U.S. FISH AND WILDLIFE SERVICE SPECIES ASSESSMENT AND LISTING PRIORITY ASSIGNMENT FORM

Scientific Name:

Gopherus polyphemus

Common Name:

Gopher tortoise

Lead region:

Region 4 (Southeast Region)

Information current as of:

08/30/2018

Status/Action

___ Funding provided for a proposed rule. Assessment not updated.

___ Species Assessment - determined species did not meet the definition of the endangered or threatened under the Act and, therefore, was not elevated to the Candidate status.

___ New Candidate

_X_ Continuing Candidate

___ Candidate Removal

- ___ Taxon is more abundant or widespread than previously believed or not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status
- ___ Taxon not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status due, in part or totally, to conservation efforts that remove or reduce the threats to the species
- ___ Range is no longer a U.S. territory
- ___ Taxon mistakenly included in past notice of review
- ___ Taxon does not meet the definition of "species"

___ Taxon believed to be extinct

___ Conservation efforts have removed or reduced threats

___ More abundant than believed, diminished threats, or threats eliminated.

___ Insufficient information exists on taxonomy, or biological vulnerability and threats, to support listing

Petition Information

___ Non-Petitioned

_X_ Petitioned - Date petition received: 01/18/2006

90-Day Positive:09/09/2009

12 Month Positive:07/27/2011

Did the Petition request a reclassification? **No**

For Petitioned Candidate species:

Is the listing warranted(if yes, see summary threats below) **Yes**

To Date, has publication of the proposal to list been precluded by other higher priority listing? **Yes**

Explanation of why precluded:

We find that the immediate issuance of a proposed rule and timely promulgation of a final rule for this species has been, for the preceding 12 months, and continues to be, precluded by higher priority listing actions (including candidate species with lower LPNs). During the past 12 months, the majority our entire national listing budget has been consumed by work on various listing actions to comply with court orders and court-approved settlement agreements; meeting statutory deadlines for petition findings or listing determinations; emergency listing evaluations and determinations; and essential litigation-related administrative and program management tasks. We will continue to monitor the status of this species as new information becomes available. This review will determine if a change in status is warranted, including the need to make prompt use of emergency listing procedures. For information on listing actions taken over the past 12 months, see the discussion of Progress on Revising the Lists, in the current CNOR which can be viewed on our Internet website (http://endangered.fws.gov/).

Historical States/Territories/Countries of Occurrence:

- **States/US Territories**: Alabama, Florida, Georgia, South Carolina
- **US Counties**:County information not available
- **Countries**: United States

Current States/Counties/Territories/Countries of Occurrence:

- **States/US Territories**: Alabama, Florida, Georgia, South Carolina
- **US Counties**: Baldwin, AL, Barbour, AL, Bullock, AL, Butler, AL, Choctaw, AL, Clarke, AL, Coffee, AL, Conecuh, AL, Covington, AL, Crenshaw, AL, Dale, AL, Dallas, AL, Escambia, AL, Geneva, AL, Henry, AL, Houston, AL, Lee, AL, Lowndes, AL, Macon, AL, Marengo, AL, Mobile, AL, Monroe, AL, Montgomery, AL, Pike, AL, Russell, AL, Washington, AL, Wilcox, AL, Alachua, FL, Baker, FL, Bay, FL, Bradford, FL, Brevard, FL, Broward, FL, Calhoun, FL, Charlotte, FL, Citrus, FL, Clay, FL, Collier, FL, Columbia, FL, DeSoto, FL, Dixie, FL, Duval, FL, Escambia, FL, Flagler, FL, Franklin, FL, Gadsden, FL, Gilchrist, FL, Glades, FL, Gulf, FL, Hamilton, FL, Hardee, FL, Hendry, FL, Hernando, FL, Highlands, FL, Hillsborough, FL, Holmes, FL, Indian River, FL, Jackson, FL, Jefferson, FL, Lafayette, FL, Lake, FL, Lee, FL, Leon, FL, Levy, FL, Liberty, FL, Madison, FL, Manatee, FL, Marion, FL, Martin, FL, Miami-Dade, FL, Monroe, FL, Nassau, FL, Okaloosa, FL, Okeechobee, FL, Orange, FL, Osceola, FL, Palm Beach, FL, Pasco, FL, Pinellas, FL, Polk, FL, Putnam, FL, Santa Rosa, FL, Sarasota, FL, Seminole, FL, St. Johns, FL, St. Lucie, FL, Sumter, FL, Suwannee, FL, Taylor, FL, Union, FL, Volusia, FL, Wakulla, FL, Walton, FL, Washington, FL, Appling, GA, Atkinson, GA, Bacon, GA, Baker, GA, Ben Hill, GA, Berrien, GA, Bleckley, GA, Brantley, GA, Brooks, GA, Bryan, GA, Bulloch, GA, Burke, GA, Calhoun, GA, Camden, GA, Candler, GA, Charlton, GA, Chatham, GA, Chattahoochee, GA, Clay, GA, Clinch, GA, Coffee, GA, Colquitt, GA, Cook, GA, Crawford, GA, Crisp, GA, Decatur, GA, Dodge, GA, Dooly, GA, Dougherty, GA, Early, GA, Echols, GA, Effingham, GA, Emanuel, GA, Evans, GA, Glascock, GA, Glynn, GA, Grady, GA, Houston, GA, Irwin, GA, Jeff Davis, GA, Jefferson, GA, Jenkins, GA, Johnson, GA, Lanier, GA, Laurens, GA, Lee, GA, Liberty, GA, Long, GA, Lowndes, GA, Macon, GA, Marion, GA, McDuffie, GA, McIntosh, GA, Miller, GA, Mitchell, GA, Montgomery, GA, Muscogee, GA, Peach, GA, Pierce, GA, Pulaski, GA, Quitman, GA, Randolph, GA, Richmond, GA, Schley, GA, Screven, GA, Seminole, GA, Stewart, GA, Sumter, GA, Talbot, GA, Tattnall, GA, Taylor, GA, Telfair, GA, Terrell, GA, Thomas, GA, Tift, GA, Toombs, GA, Treutlen, GA, Turner, GA, Twiggs, GA, Ware, GA, Washington, GA, Wayne, GA, Webster, GA, Wheeler, GA, Wilcox, GA, Wilkinson, GA, Worth, GA, Aiken, SC, Allendale, SC, Bamberg, SC, Barnwell, SC, Colleton, SC, Dorchester, SC, Hampton, SC, Jasper, SC
- **Countries**: United States

Land Ownership:

The range of the gopher tortoise is frequently associated with the longleaf pine ecosystem. An estimated 4.7 million acres (ac) (1.9 million hectares [ha]) of longleaf pine habitat currently exist in the southeastern United States up from an estimated 3.3 million acres (1.3 million ha) in 2012 (Oswalt et al. 2012, p. 13; ALRI, 2017, p. 10). It is estimated that approximately fifty–five percent of this acreage is in private ownership, 34 percent is in Federal ownership, and 11 percent is in State

or local ownership (Gaines 2010, entire). In 2010, modeling efforts were used to identify potential habitat where tortoises may be present (Hoctor and Beyeler, entire). A total of about 23.5 million ac (9.5 million ha) of potential primary, secondary, and foraging habitat is estimated to currently occur within the eastern portion of the tortoise's range (Hoctor and Beyeler 2010, p. 12). Over 80 percent of the potential habitat is estimated to be in private ownership, and the remainder is controlled by local, State, Federal, or private conservation entities. Currently, Georgia is expanding the amount of occupied gopher tortoise habitat that is under conservation and has conserved approximately 11,000 acres between 2015-2017 (9th Annual GT CCA report, 2018, p. 34).

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Biological Information

Species Description:

The gopher tortoise is the only tortoise (family Testudinidae) east of the Mississippi River; one of five species in the genus *Gopherus* in North America. It is larger than any of the other terrestrial turtles in this region, with a domed, dark brown to grayish-black carapace (upper shell), and is typically 10 to 12 inches (25.4 to 30.5 centimeters) long (Ashton and Ashton 2008, p. 17). The plastron (lower shell) is yellowish and hinge-less. A fossorial species, its hind feet are elephantine or stumpy, and the forelimbs are shovel-like, with claws used for digging. In comparison to females, males are generally smaller, with a larger gland under the chin, a longer gular (throat) projection, and more concave (curved in) plastron. Hatchlings are up to 2 inches (5 centimeters) in length, with a somewhat soft, yellow-orange shell.

Taxonomy:

The gopher tortoise is one of five living North American tortoise species and the only one indigenous to the southeastern United States (Ernst and Lovich 2009, p. 581). The other four species are found in the western United States. First described by F.M. Daudin in 1802, *G. polyphemus* is classified as belonging to class Reptilia, Order Testudines, and Family Testudinidae. The most recent change affecting the genus Gopherus is the splitting of the desert tortoise (*G. agassizii*) into two species (Murphy *et al.* 2011, 33 pp.): Agassiz's desert tortoise (*G. agassizii*) and Morafka's desert tortoise (*G. morafkai*).

Bramble (1982, p. 864) proposed that *G. polyphemus* along with its cladistic (species classification) relative *G. flavomarginatus* (Bolson tortoise) should be the only members of genus *Gopherus*, placing the other members of this genus, *G. berlandieri* (Texas tortoise) and *G. agassizii* (desert tortoise), into a new genus Scaptochelys. However, more recent morphological and genetic studies

have reinforced the traditional assignment of all species into genus *Gopherus* (Crumly 1994, pp. 12-16). Allozyme differentiation has indicated that *G. polyphemus* is most closely related to *G. flavomarginatus* and is thus placed in a clade (genetically related group) distinct from the clade containing *G. berlandieri* and *G. agassizii* (Morafka et al. 1994, p. 1669).

The taxonomic status of the gopher tortoise throughout its range is considered valid (Interagency Taxonomic Information System 2010, p. 1). There is no taxonomic distinction between gopher tortoise populations in the western and eastern portions of its range, or at any level of geographic subdivision. There have been two recent gopher tortoise genetic analyses, utilizing both mitochondrial DNA and nuclear microsatellite markers that examined population structure and the biogeographic barriers that best explain the genetic variation range-wide (Clostio *et al.* 2012, pp. 613-625; Ennen *et al*. 2012, pp. 110-122). These studies both support earlier findings by Osentoski and Lamb (1995, p. 709) that identified the Apalachicola-Chattahoochee-Flint River system as the geographic feature that best explains gopher tortoise genetic differentiation, along with the Mobile-Tombigbee Rivers in Alabama (where the current split between listed and unlisted populations exists).

A recent publication (Gaillard *et al.,* 2017, p. 497) genotyped 933 tortoises across the species range (listed and candidate range) and recognized five genetic groups (or regions) delineated by the Tombigbee-Mobile Rivers, Apalachicola-Chattahoochee Rivers, and the transitional areas between several physiographic province sections of the Coastal Plains (i.e., 46 Eastern Gulf, Sea Island, and Floridian). In addition, Gaillard *et. al.* (2017, p. 497) describe the periphery of the range with lower genetic diversity relative to the core and genetic admixture at sampling sites along the boundaries of the genetically defined groups. The periphery of the range showed lower genetic diversity, with reduced genetic diversity in the Western region (listed range) and the East Georgia region (candidate range) demonstrating reduced genetic diversity in the fringes of the range of the species. The authors recommend that the regions delineated by the five genetically separated groups be recognized as different management units in terms of conservation planning and to consider the intraregional differentiation among the populations as part of management plans that involve translocations (Gaillard *et al.,* 2017, p. 509).

Habitat/Life History:

Gopher tortoises require well-drained, sandy soils for burrowing and nest construction, an abundance of herbaceous ground cover for food, and a generally open canopy that allows sunlight to reach the forest floor (Landers 1980, p. 6; Auffenberg and Franz 1982, p. 98). Longleaf pine and oak uplands, xeric hammock, xeric Florida scrub, maritime scrub, and ruderal (disturbed) habitat most often provide the conditions necessary to support gopher tortoises (Auffenberg and Franz 1982, p. 99). Ruderal (i.e., disturbed or atypical) habitats include roadsides and utility rights-of-way, grove/forest edges, fencerows, and clearing edges. In the western range, soils contain more silt, and xeric (dry) conditions are less common west of the Florida panhandle (Craul et al. 2005, p. 73). Ground cover in this Coastal Plains area can be separated into two general regions with the division in the central part of southern Alabama and northwest Florida. To the west, bluestem (Andropogon and Schizachyrium spp.) and panicum (Panicum spp.) grasses predominate; to the east, wiregrass (Aristida stricta) is most common (Boyer 1990, p. 3). However, gopher tortoises do

not necessarily respond to specific plants but rather the physical characteristics and structure of habitat (Diemer 1986, p. 126). Historic gopher tortoise habitats were open pine forests, savannahs, and xeric grasslands that covered the coastal plain from Mexico and Texas to Florida.

Gopher tortoises have a well-defined activity range where all feeding and reproduction take place and that is limited by the amount of herbaceous ground cover (Auffenberg and Iverson 1979, p. 549). Tortoises are herbivores eating mainly grasses, plants, fallen flowers, fruits, and leaves. Gopher tortoises prefer grassy, open-canopy microhabitats (Boglioli et al. 2000, p. 703), and their population density directly relates to the density of herbaceous biomass (Auffenberg and Iverson 1979, p. 558; Landers and Speake 1980, p. 522; Wright 1982, p. 22; Stewart et al. 1993, p. 79) and a lack of canopy (Breininger et al. 1994, p. 63; Boglioli et al. 2000, p. 703). Grasses and grass–like plants are important in gopher tortoise diets (Auffenberg and Iverson 1979, p. 558; Landers 1980, p. 9; Garner and Landers 1981, p. 123; Wright 1982, p. 25; Macdonald and Mushinsky 1988, p. 351; Mushinsky et al. 2006, p. 480; Birkhead et al. 2005, p. 146). A lack of vegetative diversity may negatively impact the long-term sustainability of gopher tortoise populations (Ashton and Ashton 2008, p. 78).

