GOPHER FROG
CONSERVATION PLAN for NORTH CAROLINA

Dec. 10, 2020

NORTH CAROLINA WILDLIFE RESOURCES COMMISSION

Gopher Frog in a "defensive" posture (Jeff Humphries)

Head-started juvenile Gopher Frog released on to Holly Shelter Game Land

Gopher Frog with transmitter

Gopher Frog

Surveying for Gopher Frogs

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Unless otherwise indicated, all photos by Jeff Hall/ N.C. Wildlife Resources Commission

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Executive Summary

The U.S. Fish and Wildlife Service (USFWS) is evaluating the need to list the Gopher Frog (*Rana capito*) under the federal Endangered Species Act. In North Carolina, this species exists in low numbers across the southern Coastal Plain. Known populations have suffered major losses that are likely not recoverable. Only seven of the historical 23 populations remain (70% reduction). Only 14 of the original 53 pond sites remain. Egg mass data suggest that the total population of Gopher Frogs is 200-300 individuals. Those populations are fragmented and face numerous threats including disease, severe weather (especially long periods of drought), development, and lack of proper management. To maintain the Gopher Frog, the N.C. Wildlife Resources Commission will augment populations, where possible, through head-starting efforts and the creation of additional breeding habitats, work with partners to establish goals for each population, and determine and implement Best Management Practices for wetland and upland restoration and maintenance, including appropriate application of prescribed fire. The Wildlife Commission also will continue to pursue land acquisition and other land conservation practices in areas where Gopher Frogs exist, or where appropriate habitat can be restored, managed, or created where new populations may be introduced or re-introduced. Finally, the Commission will continue genetic analyses of Gopher Frog populations. The Commission may work to establish connectivity and gene flow between existing populations, potentially through translocation.

Juvenile Gopher Frog

Biological Information

Description and Taxonomic Classification

The Gopher Frog (*Rana capito*) is a medium-sized frog (7.2-9.4 cm in snout-vent length) with a gray to brownish dorsum containing many small dark gray to black spots. The venter is white, cream, or yellowish with dark speckling or mottling. This frog has a warty skin texture unlike that of most other North American *Rana*. Tadpole identification is difficult without experience. Key characteristics for North Carolina tadpoles were presented by Braswell (1993). Published keys to tadpole identification (e.g., Altig 1970 and Travis 1981) are virtually useless when trying to separate North Carolina *R. capito* from the Southern Leopard Frog (*R. sphenocephala*) and the Pickerel Frog (*R. palustris*). *Rana capito* was formerly known as the Carolina Crawfish Frog (*Rana areolata capito*) and the Carolina Gopher Frog (*Rana capito capito*), but no subspecies are currently recognized (Young and Crother 2001). Additionally, there have been two publications suggesting changes to the genus *Rana*. Frost et al. (2006) suggested changing *Rana* to *Lithobates*, while Yuan et al. (2016) argued for changing *Lithobates* back to *Rana*. Therefore, we use *Rana* for this publication. Various accounts of this species are found in Beane et al. (2010), Altig and Lohoefener (1983), Jensen and Richter (2005), and Dorcas et al. (2007).

Life History and Habitat

Gopher Frogs in North Carolina usually breed in isolated, fish-free, ephemeral wetlands (Braswell 1993). Adult frogs remain in upland burrows (principally stumpholes) during the non-breeding season. Adult frogs in North Carolina travel as far as 3.5 km from their breeding pond to a stumphole — a hole in the ground resulting from the decay of a tree's roots — and can use the same stumps as refugia from year-to-year (Humphries and Sisson 2012). Use of refugia is critical to survival of Gopher Frogs, especially for juveniles. Roznik and Johnson (2009a) found that Gopher Frog juveniles using refugia were 25 times less likely to be preyed upon than other juveniles. Furthermore, the only frogs that survived to the end of their study were those that found refugia within eight days of leaving a wetland.

