

BIOLOGICAL STATUS REPORT

GOPHER TORTOISE

(Gopherus polyphemus)

INTRODUCTION

In November 2001, Florida Fish and Wildlife Conservation Commission (FWC) staff conducted a preliminary status review of the gopher tortoise (*Gopherus polyphemus*) pursuant to development of a species management plan. The species is currently on the state list of species of special concern (Rule 68A-27.005 F.A.C.). According to the procedural requirements of Rule 68A-27.0012 F.A.C. (Appendix 1), in order to warrant state listing as an endangered species, threatened species, or species of special concern, the gopher tortoise range-wide must meet at least 1 of the 5 criteria in 68A-1.004 F.A.C. (Appendix 2). The following assessment is intended to evaluate the biological status of the gopher tortoise pursuant to the criteria and definitions embodied in Rule 68A-1.004 F.A.C. Herein we present information concerning the status of the gopher tortoise in relation to those criteria.

BIOLOGICAL INFORMATION

Taxonomic Classification

Gopher tortoises (*Gopherus polyphemus*) are members of the class Reptilia, order Testudines, and family Testudinidae.

Life History and Habitat

The gopher tortoise is a moderate-sized, terrestrial turtle, averaging 23-28 cm (9-11 in) in length. The species is identified by its stumpy, elephantine hind feet and flattened, shovel-like forelimbs adapted for digging. The shell is oblong; coloration is generally tan, brown, or gray.

The gopher tortoise inhabits relatively well-drained, sandy soils. Throughout its range, the gopher tortoise is generally associated with longleaf pine (*Pinus palustris*)-xeric scrub oak (*Quercus spp.*) sandhills; however, in Florida, the species also occurs in scrub, pine flatwoods, dry prairies, vegetated beach dunes, and a variety of disturbed habitats (Auffenberg and Franz 1982; Diemer 1986, 1987). Gopher tortoises excavate burrows, averaging 4.5 m (14.8 ft) in length and 2 m (6.6 ft) in depth (Hansen 1963). These burrows provide protection from temperature extremes, desiccation, and predators and serve as refuges for some 360 other species (Jackson and Milstrey 1989).

The gopher tortoise exhibits deferred sexual maturity, low fecundity, and a long life span (Landers 1980). Females reach sexual maturity at 10-21 years of age, depending on latitude; males mature at a slightly younger age (Landers et al. 1980, Diemer and Moore 1994, Mushinsky et al. 1994). The breeding season is roughly April-July, but males may attempt to breed throughout the active season (Apr-Nov). Nests are constructed (often in burrow mounds) from mid-May to mid-

June, and only one clutch is produced annually (Landers et al. 1980). Clutch size usually ranges 3-12, with an average of 6 (Diemer and Moore 1994). Predation on nests and hatchlings is heavy (Alford 1980, Landers et al. 1980, Butler and Sowell 1996, Smith 1997).

Gopher tortoises feed primarily on broadleaf grasses, wiregrass, grass-like asters, legumes, and fruits (Garner and Landers 1981; Macdonald and Mushinsky 1988). Tortoise densities and movements are affected by the amount of herbaceous ground cover (Auffenberg and Iverson 1979). Generally, feeding activity is confined to within 50 m (164 ft) of the burrow (Auffenberg and Franz 1982), but multiple burrows are typically used (McRae et al. 1981, Auffenberg and Franz 1982, Diemer 1992). Home range size varies with habitat type, season, and sex of the tortoise; moreover, considerable individual variation has been found (Diemer 1992). Reported average home ranges for males have varied from 1.2 to 4.7 acres. Females generally have smaller home ranges, reported averages ranging from 0.2 to 1.6 acres (McRae et al. 1981, Smith et al. 1997).

Distribution

The gopher tortoise occurs in the southeastern Coastal Plain from extreme eastern Louisiana to southern South Carolina (Auffenberg and Franz 1982). Tortoises remain widely distributed in Florida, occurring in parts of all 67 counties; however, their current range in south Florida is restricted due to unsuitable habitat and increased urbanization (Diemer 1987). Given the historical distribution of their habitat, it is likely that gopher tortoises were historically common and widespread in the southeastern United States prior to European settlement.

BIOLOGICAL STATUS ASSESSMENT

Available data on the range-wide gopher tortoise population were evaluated relative to each of the 5 criteria for state listing under Rule 68A-1.004 F.A.C. Many of these data were derived from on-going studies and represent the best professional opinion of FWC scientific staff and their peers.