Gopher tortoises require a sparse canopy and litter-free ground not only for feeding, but also for nesting (Landers and Speake 1980, p. 522). In Florida, McCoy and Mushinsky (1995, p. 35) found that the number of active burrows per tortoise was lower where canopy cover was high. Females require almost full sunlight for nesting (Landers and Buckner 1981, p. 5) because eggs are often laid in the burrow apron or other sunny spot and require the warmth of the sun for appropriate incubation (Landers and Speake 1980, p. 522). At one site in southwest Georgia, Boglioli et al. (2000, p. 703) found most tortoises in areas with 30 percent or less canopy cover. Diemer (1992, p.162) found that ecotones (areas on the edges of landscapes) created by clearing were also favored by tortoises in north Florida. When canopies become too dense, usually due to fire suppression, tortoises tend to move into ruderal habitats such as roadsides and rights-of-way with more herbaceous ground cover, lower tree cover, and significant sun exposure (Garner and Landers 1981, p. 122; McCoy et al. 1993, p. 38; Baskaran et al. 2006, p. 346). In Georgia, Hermann et al. (2002, p. 294) found that open pine areas (e.g., pine forests with canopies that allow light to penetrate to the forest floor) were more likely to have burrows, support higher burrow densities, and have more burrows used by large, adult tortoises than closed-canopy forests.

Historically, open-canopied pine forests were maintained by frequent, lightning-generated fires, with peak lightning ignition occurring in late spring to early summer (Knapp et al. 2009, p. 3).The burrows of a gopher tortoise are the habitat and center of normal feeding, breeding, and sheltering activity. Gopher tortoises can excavate many burrows over their lifetime, and often use several each year. Burrows typically extend 15-25 feet (4.6 to 7.6 meters), with a record burrow measuring 67 feet (20.5 meters; Ashton and Ashton 2008, p. 46), and can be up to 12 feet (3.7 meters) deep, and provide shelter from predators, winter cold, fire, and summer heat. Tortoises spend most of their time within burrows and emerge during the day to bask in sunlight, to feed, and reproduce. Tortoises breed from March through October (e.g. Landers et al. 1980, p. 353; McRae et al. 1981, p. 178; Wright 1982, pp. 54-55; Eubanks et al. 2002, p. 470), but females do not reproduce every year (estimated at 80 to 85 percent; Smith et al. 1997, p. 598). Females excavate a shallow nest to lay and bury eggs, typically between early May and late June, and usually in the apron of soil at the

mouth of the burrow. Range-wide, average clutch size varies from about 4 to 10 eggs per clutch, and incubation lasts 85 to 100 days.

Home range size and movements increase with age and body size, and home range area tends to vary with habitat quality, becoming larger in areas of poor habitat (Auffenberg and Iverson 1979, p. 558). Males typically have larger home ranges than females. Mean home ranges of individual tortoises in Alabama, Florida, and Georgia have varied from 1.3-5.2 acres (3.2-2.2 ha) for males and 0.2-2.5 acres (0.09-1.0 ha) for females (McRae et al. 1981, p. 175; Diemer 1992, p. 160; Tuma 1996, p. 33; Eubanks et al. 2002, p. 468).

Historical Range/Distribution:

The gopher tortoise occurs in the southeastern Atlantic Coastal Plain from southern South Carolina west through Georgia, Alabama, and Mississippi to eastern Louisiana, and south through peninsular Florida. The eastern (candidate) portion of the gopher tortoise's range includes Alabama (east of the Tombigbee and Mobile Rivers), Florida, Georgia, and South Carolina.

Current Range Distribution:

The current range for the eastern (candidate) population of the gopher tortoise aligns with the historic range which includes Alabama (east of the Tombigbee and Mobile Rivers), Florida, Georgia, and South Carolina. The core of the current distribution of the gopher tortoise in the eastern portion of its range includes central and north Florida and eastern and southern Georgia.

Population Estimates/Status:

Due to discrepancies in historical data collection (described below), we have recommended that surveys be performed using Line Transect Distance Sampling (LTDS) when possible and applicable, as this methodology is the most statistically reliable to assess accurate measurements of tortoise populations (Smith *et al.,* 2009, p. ii). Surveys using this methodology have been ongoing across all states within the candidate range of the tortoise and are providing more comprehensive data on the status of the species. For instance, the State of Georgia has the most comprehensive gopher tortoise survey effort to-date, both on public and private lands. Georgia Department of Natural Resources (GA DNR) has estimated that surveys have been contracted and/or completed on at least 82 individual properties statewide, and estimates at least 122 tortoise populations that meet the size and demographic requirements of a minimum viable population (250 adult tortoises with a density of no less than 0.4 tortoises/ha), 64 primary support populations (50-250 adult tortoises), and 8 secondary support populations (< 50 adult tortoises). .

Historical Data: A wide variety of information is available on the number and density of gopher tortoises and their burrows throughout their range. These data are the result of numerous surveys/censuses using a variety of methodologies ranging from one-time censuses to repeated surveys over several decades. In the past, the diversity of data has posed a challenge when trying

to evaluate the status of the species from a landscape perspective. For example, in geographic areas where we had more data, we had higher confidence in drawing conclusions about the status of those populations. In other areas, where there was little or no data, our confidence in assessing the status of tortoises was lower. In order to address the issue of incompatible data from various survey methodologies, we have recommended that surveys be performed using LTDS when possible and applicable, as this method is the most statistically reliable to assess accurate measurements of tortoise populations (Smith *et al.,* 2009, p. ii).

Current Efforts: The gopher tortoise is more widespread and abundant in parts of the eastern portion of its range, in particular southern Georgia and central and northern Florida; these areas have been designated as the “central” portion of the tortoise’s geographic extent previously in the literature (Tuberville *et al.,* 2009, p. 12) and more recently as east Georgia, West Georgia and Florida (Gaillard *et al.,* 2017, pp. 500-502). Although most state-wide estimates of gopher tortoise abundance have not been calculated directly from survey results, some estimates have been made based on available habitat and extrapolation of existing population data. These estimates include: approximately 785,000 in Florida (Florida Fish and Wildlife Conservation Commission (FWC) 2012, p. 2); 350,000 in Georgia (9th Annual GT CCA report); 30,000 to 130,000 in Alabama (Guyer *et al.,* 2011, p. 4); and 1500-2000 in South Carolina (Buhlmann, Savannah River Ecology Laboratory, in litt. 2012). Many surveys indicate that tortoise populations often occur in fragmented and degraded habitat, and densities of individuals are low within populations; however, there are also many populations of tortoises in the eastern portion of the range that appear to be sufficiently large enough to persist long-term if proper management and protections are secured (Service 2011, p. 38).

The characteristics of a sustainable gopher tortoise were identified and effort to identify the locations of gopher tortoise populations are underway to assist with developing conservation priorities. All states in the candidate range of the tortoise continue to evaluate their current populations in order to have a more thorough understanding of the status of the species, areas with the highest potential for expansion or connection between populations, areas where recruitment of young tortoises seems to be highest, populations necessary to maintain the genetic viability of the species, and populations most susceptible to fragmentation or pressure from urbanization. The Gopher Tortoise Council has prepared a document detailing the characteristics of a minimum viable population (MVP), as well as the definitions of smaller support populations that are not presently viable. An MVP has been described as a demographically stable population with at least 250 adult tortoises, at a density of no less than 0.4 tortoises/hectare (approximately one tortoise for every 6 acres), on at least 100 ha (250 ac) of well-managed, suitable habitat (GTC 2014, p. 1). These populations should have a sex ratio approaching 1:1, and have evidence of active burrows representing all age classes. However, a full assessment of viability must also include determinations that appropriate habitat management and land protection have been secured long-term. Evaluations of the number of large, potentially-viable populations in Alabama, Florida, Georgia, and South Carolina continue to better understand the status of the species.

Presently, South Carolina DNR reports two (2) minimum viable populations (Tillman Sand Ridge HP and Coosawhatchie River Sand Hills) with estimated populations of 226 and 360 gopher tortoises respectively. An additional population is being augmented at Aiken Gopher Tortoise

Heritage Preserve where approximately 160 adult gopher tortoises have been released and the total gopher tortoise population, including all demographics, is of approximately 300 tortoises. In addition, four (4) primary support populations and five (5) secondary support populations have been identified (Dillman *et al.,* 2018, p. 17). Georgia DNR reports an estimate of one-hundred-twenty-two (122) minimum viable populations, sixty four (64) primary support populations and eight (8) secondary support populations (Matt Elliot, pers. comm., 2018). In Florida, FWC reports thirty eight (38) minimum viable populations, twenty eight (28)28 primary support populations, twenty three (23) secondary support populations, and twenty four (24) recipient sites with potential viability. Three of the largest populations identified in Florida are the Withlacoochee State Forest population with an estimate of 8,221 gopher tortoises; Jennings State Forest with 3,828 tortoises, and Kissimmee Prairie Preserve State Park with an estimated population of 4,778 tortoises. Alabama DCNR is continuing their efforts in identifying areas to survey but so far report one to two minimum viable populations in Conecuh National Forest and four support populations in state conservation lands.

Distinct Population Segment(DPS):

A species may warrant listing if it is endangered or threatened throughout all or a significant portion of its range. The Act defines “species” as follows: “The term ‘species’ includes any subspecies of fish or wildlife or plants, and any distinct population segment [DPS] of any species of vertebrate fish or wildlife which interbreeds when mature.” For the 12–Month Finding on a Petition To List the Gopher Tortoise as Threatened in the Eastern Portion of Its Range (76 FR 45130 45162), the status of the gopher tortoise throughout all of its range was considered (including where it is currently listed as threatened), in order to comprehensively evaluate the status of the species. Therefore, the listable entity is the species (gopher tortoise) throughout its range, and not separated into eastern and western distinct population segments.

Threats

A. The present or threatened destruction, modification, or curtailment of its habitat or range:

There are many direct and indirect factors contributing to this threat, including (but not limited to): 1) habitat fragmentation by roads (potentially causing road mortality, reproductive isolation, small and discontinuous populations, and edge effects that may increase predation); 2) habitat modification (either deliberately or from inattention), including conversion of open pine (e.g., longleaf pine) forests to other silvicultural or agricultural habitats, mining, shrub/hardwood/sand pine encroachment (mainly from fire exclusion or insufficient fire management), and establishment and spread of invasive species (potentially causing the aforementioned indirect effects due to canopy closure and decline of available forage/groundcover); and 3) habitat destruction from activities such as urbanization, solar farm construction, and sand extraction (potentially causing direct mortality and/or displacement of tortoises to undesirable habitats).

Conversion of Open Pine

Fire-maintained southern pine ecosystems, particularly the longleaf pine ecosystem, have declined dramatically across the South. Gopher tortoise habitat in the eastern portion of its range has been destroyed or modified in the past due to conversion of natural pine forests to intensely managed planted pine plantations or naturally regenerated stands (Hermann et. al. 2002, p. 296; Siry 2002, p.335; Conner and Hartsell 2002, pp. 373-376). The spatial and temporal scale of fragmentation from silvicultural activities will vary depending on location, size, and timing of these activities. Current estimates show that the longleaf pine forest type has declined 95 percent from the historical estimate of 88 million ac (35.6 million ha) (Oswalt et al. 2012, p. 13). Recently, however, longleaf acreage has been trending upward in parts of the Southeast through restoration efforts and as of 2016 was estimated at 4.7 million ac (1.9 million ha) (ALRI, 2015, p. 13; ALRI, 2017, p. 10).

Frequent alterations of intensely managed pine forests are unlikely to support stable tortoise populations (Diemer 1992, p. 288); however, there are situations where tortoise populations have persisted on sites with a history of intensive silvicultural activities (Diemer Berish *et al.* 2012, p. 50). Gopher tortoises are known to abandon areas that had been recently converted to pine plantations (FWC 2001, p. 4). Typically, gopher tortoises move from intensively managed pine forests when canopies begin to close to roadsides and then to adjacent clear cuts or other peripheral habitats, if they are available (Auffenberg and Franz 1982, p. 102; Diemer 1992, p. 288). These peripheral areas are often road shoulders, which may give the impression that population numbers are high, even though the adjacent pine plantation is largely unoccupied (FWC 2001, p. 4).

Additionally, loss of natural pine forests has resulted from urban development and industrialization (Kautz 1998, p. 184; FWC 2006, pp. 4 and 8), and degradation of natural pine forest due to lack or insufficient use of prescribed fire (FWC 2006, p. 10; Bailey and Smith 2007, p. 8; Yager *et al.,* 2007, p. 428). Several of these same factors are cited in the gopher tortoise recovery plan as historical processes that resulted in habitat destruction and modification in the western portion of the tortoise's range (Service 1990, pp. 8-10). The conversion of native southern pine forests to intensively managed pine forests (planted pine plantations or regenerated forests) is anticipated to continue in the future (Bailey and Smith 2007, p. 8), although the rates of projected conversion vary and this has certainly been slowed by the longleaf restoration and ecosystem management efforts of several programs (described in detail under the "Conservation Measures Planned or Implemented" Section below). The forest products industry land base has historically been stable, and therefore a predictable component of forested landscapes; however, recently there have been large land transitions to timber investment management organizations and real estate investment trusts (Butler and Wear 2013, p. 103). This increased liquidity of forest assets could further reduce and fragment individual land holdings (Butler and Wear 2013, p. 119).