The Gopher Frog is associated with the Longleaf Pine ecosystem in the southeastern United States. This ecosystem is considered critically endangered, having been reduced by more than 98% (Noss et al. 1995). The Gopher Frog requires both appropriate breeding ponds and upland terrestrial habitat. Breeding ponds must be large enough to retain water throughout the tadpole stage, but shallow enough to dry periodically, because the Gopher Frog does not tolerate fish. Additionally, these ponds must be relatively open-canopy and have a heavy herbaceous component. Gopher Frogs deposit their egg masses on the stems of herbaceous

Gopher Frogs usually breed in isolated, fish-free, ephemeral wetlands

vegetation, and developing tadpoles graze along these same herbaceous stems. Upland habitats used in more southern localities include preexisting refugia such as Gopher Tortoise burrows, stumpholes, and other naturally occurring holes (Bailey 1991; Blihovde 1999, 2000). Recent research showed similar terrestrial habitat usage in North Carolina (Humphries and Sisson 2012).

Breeding in North Carolina typically occurs from mid-February to mid-April, with most breeding occurring in March. Fall breeding also has been documented in North Carolina (Alvin Braswell field notes, WRC staff database). The breeding call is a loud snore that lasts up to two seconds (Wright and Wright 1949). Larvae develop over 3-4 months, and transformation usually occurs from May to July, when tadpoles grow larger than 85 mm in total length (Braswell 1995). The juveniles and adults occupy terrestrial habitats except for the intervals when adults migrate to breeding ponds. Longevity information is scant. One captive male reported in Snider and Bowler (1992) was from North Carolina and lived for 9+ years. Gopher frogs in Mississippi live at least 15 years in the wild (M. Sisson, pers. comm.). Based on one observation from Florida (Franz et al. 1988), Gopher Frogs can travel up to 2.0 km from their breeding sites. Research in North Carolina corroborates long-distance travel to breeding sites, with telemetered animals traveling an average of 1.3 km away from a Sandhills breeding site, and a maximum of 3.5 km (Humphries and Sisson 2012). In addition, during a separate project, a Gopher Frog from this same Sandhills breeding site was detected by drift fence, 5.2 km away. Thus, this species requires large tracts (typically >5,000 acres) of fire-maintained upland Longleaf Pine forest with embedded isolated ephemeral wetlands.

Gopher Frog tadpole

Gopher Frog tadpoles are herbivorous, while adults eat a variety of invertebrates and possibly some smaller vertebrates. An ambush predator, the adult Gopher Frog will clear a spot near the mouth of its stumphole or burrow and await prey. Preliminary work with acidity tolerances/preferences of amphibians in ephemeral ponds in North Carolina (Smith and Braswell 1994) suggests Gopher Frogs prefer an aquatic acidity range from approximately 4.3 – 5.2 pH.

Distribution and Population Status

The northern limit to the range of *Rana capito* occurs in southeastern North Carolina, where it has been reported from 53 pond localities, representing 23 populations (Braswell 1993) historically (over the past 100 years). The historical range of this species extends from Beaufort County on the coast and Cumberland County on the inner Coastal Plain south to southern Florida, and west along the Gulf Coast to Louisiana (see Conant and Collins 1998;

Jensen and Richter 2005). The current northern extent of the range in North Carolina is on Fort Bragg in Cumberland County. In the outer Coastal Plain, the most northern extent can be found in the Croatan National Forest in Carteret County. Sites farther north in Beaufort County have been destroyed (Braswell 1993; Dorcas et al. 2011). Historically, populations of Gopher Frogs were composed of multiple, small sub-populations connected across the landscape (Semlitsch et al. 1995; Palis 1998; Greenberg 2001; Richter et al. 2009). As habitats have become fragmented and altered, extirpations have occurred, preventing recolonization due to lack of connectivity and uninhabitable landscapes.

The Gopher Frog is currently listed as a state endangered species. It is under consideration by the U.S. Fish and Wildlife Service for federal protection under the Endangered Species Act.