Criterion A: Population Reduction

This criterion requires the assessment of an observed, estimated, inferred, or suspected population reduction exhibited by the range-wide gopher tortoise population over either the previous or the next 10 years or 3 generations, whichever is longer. To meet this criterion for listing, the population reduction percentage must be at least 80% (endangered), 50% (threatened), or 20% (species of special concern). Determination of average generation time for the gopher tortoise is tied to female age at maturity. Female age at maturity is known to vary latitudinally, having been reported as 12-13 years in south-central Florida (Linley, 1986; McLaughlin, 1990), 14-18 years in north-central Florida (Diemer and Moore, 1994), and 19-21 years in southwest Georgia (Landers et al., 1980, 1982) and south Alabama (Aresco and Guyer 1999). These values are thought to be reasonable estimates for most Florida tortoise populations, although maturity may be reached at a slightly earlier age on intensively managed sites (Mushinsky et al., 1994).

Generation time is the average age of the breeding adults. Vortex calculates regional generation times as 27 years in south Florida, 31 years in north central Florida, and 35 years in the Panhandle, for a rough statewide average of 31 years (Miller 2001). Allowing for the more northerly populations in Mississippi, Alabama, and Georgia, we estimate a rangewide generation time of 33 years. Based upon this estimated generation time, we use 99 years (3 generations) as the relevant time interval for this assessment.

Previous Trend.—For purposes of discussion, the period 1900-2000 will be used in assessing previous gopher tortoise population reduction. During this period, the human population of Florida increased from 530,000 to 15.98 million people (2924%; U.S. Census Bureau, 2001). Table 1 summarizes 1900-2000 changes in the human population of states within the range of the gopher tortoise. Florida was by far the least populous of the range states in 1900, but whereas the populations of the other states have increased by 83-269% since 1900, the population of Florida has increased 29 fold. In states other than Florida, much of the human population growth has occurred outside the range of the gopher tortoise, so for those states, the indicated percent change overestimates human population growth within the range of the gopher tortoise.

Table 1. Human population change in the states within the range of the gopher tortoise, 1900-2000.

	1900	2000	%change
Alabama	1,830,000	4,447,100	143
Florida	528,542	15,982,378	2924
Georgia	2,220,000	8,186,453	269
Louisiana	1,384,000	4,468,976	223
Mississippi	1,553,000	2,844,658	83
South Carolina	1,340,316	4,012,012	199
	8,855,858	39,941,577	351

Kautz (1998) estimated that from 1949 to 1995 the area of urban lands in the state increased from 1.07 million acres to 5.3 million acres. Extrapolating from Kautz's data, we estimate that the area of urban lands in 1900 would have been approximately 190,300 acres, and that by 2000, the area of urban lands in Florida would have increased to 5.7 million acres, for an overall increase of 5.5 million acres between 1900 and 2000. Clearly, not all of this increase has occurred in areas occupied by gopher tortoises. Stys (pers. commun.) has estimated that 1,715,708 acres of former tortoise habitat in Florida are now urban, for a net loss of 1,525,408 acres to urban growth since 1900, representing a 14% loss of original tortoise habitat. It is worth noting that along the Atlantic and Gulf coasts in southern Florida, tortoises are (or were) largely restricted to the often narrow ridges of higher, well-drained lands near the coast. These areas are also highly sought for development, and competition with urban development has eliminated or severely reduced tortoise populations in Dade, Broward, Palm Beach, Martin, Saint Lucie, Indian River, Brevard, Collier, Lee, and perhaps other counties (Diemer, 1991). Inland, the dramatic growth of Orange, Osceola, Seminole, and Lake counties since 1950 has eliminated extensive areas of tortoise habitat, and considerable additional habitat has been eliminated by urbanization in Highlands, Polk, Pasco, Hernando, Citrus, Marion, and Alachua counties, among others.