Insufficient Fire Management

Gopher tortoise habitat is fire-dependent, and naturally ignited fires and prescribed burning maintain an open canopy and reduced forest floor litter that allow penetration of sunlight necessary for ground cover growth and gopher tortoise nest thermoregulation. In natural and planted pine stands, frequent burning is the most important management tool in sustaining gopher tortoise habitat by restricting a woody mid-story and promoting the flowering and seed production of

fire-stimulated groundcover plants (Landers and Buckner 1981, p. 6; Breininger *et al,*. 1994, p. 63; Oswalt *et al.,* 2012, pp. 2-3).

Loss and alteration of gopher tortoise habitat from fire exclusion or fire suppression has a significant effect on survival of the gopher tortoise (Boglioli et al. 2000, p. 704). Although burning has generally been accepted as a management tool, increased urbanization has limited its use in many locations (Ashton and Ashton 2008, p. 78). Many southeastern pine forests have dense canopies, more mid-canopy shrubs, and herbaceous ground cover decline due to fire suppression (Yager et al. 2007, p. 428). Tortoise population life expectancy was shorter than normal in fire-suppressed savanna communities (Auffenberg and Iverson 1979, p. 562). Population reduction was directly correlated with the degree and rate of successional habitat modification (Auffenberg and Iverson 1979, p. 562). Fire exclusion may reduce tortoise numbers by 60 to 80 percent in 8 years (Diemer 1989, p. 3) or 100 percent in 16 years (Auffenberg and Franz 1982, p. 108). In south-central Florida, sandhill and scrubby flatwoods were abandoned by gopher tortoise after about 20 years of fire exclusion (Ashton *et al.,* 2008, p. 528).

In suitable habitats, periodic burning or shrub removal can increase gopher tortoise carrying capacity (Stewart et al. 1993, p. 79). Landers (1980, p. 7) found that mixed stands of longleaf pine, turkey oak, and other scrub oaks that were burned every 2 to 4 years produced the densest tortoise colonies. In south-central Florida, tortoises moved into areas that were frequently burned and abandoned areas that were unburned or burned less frequently (Ashton et al. 2008, p. 527). Breininger et al. (1994, p. 63) determined that burned habitats had more herbaceous ground cover and gopher tortoises than unburned oak-palmetto. Landers and Buckner (1981, p. 5) determined that burned plantations and longleaf pine scrub oak ridges had nest densities four times higher than in unburned plantations and ridges. Landers and Speake (1980, p. 518) recorded that herbaceous ground cover was 2.3 times higher and gopher tortoise density was 3.1 times higher in a frequently burned slash pine plantation as in an adjacent unburned natural sandhill area.

Even though management efforts may restore habitat, previous fire suppression can result in abandonment of adjacent habitat and create dispersal barriers (Ashton *et al.,* 2008, p. 528). Recently burned potential (but unoccupied) habitat may not be colonized by tortoises if fire has been suppressed in surrounding habitat making it unsuitable for tortoises. However, these areas, if properly restored, could potentially be utilized as restocking sites if long-term management plans have been established, they are thought to historically have been occupied by tortoises, and the reason(s) why the sites were originally abandoned have been addressed.

We realize that typically there are multiple use objectives (including management for a variety of species) on public lands and not all potential habitats on public lands are currently suitable gopher tortoise habitat. Thus, tortoise habitat suitability is often a byproduct of other management treatments. Public lands, while less vulnerable to development, are still subject to economic pressures and constraints. Currently, public agency budgets are strained, and most are probably not adequate to provide for large-scale, intensive management specifically targeting gopher tortoise habitat. We know that periodic burning of gopher tortoise habitat is crucial to the conservation of the species. We also know that pressures to control wildfires for public safety and the adverse effects of smoke (both perceived and actual) make burning more and more difficult. Compounding

these challenges are the forecasts that spring and fall wildfire seasons will increase in the future, and increased urbanization may lead to reduced acceptance of fire as a management tool (Klepzig *et al*., 2014, p. 15).

Recent reports from the America's Longleaf Restoration Initiative (ARLI) show that there currently 4.7 million acres of longleaf in the southeast U.S. and that 131,000 acres of newly planted longleaf in 2017 was a 16% decline from 2013 (ARLI 2018, p.14). In 2017, ARLI also reported 1.37 million acres burned a 17% decline of acres burned from 2013 (ARLI 2018, p.1). An increase in 2017 was observed in the amount of land protected in perpetuity through fee tile acquisition compared to 2016 but lower than 2013 (ARLI 2018, p.5). The efforts from ARLI along with all of the prescribed burning and land protection reported by the signatories to the GT CCA are contributing to improving gopher tortoise habitat (9th CCA report, 2018, entire).

Solar Farms

A fairly recent activity that threatens destruction of gopher tortoise habitat is the construction of solar farms, which are part of a new movement towards renewable energy. In Georgia, some of the characteristics of prime sites selected for solar farm projects are also characteristics of high-quality tortoise habitat, such as high solar radiation, high elevation, low humidity and cloud cover, and excessively well-drained (sandy) soils. Areas with sandy soils are also often less expensive, because they are less desirable for agriculture and silviculture due to their low potential vegetative productivity. Sandhill ecosystems/habitats along the Fall Line and southwest Georgia are associated with these excessively well-drained coastal plain soils, and are of vital importance to gopher tortoise populations and other species of concern. Impacts from solar farm projects are also ongoing in Florida, Alabama and South Carolina.

The primary concern with solar farms is that resident animals may be injured or killed during land-clearing/grading activities. In addition, since the design for the panel arrays is to maximize solar radiation, very little sunlight reaches the ground once construction is complete. The consequence to wildlife is that there is not enough light to grow much vegetation below, and thus the base of the food web is nearly absent. Further, to prevent any rogue plants from growing high enough to block sunlight from hitting the panels, solar farms regularly herbicide the ground. For security purposes, solar farms are surrounded by chain link fences; therefore, many animals are excluded from even passing through for dispersal needs (J. Jensen, GA DNR, pers. comm., 2015).

It is unclear how much land is being lost to solar farms, but in Georgia at least 3,000 ac (1,214 ha) of tortoise habitat was destroyed in 2015-2016 (J. Jensen, GA DNR, pers. comm., 2015). While tortoises may sometimes be relocated when state agencies are informed prior to land-clearing, this activity still represents a fairly unregulated activity in much of the candidate range (particularly outside of Florida) that results in loss of habitat, isolation of populations, and may threaten some of the best remaining tortoise habitat. In 2016, Army and Navy installations lost over 800 acres of gopher tortoise habitat due to solar projects.

The Gopher Tortoise Council and State Agencies within the range of the species have developed Voluntary Best Management Practices for Solar Development that is compatible with the

conservation of gopher tortoises (www.gophertortoisecouncil.org/conserv/gtc_solar_development.pdf). These practices have been already used in South Carolina, Florida, Alabama, and Georgia where solar development is increasing. In South Carolina, solar development in a site in Hampton County (~1100 acres) developed as a solar facility and 10 tortoises were relocated to a property in conservation prior to construction (9th CCA report, 2018, p. 54). As in South Carolina, military projects are also using translocations as a tool for tortoises where solar panel installation projects are occurring (9th CCA report, 2018, p. 97)

Summary of Factor A

In summary, we find that the destruction, modification, or curtailment of the gopher tortoise's habitat is currently a threat and is expected to persist. While there are a number of conservation measures in place, we have a better understanding of populations in conservation lands that won't be developed in South Carolina, Florida, and Georgia. Although this threat is ongoing and expected to continue over the coming decades, we have compiled more information about current gopher tortoise populations and their habitat and may be able to understand the implications of this threat better as we continue to assess this species. Considering that the threat of habitat loss is reduced on the relatively large amount of habitat that is in public ownership and private conservation lands, we believe the magnitude of this threat is moderate.

B. Overutilization for commercial, recreational, scientific, or educational purposes:

The primary threat associated with this factor is the harassment and mortality of gopher tortoises associated with the unregulated harvest of rattlesnakes, specifically the eastern diamondback rattlesnake (Crotalus adamanteus). The technique of blowing fumes of noxious liquids (otherwise known as "gassing") down tortoise burrows in order to capture the snakes harms or harasses the resident tortoise, and is known to be used primarily to collect the snakes for rattlesnake "round-ups" (Means 2009, p. 139).

Rattlesnake round-ups are locally-organized events that offer prizes for largest and most rattlesnakes caught, and promotes the slaughter of the snakes for skins and meat. Before 2012, there were three rattlesnake round-ups remaining; however, in 2012 the Claxton, GA, round-up was converted to a wildlife festival and snakes used at the festival are longer harvested from the wild. This threat has declined over the past several decades but still occurs in some rural areas. Therefore, public pressure to convert the two remaining rattlesnake round-ups (one in Alabama, the other in Georgia) to wildlife festivals, in addition to regulations prohibiting the gassing of tortoise burrows (Florida, Georgia, and Alabama), should continue to help diminish this threat to the tortoise. Florida law specifically prohibits the use of gasoline or other chemical or gaseous substances to drive wildlife from their retreats (Florida Administrative Code 68 A.4-001(2). Alabama regulation 220-2-.11 currently prohibits the use of gas, noxious chemicals, or gaseous substances into wildlife burrows, dens, or retreats, and Georgia recently eliminated the loophole that allowed people to use gasoline and other noxious chemicals to drive rattlesnakes from gopher tortoise

burrows (Senate Bill 322 of Georgia codes § 27-1-130 and 27-3-130). These regulatory measures will reduce incidental mortality of gopher tortoises during rattlesnake collections, but additional pressure will undoubtedly be necessary to convert the remaining two round-ups. Currently, there is a petition to list the eastern diamondback rattlesnake (submitted August 22, 2011, by the Center for Biological Diversity, Coastal Plains Institute, Protecting All Living Species, and One More Generation); implications from the U.S. Fish and Wildlife Service's (FWS) finding on that petition could potentially have effects on this threat to the tortoise as well.

In summary, after reviewing available information, we find that the unregulated harvest of rattlesnakes poses a current and future threat to the gopher tortoise. We anticipate this threat is imminent since rattlesnake roundups continue to occur annually, although at a much smaller scale, and collections for these events and by individual collectors may occur throughout the year. We believe the impacts will be localized to areas near the communities that still support rattlesnake roundups; consequently, the magnitude of threat is considered low.

C. Disease or predation:

A number of diseases have been documented in the gopher tortoise, including fungal keratitis (Myers et al. 2009, p. 582), iridovirus, herpesvirus, bacterial diseases related to Salmonella, Mycoplasma, and *Dermatophilus*, and numerous internal and external parasites (Ashton and Ashton 2008, pp. 39-41). Upper Respiratory Tract Disease (URTD) resulting from Mycoplasma infection has received the most attention recently and has been implicated in mortality of gopher tortoises in Florida where URTD was documented (Diemer Berish et al. 2010, p. 696). It is considered an infectious disease which may threaten populations of free–ranging tortoises (Seigel *et al*., 2003, pp. 142-143). However, correlations between exposure to Mycoplasma spp. and population declines appear to be variable among geographic locations and often transient when viewed over a 10–year timeframe (McCoy *et al.,* 2007, p. 173).

Currently, all tortoises in the listed range are tested for the presence of Mycoplasma antibodies prior to relocation. Additionally, as part of the guidelines for the establishment of conservation banks in the listed range (Service 2009, p. 6), all resident tortoises at the bank are tested as well, and the FWS reserves the right to further evaluate and determine whether a prospective property with seropositive tortoises can accept relocated seronegative tortoises, or vice versa. However, consensus on the significance of a seropositive result is still unresolved. According to the Florida Gopher Tortoise Management Plan (FWC 2012, p. 57), previous attempts to control the spread of URTD by requiring serological testing of a sample of tortoises prior to relocation were recognized as insufficient, with detrimental consequences to tortoise populations. The degree to which exposure to the pathogen correlates to clinical signs of URTD or die-offs is unclear, as are the degree of transfer between animals, and the potential for decreased resistance to the disease based on stresses from habitat modification or relocation. The threat of disease across the range is an ongoing challenge while additional data are gathered about the potential pathogens in the environment and how populations respond to them.

The FWC encountered a large-scale mortality event at Lake Louisa State Park (Clermont, FL) in 2015. A survey of shells resulted in 91 shells in an approximately 15 hectare area of the park. An

intensive trapping and blood collection effort was completed in August 2016 and 42 blood samples were sent to the University of Florida to test for *M. agassizii*. Thirteen samples came back positive, seven were suspect, and 22 tested negative for the mycoplasma. A report of the findings will be published.