Ten years of survey data collected by Wildlife Commission biologists reveal seven distinct populations of Gopher Frogs (Figure 1): 1) Croatan National Forest, 2) Camp Lejeune, 3) Holly Shelter Game Land (GL), 4) Military Ocean Terminal at Sunny Point (MOTSU), 5) Boiling Spring Lakes, 6) Sandhills GL, and 7) Fort Bragg. Due to landscape scale separation and fragmentation, these populations are now isolated from each another and do not function as a metapopulation. Several of these populations are supported by only 1-3 appropriate breeding wetlands, and only one population is considered somewhat secure. Egg mass data from 2016 confirmed that at least 96 females deposited eggs across all surveyed breeding sites. These data suggest a total adult population of only 200-300 animals. However, data from Camp Lejeune were not complete, so the estimate for the total population is likely higher. The most robust population known in North Carolina, obtained using drift fence data and corresponding with egg mass counts, numbers approximately 100 adults. Several populations appear to consist of fewer than 50 adults.

The Gopher Frog is currently recognized as state Endangered. It is under consideration by the U.S. Fish and Wildlife Service (USFWS) for federal protection under the Endangered Species Act. This species is designated G3-Vulnerable by NatureServe, Near Threatened by IUCN, and is currently a species of concern to the USFWS.

Gopher Frog

Gopher Frog egg mass

Historic and Ongoing Conservation Efforts

The Gopher Frog has received consistent survey efforts to determine conservation status. Alvin Braswell, at the NC Museum of Natural Sciences, laid the ground work for an extensive database of all known historical and current breeding wetlands (1993, and see also Braswell and Youmans 1995). These documents provided the basis for the Wildlife Commission Gopher Frog project that began in 2007. Since that time, Commission staff has visited all wetlands historically known as Gopher Frog breeding sites. In addition, numerous wetlands that appear to have potential for Gopher Frog breeding have also been surveyed. A few new breeding sites have been documented, but no new populations. Telemetry work by Commission staff (Humphries and Sisson 2012) showed the distances that frogs would travel and helped establish the populations that we now recognize (Figure 1).

Because many of these populations consist of few adults, the Commission began head-starting efforts to bolster local populations. These efforts were piloted in 2011 at Holly Shelter Game Land (in a year when only seven females laid eggs) and continued at that location from 2015-2018. Additionally, head-starting efforts were established at Sandhills GL from 2015-2018, MOTSU from 2015-2018, and Boiling Spring Lakes in 2017. Head-starting involves collecting small portions of egg masses during the breeding season, raising them to metamorphosis in outdoor cattle tanks, then releasing them back at the sites of capture. These head-starting efforts were made possible