Gopher tortoises have also been impacted by dramatic changes in land management practices in the past 50 years. Auffenberg and Franz (1982) noted that selective removal of trees from natural pine stands could benefit tortoise populations, but they cautioned that the more recent practice of clear-cutting and replanting in dense stands of slash pine, or sand pine in the Panhandle, detrimentally affects tortoise populations because so few grasses grow in the dense shade, and the habitat is generally too poor for gopher tortoises. Extensive conversion of natural pine stands to pine plantations began in the 1950s. Kautz (1998) estimated that between 1970 and 1995 natural pine forests in Florida declined from 5.58 million acres to 2.82 million acres, a loss of 2.76 million acres (49.4 %) in less than one tortoise generation. Kautz further estimated that acreage of pine plantations increased from 2.51 million acres to 4.67 million acres between 1970 and 1995. Most of the 4.67 million acres of pine plantation has been converted since 1950. Gopher tortoises often do well in the early years following plantation development, but as the dense pines shade out understory forage plants, the tortoises are forced to move to peripheral areas to find food. This often means that gopher tortoises relocate to road shoulders, where their numbers convey a false impression of abundance, even though adjacent pine plantations are largely unoccupied.

More recently, fire suppression and the decline in the use of prescribed fire in both natural pine forests and pine plantations has resulted in substantial decline in gopher tortoise habitat quality. Auffenberg and Franz (1982) reported that in the absence of fire, tortoise density declined by an average of 0.64 tortoises/acre for each 5-year period following cessation of burning. In at least some habitats, tortoises may be completely eliminated following fire suppression for less than 20 years

Based on the maps of Davis (1967), Stys (pers. commun. 2001) estimated that the natural extent of tortoise habitat in Florida was 10,845,015 acres. Her estimate for the current extent was 1,620,612 acres, a decline of 85.1%. Some of this loss of habitat occurred prior to 1900, but the decline in native tortoise habitat may well have exceeded 80% since 1900. Tortoises have not necessarily been eliminated from all of the converted habitat, though. Agricultural lands now comprise 2,522,201 acres (23%) of the original tortoise habitat, and tortoises are still found on or around the periphery of many of the less intensively developed lands. Similarly, although tortoise populations typically decline following conversion of natural pine forests to high density pine plantations, they may still remain in reduced numbers around the periphery of the plantations or by moving among early successional stands generated as areas are harvested. Also, some ruderal habitats support fairly dense populations of tortoises.

The situation in the other range states differs somewhat, because agricultural conversion of the Coastal Plain began much earlier in South Carolina, Georgia, Alabama, and Mississippi than it did in Florida. The overall percentage of habitat lost in those areas may have been just as great as in Florida, but much of the agricultural development occurred in the 18th and 19th centuries, thus predating our 1900-2000 review period. Also, the loss of habitat to urban conversion has been far less in those other states.

Tortoises have also experienced human predation, especially in the Panhandle and northern peninsula. There is a long history of human predation on tortoises, especially in the western Panhandle, and prior to the closure of tortoise harvest in the late 1980s, one community in Okaloosa County held an annual tortoise cookout. Extensive potential tortoise habitat still remains

in the Florida Panhandle, but tortoise populations are sparse in most areas. Auffenberg and Franz (1982) found that tortoise populations in longleaf pine-turkey oak habitat in the Panhandle averaged only 20% of the density of populations in similar habitat in the Peninsula. Stys (1999) estimated that Eglin Air Force Base and Blackwater River State Forest together had 316,840 acres of potential gopher tortoise habitat, representing 88% of potential habitat on conservation lands in the Panhandle. Nonetheless, tortoises are absent or scarce throughout much of both areas. Johnson and Hipes (1997) surveyed 7 areas on Blackwater thought to potentially have gopher tortoises. They found tortoises at 5 sites, but densities were very low (0.024-0.166 gopher tortoises per acre; mean=0.074/acre). Similarly, Printiss and Hipes (1999) surveyed 10 areas on Eglin thought to potentially have gopher tortoises. They observed tortoises at 8, but again densities were low (0.029-0.136 gopher tortoises per acre; mean = 0.077/acre).

Auffenberg and Franz (1982) estimated that the “original standing crop” of gopher tortoises had been reduced by about 80% during the preceding 100 years. Based upon:

- (1) decline in area of occupancy and quality of habitat due to urbanization, especially in Florida,
- (2) extensive conversion of sandhill habitats to pine plantations,
- (3) extensive conversion of scrub and sandhill habitats to agriculture,
- (4) lack of prescribed fire and suppression of natural fire, and
- (5) a long history of human predation,

we infer that gopher tortoise populations range-wide have declined by 60-80% in the last three generations (99 years). Hence, listing of the gopher tortoise as a threatened species is supported.