Nest depredation by vertebrates typically has been considered substantial; from studies in southern Georgia, Landers et al. (1980, p. 353) estimated about 90 percent of nests were destroyed by predators; a study in Alabama documented about 46 percent of nests (n = 11) were destroyed (Marshall 1986, p. vii). Documented predators of nests, hatchlings, and juvenile gopher tortoises include raccoons (*Procyon lotor*), gray fox (*Urocyon cinereoargenteus*), striped skunks (*Mephitis mephitis*), opossum (*Didelphis virginiana*), nine-banded armadillos (*Dasypus novemcinctus*), red-tailed hawks (Buteo jamaicensis), cottonmouths (*Agkistrodon piscivorous*), coachwhips (*Coluber flagellum*), eastern indigo snakes (*Drymarchon couperi*), and red imported fire ants (*Solenopsis invicta*; see Epperson and Heise 2003 and references therein, pp. 315-316). Dogs and coyotes have been documented as predators of adult tortoises (Causey and Cude 1978, pp. 94-95; Hinderliter 2008, p. 344). As is the case with most turtle species, predation pressures are highest for gopher tortoises in the first year post-hatching, and diminish gradually over the next several years. In a current head-starting study in the listed range (Camp Shelby, MS), documented predation by mammals was fairly constant on tortoises across all age groups (hatchling through 5-year-olds); however, 91% of the documented predation by fire ants was on hatchling tortoises (M. Hinderliter, unpubl. data). In another study in Baker County, GA, Dziadzio et al (2016), found that fire ants were responsible for 7% of hatchling predation (all hatchlings were predated by fire ants in 1 nest). The gopher tortoise has evolved to persist with the pressures of native predators, although the range expansions of armadillos and coyotes, combined with the introduction and invasion of other species (non-native fire ants, constrictor snakes, and tegus) has redefined predation as a serious threat that needs to be addressed. Harvest for human consumption is also known to occur, although this type of harvest is probably localized and sporadic (FWC 2012, p. 104), and therefore its impacts are currently unknown.

In summary, predicting where and when populations will be affected by disease is not currently possible. URTD-related mortality may become more prevalent under high density conditions. Given our current state of knowledge, we believe the threat of disease is uncertain and that because mortality associated with the presence of disease is not currently widespread and the sub-lethal effects are not understood, we believe the magnitude of impact is low. Predation of eggs and young is common and substantial throughout the tortoise's range and may be a limiting factor in some parts of the western portion of the range. Predation is an ongoing threat, occurs annually, and occurs throughout much of the tortoise's range. Tortoise populations undoubtedly persisted historically in the face of natural predation; even though, tortoises are now faced with additional anthropogenic (man-caused) factors, the magnitude of predation as a threat is considered to be low.

D. The inadequacy of existing regulatory mechanisms:

There are several issues involving potential regulatory inconsistencies throughout the range, which

need to be addressed to analyze which have the greatest conservation benefit on individual tortoises, their populations, and their habitat. The practice of maintaining a buffer area around known tortoise burrows while operating heavy machinery for habitat management is currently utilized in the listed range, but not everywhere in the candidate range. Additionally, the mechanisms of relocation/translocation of tortoise populations are not consistent throughout the states, specifically the methods of placing relocated tortoises in temporary enclosures and the use of “starter” burrows into which to release animals. In order to effectively assess the success of relocation, more consistency is needed in establishing long-term monitoring studies to investigate site fidelity, reproductive fitness, and population health post-relocation. The recipient site needs to be evaluated periodically, as well, to ensure that the habitat management plan is still effective and that the site is still viable to maintain a tortoise population.

Generally, State statutes and regulations provide measures to protect individual gopher tortoises from take but do not provide for protection from modification of their habitat. On much of the habitat outside of Florida, there are no State regulations providing permitting oversight or requiring conservation benefit to gopher tortoises or their habitat on private lands. In Georgia, for example, State statute requires that any rule and regulation promulgated for protected species (including the gopher tortoise) shall not affect rights on private property or in public or private streams, nor shall such rules and regulations impede construction of any nature (GA ST §§ 27-3-132(b)). Any implementing regulations promulgated in Georgia are constrained by these statutory requirements. Regulations cannot exceed the statutory requirement and, therefore, can only prohibit collection, killing, or selling of individual tortoises. However, regulations may be developed to protect gopher tortoise habitat on public lands. All States within the range of the gopher tortoise have protective statutes, but none, except for Florida, have developed implementing regulations addressing impacts to gopher tortoise habitat. This is becoming more evident recently with the rapid increase in solar farm projects. Current regulatory tools are insufficient to protect tortoises and their habitat in many of the high-quality sandhills that are highly targeted for such projects, which also likely contain viable tortoise populations.

In the eastern portion of the tortoise’s range, only Florida implements a regulatory program designed to mitigate the effects of habitat loss on non-agricultural private lands. The amount of habitat on protected lands might increase substantially if other States considered developing and implementing similar tortoise management plans, especially if those plans included best management practices within various types of tortoise habitat. While mechanisms are in place to protect individual tortoises, in terms of minimizing take, those processes ultimately resulting in the relocation of tortoises need to be assessed to ensure that stocking density, reserve area requirements, and best habitat management practices are based on documented successful relocations and are comparable range-wide.

In summary, threats due to inadequacy of existing regulatory mechanisms, particularly outside of Florida, are an imminent threat to the gopher tortoise throughout its range because the existing regulatory mechanisms that are currently in place are not sufficiently protecting tortoise habitat throughout its range. The magnitude of this threat is moderate because existing regulations protect individual tortoises throughout their range. These regulations have eliminated some forms of harassment and mortality (e.g., capture for food, pets, races, etc.), but gopher tortoise habitat in

private ownership is largely unprotected and is vulnerable to degradation or destruction throughout most of its range.

E. Other natural or manmade factors affecting its continued existence:

Additional factors that threaten the continued existence of gopher tortoises include long-term herbicide exposure, road mortality, and climate change; however, the status of these potential threats is unknown and requires further investigation. The application of herbicide for invasive species control, brush management, and site preparation is an important component of habitat management and a valuable tool for land managers. Although where herbicide is applied there is the potential for short-term loss of forage, the primary concern is that the possible effects of long-term or chronic exposure of herbicide on adults, juveniles, and eggs are unknown and need further investigation.

We know that road mortality occurs, but the extent to which it affects populations and the species as a whole is not well documented. Increases in observed road mortality, whether episodic or consistent, may be a by-product of new construction, road expansion, or relocation (legal or illegal); however, there is no information directly linking road mortality to population declines so the magnitude of this factor is not currently known. For impacts from climate change, there is the potential for a loss of coastal dune habitat from sea level rise, habitat fragmentation from water table rise in inland habitats, temporal shifts in behavioral seasons such as nesting and overwintering, and a skewed sex ratio in some populations since tortoises have temperature-dependent sex determination.

In summary, the threats from silvicultural herbicides and road mortality are occurring and are expected to continue in the future. These threats can be focused in areas of silvicultural production and roadways in and around urban areas, and since they are ongoing they are considered imminent. The magnitude of these threats is low, since we have little to no information on impacts from road mortality or herbicide use on tortoise populations; although there is potential vulnerability to incompatible silvicultural forest management practices. Climate change is not an imminent threat because we have not detected climate change-related impacts on gopher tortoise populations. We are uncertain about the magnitude of this threat because we do not currently understand all potential impacts of climate change on the gopher tortoise or human responses to mitigate its effects on human populations.

Conservation Measures Planned or Implemented :

A major conservation effort presently ongoing is the Range-Wide Conservation Strategy (Strategy) for the Gopher Tortoise, which was finalized in 2013. The purpose of this Strategy is to lay out a course of action for the conservation of the gopher tortoise. It is meant to serve as a “roadmap” for all partners to determine the highest priority conservation efforts for the tortoise, and identify those agencies and organizations best suited to effectively undertake those efforts. The implementation of this plan, with progress evaluated annually, is providing the information needed to evaluate the threats to the species and improve its conservation status range-wide. This is intended to be an adaptive document that will be revised as new information is received from the public and partners,

and should be used as a guide for helping to develop conservation and habitat plans that address the priority needs of the tortoise. Through extensive collaborative efforts with State Agencies and other partners, we have identified appropriate threat leads and teams to formulate plans to ameliorate those threats. The conservation objectives identified in this Strategy, as well as updates on the progress of these objectives, are outlined under “Recommended Conservation Measures” of this document.

The Florida Gopher Tortoise Management Plan (FWC 2012, pp. 1-243) has recently undergone a 5-year revision. The ultimate goal of this plan is to “restore and maintain secure, viable populations of gopher tortoises throughout Florida so the species no longer warrants state listing. For this 10-year plan, the overarching objective of no net loss of gopher tortoises will be accomplished by meeting all of the following objectives: 1) Minimize the loss of gopher tortoises; 2) Increase and improve gopher tortoise habitat; 3) Enhance and restore gopher tortoise populations; and 4) Maintain the gopher tortoise’s function as a keystone species. To achieve these objectives, a cooperative program partnering with state, local, and private entities has been established across the state” (FWC 2012, pp. v-vi). Additionally, the Florida Gopher Tortoise Permitting Guidelines were revised based on stakeholder and staff input and approved by FWC’s Commission in November 2011 and again in September 2012 to incorporate the new relocation policy on commensals. The guidelines also include a new permit option for replenishing public conservation lands where gopher tortoise populations are depleted. In all, gopher tortoise conservation efforts in Florida are making significant progress. Much of the progress in prescribed fire and habitat management is made possible through partnerships with cities, counties, non-profit conservation organizations, and other state agencies.

Another tool that has been successfully implemented is the Candidate Conservation Agreement for the Gopher Tortoise – Eastern Population (CCA), which was completed in 2008 and whose signatories (Parties) represent the four States’ fish and wildlife agencies, branches of the Department of Defense, U.S. Forest Service, National Park Service, FWS, and various NGOs. The goal of the gopher tortoise CCA is to organize a cooperative range-wide approach to tortoise conservation and management in the eastern portion of the range. The CCA uses a common conservation approach and framework and allows the Parties to leverage knowledge and funding within it. The CCA is flexible and voluntary, so that different conservation and management actions can be adopted and implemented at varying levels by the Parties. In the annual report, there is information on acres included by protection level, acres managed and restored, invasive exotics treated, population trends/survey results, population manipulation, research, land conservation, education and outreach, and legal protection measures (Southeast Regional Partnership for Planning and Sustainability (SERPPAS) 2014, pp. 1-2). Additionally, the report contains conservation-related research on gopher tortoises that is ongoing or recently completed by the Parties: 1) rare plant and animal inventories/surveys; 2) disease prevalence and impacts; 3) population responses to management actions; 4) effectiveness of re-stocking tortoises; 5) habitat assessments; and 6) population dynamics assessments. The CCA further states, “It is the intent and expectation of the Parties that the execution and implementation of this Agreement will lead to the conservation of the gopher tortoise in its natural eastern range. It is also the expectation of the Parties that the conservation and management commitments made in this document will be considered in the event of a listing under the ESA.” There have been six CCA Annual Reports so

far, and therefore an effort has begun to summarize the findings from all the parties; especially trends over the first five years in habitat lost/gained, acres managed for tortoises, and surveys. The CCA represents one of the most important ongoing collaborations to benefit gopher tortoise populations in terms of large landowners sharing conservation and management experience across the landscape.

There are many other collaborative efforts and agency/NGO-led actions currently ongoing that are either targeting species-specific conservation for the gopher tortoise (e.g., National Resources Conservation Service (NRCS) Working Lands for Wildlife) or ecosystem based conservation programs (e.g., America's Longleaf Restoration Initiative (ALRI)), which are designed to directly and indirectly benefit the gopher tortoise. In 2016, NRCS reported investing $12.8M in longleaf pine through the Longleaf Pine Initiative, including $4.4M specifically for the gopher tortoise through Working Lands for Wildlife (NRCS 2016). In addition, various public and private sector partners involved in America's Longleaf Restoration Initiative accomplished over 2.02 million acres of on-the-ground activities to further the conservation of longleaf pine in 2016 (ARLI, 2017, p. 5). In 2016, the ALRI has reported that an estimated more than 433,000 acres of prescribed burning was conducted on private lands and an additional 139,500 acres of longleaf pine was planted in the region (ARLI, 2017, p. 12). For 2017, ARLI reported 131,000 acres of newly planted longleaf and 1.37 million acres burned (ARLI, 2018, p.1). With regard to the gopher tortoise, this resulted in approximately 64,252 acres of longleaf establishment in Georgia, Florida, South Carolina, and Alabama in 2016 and 39, 800 acres in 2017– much of which corresponds to the range of the gopher tortoise. In addition, this program resulted in prescribed burning 433,000 acres; 42,215 acres of invasive species control, 116, 774 acres of mid-story treated, and 37,079 acres of overstory treatments; 27,175 acres of land acquisitions and easements; and native understory establishment on 2,192 acres in those same states in 2016 (ARLI, 2017, p. 12). In 2017, the program resulted in approximately 337,000 acres burned; 2,777 acres of land acquisitions and easements; and native understory establishment on 8,569 acres (ARLI, 2018, p. 8). While it is difficult to precisely estimate the direct benefits to tortoises from this effort, overall this program is expected to result in substantial benefit to this species and others through time.

There are also many programs in place that are contributing to on-the-ground gopher tortoise conservation on private lands, illustrating the power and potential of public/private partnerships (e.g., Sustainable Forestry Initiative, Wildlife Habitat Incentive Program, Environmental Quality Incentives Program). Additionally, management efforts are ongoing to determine how to effectively balance planted pine plantations with a mixture of more open conditions compatible with good gopher tortoise habitat (Wigley *et al.,* 2012, p. 42).

In 2016, the FWS' Partners for Fish and Wildlife program reported projects in Alabama, Georgia, and Florida for the benefit of gopher tortoises. Projects in Alabama and Georgia have landowner agreements of 20-30 years. Those in Florida are 10 year agreements. No population status surveys or biological response monitoring were carried out on these lands due to lack of capacity. However, as documented by FWS biologists, evidence shows presence of gopher tortoises on or adjacent to many of these projects, and they are all done in the gopher tortoise range. In 2015, this program

resulted in 2,738 acres restored or enhanced in these three states and in 2016 it continued to work towards restoring and enhancing gopher tortoise habitat. In 2017, the program helped restore 7,306 acres of upland pine habitat.