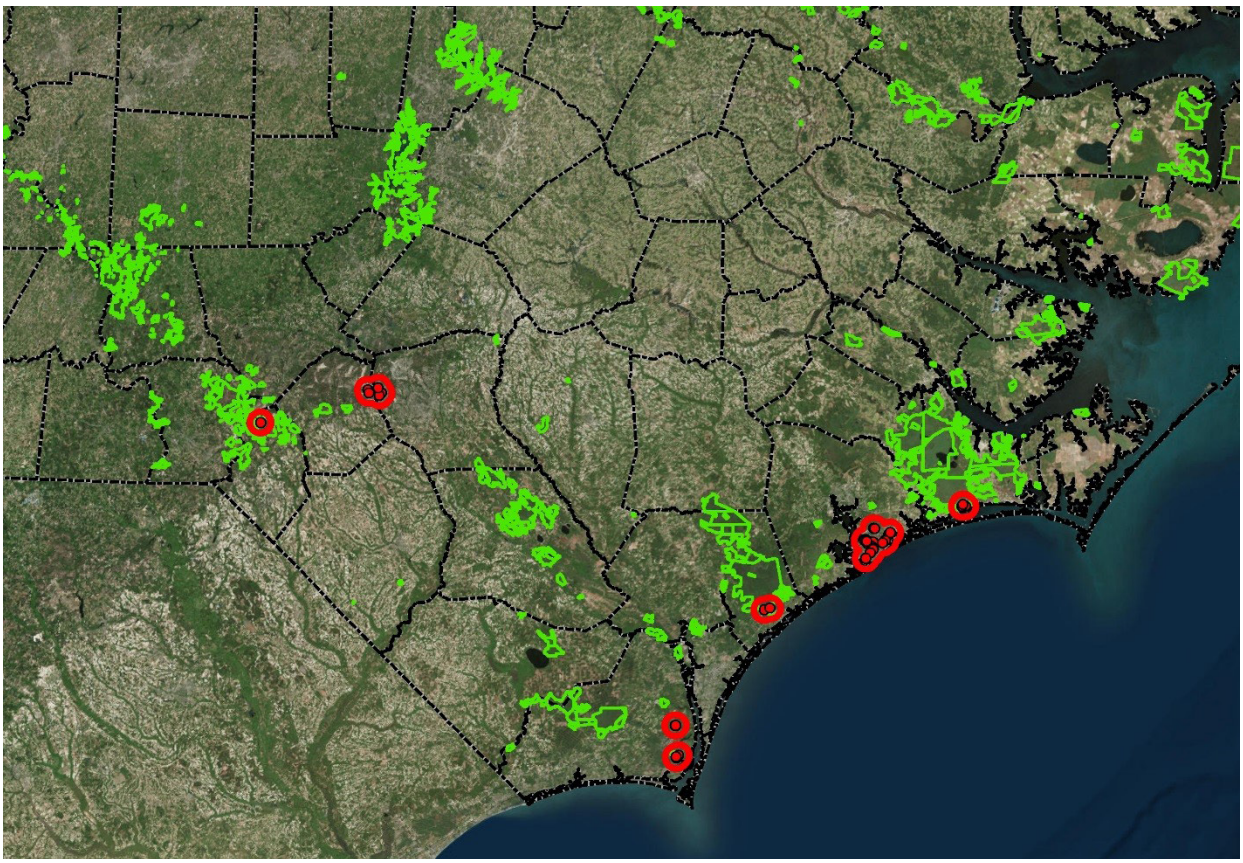


Figure 1. Distribution of known breeding ponds of Rana capito *in North Carolina, depicted as red dots. Currently, there are only seven populations, depicted as red circles around the dots. Green outlines show extent of Wildlife Commission game lands. (Map source: Esri, DigitalGlobe, GeoEye, Earthstar Graphics, CNES/Airbus, DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstope, and the GIS User Community)*

through collaborations with the North Carolina Aquarium at Fort Fisher and the North Carolina Zoo. Fort Fisher Aquarium staff has assisted with head-starting at Holly Shelter Game Land, MOTSU, and Boiling Spring Lakes, while North Carolina Zoo staff has assisted with the Sandhills Game Land population. Attempts also have been made to head-start eggs from Fort Bragg, but no eggs have been found since these efforts began. Future head-starting efforts will continue for all of these populations, as well as the possibility of adding Croatan National Forest.

When collecting eggs for head-starting, Commission staff also collected egg samples for genetic analysis of Gopher Frog populations. After some initial information from Eastern Kentucky University indicating very low genetic diversity among some of the populations, a longer term genetic study has been undertaken through a graduate student's research at UNC-Wilmington. Hopefully, this study will help inform head-starting efforts and identify populations that need the most attention.

Gopher Frog head-starting tanks

In addition to conducting head-starting and genetic analyses, Commission staff has made significant effort to manage and restore Gopher Frog habitat. Specifically, Commission staff has worked on game lands, as well as on other public lands with external partners to fine-tune the timing and intensity of prescribed fires on the landscape. Summer, late growing-season, hot fires are important to maintaining the landscapes needed for Gopher Frogs. These fires are important for both upland and wetland habitats. Fires later in the year more closely mimic the historical fire regime, when lightning from thunderstorms would have started large fires hundreds of years ago. Fires such as these encourage the growth of herbaceous vegetation in both upland and wetland habitats, as well as creating new stumpholes by burning them out. Additionally, prescribed fire is most effective for these sites if conducted after breeding ponds dry because fire burns across the entire wetland, encouraging herbaceous grasses that are critical for egg deposition and tadpole herbivory patterns, as well as reducing organic material build-up and subsequent lowering of pH in the ponds (Roznik and Johnson 2009b). Proper management for Gopher Frogs also benefits other species of conservation concern (e.g., Ornate Chorus Frog, Tiger Salamander, Mabee's Salamander, etc.). Gopher Frog breeding sites routinely support as many as 15-20+ amphibian species, a large number of other vertebrate and invertebrate species, and many rare plants.