Future Trend.— It is estimated that the human population of Florida will increase to 24,420,700 by the year 2030, an increase of 53% within one tortoise generation. If this rate of growth were sustained for 3 tortoise generations, the population of Florida would be 55 million people in 2100. Kautz (1998) projected that natural pine forests could disappear from all commercial forest lands in Florida by 2021, again within one tortoise generation. Although the other range states may not experience the dramatic growth that Florida has seen over the last 50 years, their prospects for loss of natural pine forests are no less bleak. The gopher tortoise may already have been extirpated from Louisiana due to the near total conversion of natural pine forests there to industrial pine plantations (Lohofener and Lohmeier 1984). It may be inevitable that gopher tortoises will be largely eliminated from private lands in Florida within the next 3 generations, which would represent a 60-65% decline of tortoise habitat. We anticipate similar losses in the other range states. Hence the listing of the gopher tortoise as a threatened species is supported.

Criterion B: Extent of Occurrence and /or Area of Occupancy

This criterion requires an estimate of the gopher tortoise’s extent of occurrence (i.e., total range) and area occupied (i.e., area within the total range where the species actually occurs). These 2 parameters may differ considerably for species that are patchily distributed. To meet this criterion for listing, the extent of occurrence must be less than 40 square miles (endangered), 2,000 square miles (threatened), or 7,700 square miles (species of special concern), or the area of occupancy must be less than 4 square miles (endangered), 200 square miles (threatened), or 770 square miles (species of special concern). The criterion also includes an assessment of the species’

distribution (i.e., severely fragmented or a limited number of locations) and a determination of whether or not the species is experiencing declines and/or fluctuations in extent of occurrence, area occupied, habitat quality, number of locations, or number of mature individuals.

Extent of Occurrence.— The gopher tortoise occurs from Mississippi to southern South Carolina and south to the southern tip of the Florida peninsula. It originally occurred in eastern Louisiana, but viable populations may have been extirpated from there (Loehfener and Lohmeier 1984). The total extent of occurrence, excluding the Gulf of Mexico, is in excess of 110,000 square miles. Under the criterion of extent of occurrence, listing of the species as endangered, threatened, or species of special concern is not supported.

Area of Occupancy.— Stys (FWC, Office of Environmental Services; pers. commun.) conducted a GIS-based (1986-1989 data) assessment of the extent of remaining, potential gopher tortoise habitat in Florida. Much of the information on range-wide extent of occurrence in other states dates to the mid-1980s. Table 2 summarizes the available information on area of occupancy.

Table 2. Estimated range-wide extent of potential gopher tortoise habitat.

State	Tortoise Habitat (square miles)	Source
Alabama	3675	Spillers and Speake 1986, Lohofener and Lohmeier 1984
Florida	4257	Stys (FWC, GIS-based estimate, 1989 data)
Georgia	3125	Conservative estimate, data not available
Louisiana	2	Lohofener and Lohmeier 1984
Mississippi	394	Lohofener and Lohmeier 1984
South Carolina	7	Wright 1982
Total	11,460	

The range-wide estimate of 11,460 square miles for the area of occupancy is based on 1982-1989 data. Allowing for additional losses in occupied area between 1985 and 2000, the area of occupancy is thought to still exceed 8,000 square miles. Hence, area of occupancy is thought to significantly exceed the 770 square miles that would be required to trigger listing as a species of special concern. Under the criterion of area of occupancy, listing the species as endangered, threatened, or species of special concern is not supported.

Criterion C: Population Size and Trend

This criterion combines an estimate of range-wide population size (in terms of the number of mature individuals) with an estimate of the population trend over the next 10 years, or 3 generations, whichever is longer. We use 99 years (3 generations) as the relevant time interval for this assessment. To meet this criterion for listing, the number of mature individuals must be fewer than 250 (endangered), 2,500 (threatened), or 10,000 (species of special concern), with an estimated population decline of at least 25% (endangered), 20% (threatened), or 10% (species of special concern). This criterion also includes an assessment of the species' distribution (i.e., severely fragmented or limited to a single location).

Table 3 summarizes available estimates for the number of tortoises range-wide. Diemer (1992) found that adults comprised 40-62% of 3 study populations in northern Florida. Using the lower figure, the populations summarized in Table 3 would conservatively have included a minimum of 684,091 mature tortoises in the mid-1980s.

Table 3. Estimated number of gopher tortoises range-wide.