Military installations across the southeast complement the state and Federal laws by maintaining regulations on training restrictions in areas where rare species are found, as part of their Integrated Natural Resource Management Plans. These organizations and initiatives are important in addressing the preservation and management needs across state lines and land ownership categories, specifically when they offer landowner incentives and cost-share programs. Military installations represent some of the largest expanses of protected lands covered under regularly-updated management plans, and therefore are a vital part of the future conservation of at-risk species. In 2017, the Service and the Department of Defense adopted The Gopher Tortoise Conservation and Crediting Strategy to balance military mission activities and gopher tortoise conservation in southeast installations (DoD, 2017, entire). In addition, the a Candidate Conservation Agreement with Assurances was established at the Camp Blanding Joint Training Center where 17, 183 acres of sandhill will be managed for the benefit of multiple at-risk species, including the gopher tortoise (Service *et al.,* 2017a).

Summary of Threats :

Overall, the assessment is that gopher tortoise habitat is still diminishing/degrading, although restoration efforts have slowed down this habitat loss from previously reported rates, and human-related impacts are documented threats to the species. There are many potentially-viable gopher tortoise populations on both public and private lands across the species' range. However, the extent to which these populations are sufficient in number, arrangement, and security to ensure the long-term persistence of gopher tortoises is still unknown. The positive effects of commitments of landowners through the CCA and more protective regulations in Florida are beneficial to the species; however, there are few programs in place that would ensure the maintenance of contiguous, suitable, occupied habitats to secure the species against stochastic events and to provide for sufficient genetic diversity.

Most of the potential gopher tortoise habitat is privately held, and much of this is in silviculture. Private landowners hold more than 86 percent of forests in the South and produce nearly all of the forest investment and timber harvesting in the region (Wear and Greis 2013, p. 103). Silvicultural practices can be, but are not necessarily, compatible with gopher tortoise conservation. While much of this land is unlikely to be developed in the near term, private lands are also sensitive to economic conditions. These conditions affect potential conversion to other land uses as well as the viability of management treatments that impact species composition, harvest rates, thinning, and burning. Forecasts indicate a loss of 5.5 to 12.2 million ac (2.2 million to 4.9 million ha) of private forest land in the South by 2060, and this loss, combined with expanding urbanization and ongoing splitting of ownership as estates are divided, will result in increased fragmentation of remaining forest holdings (Wear and Greis 2013, p. 119). Public lands, while less vulnerable to development, are still subject to economic pressures and constraints. Currently, public agency budgets are strained, and most are probably not adequate to provide for large–scale, intensive management specifically targeting gopher tortoise habitat. We know that periodic burning of gopher tortoise

habitat is a necessary management tool across many landscape types, and crucial to the conservation of the species. We also know that pressures to control wildfires for public safety and the adverse effects of smoke (both perceived and actual) make burning challenging.

The threats discussed under factors A-E contribute to the overall challenge facing the persistence of gopher tortoises across the range, although in terms of pure scale, the continued loss and degradation of habitat is still the most influential threat to the species. Many of the threats occur range-wide, although disease, harassment due to gassing of burrows, and regulatory deficiencies seem to be more localized. Addressing the loss, fragmentation, and mismanagement of priority tortoise habitat is paramount; however, it is also the most challenging task due to economic and resource constraints (e.g., potential for conversion described above, constraints on the use of prescribed fire, and incompatible management practices). Conservation of the species at this stage requires that sufficient habitats currently supporting large populations or having the capability to support large populations be identified and secured, and protective and management measures implemented.

For species that are being removed from candidate status:

_____ Is the removal based in whole or in part on one or more individual conservation efforts that you determined met the standards in the Policy for Evaluation of Conservation Efforts When Making Listing Decisions(PECE)?

Recommended Conservation Measures :

The following action items, taken from the Range-Wide Conservation Strategy, have been identified as recommended conservation measures for the gopher tortoise and categorized by similar overarching objectives. The extent to which these action items have been addressed, updated, and/or completed is included below:

Objective 1: Determine population viability parameters

1) Establish consensus within the research community on what defines a viable gopher tortoise population across various states/habitats (e.g., age structure, number of individuals, acreage, recruitment rate, spatial distribution, etc.).

Status (Completed): Workshops in 2013 and 2014 were held to define the characteristics of both minimum viable populations (MVPs) and support populations of gopher tortoises. Consensus of most of this information has been reached by a panel of species experts, State agency biologists, and environmental consultants, and was compiled in a report prepared by the Gopher Tortoise Council. Further description of MVPs was provided previously in the Population Estimates/Status section of this document.

2) Establish consensus on the necessary number and distribution of viable gopher tortoise populations in suitable habitat such that the species in the eastern portion of its range would be

considered secure, and in the western range would be considered recovered. This information will come from first identifying how many viable populations each state currently has, and then evaluating historic population levels to determine the potential for long-term species viability.

Status: This information is being collected as a rough draft by the MVP working group to determine density of current populations in each ecoregion. In addition, as part of the Working Lands for Wildlife (WLFW) initiative, Priority Areas for Conservation (PACs) were identified with the goal of focusing conservation actions and expenditures of the WLFW program on gopher tortoise habitat in those PACs. An additional workshop was conducted in 2017 to discuss the distribution of viable gopher tortoises and what representation of the species is needed in the landscape to maintain sustainable populations across the species range to ensure species viability. Modeling efforts are still needed to complete a new population viability analysis.

3) Investigate the potential use of captive-reared or head-started gopher tortoises to augment a population or re-populate a previously occupied area to increase viability of the general population.

Status (Ongoing): Various entities continue to use head-starting as a tool for population augmentation. In 2014, GA DNR initiated a project at Yuchi Wildlife Management Area (WMA) investigating the feasibility of augmenting gopher tortoise populations by releasing captive-reared and head-started hatchlings. This particular site has extensive suitable habitat but a perilously small native population of gopher tortoises. Late-stage eggs are collected from nests at two sites currently at or above carrying capacity and transferred to incubators for the remainder of the incubation period. Hatchlings are reared on St. Catherine's Island from hatching time until the following spring in outdoor, semi-natural, predator-proof enclosures. The spring after hatching, hatchlings are released in soft-release pens at Yuchi WMA, and then allowed free roam once they became well-acclimated to the site. During 2014 and 2015, 145 tortoises were head-started and released, 41 were radio tracked, from 2 cohorts at 2 release areas within Yuchi WMA (Quinn et al, 2018, pp. 1-4). 28 head-started juvenile tortoises sourced from St. Catherine’s Island and Reed Bingham State Park nests were released at Yuchi WMA in 2016. Results from the work in Yuchi WMA shows that movement and mortality of gopher tortoises was highest in the first month after release but declined soon after. In addition, Quinn et al (2018) estimated an annual survivorship of 60.6% for the first cohort and a much lower survivorship of 7.1% of the second cohort at the southeast release area but a much higher survivorship at the northwest release site of 75.0% most likely due to spatial variation in predation (Quinn *et al.,* 2018, p.1). Tortoises did not move >122.0 m from their release site showing previously known high fidelity from head-started tortoises which can suggest that head-starts may not need to be penned to achieve high site fidelity (Quinn *et al.,* 2018, p. 6-8). These initial results suggest that head-starting can be an effective tool for population recovery, but as pointed out by Quinn et al. the release strategy and predator mitigation is critical within the first month.

South Carolina DNR released 20 head-started yearlings (raised at SREL and collected eggs at Aiken GTHP) at Aiken GTHP with 5 direct release hatchlings and plans to release and additional group of 10-15 yearlings and up to 5 2 year head starts in 2017. All tortoises were and will be monitored via telemetry (SERPAS, 2017).

Tuberville et al (2015), showed that head-started hatchlings exhibited nearly 100% survivorship during the captive period but varied by cohort during the first year post release. When compared to hatchlings directly released from St. Catherines's Island, which 20% survived their first winter, head-started hatchling survivorship was lower during their first year (Tuberville et al, 2015, p. 464). Head-starting has potential for population augmentation in areas with need.

4) Integrate the use of Line Transect Distance Sampling (LTDS) as a surveying/monitoring protocol (where applicable) into State, Federal, and local policy as the approved method to accurately assess gopher tortoise population levels, trends, and responses to management; determine appropriate time frames for surveying, and acceptable alternative survey protocols in small parcels and in scrub or flatwoods communities.

Status (Completed): Adopted in 2012 at the annual Gopher Tortoise CCA meeting, LTDS has become the established monitoring protocol for CCA partners, as well as on private lands. CCA partners continue to use LTDS to establish population estimates (SERPAS, 2017).

5) Provide information and incentives to private landowners to manage their land for tortoises, possibly working with partners to offer higher cost-sharing for more aggressive habitat management.

Status: In 2015, NRCS hired a new WLFW East Coast Coordinator and efforts to advance the WLFW Program for the gopher tortoise are ongoing. Priority Areas for Conservation (PACs) were identified for the gopher tortoise WLFW program in 2016. In addition, WLWF has identified priority needs for prescribed fire implementation, spatial analysis and modeling to inform management priorities that would benefit gopher tortoises.

6) Investigate using Section 6 funding to conduct surveys and censuses of large, suitable public parcels that contain a substantial amount of potential gopher tortoise habitat, to estimate the number of tortoises present and evaluate those sites for potential tortoise population enhancement or re-establishment.

Status: Surveys are ongoing in all four states, many through State Wildlife Grants, Section 6 Grants, and contract agreements. Part of the data and analyses from these projects will be used to direct future translocation and conservation prioritization. See the State Coordination section for specific information regarding ongoing survey efforts and results.

Objective 2: Address the present and threatened destruction, modification, or curtailment of gopher tortoise habitat.

1) Identify, prioritize, protect, and manage viable tortoise populations and best remaining tortoise habitat. This investigation begins with the identification of viable populations (described in Objective 1.2).

Status: Minimum viable tortoise populations will be factored into the model that will identify Priority Areas for Conservation for the tortoise as part of the Working Lands for Wildlife initiative. Acreage

goals and performance metrics will be developed and implemented for each PAC that will contribute to conservation of the tortoise MVPs in those areas. In addition, the FWS (in cooperation with state wildlife agencies) has developed a draft Gopher Tortoise Conservation and Crediting Strategy for the Department of Defense that will focus conservation actions on currently unprotected lands that are of greatest conservation value to the species. The conservation actions the strategy promotes include, but are not limited to, engaging in partnerships that acquire lands or easements on lands containing gopher tortoises and/or gopher tortoise habitat for conservation management purposes. In addition, the Longleaf at-risk species conservation project (Longleaf ARC Project) is developing spatially explicit models for the status of five at-risk species, including the gopher tortoise. The product from this effort will ultimately help inform the Service's species status assessment of the gopher tortoise and enable regional partners to implement effective conservation strategies.

2) Increase the size and/or carrying capacity of those viable population areas (and areas with tortoise populations just below the "viable" threshold) through applied land management, land acquisition, or incentives to adjacent landowners to properly manage for tortoises; in order to allow for the potential expansion of those populations.

3) Locate areas of "secondary priority" where re-stocking and restoration can most effectively be accomplished by creating large, contiguous tracts or habitat corridors that may or may not be occupied by tortoises, specifically those directly adjacent to current managed lands. This is part of the larger effort to identify, expand, and protect viable tortoise populations.

Status: Surveys continue in all four states and part of these analyses will be used to identify secondary priority areas.

4) Working with partners/land managers, maximize the amount of acreage appropriately maintained by prescribed fire, with specific emphasis on developing implementation plans with recommendations for fire intensity, frequency, seasonality, and post-fire analyses. Part of this effort should be educational outreach with the public, emphasizing the benefits of prescribed fire for both habitat management and for decreasing the chances of catastrophic wildfire.

Status: Collaboration is ongoing with fire councils, State forestry commissions, and non-profit organizations such as The Nature Conservancy to streamline prescribed fire efforts and education. The US Forest Service is participating in a project with FL FWC ("The Site Fidelity Response of Translocated Gopher Tortoises (Gopherus polyphemus) to Enclosure Time, Mechanical Thinning, Prescribed Burning, and Herbicide Application on the Apalachicola National Forest in Florida") to determine effects and/or benefits of various management tools to gopher tortoises.

5) Create a draft document detailing Best Management Practices (BMPs) and Desired Future Conditions (DFCs) for various gopher tortoise habitat types (longleaf pine forests, sandhills, scrub, etc.) for range-wide distribution; encourage participation from the silvicultural industry and private lands foresters in the development of these recommendations, which also must include input from migratory birds and rare species biologists to ensure compatibility.

Status (Completed): Both documents (BMPs and DFCs) were completed in 2017, with the BMP

document representing an assemblage of information from FL FWC, GA DNR, Southeast Partners in Amphibian and Reptile Conservation, and the Natural Resources Conservation Service. GA DNR completed and distributed their own state version of recommended practices entitled “Forest Management Practices to Enhance Habitat for the Gopher Tortoise” in 2014. FWC also has their own state version of recommended practices entitled “Get the Facts about Gopher Tortoises: Best Management Practices,” and in 2015 the Florida Department of Agriculture adopted new Wildlife Best Management Practices for Forestry and Agriculture. The Alabama Department of Conservation and Natural Resources’ Division of Wildlife and Freshwater Fisheries has partnered with the Alabama Forestry Commission to also develop their own gopher tortoise best habitat management practices brochure to enhance habitat management; this project is ongoing. The Gopher Tortoise Council has developed “Voluntary BMPs for Solar Development” that are compatible with conservation of the gopher tortoise (GTC 2017). Recommended habitat management guidelines for the gopher tortoise in longleaf pine habitat were developed by the Service in cooperation and input from the States in the species range as well as Gopher Tortoise Council committee members (Service 2017b).