Checking for Gopher Frog metamorphs in minnow trap in head-starting tank

Wildlife Commission staff creating a new pond on the Sandhills Game Land in 2013 (top photo); the same pond in 2019 (Bottom photo: Mike Martin)

Commission staff and partners have also made great strides in wetland restoration and creation. Gopher Frogs prefer open canopy, herbaceous wetlands. In sites that have experienced infrequent fires or fires outside the late growing season, wetland shrub and tree canopies often develop. Commission staff on Sandhills Game Land and Holly Shelter Game Land, as well as DoD staff on MOTSU, and USFS staff on Croatan, have all worked toward opening the canopies of wetlands by harvesting trees, and in some cases, removing heavy duff layers in unburned wetlands. Commission staff on Sandhills Game Land also created a new pond in October 2013, specifically targeting use by the Gopher Frog. As of 2018, Gopher Frogs have bred in this artificially constructed wetland in at least two separate years.

The Wildlife Commission has pursued land acquisition and conservation of lands supporting Gopher Frogs. Two tracts were acquired adjacent to the MOTSU population, and one new breeding pond was discovered on these tracts. Commission staff also has reached out to landowners with lands that appeared suitable for Gopher Frogs, and has gained access to several additional parcels — two of which include newly discovered breeding ponds. Survey work for new sites will continue, but few suitable areas appear to remain.

Threat Assessment

Reason for Listing

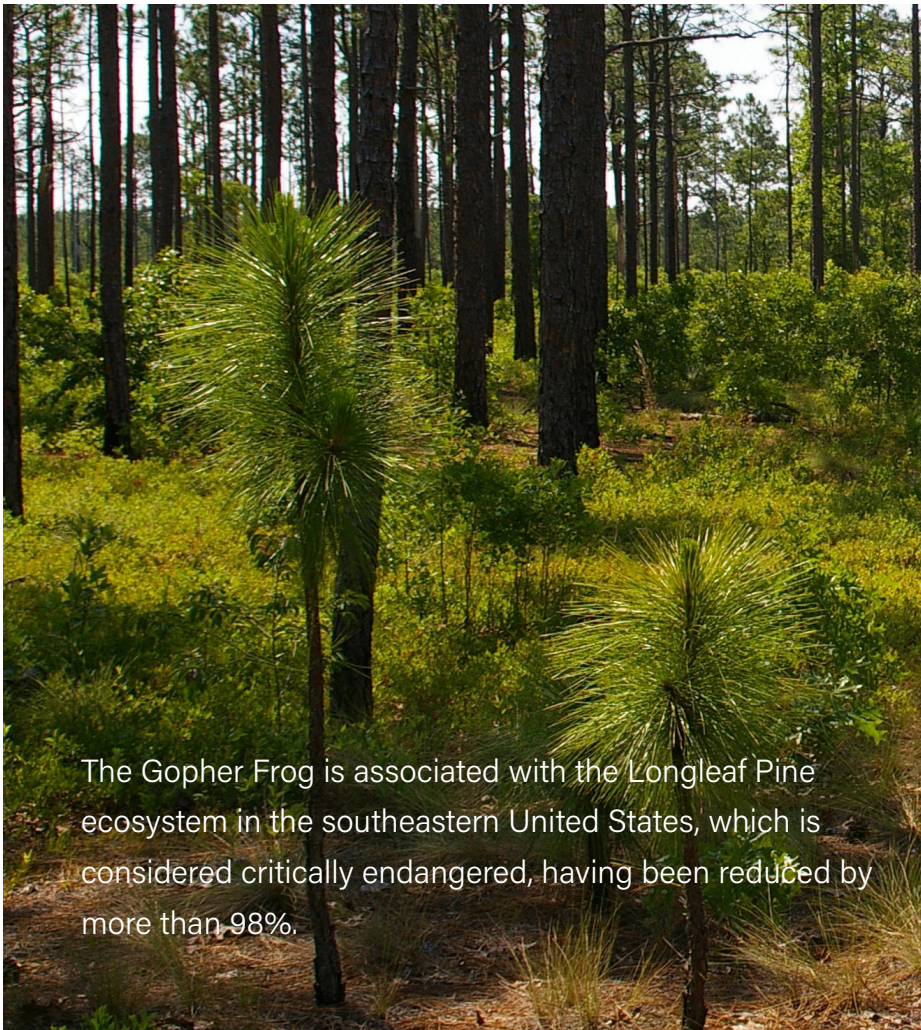
Braswell (1993) reported on the status of *R. capito* in North Carolina and recommended state Threatened status for the species based on a significant reduction in the number of active breeding sites and the threats to those remaining sites. Since that report, new Gopher Frog breeding sites have been located within the Sandhills Game Land, Holly Shelter Game Land, Fort Bragg, Boiling Spring Lakes, and MOTSU (Beane and Hoffman 1995, Beane and Hoffman 1997, and NCWRC staff). However, many more of the historical sites have been lost, and these new breeding sites do not appear to improve the outlook for the species significantly. Of the original 23 populations