State	Number Tortoises	Mature Individuals ^{1,4}	Source
Alabama ²	482,848	193,139	Spillers and Speake 1986,
Alabama ³	12,900 ⁴	12,900	Lohofener and Lohmeier 1984
Florida	763,784	305,513	Stys (FWC, 2001 GIS-based estimate)
Georgia	400,000	160,000	Conservative estimate, not available
Louisiana	0 ^{4,5}	0	Lohofener and Lohmeier 1984
Mississippi	11,231 ⁴	11,231	Lohofener and Lohmeier 1984
South Carolina	3,271	1,308	Wright 1982
	1,674,034	684,091	

¹Number of tortoises X minimum proportion of adults (0.40)

²Alabama east of the Tombigbee and Mobile rivers.

³Alabama west of the Tombigbee and Mobile rivers.

⁴Estimated number of mature tortoises.

⁵Only scattered individuals survive in Louisiana (Lohofener and Lohmeier 1984).

More recently, McCoy et al. (in press) estimated tortoises to number 81,928 on 44 selected "conservation lands" (i.e., national forests, national wildlife refuges, state parks – 138,000 acres) in Florida. Again, using Diemer's (1994) minimum value of 40% adults, the tortoise populations reported by McCoy et al. would conservatively include a minimum of 32,771 mature individuals. Stys (pers. commun.) and Allen (pers. commun.) estimated that 75,678 acres of tortoise habitat are managed on lands under management by the Florida Fish and Wildlife Conservation Commission (FWC). If these lands support gopher tortoises in numbers proportional to the numbers reported by McCoy et al., then an additional 18,000 mature tortoises would be found on FWC managed lands. Thus, a very conservative estimate of 50,000 mature tortoises is thought to occur on these

selected state and federal lands in Florida. It is clear that gopher tortoises range-wide and in Florida exceed the listing thresholds for population size. Because the number of mature individuals exceeds thresholds for listing under criterion C, population trends are not considered under this criterion. Under the criterion of population size, listing of the species as endangered, threatened, or species of special concern is not supported.

Criterion D: Number of Mature Individuals

This criterion requires an estimate of the number of mature individuals in the range-wide population to determine if the population is extremely small or restricted. To meet this criterion for listing, the range-wide population estimate for the species must be no greater than 50 (endangered), 250 (threatened), or 1,000 (species of special concern) mature individuals. As discussed under Criterion C above, the minimum number of mature tortoises in the mid-1980s is estimated to have exceeded 680,000. Numbers likely have declined in the intervening years, but they clearly still exceed the number of tortoises (1000) range-wide that would warrant listing under Criterion D. This conclusion is further supported by the very conservative estimate of 50,000 mature tortoises thought to occur on selected state and federal lands in Florida. Under the criterion of number of mature individuals, listing of the species as endangered, threatened, or species of special concern is not supported.

Criterion E: Quantitative Analyses

This criterion requires an estimate of the probability of a species' extinction in the wild within a particular timeframe. In order to be listed as endangered, threatened, or species of special concern, that probability would have to be at least 50% within the next 3 generations (99 years), 20% within the next 5 generations (165 years), or 10% within the next 100 years, respectively. Miller (2001) conducted a population viability analysis for the gopher tortoise and concluded that it had neither a 50% probability of extinction within the 3 generations (endangered) nor a 10% probability of extinction within the next 100 years. No simulations were run for 5 generations (165 years), but by extrapolation from the 100 year simulations it is clear that the probability of range-wide extinction of gopher tortoises under foreseeable circumstances is less than 20% within the next 165 years. Hence, listing of the gopher tortoise as endangered, threatened, or species of special concern is not supported under this criterion.

CONCLUSIONS

The gopher tortoise is currently listed by the FWC as a species of special concern. This status review finds that it meets the population reduction criteria for classification as a threatened species. The gopher tortoise is a species which is facing a very high risk of extinction in the future, as determined by past and projected future population declines.

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APPENDIX 1. Procedures for Listing, Delisting, and Reclassifying Endangered, Threatened, and Species of Special Concern.

Rule 68A-27.0012, Florida Administrative Code (F.A.C.)