6) Quantify the benefits provided to this species by longleaf restoration efforts (both public and private).

Objective 3: Address issues related to overutilization for commercial, recreational, scientific, or educational purposes

1) Work with partners to convert the two remaining rattlesnake round-ups to wildlife festivals.

2) Work with Georgia state legislature to change the law that currently exempts venomous snakes from gassing.

Status (Completed): In 2014, GA DNR spearheaded the passage of Senate Bill 322 which eliminated exclusion of venomous snakes from State Law 27-1-30 (“Disturbing or destroying wildlife habitats”). Often referred to as the “gassing bill,” this bill addressed the legitimate concern that rattlesnake hunters may be impacting gopher tortoise populations by introducing gasoline fumes into their burrows to drive snakes out. This practice is unambiguously illegal now.

Objective 4: Investigate and mitigate disease and predation effects

1) Working with a gopher tortoise health/disease working group, investigate if and when disease testing should be performed on gopher tortoises (and for what diseases), the significance and ramifications of a positive result (i.e. presence of Mycoplasma antibodies), what to do with suspect and positive tortoises, and the degree to which disease can be linked to die-offs in tortoise populations (temporal and spatial scales).

Status: A working group met at the 2014 Gopher Tortoise Council meeting to discuss range-wide collaboration on tortoise disease/health screening and how to handle testing waif tortoises. Waif tortoises are gopher tortoises that have been removed from the wild (either unauthorized or due to injury) and for which no locale information is known. The goal of the meeting was to discuss and review current state policies and procedures for waif tortoises, identify gaps and/or differences in

handling waif tortoises, consider suggestions for standardizing policies and procedures among states, discuss emerging gopher tortoise health issues, identify protocols for handling sick/waif tortoises, identify the best avenue for range-wide coordination/collaboration, and discuss development of an online portal of resources. A small committee will be tasked with drafting suggested Standard Operating Protocols. In Florida, the FWC is identifying willing landowners to care for waifs on their property as a “waif tortoise recipient site”, and is working with permitted recipient sites to develop a site-specific and adaptive protocol in the event of mortalities in the future.

2) Identify the predators having the largest impact on gopher tortoise populations, with special emphasis on documenting unnaturally high rates from nuisance, invasive, and introduced predators (e.g., red imported fire ants, coyotes, armadillos, feral hogs); this should include documenting predation on various tortoise age classes and recommendations for predator control.

Status: Army installations implemented feral swine, coyote trapping and control where applicable. In 2016, various Navy installation removed coyotes and hogs by direct lethal controls, as well as other predator removals. Relocations of 12 coyotes, 17 feral hogs, 15 feral cats, 4 raccoons, 10 opossums, 4 bobcats, 1 grey fox, 1 red fox, and 88 armadillos were conducted as removed from gopher tortoise habitat by USDA BASH (United States Department of Agriculture Bird/Animal Aircraft Strike Hazard) biologists, installation nuisance animal trapping contractors, and management staff at Naval Submarine Base King’s Bay, Naval Air Station Pensacola, Naval Air Station Whiting Field, and Naval Air Station Jacksonville (Outlying Landing Field (OLF) Whitehouse). The St. Vincent NWR removed nonnative predators (armadillos and feral swine). Other refuges also conducted predator control on their properties by public hunting and trapping (GTCCA 2017).

The Jones Center in Georgia is excluding meso-mammalian predators (raccoon, opossum, skunk, fox, bobcat, and coyote) from 4 large-scale (90 ac) study plots to monitor effects on recruitment of gopher tortoises. South Carolina DNR law enforcement continues to enforce dogs-at-large ordinance and few dog disturbances were noted in 2016.

3) Work with local and state law enforcement to investigate the magnitude of tortoise harvest for human consumption, evaluating current regulations and creating outreach to educate the public on laws protecting gopher tortoises.

Status: Although there is currently no range-wide investigation being conducted, Florida continues to actively investigate and prosecute numerous cases each year involving tortoise harvest for consumption.

Objective 5: Investigate range-wide effective regulatory mechanisms

1) Adopt mitigation strategies across the range that address the ongoing need for relocation of tortoises, but do it in a way as to minimize loss of preferred habitat (sandy soils, open forest structure, herbaceous groundcover), maximize site fidelity, and provide protection of relocated tortoises and the recipient site.

Status: The Department of Defense (DoD) Gopher Tortoise Conservation and Crediting Strategy (Crediting Strategy) was developed by the FWS, DoD, and the states of Alabama, Georgia, Florida, and South Carolina. It has been designed to contribute to the conservation of the species by implementing proactive actions identified as necessary to help preclude the need to list the eastern population of the tortoise, while also preserving DoD installation mission capabilities and providing DoD regulatory predictability in the event that the eastern population is listed under the ESA. The Crediting Strategy is intended to focus conservation actions on currently unprotected lands that are of greatest conservation value to the species. It establishes a mechanism allowing military commanders the flexibility needed to ensure that our military men and women can test, train, and operate now and in the future by taking conservation actions to protect the gopher tortoise outside the boundaries of military installations. The conservation actions it promotes include, but are not limited to, engaging in partnerships that acquire lands or easements on lands containing gopher tortoises and/or gopher tortoise habitat for conservation management purposes. Conservation credits will be given for implementing the conservation actions and these credits may be utilized by participating DoD installations within the range of the Eastern Population to offset actual or potential effects to gopher tortoises by their training and other mission activities.

2) Evaluate whether each state in the candidate range for the tortoise should have a state Management/Conservation Plan similar to Florida's.

3) Develop minimum standards for regulatory mechanisms.

4) Encourage the development and implementation of a model Candidate Conservation Agreement with Assurances/Habitat Conservation Plan (preferably one that is state-wide and programmatic) that details effective, measurable conservation objectives and habitat management goals.

Status: A CCAA was developed for Camp Blanding Joint Training Center in Florida that includes habitat management goals for the gopher tortoise. This CCAA is for multiple at-risk species but benefits the gopher tortoise. A new CCAA is in draft form for South Carolina. This effort includes the gopher tortoise as well as other petitioned species.

5) Develop state regulatory processes to minimize and mitigate loss/degradation of tortoise habitat resulting from agricultural land conversion, and investigate compatible management of agricultural land in occupied tortoise habitat.

6) Complete a study investigating gopher tortoise burrow collapse, specifically to determine the minimum distance from the entrance where the burrow integrity is still maintained when run over by heavy equipment (in different representative soil types). This value can then be used as a burrow buffer recommendation range-wide for conservation measures during habitat management practices.

Status (Completed): This study was completed in 2013 and the results were published in 2015 (Smith et al. 2015, entire). To minimize risk of burrow collapse from heavy equipment, the new recommended burrow buffer distance for land management activities is 4 m in radius from the entrance of the gopher tortoise burrow (Smith et al. 2015, p. 461).

Objective 6: Investigate other natural or man-made factors affecting its continued existence

1) Initiate a risk assessment of the use of herbicides in gopher tortoise habitat, specifically where broad-spectrum herbicides are utilized as a common management tool, not for treating invasive species. The study should evaluate the potential short-term and long-term impacts on forage availability, and tortoise health and reproduction;

2) Create a database for documenting tortoise road mortality events, in order to document potential responses to road expansion, construction projects, etc. This data could then be used to identify areas with the high incidences of vehicle collisions, and potentially assist with project planning of road construction (e.g., minimizing curbs, utilizing excluder fences).

Status: This information is beginning to be gathered by various transportation partners, and FWC is currently collecting incidental data using the Florida gopher tortoise smartphone application to document tortoise road mortality through photographic evidence.

Priority Table

Magnitude	Immediacy	Taxonomy	Priority
High	Imminent	Monotypic genus	1
		Species	2
		Subspecies/Population	3
	Non-imminent	Monotypic genus	4
		Species	5
		Subspecies/Population	6
Moderate to Low	**Imminent**	Monotypic genus	7
		Species	**8**
		Subspecies/Population	9
	Non-Imminent	Monotype genus	10
		Species	11
		Subspecies/Population	12

Rationale for Change in Listing Priority Number:

Not Applicable, no recommended change.

Magnitude:

There is a broad geographic area affected by the destruction, modification, or curtailment of gopher tortoise habitat across the species' range, and reduced survival and low recruitment observed in many gopher tortoise populations throughout the range are potentially due to degradation of habitat. A large percentage (estimated at over 80 percent) of the potential tortoise habitat is under private ownership and is therefore largely uncategorized, unprotected, and vulnerable to degradation or destruction. Based on the high percentages of nest/hatchling predation documented in the literature (70 to 100 percent), this threat is viewed as widespread throughout the range. High mortality is likely to impede the persistence and recovery of tortoise populations. Even though predation has been, and still is, a naturally occurring limiting factor, it has recently expanded to include additional predator species, and is probably working synergistically with other threats identified herein to impact gopher tortoises. Additionally, potential future impacts to gopher tortoises resulting from lack of implementation, compliance, and enforcement of regulations are expected to be substantial. In all states in the eastern portion of the range, silvicultural and agricultural lands are generally exempted from regulatory oversight; therefore, impacts to tortoises resulting from activities associated with silviculture or agriculture are not reviewed or mitigated. Although still in need of further data collection and research, threats such as disease, road mortality, silvicultural herbicide, and the effects of climate change are perceived to be of lower magnitude; however, based on the other factors described, the overall magnitude of the threats to the gopher tortoise are moderate.

Imminence :

Much of the potential tortoise habitat is susceptible to future conversion for silviculture, solar projects, agriculture, and urban land uses because most existing regulatory mechanisms do not protect gopher tortoise habitat. The area covered by pine plantations in the south has been modeled and under certain scenarios is projected to increase between about 10–25 million acres (~ 4–10 million ha) by 2040 (Prestemon and Abt 2002, pp. 18-20). Future urban development may result in the loss of about 700,000 acres (283,000 ha) (or 20 percent of the remaining gopher tortoise habitat) in Florida by 2060 (FWC 2008, p. 4). Others have predicted a loss of 5.5 to 12.2 million ac (2.2 million to 4.9 million ha) of private forest land in the South by 2060 (Wear and Greis 2013, p. 119). . Researchers have recently discovered environmental pathogens potentially affecting tortoise populations, and numbers of anthropogenically-enhanced predator populations seem to be increasing. Therefore, these threats are seen as imminent.

__Yes__ Have you promptly reviewed all of the information received regarding the species for the purpose of determination whether emergency listing is needed?

Emergency Listing Review

__No__ Is Emergency Listing Warranted?

Although the range–wide modification and fragmentation of gopher tortoise habitat poses a moderate threat to the persistence of the species, and studies generally indicate population

declines, there are some regulatory measures to protect tortoises in place in each state throughout the range. In a few studies, populations appear to be stable or even improving somewhat; therefore the species is not in immediate danger of becoming extinct, and emergency listing is not warranted.

Description of Monitoring:

For documenting the current status of the species, three primary sources were used: 1) the draft Range-Wide Gopher Tortoise Conservation Strategy; 2) the state representatives' updates to the Gopher Tortoise Council; and 3) the Annual Reports for the Candidate Conservation Agreement for the Gopher Tortoise. The Conservation Strategy was generated primarily from the "12-Month Finding on a Petition To List the Gopher Tortoise as Threatened in the Eastern Portion of Its Range" (76 FR 45130 45162), and through the draft process has been open to comment from State and Federal Agencies, industry professionals, consultants, and private landowners. The action items described in the Strategy (listed as "Recommended Conservation Measures" in this document) were derived not only from the information provided for the 12-month finding, but also from more recent information from relevant land managers, researchers, population viability workshops, and literature review. A Conservation Strategy team was created consisting of a FWS and a State Agency representative from each state within the range of the tortoise, and this team has regular conferences to arrange working groups, meetings, and collaborative research in order to address these Recommended Conservation Measures.

Annual reports are generated by the CCA Gopher Tortoise Team (GTT), and the following conservation-related research on gopher tortoises is ongoing or recently completed by the members of the Agreement: 1) rare plant and animal inventories/surveys; 2) disease prevalence and impacts; 3) population responses to management actions; 4) effectiveness of re-stocking tortoises; 5) habitat assessments; and 6) population dynamics assessments. Since a primary goal of the CCA was to establish baseline population levels, as a first step the GTT adopted a tortoise survey methodology (LTDS) to be utilized where applicable on covered lands. This establishment of a consistent, statistically valid method for documenting tortoise population size and demography, along with the establishment of regular monitoring schedules, will more accurately assess population trends, stability, enhancement, or decline. Additionally, the structure of the CCA Annual Report changed so that signatories report their data organized by the ESA five-factors, and all data on land management activities, and acres restored or lost are reported in a tabular form (displaying several years' activities) so that trends may be evaluated. In this way we will more readily document progress towards improving habitat conditions and abating the threats to the species.

Effective long-term tortoise monitoring programs have been established in a few places range-wide, typically through state- or federally-managed lands. There are ongoing programs where DoD, Forest Service, National Wildlife Refuge, and State-owned lands are being surveyed for gopher tortoises; however, there is still very little data on the status of tortoise populations on private lands. A collaborative program between FWS and USDA-NRCS was initiated in 2012 (Working Lands for Wildlife), which offers incentives to private landowners to manage their habitat specifically for gopher tortoises, and should begin to provide crucial information on the status of tortoise populations on those lands.