detected by Braswell (1993), only seven populations remain (70% reduction). Of the 53 original pond sites, only 14 are still used by Gopher Frogs. Most have been destroyed or altered significantly (e.g., stocked with fish). Furthermore, lost populations are not likely to be recovered. Remaining populations face numerous threats including severe weather (especially long periods of drought), development, and lack of proper management. Thus, in 2017, the Commission elevated the Gopher Frog's state-listing status from Threatened to Endangered.

Present and Anticipated Threats

Surveys of Cherry Point Marine Corps Base properties in Carteret, Jones, and Craven counties during 1992-1993 did not locate any Gopher Frogs in habitats where the frog should have occurred historically. Additional survey efforts in New Hanover County, where the species was once common, have detected no Gopher Frogs. Threats to the population on and near MOTSU in Brunswick County have increased over those reported by Braswell (1993) with the additional threat of sand mining and water treatment spray fields in prime Gopher Frog breeding and terrestrial habitats. A breeding site in Scotland County was purchased by the Department of Transportation to mitigate wetlands loss, but much of the adjoining terrestrial habitats have been severely degraded. The site appears to no longer support the Gopher Frog. Coastal development continues to erode habitat. Drought and groundwater draw-down have reduced breeding and recruitment potential. Disease threats from at least three pathogens have been identified — two of which (chytrid fungus and ranavirus) have been found in North Carolina. Gopher Frog populations are unlikely to overcome the negative effects of human population growth and exploitation of natural resources in North Carolina.

A significant threat to the continued survival of the Gopher Frog in North Carolina is lack of management or inadequate management of sites. The use of prescribed fire is critical to maintaining this species on the landscape, and it must be applied appropriately. Lack of fire entirely will lead to canopy closure of wetlands, as well as alteration and degradation of Longleaf Pine uplands. Inappropriately applied winter fires threaten adult frogs moving across the landscape, and do not have the desired effects of removal of organic buildup in breeding ponds (Humphries and Sisson 2012). Late spring or summer are the ideal times for application of prescribed fire. However, this is not always possible at all sites. Managers must weigh and consider varying conditions to determine appropriate timing of fire at each site. A delicate balance is required to maintain fire on the landscape, and not lose species such as the Gopher Frog, found within Longleaf Pine systems.



The Gopher Frog is associated with the Longleaf Pine ecosystem in the southeastern United States, which is considered critically endangered, having been reduced by more than 98%.

Availability of refugia, such as stumpholes and mammal burrows, is a limiting factor at some sites. The process of "natural" stumphole formation can take many years, because a tree's roots slowly rot away, although fires can somewhat shorten stumphole formation time. Historically, extraction of sap from living Longleaf Pines was the initial strategy for supplying the naval stores industry that rose in the 1800s, but this was replaced in the mid-1900s with the easier "stumping" method, which extracted spirits and rosin from the stumps of Longleaf Pines (Earley 2004). Thus, much of the North Carolina landscape within the Longleaf Pine ecosystem experienced stump removal, leading to fewer stumphole refugia for Gopher Frogs. Stumphole availability varies greatly across the various Gopher Frog population areas, but its limited availability appears to be a potential threat at several sites. Uneven-aged management of trees, such as is typically the case in Longleaf Pine forests managed for wildlife, is important to avoid boom-and-bust cycles of stump formation.