- (1) Petition to list, delist, or reclassify a species in Rules 68A-27.003, 68A-27.004 or 68A-27.005, F.A.C.
 - (a) Persons wishing to add, delete or reclassify species in Rules 68A-27.003, 68A-27.004 or 68A-27.005, F.A.C., shall submit a written petition to the Commission.
 1. Petitions shall be clearly identified as such, and must contain the following in order to be considered complete:
 - a. The rule to which the species is proposed to be added, removed from or reclassified to,
 - b. The name, address and signature of the petitioner, and
 - c. Sufficient information on the biology and distribution of the species to warrant investigation of its status using the criteria contained in definitions of endangered, threatened or species of special concern in Rule 68A-1.004, F.A.C.
 - (b) Incomplete petitions will be returned to the petitioner with insufficiencies clearly noted in writing. Corrected petitions may be resubmitted for consideration.
 - (c) Complete petitions will be evaluated in accordance with the provisions in subsection (2).
 - (d) If, in the opinion of the Executive Director, immediate inclusion of a species in Rule 68A-27.003(1), F.A.C., is essential to prevent imminent extinction, such listing may be effected on a temporary basis not to exceed 240 days. Such emergency listings shall be approved by the Commission at the next scheduled meeting. The Commission shall conduct the evaluations prescribed in (2) and (3) of this subsection to determine the appropriate final classification of the species.
- (2) Review of petitions to determine biological status; Phase 1.
 - (a) The Commission shall establish a deadline for completion of the biological review of each complete petition.
 - (b) The Commission shall provide notice by mail to parties who request such notification and shall publish in the Florida Administrative Weekly a solicitation of information on the biological status of the petitioned species. Written comments regarding biological status shall be accepted by the Commission for a period of no less than 45 days following public notice.
 - (c) The Commission shall summarize information provided in the petition, information obtained from the public and other available biological data on status of the petitioned species into a preliminary biological status report. The preliminary biological status report shall contain a recommended classification for the petitioned species consistent with the available biological data and based on the criteria established in 68A-1.004, F.A.C.
 - (d) The Commission shall designate a biological review panel with a minimum of three scientists with demonstrated knowledge and expertise pertaining to species conservation and management. This panel shall independently evaluate information compiled on the petitioned species' biological status relative to its proposed classification in Rules 68A-27.003, 68A-27.004 or 68A-27.005, F.A.C.
 - (e) The biological status report and the information referenced in subparagraph (c) shall be provided to members of the panel of scientific experts for the review mandated in (d) of

this subsection. Panel members shall have no fewer than 45 days to review the document and provide recommendations to the Commission.

- (f) The Commission shall consider the final biological status report, biological recommendations from the panel of scientific experts and public testimony regarding biological status in making a final determination whether addition, deletion or reclassification of the petitioned species in Rules 68A-27.003, 68A-27.004 or 68A-27.005, F.A.C., is warranted.
- (g) If the petitioned species is determined by the Commission to warrant inclusion in Rules 68A-27.003, 68A-27.004 or 68A-27.005, F.A.C., the Commission shall:
 - 1. Specify the appropriate listing category for the species based on biological status.
 - 2. Establish a deadline for completion of Phase 2 for the species as described in subsection (3) below, considering the recommendation of Commission employees and other interested parties.
 - 3. If the species is not already listed in Rules 68A-27.003, 68A-27.004 or 68A-27.005, F.A.C., it shall be added to the list of candidate species in Rule 68A-27.0021, F.A.C., and the protective provisions therein shall apply to the species.
- (3) Development of management plans, regulations, permit requirements for candidate species; Phase 2.
 - (a) Within 45 days following designation of a candidate species, the Commission shall provide notice by mail to parties who request such notification and shall publish in the Florida Administrative Weekly a solicitation of information on the conservation needs of the species, and any economic and social factors that should be considered in its management.
 - (b) The Commission shall use information obtained from the public and other available information to develop a draft management plan for each candidate species that addresses:
 - 1. Biological status as determined in Phase 1,
 - 2. Conservation objectives,
 - 3. Recommended management actions,
 - 4. Recommended Commission regulations and incentives,
 - 5. Anticipated economic and social impacts of implementing or not implementing the recommended conservation actions.
 - (c) The Commission shall provide notice by mail to parties who request such notification and shall publish in the Florida Administrative Weekly a notice of the availability of the draft management plan. Written comments regarding conservation recommendations and expected economic and social impacts of implementation of the management plan shall be accepted by the Commission for a period of no less than 45 days following public notice.
 - (d) Final Commission action on the petition shall include:
 - 1. Deletion of the species from 68A-27.0021 if appropriate, and addition to and/or deletion from Rules 68A-27.003, 68A-27.004 or 68A-27.005, F.A.C., in accordance with the determination made in (2) of this subsection.
 - 2. A determination on any proposed regulations in the management plan.

Specific Authority Art. IV, Sec. 9, Fla. Const.
Law Implemented Art. IV, Sec. 9, Fla. Const.
History--New 6-23-99, Formerly 39-27.0012.