Indicate which State(s) (within the range of the species) provided information or comments on the species or latest species assessment:

Alabama,Florida,Georgia,South Carolina

Indicate which State(s) did not provide any information or comment:

none

State Coordination:

Coordination with State Agencies has primarily been done through collaborative efforts in developing and implementing the Range-Wide Conservation Strategy, reporting data/project updates for the CCA Annual Report, and through the Gopher Tortoise Council. In addition to gathering input from the State Agencies, we will continue to obtain information from the various Service field offices, military installations, and signatories to the gopher tortoise CCA. Monitoring of ongoing tortoise research and applicable literature will continue to be coordinated through the Gopher Tortoise Council and related journal databases. State Agency coordination for all four states was compiled from updates to the Gopher Tortoise CCA Annual Report.

Alabama Department of Conservation and Natural Resources (ADCNR)

A State Wildlife Grant titled “Study of Distribution, Abundance, and Health Status of the Gopher Tortoise in Alabama” is underway by the Alabama Natural Heritage Program. Roughly 95% of the gopher tortoise habitat, in Alabama, is in private ownership. The State of Alabama permanently protects and manages approximately 24,000 acres of tortoise habitat on public lands to include Barbour, Geneva, and Perdido Wildlife Management Areas (WMAs), Fred T. Stimpson and Upper Place Wildlife Sanctuaries, and Elhew Research Station. The Alabama Department of Conservation and Natural Resources, Division of Wildlife and Freshwater Fisheries (DWFF) and the State Lands Division (SLD) continue to work together to restore and maintain gopher tortoise habitat on DWFF, Forever Wild Land Trust, and SLD lands. Land management conducted by DWFF staff included 4037 acres of prescribed burning, removal of 58 acres of invasive plant species, planting 310 acres of longleaf pine, and feral hog and coyote removals. Land management conducted by the SLD, Elhew Research Station personnel included 424 acres of growing season burns and approximately 20 acres of invasive plant species removal. A plan will be developed for translocation and population augmentation with recommendations and protocol pertaining to donor and recipient sites and methods.

Line Transect Distance Sampling (LTDS) has been completed in Geneva State Forest, three tracts in Conecuh National Forest (including one site that is being evaluated as a secondary release site for the eastern indigo snake), Fred T Stimpson Sanctuary, Upper State Sanctuary, and Perdido WMA. Survey work and population estimates continued throughout 2016 in public lands. Private landowners are currently being identified, a grant from the Service has been secured to target private lands and surveys should begin in FY17-18.

Gopher tortoise URTD surveys have been completed across seven populations in the state,

including a new population in Geneva County, as well as additional areas in Covington County. Preliminary findings show that all populations of tortoises sampled have been exposed to pathogens responsible for this disease and that symptomatic tortoises are present at low frequencies in all populations. Additionally, experiments at Auburn University continue investigating interactions between the environment and physiological responses of gopher tortoises. Specifically, studies aim to investigate immunological parameters related to the environment. These parameters include baseline immunological performance across thermal and seasonal changes, thermoregulatory responses to acute bacterial infection, and how immunological responses may be affected by physiological stress.

Wehle Nature Preserve has been a recipient site for gopher tortoises from outlying counties. Fifty five tortoises were translocated between 2006 and 2009. Results of surveys through 2013 have shown that only 13 tortoises (24%) have remained on-site. Barbour WMA, with tortoise-suitable soils, is adjacent to Wehle Nature Center and emigration off Wehle Nature Center onto Barbour WMA is thought to be a possible cause for the loss of tortoises. ADCNR successfully trapped a Wehle-marked gopher tortoise off the tract on adjacent Barbour WMA. This animal was added to their number of “retained” individuals from initial translocations. Additional surveys (LTDS to be performed by Auburn University) may reveal new burrows elsewhere on Barbour WMA resulting in the identification of additional tortoises that have relocated from the Wehle Nature Preserve. Burning continues on a staggered two-year regime between the north and south ends of the property. In 2016, ADCNR translocated seven gopher tortoises from a site slated for a housing development to soft release enclosure at the Geneva State Forest to boost the long-term viability of those protected populations.

Since 2007, the Landowner Incentive Program (LIP) for Longleaf Pine Ecosystem Restoration has restored 8,670 acres of longleaf pine in Alabama. All projects implement a prescribed burning program on a rotation of every 3-4 years. For 2013, projects approximating 1,300 acres of longleaf pine habitat were restored and approximately 2,000 acres are projected for longleaf pine restoration and management in 2014. All of this acreage represents habitat improvements for tortoises. The Division of Wildlife and Freshwater Fisheries purchased a 3,600-acre tract in 2014 and a 5,725-acre tract in 2015 adjacent to Geneva State Forest that will be included in the Geneva State Forest Wildlife Management Area. Map surveys indicate the presence of soils suitable to support the gopher tortoise and preliminary surveys have located several clusters of occupied burrows. Longleaf pine restoration work continues under the Multi-state Sandhill / Longleaf Pine Ecosystem Restoration State Wildlife Grant. Roughly 450 acres have been site prepped and will be planted this winter on the Geneva WMA. Prescribed burning efforts on WMAs continue with emphasis on summer burns when applicable. Invasive plant control and feral hog management also continue on public lands.
The Alabama Department of Conservation and Natural Resources, Division of Wildlife and Freshwater Fisheries (DWFF) and the State Lands Division (SLD) continue to work together to restore and maintain gopher tortoise habitat on both DWFF, Forever Wild Land Trust, and SLD lands. Land management conducted in 2016 by agency staff included prescribed burning, removal of invasive plant species, hardwood removal, clear-cutting, timber stand improvements, longleaf pine restoration, planting native warm season grasses, and feral hog and coyote removals. Land under DWFF ownership, within the Geneva WMA, currently protects approximately 9325 acres of

gopher tortoise habitat. A DWFF secured Competitive State Wildlife Grant that funded survey work on public lands was completed this fiscal year (2017). From this project, DWFF conducted 1 relocation effort permanently relocating 12 tortoises. In April 2017, DWFF took possession of 12 tortoises confiscated from a wildlife rehabilitator, 8 tortoises were taken in from the public as nuisance tortoises and 4 were rehabilitated from either dog or car injuries; origin of all tortoises was unknown. Gopher tortoises were relocated to an enclosure at Perdido Wildlife Management Area. All tortoises appeared in good condition and were permanently marked. Tortoises will reside in the enclosure for 12 months. After that time the enclosure will be dismantled. A second project that DWFF authorized and participated in was where nine gopher tortoises were relocated by a Wildlife Consultant company from a private landowner's property to the Splinter Hill property owned by TNC. The reason for relocation was due to unsuitable habitat (a small development site containing mostly cogon grass). Three tortoises were adults (one male and two females), six sub adults and one juvenile. All tortoises appeared to be in good condition and all have constructed burrows at the new site. Data was collected and a ALDCNR data sheet was completed for each tortoise. Monitoring of the enclosure will continue throughout the rest of the project until it is removed next summer.

Education and outreach efforts continue to be a priority. Projects that are currently underway or that have been completed set the stage for future outreach opportunities in the next fiscal year.

Florida Fish and Wildlife Conservation Commission (FWC)

Florida law provides more protection for tortoises than elsewhere in the eastern portion of the range, and there is more protected habitat in Florida than in the rest of the range combined. Florida is also the only state with a comprehensive management plan and permitting program for the species. Significant development/habitat conversion has occurred in the past which has led to the species' imperilment, and future pressures from development are likely. FWC reports on conservation and management activities that benefit gopher tortoise conservation on habitat throughout Florida. Efforts have also been made through public outreach and education for the awareness of roughly 3 million more acres of potential gopher tortoise habitat. Progress has also been made in protecting additional acres of habitat on private lands through the gopher tortoise recipient site permit program. Approximately 18,218 acres are now permanently protected and are being managed for gopher tortoises through conservation easements required for recipient site permits. The combination of the management plan efforts to protect the gopher tortoise and its habitat has made an impact on the status of this keystone species and continues to show progress toward achieving conservation.

The Gopher Tortoise Management Plan (GTMP) was revised and approved by FWC in September 2012 (FWC published its first gopher tortoise management plan in 2007). The revised GTMP guides the continued recovery of the gopher tortoise in Florida through 2022. The plan places an emphasis on landowner incentives, habitat management, and maintaining the gopher tortoise as a keystone species through commensal species conservation. FWC continues to coordinate with the stakeholder Gopher Tortoise Technical Assistance Group on gopher tortoise conservation issues. The continued participation of stakeholders is vital to the long-term conservation of the species. For

this 10-year plan, the overarching objective of no net loss of gopher tortoises will be accomplished by meeting four objectives: minimize loss, increase and improve habitat, enhance and restore populations, and maintain the gopher tortoise's function as a keystone species. The plan presents a suite of conservation strategies and actions that serve to achieve these objectives. The actions are captured under the following broad categories: regulation, permitting, local government coordination, law enforcement, habitat protection, habitat management, population management, disease management, incentives, monitoring, education and outreach, and research. Some highlights of the new plan include: creating a new incentives model for private landowners, collaborating with military partners on Integrated Natural Resource Management Plans (INRMPs) on the management of gopher tortoises on U.S. military installations in Florida, practical considerations for managing habitat, actions minimizing tortoises removed from the wild (waif tortoises) and identifying solutions to accommodate them, and expanded monitoring provisions to track the success of gopher tortoise conservation efforts.

The FWC continued with efforts to identify solutions for waif tortoises. Eight sites have been established as recipient sites for waif tortoises since 2011. Waif tortoises are gopher tortoises that have been removed from the wild (either unauthorized or due to injury) and for which their origin cannot be determined. One solution includes identifying willing landowners to care for waifs on their property and designating the land as a "waif tortoise recipient site." Newly-permitted waif sites were established in Bay, Manatee, Miami-Dade, and Okaloosa Counties and four tortoises have found permanent homes at Manatee County's Perico Preserve. Additionally, previously-permitted Sabal Bluff (Lake County) and Circle B Bar Reserve (Polk County) waif recipient sites received ten and five tortoises, respectively. FWC is currently in the process of developing additional waif sites by working with private landowners to establish sites in Pasco and Wakulla Counties. FWC is working with wildlife rehabbers to place waifs at designated waif recipient sites or releasing them back to their origin if location information is known. Under a Memorandum of Agreement (MOA) with the SC DNR there is also an ongoing effort to restock depleted gopher tortoise populations on public lands in South Carolina through the FWC waif program. FWC staff worked with the SC DNR to amend the MOA by extending it by three years and increasing the number of gopher tortoises transferable to South Carolina by an additional 100 tortoises. During 2016, 13 juvenile and 25 adult tortoises were relocated to Aiken Gopher Tortoise Heritage Preserve under supervision of the SC DNR.

The FWC also continues to work with stakeholders to discuss and explore possible solutions to challenges encountered with gopher tortoise permitting and conservation issues. Constant discussion on implementing new improvements to the guidelines occurs with help from the stakeholders. Through the recipient site permit program (a voluntary program in which landowners may use their lands with suitable habitat to receive gopher tortoises from development sites), approximately 18,218 acres of gopher tortoise habitat have been protected through permanent conservation easements. Under these permits, private landowners can accept gopher tortoises relocated from development sites and assess a monetary charge to the developer for accepting the tortoises. In exchange, the recipient site landowners agree to manage and protect the habitat for gopher tortoises in perpetuity. Currently, 39 recipient sites with an available capacity of 38,342 tortoises are permitted. Since 2009, 20,715 tortoises have been authorized for permanent relocation by FWC-issued permits (16,568 to protected lands and 4,147 to unprotected lands).

Following recommendations from a scientific study looking at viability of gopher tortoise populations and survivorship of hatchlings and juveniles on improved pasture (i.e., those pastures where grasses and other forage species have been planted, fertilized, and irrigated in order to increase forage availability for grazing), FWC staff and stakeholders have identified additional conservation measures for recipient sites with improved pasture. These measures include limiting the percent of improved pasture to less than 40% of suitable gopher tortoise habitat as part of the overall recipient site, requiring at least 10% patchy shade in improved pasture areas to provide cover from weather and predators, and reducing the overall permitted gopher tortoise density for improved pasture areas from up to four gopher tortoises per acre to up to two gopher tortoises per acre including baseline population.

Additionally, the FWC has entered into a MOA and formed a partnership with Nokuse Plantation, the St. Joe Company, St. Joe Foundation, and the Humane Society of the United States to promote humane relocation of gopher tortoises from previously permitted incidental take sites. The FWC also approved Avalon Plantation (owned by Ted Turner) in Jefferson County, Florida, to receive up to 1,300 gopher tortoises on well-managed, protected habitat from previously permitted incidental take permit sites. To date, Avalon has released more than 150 tortoises on-site into temporary enclosures and Nokuse has released more than 4,000 tortoises on-site into temporary enclosures.