Populations of Gopher Frogs are separated from each other due to fragmentation of the landscape, which can be caused by development and impoundment of large waterbodies, among other activities. The resulting landscape fragmentation precludes genetic interchange between populations. A significant risk for these small isolated populations is loss of genetic diversity leading to bottlenecks and potential loss of response plasticity in the face of a complex, dynamic environment. Richter and Hinkson (2015) sought to assess the population genetics of gopher frogs in North Carolina with an emphasis on quantifying the amount of genetic variation in each wetland surveyed, and the degree of differentiation among these wetlands. Overall, genetic variation in North Carolina populations was lower, and amount of historical inbreeding (FIS) was much higher, than in populations of *R. capito* in other states, including Alabama and Florida, or in populations of a related species, *Rana sevosa*, in Mississippi. In summary, this research revealed low population genetic diversity and limited gene exchange between populations of Gopher Frogs in North Carolina. The authors recommended additional genetics work be conducted to assess how the Wildlife Commission might mitigate for some of this loss by moving individuals across the landscape through head-starting efforts.

Recent telemetry work on the Gopher Frog has revealed that this species uses large amounts of upland habitat. It will range as far as 3.5 km from its breeding sites (Humphries & Sisson 2012). Thus, large tracts of unfragmented Longleaf Pine embedded with high quality, isolated ephemeral wetlands are required for this frog's survival. This type of habitat is rare in North Carolina, and land-use pressures on the Coastal Plain are unlikely to abate.

Climate change effects may negatively impact Gopher Frog breeding success via changes to seasonal rainfall (e.g., more extreme weather events such as droughts and floods), as well as extreme temperatures (NCDENR 2010). How these climatic changes may affect Gopher Frogs is unclear, but it may lead to ponds drying at times when they would normally have water, and ponds containing more water when they would normally be dry. These circumstances would likely result in poor or no breeding success, and significant degradation of habitats (e.g., reduced ability to burn through wetlands if they remain wet during the summer and/or introduction of fish during flood events).

CONSERVATION GOAL AND OBJECTIVES

Conservation Goal

Biologists with the N.C. Wildlife Resources Commission are working toward the conservation goal for Gopher Frogs to prevent the extinction of this species and to ensure its long-term viability as a member of the fauna of North Carolina for 100 years.

Conservation Objectives

Conservation objectives for the Gopher Frog:

1. Maintain all seven current populations of Gopher Frogs and augment each population, where possible, through head-starting efforts and by adding additional breeding ponds, where needed.
2. Work with partners to establish goals for each population and determine and implement Best Management Practices for wetland and upland restoration and maintenance, including appropriate application of prescribed fire.
3. After all current populations are thought to be sustainable and resilient (>100 breeding adults), attempt to reestablish extirpated populations using head-starting from nearby populations where possible (e.g., Carolina Beach State Park).
4. Continue to pursue land acquisition and other land conservation practices in areas where Gopher Frogs exist, or where appropriate habitat can be restored, managed, or created where new populations may be introduced or re-introduced.
5. Continue genetic analyses of Gopher Frog populations, and, where advisable, establish connectivity and gene flow between existing populations. Translocation of frogs between sites is one potential technique to manage for genetic diversity. Explore potential for genetics to ascertain susceptibility of each population to chytrid, ranavirus, and other pathogens.