APPENDIX 2. Definitions of the Florida Fish and Wildlife Conservation Commission Relative to Listed Species.**Rule 68A-1.004, Florida Administrative Code (F.A.C.)**

The following definitions are for the purpose of carrying out the provisions of the rules of the Fish and Wildlife Conservation Commission relating to wild animal life and freshwater aquatic life. As used herein, the singular includes the plural. The following shall be construed respectively to mean:

- (18) Candidate species — A species, subspecies, or isolated population of a species or subspecies, which has been determined by the Commission to warrant listing under Rules 68A-27.003, 68A-27.004 or 68A-27.005, F.A.C., but for which actual listing in the aforementioned rules is pending development of a management plan.
- (25) Direct take — Intentionally pursuing, hunting, capturing, killing, or destroying fish or wildlife or the nests, eggs, homes or dens of fish or wildlife.
- (26) Endangered species — As designated by the Commission, a species, subspecies, or isolated population of a species or subspecies which is so few or depleted in number or so restricted in range or habitat due to any man-made or natural factors that it is in imminent danger of extinction as determined by (a), (b), (c), (d) or (e) below:
 - (a) Population reduction in the form of either:
 - 1. An observed, estimated, inferred or suspected reduction of at least 80% over the previous ten years or three generations, whichever is longer, based on, and specifying, any of the following:
 - a. Direct observation
 - b. An index of abundance appropriate for the species
 - c. A decline in area of occupancy, extent of occurrence or quality of habitat
 - d. Actual or potential levels of exploitation
 - e. The effects of introduced species, hybridization, pathogens, pollutants, competitors or parasites
 - 2. A reduction of at least 80%, projected or suspected to be met within the next ten years or three generations, whichever is longer, based on, and specifying, any of 1.b., 1.c., 1.d. or 1.e. above.
 - (b) Extent of occurrence estimated to be less than 40 square miles or area of occupancy estimated to be less than 4 square miles, and estimates indicating any two of the following:
 - 1. Severity fragmented or known to exist at only a single location.
 - 2. Continuing decline, observed, inferred or projected, in any of the following:
 - a. Extent of occurrence
 - b. Area of occupancy
 - c. Area, extent and/or quality of habitat
 - d. Number of locations or subpopulations
 - e. Number of mature individuals
 - 3. Extreme fluctuations in any of the following:
 - a. Extent of occurrence

- b. Area of occupancy
 - c. Number of locations or subpopulations
 - d. Number of mature individuals
- (c) Population estimated to number fewer than 250 mature individuals and either:
- 1. An estimated continuing decline of at least 25% within three years or one generation, whichever is longer, or
 - 2. A continuing decline, observed, projected or inferred, in numbers of mature individuals and population structure in the form of either:
 - a. Severe fragmentation (that is, no subpopulation estimated to contain more than 50 mature individuals).
 - b. All individuals are in a single subpopulation.
- (d) Population estimated to number less than 50 mature individuals.
- (e) Quantitative analysis showing the probability of extinction in the wild is at least 50% within ten years or three generations, whichever is longer.
- (73) Species of special concern — As designated by the Commission, a species, subspecies, or isolated population of a species or subspecies which is facing a moderate risk of extinction in the future, as determined by (a), (b), (c), (d) or (e) below:
- (a) Population reduction in the form of either:
- 1. An observed, estimated, inferred or suspected reduction of at least 20% over the last ten years or three generations, whichever is longer, based on, and specifying, any of the following:
 - a. Direct observation
 - b. An index of abundance appropriate for the species
 - c. A decline in area of occupancy, extent of occurrence and/or quality of habitat
 - d. Actual or potential levels of exploitation
 - e. The effects of introduced species, hybridization, pathogens, pollutants, competitors or parasites
 - 2. A reduction of at least 20%, projected or suspected to be met within the next ten years or three generations, whichever is longer, based on, and specifying, any of 1.b., 1.c., 1.d. or 1.e. above.
- (b) Extent of occurrence estimated to be less than 7,700 square miles or area of occupancy estimated to be less than 770 square miles, and estimates indicating any two of the following:
- 1. Severely fragmented or known to exist at only a single location.
 - 2. Continuing decline, observed, inferred or projected, in any of the following:
 - a. Extent of occurrence
 - b. Area of occupancy
 - c. Area, extent and/or quality of habitat
 - d. Number of locations or subpopulations
 - e. Number of mature individuals
 - 3. Extreme fluctuations in any of the following:
 - a. Extent of occurrence
 - b. Area of occupancy
 - c. Number of locations or subpopulations
 - d. Number of mature individuals

