	Fort Stewart Gopher frog wetland
Army	Liberty	31.940983	-81.558089	—	—	Not assessed	Yes	Fort Stewart, frog found in upland
Army	Liberty	31.915764	-81.672856	—	—	Not assessed	Yes	Fort Stewart, Gopher frog found on road