CONSERVATION ACTIONS

Habitat Protection and Habitat Management

In general, steps that can be taken to improve the status of the Gopher Frog include: (1) incorporate management strategies favoring this species on properties in public and, where possible, private ownership; (2) seek recovery of the Longleaf Pine ecosystem in areas that would increase the size of favorable habitat blocks for the Gopher Frog; and (3) provide better protection for the relatively small, ephemeral wetland habitats that the species uses for breeding. In some areas, creation of breeding habitat might be an option available to help the species (Braswell 1995). Specifically, staff within various divisions of the Wildlife Commission will coordinate regularly about proper timing and use of prescribed fire on Commission game lands properties. The formation of a specialized wetland burn team would allow for the extra attention needed to achieve appropriate wetland burning. Artificial refugia have been constructed on Sandhills GL to mimic stumpholes. These artificial refugia also will be utilized at other sites where

stumpholes may be a limiting factor. Preliminary work looks promising, with both juvenile and adult frogs found using artificial burrows. The Commission will continue to survey for and restore potential breeding wetlands found on game lands, as well as consider creation of new wetlands. Additionally, Commission staff will continue to pursue acquisition of available lands either already sustaining Gopher Frogs or containing appropriate habitats that would support the potential for their reintroduction.

Commission staff will continue providing technical support to external federal, state, municipal, and private partners with extant populations of Gopher Frogs, or those with the potential for reintroduction.

Population Management

Commission staff will continue to assess population status at each location, and will make recommendations regarding head-starting efforts. Where needed, Commission staff will construct agreements to work with external partners on head-starting. Commission staff also will continue coordination of head-starting efforts of multiple populations with external agencies: North Carolina Aquarium at Fort Fisher, North Carolina Aquarium at Pine Knoll Shores, and North Carolina Zoo. Additionally, the Commission will continue collecting eggs for genetics work and supporting analyses to direct head-starting efforts. If feasible, staff will establish connectivity and gene flow between existing populations and newly established populations by translocating head-started individuals.

Incentives (Tax Break)

The Commission will encourage private landowners with Gopher Frog habitat on their property to participate in the Wildlife Conservation Land Program. This program allows qualifying landowners whose property contains state listed species to get a break in property taxes for implementing conservation actions.

Gopher Frog with a transmitter for tracking purposes

Monitoring and Research

Commission staff will: (1) Continue extensive monitoring of all known Gopher Frog populations, including annual egg mass counts in all known and potential breeding ponds; continue partial egg mass collections to support head-starting efforts. Staff will also continue surveys for new Gopher Frog populations in suitable habitats using aerial imagery, automated audio data loggers (frogloggers), and site visits.

(2) Conduct telemetry studies to determine the fate of head-started Gopher Frog metamorphs in both Sandhills GL and Holly Shelter GL populations. Telemetry will be

considered at other sites. A study has begun of head-started juvenile frogs on Sandhills GL, with initial results showing very low survival. Continued studies of head-started Gopher Frogs should consider the timing and location of released frogs, along with considerations of the effects of invasive species such as fire ants.

(3) Continue egg mass collections (two eggs per mass) for genetic analyses to determine diversity and relationships between populations, and examine gene flow between them.

Education and Outreach

The Commission will continue to contribute to reports, educational materials, publications, social media and outreach events that feature or include the Gopher Frog, as well as distribute public information about the species and associated projects through publications of conservation partners such as the North Carolina Partners in Amphibian and Reptile Conservation (NCPARC) and the North Carolina Herpetological Society (NCHS). Additionally, presentations on Gopher Frog natural history, management, research, and surveys will be given to academic, professional, and public citizen groups.

Regulations

Take or possession of this species without a valid permit is currently prohibited under NC law and administrative code (15A NCAC 10I .0102) and is considered a Class 1 misdemeanor (§ 113 337b). It is unlawful to release hatchery-raised fish on game lands without prior written authorization (15A NCAC 10D .0102), which could help prevent introduction of fish into ponds used by Gopher Frogs. Additionally, Commission regulations (15A NCAC 10B .0123) prohibit import, transport, export, purchase, possession, sale, transfer, or release into public or private waters or lands of the State, any live specimen(s) of Tongueless or African Clawed Frog (*Xenopus* spp.; known carriers of the chytrid fungus *Bd*), and several genera of Asian newts (*Cynops*, *Pachytriton*, *Paramesotriton*, *Laotriton*, *Tylototriton*; all known carriers of the chytrid fungus *Bsal*).

Staff surveying for gopher frogs on the Sandhills Game Land

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