- (c) Population estimated to number fewer than 10,000 mature individuals and either:
 - 1. An estimated continuing decline of at least 10% within ten years or three generations, whichever is longer; or
 - 2. A continuing decline, observed, projected, or inferred, in numbers of mature individuals and population structure in the form of either:
 - a. Severely fragmented (i.e., no subpopulation estimated to contain more than 1,000 mature individuals).
 - b. All individuals are in a single subpopulation.
 - (d) Population very small or restricted in the form of either of the following:
 - 1. Population estimated to number fewer than 1,000 mature individuals
 - 2. Population is characterized by an acute restriction in its area of occupancy (less than 40 square miles) or in the number of locations (fewer than 5)
 - (e) Quantitative analysis showing the probability of extinction in the wild is at least 10% within 100 years.
- (77) Threatened species — As designated by the Commission, a species, subspecies, or isolated population of a species or subspecies which is facing a very high risk of extinction in the future, as determined by (a), (b), (c), (d) or (e) below:
- (a) Population reduction in the form of either of the following:
 - 1. An observed, estimated, inferred, or suspected reduction of at least 50% over the last ten years or three generations, whichever is longer, based on, and specifying, any of the following:
 - a. Direct observation
 - b. An index of abundance appropriate for the species
 - c. A decline in area of occupancy, extent of occurrence and/or quality of habitat
 - d. Actual or potential levels of exploitation
 - e. The effects of introduced species, hybridization, pathogens, pollutants, competitors or parasites
 - 2. A reduction of at least 50%, projected or suspected to be met within the next ten years or three generations, whichever is longer, based on, and specifying, any of 1.b., 1.c., 1.d. or 1.e. above.
 - (b) Extent of occurrence estimated to be less than 2,000 square miles or area of occupancy estimated to be less than 200 square miles, and estimates indicating any two of the following:
 - 1. Severely fragmented or known to exist at no more than five locations
 - 2. Continuing decline, observed, inferred or projected, in any of the following:
 - a. Extent of occurrence
 - b. Area of occupancy
 - c. Area, extent and/or quality of habitat
 - d. Number of locations or subpopulations
 - e. Number of mature individuals
 - 3. Extreme fluctuations in any of the following:
 - a. Extent of occurrence
 - b. Area of occupancy
 - c. Number of locations or subpopulations
 - d. Number of mature individuals

- (c) Population estimated to number fewer than 2,500 mature individuals and either:
 - 1. An estimated continuing decline of at least 20% within five years or two generations, whichever is longer; or
 - 2. A continuing decline, observed, projected, or inferred, in numbers of mature individuals and population structure in the form of either:
 - a. Severely fragmented (i.e., no subpopulation estimated to contain more than 250 mature individuals)
 - b. All individuals are in a single subpopulation.
- (d) Population estimated to number fewer than 250 mature individuals.
- (e) Quantitative analysis showing the probability of extinction in the wild is at least 20% within 20 years or five generations, whichever is longer.

APPENDIX 3. Summary of the biological status of the gopher tortoise relative to the criteria for listing as a threatened species of Florida.

Criterion/Listing Measure	Data	Criterion Satisfied?	Source	Confidence
A. Population Reduction^a				
≥50% decline over last 99 years OR	60-80% decline	Yes	Inferred	High
≥50% decline over next 99 years	60-65% decline	Yes	Inferred	Moderate
B. Occurrence and Occupancy				
Extent of occurrence <2,000 sq. miles OR	110,000 sq. miles	No	Estimated	High
Area of occupancy <200 sq. miles	>8,000 sq. miles	No	Estimated	High
C. Population Size and Trend^a				
<2,500 mature individuals AND ≥20% decline over next 66 years	684,091 mature individuals	No	Estimated (Table 3)	Moderate
D. Number of Mature Individuals				
<250 individuals	684,091 mature individuals	No	Estimated (Table 3)	Moderate
E. Species' Extinction Probability^a				
20% probability over next 165 years	< 20% probability over next 165 years < 10% probability over next 100 years	No	Extrapolated from Miller (2001)	Moderate

^a Future population reductions and extinction probabilities, and confidence in them, are based on past reductions that occurred during periods of little or no management of gopher tortoise populations. These reductions and probabilities assume the worst-case scenario possible of continued habitat degradation and conversion, and a reduction or cessation of management activities that improve habitat quality or increase population size.