To better understand gopher tortoise population distribution and trends, a new surveying technique adopted by range-wide partners (LTDS) has been implemented in Florida. Under a three-year contract beginning in December 2013 (funded in part by a federal grant) with The Joseph W. Jones Ecological Research Center, initial pilot surveys were completed on 33 select state conservation lands in Florida and full surveys using LTDS will be conducted for at least 25 of those sites. Population size and density estimates for 19 conservation lands have been completed and six are currently in progress. Little Talbot Island State Park (SP) had the highest population density (4.4 tortoises/ha, 95% CI= 3.8-5.0). Withlacoochee State Forest Citrus Tract had the largest population size of the sites surveyed thus far (N= 7,179 tortoises, 95% CI= 4789-10,761). Burrow occupancy ranged from 29% at Cayo Costa State Park to 69% at Little Talbot Island State Park. Burrow size class histograms indicate a predominance of adult burrows (>23 cm in width) in most populations. However, 45% of occupied burrows at Goldhead Branch SP were ≤ 23 cm in width and small juvenile tortoises (<12 cm burrow width) were present at Bell Ridge Wildlife and Environmental Area (WEA), Cayo Costa SP, Ft. White WEA, Goldhead Branch SP, Guana River WMA, Ichetucknee Springs SP, Little Talbot Island SP, Moody Branch WEA, O'Leno-River Rise SP, and Watermelon Pond WEA. Joe Budd WMA, Hilochee WMA and Perry Oldenberg WEA appeared to have very low numbers of juvenile tortoises (0, 0 and 3.8% of occupied burrows, respectively, were ≤23 cm in width). Completion of the surveys for all of the 25 identified lands is expected in the upcoming months. Gopher tortoise interns have also helped input older burrow survey data into a GIS database in order to identify potentially viable and supporting populations throughout Florida. Also under the aforementioned contract, the Jones Center staff trained 40 state land managers and biologists on using the LTDS survey method in Florida. FWC trained an additional 16 state land managers and biologists in 2015 and 2016 on using the LTDS survey method.

Florida had significant progress on completing gopher tortoise surveys using LTDS and the contract with the Joseph W. Jones Ecological Research Center was completed in June 2016. Nine

gopher tortoise surveys were completed between October 1, 2015 and September 30, 2016 covering 30,211 acres (12,226 hectares) of habitat. Six of the surveys were conducted by the Florida Natural Areas Inventory and three by the Joseph W. Jones Ecological Research Center. Additional surveys are being done by FWC biologists and staff with the Florida Natural Areas Inventory (FNAI). Significant progress has been made on completing gopher tortoise surveys using Line Transect Distance Sampling under a contract with the Florida Natural Areas Inventory (FNAI). In 2017, 10 surveys on state-owned public conservation lands were completed and identified 6 viable populations and 4 secondary support populations.

In 2017, development in Florida significantly increased and the number of gopher tortoises relocated also increased. In the past year, more than 7,000 gopher tortoises were relocated from development sites, with most of those tortoises relocated to lands under permanent conservation easements. With the demand for recipient sites high, more than 2,200 new acres were brought in as new recipient sites. A few minor changes to the Gopher Tortoise Permitting Guidelines were approved by the FWC January 2017 and have been fully implemented. In May 2017, the first ever Candidate Conservation Agreement with Assurances (CCAA) was fully executed with Florida Army National Guard's Camp Blanding installation. This CCAA included conservation practices that benefit gopher tortoises in addition to a suite of other at-risk species. The Florida Department of Agriculture adopted new Wildlife Best Management Practices for Forestry and Agriculture and are in the process of being implemented. The FWC continues to work with stakeholders to discuss any new challenges and work together toward possible solutions throughout the implementation of the Gopher Tortoise Management Plan.

The FWC continues to work closely with public and non-profit organizations to identify and provide incentives for gopher tortoise conservation on private lands. Staff regularly participates in workshops that promote conservation opportunities and habitat management incentives for private landowners to benefit wildlife on their property. The FWC continues to use Geographic Information Systems (GIS) to help identify high quality gopher tortoise habitat throughout Florida. Outreach to landowners with suitable gopher tortoise habitat and a potential interest in conservation-based incentives for wildlife has begun. The Payment for Ecosystem Services pilot incentive program was implemented in 2014 and 2015. The initial five contracts were completed and 6,047 acres have been conserved which resulted in $60,470 in payments to landowners. The pilot project has concluded and the final results are being discussed. However, full implementation of this incentive program will not occur until a sustainable funding source is secured. The continued participation of stakeholders is important to the long-term conservation of the species. The implementation and completion of many management plan actions to protect the gopher tortoise and its habitat has made an impact on the status of the keystone species and continues to show progress toward achieving conservation.

Georgia Department of Natural Resources (GA DNR)

The State of Georgia permanently protects 51,451 acres of gopher tortoise habitat on Wildlife Management Areas, Public Fishing Areas, State Parks, and Historic Sites. Land management conducted by GA DNR-Wildlife Resources Division (WRD) personnel beneficial to the gopher tortoise on these properties included prescribed burning of 26,040 acres in 2016 and 19,541 acres

in 2017, thinning or clear-cutting 1,634 acres in 2016 and 1,137 acres in 2017 of off-site planted pines, removal of invasive plant species from 91 acres (2016) and 44 acres (2017), planting longleaf pine on 762 acres (2016) and 2,799 acres in 2017, planting native warm-season grasses on 107 acres in 2016, and chemically controlled hardwoods on 702 acres in 2017. Additionally, through the Multi-State Sandhills Ecological Restoration Project (funded by two competitive State Wildlife Grants), GA DNR-WRD assists private landowners with prescribed burns, longleaf pine plantings, and mechanical removal of encroaching hardwoods. Through the approval of two conservation easements and purchase of the Red Stripe Tract (addition to Flat Tub WMA), Almo and Ft. Perry Tracts (together forming Chattahoochee Fall Line WMA), and the Morgan Lake Tract (addition to Griffin Ridge WMA), GA DNR-WRD protected 5,632 acres of tortoise habitat in 2014. An additional 1,725 acres of tortoise habitat were protected in 2015. In 2016, through the acquisition of several properties now managed as Wildlife Management Areas (WMAs), GA DNR-WRD protected 5,563 acres of tortoise habitat. A tortoise population topping 500 tortoises at Alapaha River Ranch, a new gopher frog site discovered at a Nature Conservancy tract. In 2017, GA DNR-WRD protected an additional 5,931 acres of tortoise habitat.

GA DNR-WRD (along with staff from the Jones Center) has conducted or contracted gopher tortoise surveys and population estimates using LTDS on 82 independent properties since 2007, which includes both public and private sites. Fall Line Sandhills WMA was resurveyed using LTDS six years after baseline data were collected. The population was found to have doubled in size and now meets the MVP standard. This dramatic population increase is in part due to the intensive habitat restoration taking place there. Highlights from 2015 surveys included greater than 1,500 tortoises on both the Trail Ridge sites (Charlton County) and a Brooks County property, greater than 1,000 tortoises at Townsend WMA, and 444 tortoises at Sansavilla WMA (Wayne County). GA DNR has completed surveys on 81 sites, public and private, statewide. In 2016, GA DNR-WRD conducted gopher tortoise surveys and population estimates, using line transect distance sampling (LTDS), on nine sites, including five state-owned properties. Sites included Altama Plantation WMA in Glynn County, Flint River WMA in Dooly County, the Fort Perry Tract of Chattahoochee Fall Line WMA near Geneva, several Nature Conservancy properties near Fort Benning, private lands in Marion County, the newly acquired Altamaha "Connector" or BBT Tract in Altamaha WMA near Darien, industrial timberlands in Brantley and Camden counties, and a large private tract in Atkinson County.198 gopher tortoises displaced by development were translocated to two protected DNR-WRD lands, and 28 head-started juvenile tortoises were released at Yuchi WMA. In 2017, GA DNR conducted gopher tortoise surveys and population estimates, using line transect distance sampling (LTDS), on eleven sites, including seven state-owned properties. Five of the sites sampled were resurveys, all of which showed a population increase from their initial survey. The population at Alapaha River WMA increased to 2385 gopher tortoises; TNC R.G. Daniels increased to 74 tortoises; Ohoopee Dunes increased to 195 tortoises; George L. Smith State Park increased to 157 tortoises; and General Coffee Sate Park increased to 97 tortoises. Five of the eleven sites surveyed in 2017 hold viable populations of tortoises (Alapaha River WMA, Sandhills WMA, Ohoopee Dune WMA, Southern Power Wayne, and TCF Bulloch/Bryan).

GA DNR Nongame Conservation staff has been augmenting the population at Yuchi WMA, a site with extensive suitable tortoise habitat but very low density of tortoises, with adult tortoises displaced by development elsewhere and with juvenile tortoises hatched and head-started from

eggs collected at stable populations on other sites. Predation prevention screens were placed on nests located at St. Catherine's Island and Reed Bingham State Park that were later excavated for rearing, head-starting, and translocation to Yuchi WMA. Twelve juvenile tortoises with attached radio-transmitters were released in soft-release pens for a three week period and then were allowed to roam free once they became well-acclimated to the site. Current projects involving personnel from the University of Georgia and U.S. Geological Survey are evaluating growth, habitat use, home range, and survivorship of head-started tortoises; and developing an adaptive landscape planning and decision framework to be implemented by GA DNR to make better State-wide land management decisions for the conservation of gopher tortoises. Several publications/documents, electronic newsletter articles, workshops, and events aimed at increasing awareness for gopher tortoise conservation among both professionals and the general public occur each year. Since 2011, 220 gopher tortoises have been released at Yuchi to complement the natural population, previously estimated at 44 tortoises. In 2016, 28 head-started juvenile tortoises were released at Yuchi WMA.

GA DNR translocated 155 gopher tortoises from sites slated for solar farm development to soft release enclosures at Chattahoochee Fall Line, Fall Line Sandhills, and Silver Lake WMAs in order to boost the long-term viability of those protected populations. In 2016, an additional 198 gopher tortoises displaced by development were translocated to two protected DNR-WRD lands. In 2017, 157 gopher tortoises displaced by development were translocated to two protected DNR-WRD lands. Numerous electronic newsletter articles, workshops, social media posts, and events aimed at increasing awareness for gopher tortoise conservation among both professionals and the general public were conducted during 2017.

South Carolina Department of Natural Resources (SCDNR)

Land management activities at both Tillman Sandridge Heritage Preserve and Aiken Gopher Tortoise Heritage Preserve (AGTHP) have continued, and population augmentation and enhancement activities using waif tortoises continued at AGTHP with the goal of eventually establishing an MVP. To date, 282 individual tortoises have been reintroduced to the landscape (216 adults and juveniles and 66 hatchlings/yearlings). In 2014-2015, 11 tortoises were added to the population on site and an additional pen was constructed. SCDNR observed reproduction in this population both inside and outside of the soft-release pen walls, but would like to investigate hatching success and recruitment into the population. In 2016, 41 tortoises received from FWC (30 adults, 11 juveniles) were released at AGTHP. Additionally, 30 hatchlings were obtained from eggs collected from nests at SREL. A plan is underway to conduct a survivorship and movement study using these 2016 hatchlings and 2015 yearlings (reared at SREL) via radio telemetry. The release of the initial group of 25 animals (20 yearlings and 5 hatchlings) was in early October 2016. Each gopher tortoise acquired for release is measured, weighed, the sex determined, and the shell marked. Additionally all tortoises released at AGTHP have had blood samples drawn for future analysis. These samples are also being used to determine geographic origin through genetic testing.

SCDNR and Savanah River Ecology Lab (SREL) staff continued efforts to restock the AGTHP utilizing waif tortoises, and have released more than 300 tortoises to the site (~160 adults). SCDNR

initiated a study to examine survivorship and movements of hatchling, head-started yearling, and head-started 2-year-old gopher tortoises at the preserve. In 2016, 25 tortoises (20 yearling and 5 hatchlings) were release as well as 30 tortoises (15 hatchling, 7 yearling, 8 two-year olds) in 2017. SREL and SCDNR have concluded the first year of sampling for a collaborative project to examine long-term site fidelity, social integration, and disease status of the AGTHP tortoises.

Currently, Savannah River Ecology Laboratory staff are working on completing three papers from research conducted at AGTHP that will be submitted for publication concerning 1) the movement, dispersal, and home range establishment of waif tortoises on the AGTHP following penning, 2) the techniques and methodology used to establish a gopher tortoise population with waif tortoises, and 3) which silviculture method provides the optimum forage for the gopher tortoise in an established longleaf pine ecosystem.

SCDNR staff conducted LTDS at historic gopher tortoise sites. In 2016, they conducted 5 pilot surveys and 3 full surveys, and identified 2 MVPs and one primary support population. These surveys were conducted on both public and private lands in SC. Survey efforts will continue in 2017. One survey site identified and surveyed in 2016 (~450 acres) has been put under perpetual conservation via deed restriction (late 2016) by the land owner, the first gopher tortoise population on private land to be protected in perpetuity in South Carolina.

Both Tillman Sand Ridge Heritage Preserve and Aiken Gopher Tortoise Heritage Preserve have continued management activities for the benefit of the gopher tortoise, including prescribed fire. SCDNR has concluded the South Carolina Gopher Tortoise Survey Initiative in December 2017, where an attempted was made to identify all extant major populations of tortoises in South Carolina and provide population estimates utilizing LTDS where appropriate. Five full surveys encompassing both public and private lands were conducted and at least 2 MVPS were verified to occur in SC, one on the Tillman Sand Ridge associated with the Savannah River and a second associated with the Coosawhatchie River Sand Hills (populations occur on both sides.
Tillman Sand Ridge Heritage Preserve has been the focus of restoration activities on approximately 180 acres. Initial logging operations were concluded at this site and some site preparation began for the planting of longleaf pine and restoration of native groundcover. This effort will provide significant additional acreage for tortoises on the preserve and increase the carrying capacity of the site.

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Approval/Concurrence:

Lead Regions must obtain written concurrence from all other Regions within the range of the species before recommending changes, including elevations or removals from candidate status and listing priority changes; the Regional Director must approve all such recommendations. The Director must concur on all resubmitted 12-month petition findings, additions or removal of species from candidate status, and listing priority changes.

Approve: 09/24/2019
Date

Concur: 09/24/2019
Date

Did not concur: _____ _____
Date

Director's Remarks: