

The listing of the Mojave population of the desert tortoise as threatened provides protective measures of the Act and will provide for an active recovery program for the population. For purposes of regulating commerce and taking of federally listed species, the rule determines the Sonoran population of the desert tortoise found outside its natural range of Arizona (south and east of the Colorado River) and Mexico to be a threatened species due to similarity of appearance to the Mojave tortoises.

**EFFECTIVE DATE:** The effective date of this rule is April 2, 1990.

**ADDRESSES:** The complete file for this rule is available for inspection, by appointment, during normal business hours at the U.S. Fish and Wildlife Service, 1002 NE Holladay Street, Portland, Oregon 97232-4181.

**FOR FURTHER INFORMATION CONTACT:** Mr. Robert Ruesink, Chief, Branch of Endangered Species at the above address (503/231-6131 or FTS 429-6131).

**SUPPLEMENTARY INFORMATION:**

**Background**

The desert tortoise is one of three species in the genus *Gopherus* found in the United States. The Berlandier's tortoise (*G. berlandieri*) is found in northeastern Mexico and southern Texas. The gopher tortoise (*G. polyphemus*) is found in the hot, humid portions of southeastern United States. *G. agassizii* is relatively large, with adults measuring up to 15 inches in shell length and inhabits the Mojave, Colorado, Sonoran, and Sinaloan deserts in the southwestern United States and adjacent Mexico. *G. agassizii* has been referred to in the literature as *Xerobates agassizii* or *Scaptochelys agassizii*.

Recent studies based on shell shape and variations in genetic composition indicate that the species has two distinct populations, the Mojave and Sonoran populations. The Mojave population may be further divided into two subpopulations based on allozyme and mitochondrial DNA analysis. The genetic differences within the Mojave population appear to be more like a cline or gradation from east to west.

The Colorado River has been an effective geographic barrier, separating the Mojave and the Sonoran populations for millions of years. The Mojave population is found to the west and the north of the river and the Sonoran population is found to the east and south. The Mojave population may be further divided into two subpopulations, western and eastern. A low sink that generally runs from Death Valley to the

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**DEPARTMENT OF THE INTERIOR**

**Fish and Wildlife Service**

**50 CFR Part 17**

**RIN 1018-AB35**

**Endangered and Threatened Wildlife and Plants; Determination of Threatened Status for the Mojave Population of the Desert Tortoise**

**AGENCY:** Fish and Wildlife Service, Interior.

**ACTION:** Final rule.

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**SUMMARY:** The U.S. Fish and Wildlife Service (Service) determines the Mojave population of the desert tortoise (*Gopherus agassizii*) to be a threatened species pursuant to the Endangered Species Act of 1973, as amended (Act). The Mojave population covered by this rule includes all tortoises north and west of the Colorado River in California, southern Nevada, southwestern Utah, and northwestern Arizona. Construction projects such as roads, housing developments, energy developments and conversion of native habitats to agriculture have destroyed habitat supporting tortoises in the Mojave population. Grazing and off-road-vehicle use have degraded additional habitat. The continued existence of the Mojave population also is threatened by illegal collection, an upper respiratory disease, excessive predation of juvenile tortoises by common ravens, and other factors.

south may be used to separate the western and eastern subpopulations. The western Mojave subpopulation includes tortoises occurring within the western Mojave Desert, west of this sink. The eastern Mojave subpopulation includes tortoises in eastern California (Mojave and Colorado Deserts), southern Nevada, northwestern Arizona, and Utah. The northeastern corner of the population's range is sometimes referred to as the Beaver Dam Slope subpopulation. In 1980 the Beaver Dam Slope subpopulation was listed as threatened in Utah. However, the Beaver Dam Slope subpopulation also encompasses tortoises in parts of Nevada and Arizona that were not listed. This rule treats the entire Beaver Dam Slope subpopulation as part of the Mojave population of the desert tortoise. Tortoises occur in creosote bush (*Larrea tridentata*), cactus and shadscale (*Atriplex confertifolia*) scrub habitats, and Joshua tree (*Yucca brevifolia*) woodlands (Dodd 1986).

The Desert Tortoise species is long-lived with a relatively slow rate of reproduction. Animals do not reach sexual maturity until they are 10 to 15 years old. Tortoise populations are probably dependent on relatively rare years of sufficient and timely precipitation to produce sufficient forage for reproduction and survival. This life history makes a species susceptible to environmental perturbations that may affect recruitment of young animals into the population, or survival of breeding adults before replacement.

Analysis of study plot data from sites in the western Mojave Desert indicate that subpopulations (both adults and especially juveniles) have declined over the last decade. Vandalism, collecting, raven predation, and disease are a few of the many factors that are implicated in population declines. Habitat conditions have deteriorated and/or habitat has been lost in certain localities resulting from urban, energy, and mineral development; conversion of native habitats to agriculture ("ag-land conversion"); vehicle-oriented recreation; livestock grazing; military activities; and other uses. Luckenbach (1982) concluded that human activity is the most significant cause of tortoise mortality.

The eastern Mojave subpopulation includes tortoises in the Mojave Desert in eastern California, southern Nevada, extreme northwestern Arizona (north of the Grand Canyon) and the Beaver Dam Slope and the Virgin River Basin of southwestern Utah. The Beaver Dam Slope subpopulation of the Mojave population of desert tortoises was listed

in Utah as threatened with critical habitat on August 20, 1980 (45 FR 55654). Eastern Mojave tortoises occur in creosote bush-burro bush (*Ambrosia dumosa*) or creosote bush-Joshua tree vegetation types. Analyses of data suggest that there has been a notable decline in population numbers at the northeast end of the range in Utah and extreme northern Arizona in the Beaver Dam slope subpopulation. The rest of the eastern Mojave population shows a decline in juveniles, but data are insufficient to indicate a clear trend in overall numbers. Urban development, long-term livestock grazing, mining, off-road vehicle use, collecting, military activities, and many other human-related uses continue to adversely affect tortoises in the eastern Mojave.

Land that supports the Mojave population of the desert tortoise is owned by a wide variety of agencies and individuals. About half of the land is owned by the Bureau of Land Management. Other Federal holdings include military installations such as Fort Irwin, Edwards Air Force Base, Twenty-nine Palms Marine Corps Training Facility, Chocolate Mountains Gunnery Range and China Lakes Naval Weapons Station. Tortoises are also found on lands managed by Indian tribes. About two-thirds of the habitat is federally owned. The State governments own small amounts of land supporting the tortoise. Private parties also own large amounts of habitat, particularly near the growing urban centers. In several portions of the Mojave Desert alternating sections are owned by private parties and the Bureau.

The distribution of Sonoran population includes Arizona (south and east of the Colorado River) and Mexico. Tortoises in this area are found predominately on steep, rocky slopes of mountain ranges or sloping foothills, primarily in Arizona upland vegetation dominated by palo verde (*Cercidium floridum*) and saguaro cactus (*Carnegiea gigantea*). The distribution of the present population and habitat is patchy and disjunct. Some habitat has been lost from expansion of urban areas, grazing, mining, and fire. Tortoises occupy thornscrub habitats in Sonora and northern Sinaloa, Mexico where they apparently may not dig burrows. Virtually no information exists on distribution and abundance in this habitat type.

The Service received a petition on September 14, 1984, from the Environmental Defense Fund, Natural Resources Defense Council and Defenders of Wildlife to list the desert tortoise in Arizona, California, and

Nevada as endangered under the Act. The Service determined in September 1985 that the proposed listing of the tortoise within the three petitioned States was warranted but precluded by other listing actions of higher priority under authority of section 4(b)(3)(B)(iii) of the Act. Annual findings of warranted but precluded have been made in each subsequent year since 1985 under authority of section 4(b)(3)(C) of the Act.

Data collected on the Mojave population within the last year indicate that many local tortoise subpopulations throughout the range of the population have declined precipitously. The apparent distribution of Upper Respiratory Disease Syndrome (URDS), not identified before 1987 in wild tortoises, has suggested the possibility of an epizootic condition and thus may be a significant contributing factor to the current high level of tortoise losses documented from certain localities.

On May 31, 1989, the same three environmental organizations which petitioned the Service in 1984 provided substantial new information and petitioned the Service to list the desert tortoise as an endangered species throughout its range in the United States under the expedited emergency provisions of the Act. This second petition, treated by the Service as a petition under the Administrative Procedure Act, was received on June 2, 1989. In response to this petition, the Service conducted an extensive review of existing information on URDS, evidence of osteomalacia and osteoporosis, and the current status of the tortoise.

As a result of this and other information, the Service determined the Mojave population of the desert tortoise to be an endangered species under an emergency rule issued on August 4, 1989. The Service did not take emergency action to reclassify the Beaver Dam Slope subpopulation in Utah to endangered because it was already protected by the Act. The emergency rule ceases to have force and effect on April 2, 1990. See 16 U.S.C. 1533(b)(7). On October 13, 1989, the Service published a proposed rule (54 FR 42270) to list the Mojave population of the desert tortoise as endangered. As a result of this proposed rule, a public comment period was opened, and three public hearings were held. See Summary of Comments and Recommendations below.

Because the emergency rule expires on April 2, 1990, it is necessary that this rule be effective upon publication to provide for continued protection under the Act. A lapse in protection for the

Mojave desert tortoise population could result in irrevocable harm to the population if urban construction projects and other activities resume resulting in take of tortoises and destruction of habitat. If protection were to lapse, serious law enforcement problems would arise because the Government would have to prove that allegedly unlawful takings did not occur during the period of the lapse. Accordingly, the Service finds that good cause exists for this rule to take effect immediately upon publication.

This rule constitutes the Service's final action on the above petitions to list the desert tortoise, regarding the petitions' application to the Mojave population of the tortoise in the United States (north and west of the Colorado River). The Service will continue to evaluate the status of the Sonoran population (tortoises located south and east of the Colorado River), and in settlement of litigation, has agreed that on or before January 15, 1991, it will determine either that a proposal to list the Sonoran population of desert tortoises as an endangered or threatened species is warranted, as provided in Section 4(b)(3)(B)(ii) of the Act, 16 U.S.C. 1533(b)(3)(B)(ii), or that such action is not warranted, as provided in Section 4(b)(3)(B)(i) of the Act, 16 U.S.C. 1533(b)(3)(B)(i).

#### Summary of Comments and Recommendations

In the October 13, 1989, proposed rule and associated notifications, all interested parties were requested to submit factual reports or information that might contribute to the development of a final decision on listing. Appropriate State agencies, county and city governments, Federal agencies, scientific organizations, and other interested parties were contacted and requested to comment. A newspaper notice was published in the Bakersfield Californian (November 3, 1989), Barstow Desert Dispatch (November 3, 1989), Lake Powell Chronicle (November 3, 1989), Las Vegas Review-Journal (November 3, 1989), Las Vegas Sun (November 3, 1989), Lincoln County Record (November 9, 1989), Palm Springs Desert Sun (November 3, 1989), Palo Verde Valley Times (November 3, 1989), Ridgecrest Daily Independent (November 3, 1989), Riverside Press-Enterprise (November 3, 1989), St. George Daily Spectrum (November 3, 1989), and San Bernardino Sun (November 3, 1989), all of which invited general public comment and gave notice of public hearings. Public hearings were conducted in Riverside, California on November 20, 1989; Las Vegas, Nevada

on November 28, 1989; and St. George, Utah on November 29, 1989. A total of 133 individuals provided oral and/or written comments at the hearings. An extension of the comment period to January 19, 1990, was published on December 15, 1989 (54 FR 51432) and corrected on January 12, 1990 (55 FR 1230).

During the comment period, totaling 98 days, 1,909 written and oral comments on listing were received. Of the 1,882 comments that stated a position on listing, 1,072 (57 percent) supported listing, 205 (11 percent) supported listing for part of the population's range, and 608 (32 percent) opposed listing; 27 comments stated no position. These comments are summarized below.

Support for the listing proposal was expressed by California Department of Fish and Game, Arizona Game and Fish Department, and Utah Division of Wildlife Resources. Nevada Department of Wildlife supported listing the desert tortoise as threatened. The Bureau of Land Management (Bureau), U.S. Air Force, California Department of Parks and Recreation, Mexico's Fauna Silvestre, 51 conservation organizations (or branches thereof), and 1,013 other interested parties also supported listing.

Opposition to the listing proposal was expressed by Utah Division of Lands and Forestry, California Off-Highway Motor Vehicle Recreation Commission, Five-county Association of Governments (southwest Utah), Washington County in Utah, 25 organizations, and 576 other interested parties. Comments questioning or opposing the listing also were submitted by Clark County, Nevada; Utah Office of Planning and Budget; Utah Division of Agriculture; City of St. George; and Bureau of Reclamation.

Analysis of written comments and oral statements obtained during the comment period and the public hearings is combined in the following summary. All issues raised by those presenting comments, including opposing comments and other comments questioning the rule, can be placed in a number of general groups depending on content. These categories of comment, and the Service's response to each, are listed below.

*Comment 1:* The Service lacks sufficient biological information needed to make a determination on the appropriateness of listing the tortoise.

*Service response:* The Service believes that sufficient biological information exists upon which to make a determination on the appropriateness of listing for the Mojave population of the

desert tortoise based upon long-term biological studies primarily conducted by the Bureau. The Mojave population of the desert tortoise is threatened by loss and degradation of habitat due to construction activities (roads, pipelines, powerlines, housing developments, energy developments, etc), mining activities, grazing, and off-road-vehicle use. An upper respiratory disease has been identified in many areas (see Factor C in the "Summary of Factors Affecting the Species"). In localized areas, predation of juvenile tortoises by ravens has greatly reduced recruitment into the adult population (Berry 1989 pers. comm.). Factors adversely affecting the long term survival of the Mojave population of the desert tortoise are documented under the section entitled "Summary of Factors Affecting the Species".

*Comment 2:* The Service should determine precisely why the tortoise is declining prior to its listing.

*Service response:* The Act requires the Service to make determinations on the appropriateness of listing based upon the best biological information available. The Service is not required to know the exact extent to which many factors may affect a species. In the case of the Mojave population of the tortoise many factors apparently act cumulatively to threaten its continued existence; and no one threat alone appears sufficient to cause the trends that have been noted. Although the extent of each adverse activity or disease on the overall population is not precisely known, available data indicate a decline in numbers in portions of the population's range. For the Service to not proceed with the information now available would not be in keeping with the mandates of the Act.

*Comment 3:* Data demonstrating a decline in desert tortoise populations are flawed because of sampling techniques and data analyses.

*Service response:* The Service is aware that there are assumptions and possible flaws in the design and implementation of desert tortoise transects and permanent plots to monitor population distribution and numbers. For example, different sampling methods and variable research efforts were used. In analyzing the available data on the desert tortoise, the Service has considered these assumptions and possible flaws as well as various ways to interpret analysis of data. However, the Service concludes that the data are sufficient to indicate a downward trend in tortoise populations (both adults and juveniles) in the western and northeastern Mojave

Desert; juvenile tortoise numbers show a decline at some locations in the eastern Mojave Desert.

*Comment 4:* The Service should conduct more research prior to listing the tortoise.

*Service response:* After a thorough review of the status information the Service concluded that sufficient biological information existed to support threatened status for the Mojave population of the tortoise to be threatened. As with most listed species, the Service recognizes additional research will be an integral part of the future management for the desert tortoise.

*Comment 5:* The desert tortoise is widespread and therefore not endangered.

*Service response:* A widespread species may be listed as endangered or threatened if one or more of the five listing criteria, given below, threatens the species with extinction throughout all or a significant portion of its range. The Mojave population of the desert tortoise is threatened by habitat loss from construction activities (highways, energy developments, urbanization, mining, etc.) and degradation (grazing and off-road-vehicles). URDS has been identified in many areas of the Mojave Desert. Predation of juvenile tortoises by ravens has reduced recruitment in localized parts of the Mojave Desert. Thus, even though the Mojave population of the desert tortoise is widespread, it is threatened by one or more factors throughout most of its range.

*Comment 6:* Because an estimated 500,000 to 2,000,000 desert tortoises exist in the wild and 100,000 in captivity, the tortoise cannot be endangered.

*Service response:* As mentioned above, the Service makes listing determinations based upon the best biological information available. Any one or all of the five listing factors may be sufficient to list a species as either threatened or endangered if that species meets one of the definitions under the Act. Numbers of animals alone cannot be used to determine whether listing is appropriate. The Service finds that, in addition to documented tortoise declines in many portions of the Mojave Desert, there are a variety of limiting factors and threats that have affected and continue to affect tortoises in the Mojave Desert.

*Comment 7:* There are no data to show that livestock grazing has a direct impact on the desert tortoise.

*Service response:* Grazing by livestock has occurred on most if not all of the Mojave Desert within the range of the desert tortoise. Damage caused by

grazing livestock includes destruction of tortoise burrows and reduction of shrub cover which are needed by tortoises for thermoregulation and for protection from predators. The desert tortoise is an herbivore and has evolved within an ecosystem containing a variety of forbs and perennial grasses native to the Mojave Desert. Livestock grazing has changed the species composition and abundance of herbaceous vegetation in the Mojave Desert through selective livestock grazing pressures and the subsequent introduction and proliferation of non-native annual grasses. Grazing also appears to have reduced the abundance of perennial grasses. In many locations in the Mojave Desert the alien grasses dominate the herbaceous layer. These alien grasses may not meet the nutritional needs of the tortoise, especially during critical periods of growth and reproduction. Additionally, dried non-native annual grasses provide a means for fire to spread over large areas, killing shrubs that are an important component of tortoise habitat. With the development of water sites in recent years throughout the Mojave Desert, livestock now graze more areas of the desert than in historical times. Although much of the information regarding the effects of livestock grazing on the desert tortoise is based on indirect evidence, this increased area of impact, change in vegetation composition, increase in fire frequency, and loss or reduction of shrubs for cover and thermoregulation indicate that grazing may adversely affect the desert tortoise.

*Comment 8:* Livestock grazing may be beneficial to desert tortoises. Data indicate that when livestock numbers were greater, tortoise numbers were greater. Now that livestock numbers have been reduced, tortoise numbers have declined.

*Service response:* Whereas a rough correlation over time between numbers of tortoises and numbers of livestock may exist, there is no quantitative data to demonstrate a beneficial cause-and-effect relationship between livestock and tortoises. Substantial evidence shows that livestock grazing has altered the habitat of the desert tortoise. This information has been discussed under the previous comment and under factor A in the Summary of Factors Affecting the Species. Although the amount of livestock grazing in the Mojave Desert has been reduced in recent years, much of the Mojave Desert is still in only a fair or poor ecological condition. The full recovery of desert shrubs, forbs, and perennial grasses from past overgrazing practices to their ecological potential likely requires several decades. Tortoise

populations likely will respond to the improved habitat conditions very slowly, because of their low reproductive and recruitment potential.

*Comment 9:* There is no evidence that off-highway vehicle activities have resulted in a population decline of desert tortoises.

*Service response:* The results of off-highway vehicle studies demonstrate that operation of off-highway vehicles has a negative effect on reptiles, mammals, and birds in creosote shrub and desert wash habitats (NERC 1990). These are habitats of the desert tortoise in the Mojave Desert. Impacts include loss of the vegetation required by tortoises for forage and cover, collapse of tortoise burrows, soil compaction which reduces surface water penetration and seed germination, and crushing tortoises. Quantifiable reductions in tortoise numbers have been documented through field research (NERC 1990). Several decades may be needed for these disturbed areas to recover.

*Comment 10:* Predation is the most serious threat to the desert tortoise.

*Service response:* Common raven (*Corvus corax*) populations in the Mojave Desert have greatly increased with expanding human use and occupation of the desert. Ravens utilize sewage ponds, landfills, litter, and road kills as forage, and powerlines and fence posts for nest and roost sites. Whereas the potential exists that raven predation of young tortoises may increase as the raven population grows, specific birds are currently believed to be responsible for most of the predation of juvenile tortoises.

*Comment 11:* The desert tortoise should not be listed as endangered or threatened because many of the factors that adversely affect it are beyond human control. These factors include long-term drought, disease, and predation.

*Service response:* The Act requires the Service to list a species as endangered or threatened based upon an evaluation of threats. The Act does not distinguish between human-induced and natural threats. Hence, if there existed a natural threat to the continued existence of a species, listing would be appropriate even if humans could do nothing to minimize the threat. In the case of the tortoise, natural weather patterns do create conditions that threaten the tortoise. However, grazing, off-road-vehicle use, and other land uses exacerbate the adverse effects of unfavorable weather patterns. Predation on tortoises by ravens is natural, although some evidence suggests that

raven populations have increased in response to human use of the desert. Where grazing animals or off-road-vehicle use have reduced vegetative cover, tortoises are more vulnerable to predation due to a loss of cover sites. Moreover, environmental stress brought on by human use of the desert may make tortoises more susceptible to disease.

*Comment 12:* Supplemental feeding and watering should be used to alleviate some of the threats facing the tortoise.

*Service response:* Although supplemental efforts such as feeding and watering wild tortoises have been suggested, these efforts have only localized benefits at best, and may not provide the nutritional requirements of the tortoise. Nor is it known if such actions contribute toward the recovery of the species. Such effects would be considered only as a necessary means to support the long-term conservation of the species.

*Comment 13:* Listing the desert tortoise will adversely affect private property values and will restrict the use of private land. Executive Order 12630 directs the Service to conduct a Takings Implication Assessment.

*Service response:* The listing of the Mojave population may or may not affect land values. The Act requires the Service to make listing determinations based on the best biological information available. Economic considerations may not be used in listing determinations. The tortoise will be protected from take wherever it occurs. Section 10(a) of the Act offers to private parties a permit process for the take of listed species incidental to other legal activities. The Service will advise private land owners regarding this process. The Service will be preparing a Takings Implication Assessment regarding this listing.

*Comment 14:* Listing the desert tortoise will result in the closing of or restricting access to public lands.

*Service response:* The listing of the desert tortoise by emergency rule in August 1989 has resulted in few restrictions in the use of public land. Tortoise management may require modifications in the use of public lands. Such management plans require Federal agencies to consult with the Service pursuant to section 7 of the Act. Through the section 7 consultation process, the Service has issued biological opinions that include recommendations that generally offer reasonable conservation recommendations for the benefit of the desert tortoise. Listing the desert tortoise as a threatened population may result in better management of the ecosystem upon which the tortoise depends. It is conceivable that a Federal

agency may, through ecosystem management for the desert tortoise, limit the type or amount of access to an area or areas deemed to be important to the recovery of the tortoise.

*Comment 15:* Existing regulations to protect the desert tortoise are adequate. The state laws providing protection from take, the Bureau's Rangewide Management Plan, and National Environmental Policy Act provide the same protection that listing under the Endangered Species Act would provide.

*Service response:* The tortoise has been protected by State law or regulation from collecting in the States of California, Arizona, Utah, and Nevada. Despite this protection, collection of tortoises from the wild has continued. State regulations generally do not apply to habitat modification, which is a serious long-term threat to the tortoise. In June 1989, the California Fish and Game Commission adopted a regulation listing the desert tortoise as a threatened species. This action offers limited opportunities for protection of habitat. Arizona, Nevada, and Utah lack provisions to protect tortoise habitat. The majority of the desert tortoise's habitat is located on Federal lands. Management decisions by Federal agencies that would benefit the tortoise or include effective mitigation were optional or a matter of policy prior to Federal listing of the tortoise. Since the emergency listing of the desert tortoise on August 4, 1989, the tortoise has received protection afforded by the Act. Many provisions of the Act including the requirements for Federal agencies to consult under Section 7, and the prohibitions against take described in Section 9 are discussed later in this rule.

If implemented, the Bureau's Rangewide Plan may result in the reversal of some downward trends; however, it likely will be several years before any positive change is observed. Moreover, approximately 50 percent of the land supporting tortoises is not managed by the Bureau, and hence, even if fully implemented, this Rangewide Plan may not provide sufficient improvement in tortoise habitat to preclude the need to federally list the population. Federal listing mandates the Bureau and other Federal agencies to perform certain actions for the tortoise.

Some commenters suggested that the National Environmental Policy Act and California Environmental Quality Act provide sufficient protection for the tortoise. The National Environmental Policy Act requires Federal agencies to fully disclose impacts that would result from their proposed actions, and requires findings be made regarding the

significance of those impacts. It does not require that resources be protected. Similarly, the California Environmental Quality Act requires state and local agencies to fully disclose impacts that would result from their proposed actions. In some cases these acts may be used to obtain mitigation for an impact, but neither act provides for the protection of the desert tortoise.

*Comment 16:* Several commenters expressed concerns related to mitigation for impacts to the tortoise resulting from projects. These concerns were as follows: the listing could prevent mitigation that is beneficial to the tortoise; the Service should develop mitigation guidelines for projects prior to listing; the Service should prepare a Habitat Conservation Plan for the tortoise to streamline development and provide mitigation for the tortoise.

*Service response:* Listing of the tortoise will not hamper any action that in the judgment of the Service is of benefit to the tortoise. Mitigation or compensation for impacts to the tortoise resulting from projects may be formalized by following the procedures set forth at section 7 or section 10(a) of the Act. Through section 7 of the Act, the Service will work with other Federal agencies to ensure that measures are incorporated into projects so that adequate protection of tortoises and their habitat is provided. Section 10(a) of the Act provides a means for private parties to obtain permits to take tortoises incidental to otherwise legal activities provided that several conditions are met. It is the responsibility of the applicant (City, County or State government, or private party) to prepare a conservation plan. The Service is willing to advise individuals and governments in the preparation of such conservation plans and Section 10(a) permit applications. The Service works with other Federal agencies and private parties to obtain needed compensation for listed species. In time, guidelines can be developed.

*Comment 17:* Critical habitat should be designated in the final rule.

*Service response:* The Act requires that, to the maximum extent prudent and determinable, the Secretary designate critical habitat at the time a species is determined to be endangered or threatened. The Service finds that critical habitat is not presently determinable because the biological needs of the species are not sufficiently well known to permit identification of an area as critical habitat. Much of the habitat of the desert tortoise has been fragmented and degraded by a number of land-disturbing activities. Some

remaining areas of good habitat are isolated from each other or are of small size. The specific size and spatial configuration of these essential habitats, as well as vital linkages connecting areas necessary for ensuring the conservation of the Mojave desert population throughout its range, cannot be determined at this time.

*Comment 18:* The Service should change the boundaries of the critical habitat on the Beaver Dam Slope, Utah in the final rule.

*Service response:* The Service will continue to evaluate the existing critical habitat boundaries on the Beaver Dam Slope. Should the Service determine that a change is appropriate, a proposal would be published in the **Federal Register**. The Service would evaluate public comments on such a proposal prior to making a determination on the appropriateness of changing critical habitat boundaries.

*Comment 19:* The Service should prepare a recovery plan for the tortoise rather than a listing document.

*Service response:* Listing a species or population as endangered or threatened provides for several actions that promote the conservation of the species. The preparation of a recovery plan is one of these actions and is required under the Act. Recovery plans set forth a series of tasks that will assist in the improvement in the species condition. Listing provides for funding opportunities to implement some recovery actions. Although the Service does participate in actions to improve the status of species prior to listing, the bulk of this work is done following listing. Consequently, it is the listing of the tortoise that precipitates preparation of a recovery plan.

*Comment 20:* A recovery plan should be finalized within one year of listing the desert tortoise.

*Service response:* The Service intends to pursue development of a recovery plan as soon as possible. Given the time required to prepare a recovery plan for a wide-ranging species subjected to a variety of threats, and the public as well as agency review process that all recovery plans must follow, it is unlikely that a recovery plan for the desert tortoise will be final within one year.

*Comment 21:* Desert tortoises in the Las Vegas Valley should be excluded from Federal listing because the listing would cause economic hardship. In addition, tortoise densities, numbers, and size of habitat available suggest that maintenance of a long-term viable tortoise population in the Las Vegas Valley is unlikely.

*Service response:* A species shall be listed if the Secretary determines, on the

basis of the best scientific and commercial data available, that the species is endangered or threatened because of threats to its continued existence. Economic considerations cannot be used in listing determinations. Furthermore, listing of a species is not predicated on the species' ability to recover. While the maintenance of a long-term viable population of the desert tortoise in the Las Vegas Valley may be unlikely, this information actually points in favor of listing rather than against listing.

*Comment 22:* With the Service's petition findings in 1985, 1987, and 1988; publication of the emergency rule; and additional information to show further tortoise declines, the Service is required to publish a final rule to list the desert tortoise.

*Service response:* Following publication of a proposed rule, the Service has the option of publishing a final rule to list a species as endangered or threatened, withdrawing the proposed rule, or delaying the final decision. After review of all public comments and consideration of the best biological information available, the Service is publishing a final rule to list the Mojave population of the desert tortoise as threatened.

*Comment 23:* The Sonoran population suffers from the same threats as does the Mojave population. The Service should, therefore, list the Sonoran population as well as the Mojave population.

*Service response:* The Service, in settlement of litigation, has agreed that on or before January 15, 1991, it will determine either that a proposal to list the Sonoran population of desert tortoises as an endangered or threatened species is warranted, as provided in section 4(b)(3)(B)(ii) of the Act, 16 U.S.C. 1533(b)(3)(B)(ii), or that such action is not warranted, as provided in section 4(b)(3)(B)(i) of the Act, 16 U.S.C. 1533(b)(3)(B)(i).

*Comment 24:* Captive animals should be released to augment declining wild populations.

*Service response:* As discussed under Factor C in the Summary of Factors Affecting the Species, the release of captive animals may harm the recipient population by introducing disease. In addition, released captive animals rarely survive.

#### **Summary of Factors Affecting the Species**

The Service received no data or information indicating that the status of the Mojave population of the desert tortoise is far healthier than previously thought, or that large blocks of

appropriate or undisturbed habitat can be found within the range of the population in California, Nevada, Utah, and Arizona. No data were presented contradicting the effects of habitat conversion activities (e.g., urban development, mining, military activities, waste disposal sites, energy development, and road construction), habitat modification activities (e.g., off-highway vehicle activities, utility corridors, grazing, changes in land use designations), predation, Upper Respiratory Disease Syndrome, collecting, or vandalism on tortoises.

After a thorough review and consideration of all information available, the Service has determined that the Mojave population of the desert tortoise (*Gopherus agassizii*) should be classified as a threatened species. Procedures found in section 4(a)(1) of the Act (16 U.S.C. 1531 *et seq.*) and regulations (50 CFR part 424) promulgated to implement the listing provisions of the Act were followed. A species may be determined to be an endangered or threatened species due to one or more of the five factors described in section 4(a)(1). The Act defines species to include subspecies and any distinct population segment of any species of vertebrate fish or wildlife that interbreeds when mature. These factors and their application to the Mojave population of the desert tortoise (*Gopherus agassizii*) are as follows:

A. *The present or threatened destruction, modification, or curtailment of its habitat or range.* As indicated above, habitat is deteriorating and has been lost in many parts of the tortoise's range due to an accelerating rate of human uses of the desert. Loss of habitat from a variety of human land uses has occurred throughout the Mojave Desert and is particularly acute all over the western Mojave, the Las Vegas area, and the St. George area in Utah. Urbanization in the western Mojave has grown significantly in recent years, especially near the communities of Lancaster, Palmdale, Victorville, Ridgecrest, and Barstow, which are some of the rapidly urbanizing areas. Based on the recent past and projected into the future, these communities will continue to grow together, having a profound impact on the wildlife species of the western Mojave where the tortoise population once was considered quite extensive. Other permanent human land uses that have an adverse impact on tortoises and their habitat include ag-land conversion, construction of roads, some military activities, energy and mineral development, waste disposal areas and other land uses.

The metropolitan Las Vegas, Nevada, area has experienced rapid expansion in recent years, climbing from 241,000 people in 1980 to 335,000 in 1987, an increase of 28 percent (Walker and Cowperthwaite 1988). In the four years between 1982 and 1986, 10,000 acres of desert (largely tortoise habitat) were converted to urban uses (Clark County Department of Comprehensive Planning, pers. comm. 1989). City and county planners assume the ultimate limits of growth are set at the effective topographic limits of construction; planning maps indicate that the metropolitan area could eventually cover approximately 390 square miles (Clark County Regional Flood Control District 1986).

Areas of unrestricted vehicle use in tortoise habitat results in cumulative adverse impacts. Impacts vary from minor habitat alteration and vehicle route proliferation to total denudation of extensive areas created by intensive vehicle play, parking, and camping. Concentrated vehicle play may eliminate all but the most hardy shrubs. Other impacts include soil compaction and erosion. Tortoises suffer loss of forage, vegetative cover, and burrow sites and then become subject to increased mortality from crushing, collecting, and vandalism (Sievers *et al.* 1988).

Adams *et al.* (1982a) examined aerial photographs of the Mojave Desert and reported the following impacts to 10 million hectares (25,500,000 acres): 495 ha (1,287 ac) were highly compacted at pit areas (camping areas with high usage), 2,406 ha (6,256 ac) had heavy use on hills, and 16,391 ha (42,617 ac) had frequent trails on mostly level land. The areas of intensive use totalled about 194 square kilometers (75 square miles) in size and composed less than one percent of all desert lands in California. Light and moderate use areas could not be fully assessed (Adams *et al.*, 1982b). However, off-highway vehicle (OHV) use areas extend significantly beyond the tracks that are created, as noted in a study by Nicholson (1978). Thus, well-used OHV areas may result in areas of depressed tortoise populations extending beyond the immediate boundaries of the directly disturbed habitat itself.

Biosystems Analysis, Inc. (1990) indicated that 2.2 million motorcycles are registered in southern California, and these are primarily used for off-highway recreation. They also note that recreational use of the desert has increased from 5 million visitor use-days in 1977 to about 15 million by 1980. There is no doubt that this use has

increased even more in the ten years since 1980.

The increasing use of OHVs appears to be having a significant effect on tortoise abundance and distribution. Direct mortality may result through crushing of tortoises either above ground or in their burrows. Bury and Luckenbach (1986) documented sublethal effects of OHV activity when they noted that tortoises on sites not used by OHVs weighed more than similarly sized animals in a vehicle use area. This indicates that stress may be caused by disruptions of the tortoise's behavior patterns and reductions in forage in areas of low to moderate OHV use.

Vehicle route proliferation has occurred in many areas and can result in a significant cumulative loss of habitat. Human access increases the incidence of tortoise mortality from collecting, gunshot, and crushing by vehicles. Soil compaction results in loss of vegetation and increases in erosion (Sievers *et al.*, 1988).

Road construction and vehicle use appear to have a long-ranging impact on the tortoise. Besides the immediate loss of tortoise habitat from road construction, paved roads and vehicular traffic affect tortoise populations within about one kilometer (km) (0.62 mile) of a road. For new roads, the extent of impact is up to 0.4 km (0.29 mile) away, whereas older roads may reduce tortoise numbers up to 2 km (1.24 mile) away (Nicholson 1978).

Large surface disturbances (e.g., power plants, mining, agricultural developments, military activities, and urbanization) cause long-term, permanent loss of habitat. Both large and small developmental activities often induce further surface disturbing activities with resulting habitat loss and tortoise population reduction (Berry *et al.*, 1984).

The tortoise must consume its forage requirement during their active period of six weeks to five months out of the year (March to June, and September). If forage has not been produced or is of poor nutritive quality during this period, the opportunity for the tortoise to meet its nutritional needs cannot be met until the next year. Therefore, tortoise populations are highly dependent upon productive native plant communities and may be susceptible to increased mortality during poor years.

Changes in perennial vegetation, including alteration of species composition and reduction in cover of shrubs and perennial grasses, are believed to be the result of long-term livestock grazing. These losses of plant

cover, including the creation of openings and barren areas, are believed to result in an overall deterioration of habitat quality. Direct evidence that altered shrub composition has adversely affected the tortoise's ability to meet its nutritional requirements is largely lacking. However, the loss of cover can result in increased exposure to predators and decreased opportunities to use the shade of shrubs for thermoregulation.

Changes in annual vegetation, also thought to be mostly connected to grazing, have affected food supplies for tortoises. Native annual forbs and perennial grasses may be essential in meeting the nutritional needs of the tortoise. Many native species may be unable to compete with non-native annual plant species (Berry 1988). Non-native plant species such as red brome (*Bromus rubens*), filaree (*Erodium cicutarium*), and split grass (*Schismus arabicus*) have been introduced as result of grazing and have become widely established in the Mojave Desert. These alien plants are often more common than native annual species. Some non-native annuals are adapted to disturbed soils. Abundant large herbivores can alter crusts that are normally found on many desert soils and disrupt normal germination of native species.

Unlike most of the native annual plants, these introduced grasses remain in place after curing (drying) and create a fuel source sufficient to carry fire across a large area. Desert shrubs are not fire-adapted; therefore, once a large area has been burned, the shrubs are killed. Because of its slow growth, the shrub component of the desert may take many decades to return to pre-fire conditions. Fire in the Mojave Desert is a recent phenomenon that seriously damages or destroys native perennial shrubs. The reason for the recent occurrence of fire in the desert is credited to the introduction and proliferation of introduced annual grasses. These grasses invade disturbed areas, appear to successfully outcompete native annual vegetation, and eventually dominate the annual biomass production in the area.

The annual grasses, however, have a rapid growth rate and will return and proliferate within a short period following fire or other disturbance. In this scenario reoccurring fires provide an area with little chance of recovery to pre-grazing vegetative conditions. While grazing may reduce the availability of this annual biomass, it also promotes disturbance to these areas thus encouraging the growth of non-native annual grasses. To recreate the native

ecosystem the long-term solution would require restoration and management of these areas for their native floristic composition and biomass. With the development of water sites in recent years throughout the Mojave Desert, livestock now graze more areas than in historical times. This increased area of impact, poor to fair range condition, change in annual vegetation composition, and loss or reduction of shrubs for cover indicate that grazing is more likely detrimental than beneficial to the desert tortoise.

In addition, grazing animals can crush tortoise burrows and nests and trample young tortoises. The degree and nature of impacts from cattle grazing are dependent upon habitat, grazing history, seasons of use, stocking rates, and density of the tortoise population (Sievers *et al.*, 1988).

Livestock grazing may be a factor contributing to tortoise habitat degradation throughout the range of the Mojave population. However, formal research has been unable to indicate conclusively that livestock grazing adversely affects tortoises. Desert ecosystems require decades to recover from habitat disturbances, and tortoises are slow to react to alterations, both positive and negative, of their environment. Additionally, rainfall can vary dramatically over small areas, greatly affecting the outcome of paired observations. Therefore, the experiments needed to determine the effects of grazing on tortoise populations will require very long time frames, perhaps decades, and numerous replicates over wide areas and habitat types. However, both the Final Statement for the Proposed Domestic Livestock Grazing Management Program for the Caliente Area, Nevada, and the Final Environmental Impact Statement for the Clark County, Nevada Grazing Program concluded that conflicts between livestock and desert tortoises would be reduced by grazing reductions and/or livestock removal during portions of the growing season (USDI, Bureau of Land Management 1979; USDI, Bureau of Land Management 1982).

The majority of Utah's Beaver Dam Slope allotment is in the Southern Desert Shallow Hardpan Range Site as identified by the Soil Survey of Washington County (United States Department of Agriculture 1977). The potential vegetation composition for this site is approximately 7 to 15 percent (perennial and annual) grasses, 3 to 5 percent forbs, and 80 to 90 percent shrubs. If the site is in excellent condition, the total yearly production of air-dried perennial vegetation available

as forage for livestock is about 400 pounds per acre in good moisture years and 250 pounds per acre under poor moisture years. These estimates are for livestock and do not necessarily indicate that this forage would also be available to tortoises. The median production of annual plants on the Beaver Dam Slope between 1980 and 1986 was 83 pounds per acre. The mean (average) production of annuals during that time period was 191 pounds per acre with a range of 50 pounds per acre in 1985 to 604 pounds per acre in 1983.

It is possible that the forage requirements of the tortoise may not be met for several decades or longer. The Bureau (1987) stated that 47 percent of the Beaver Dam Slope allotment is considered to be in fair forage condition whereas 53 percent is in poor forage condition. This estimate was based on desirable forage for livestock, and hence tortoises because of the dietary overlap. In 1983, a livestock grazing system was developed for the Beaver Dam Slope which recognized the need to provide a greater amount of forage for tortoises and distribute livestock evenly across their grazing allotments. Even with implementation of these measures in 1983, tortoise numbers continued to decline, and the overall range condition has not improved.

Another important facet of tortoise feeding behavior is food preferences. Like livestock, tortoises prefer some plants over others and will go out of their way to consume them even if the plant is in low abundance. On Beaver Dam Slope, Coombs (1977b) observed that bush muhly (*Muhlenbergia porteri*) probably was sought out more than any other plant even though it was one of the least available. This perennial grass has been greatly reduced in abundance by livestock grazing (Stoddart *et al.* 1975). The second most important plant was red brome, which was also one of the least common plants available to the tortoise. Minden (1980) found that a milk vetch (*Astragalus nuttallianus*) was by far the most commonly consumed plant in his study (59 percent). This annual plant was not mentioned by Coombs (1977). Apparently, the year of Minden's study (1980) was one of above normal rainfall which allowed this annual forb to grow. It is, therefore, believed that the tortoise has food preferences and that total forage production is not a complete measure of nutrient availability.

A few studies and observations suggest that forage availability influences the health and reproductive condition of tortoises. Turner *et al.* (1984) found that during a year of low rainfall and forage production, female

tortoises laid an average of 1.1 clutches in contrast to the previous normal year when an average of 1.6 clutches were produced. Jarchow and May (1989) noted bone abnormalities in tortoises from the Beaver Dam Slope and concluded that malnutrition may be responsible (as cited by NERC 1990). They further concluded that some of the tortoise mortality observed on the Beaver Dam Slope may be the result of malnutrition. Recent observations suggest there are fewer very large tortoises in the Mojave Desert, in general the animals have shorter mean carapace lengths than reported earlier. One possible explanation is that the range condition has deteriorated and no longer provides adequate forage for tortoises.

In northwestern Arizona, the habitat of the Mojave population of tortoises has experienced alteration of plant species composition and density. Examination of livestock use since the 1850s and observation of changes in plant densities and species composition indicate that adequate nutritional forage for tortoises may be lacking because of past overgrazing practices (Hohman and Ohmart 1978).

In this area, additional habitat loss and fragmentation has occurred from mining, off-road vehicle activities, road and powerline construction and maintenance, agricultural development, and commercial, residential, and recreational developments. A current proposal would develop 2,000 acres of tortoise habitat near Littlefield, Arizona, for commercial purposes. Other developments also are planned for this area. Long-term plans call for development of a community of several thousand people in the Littlefield area. Other potential habitat degradation activities include a Bureau proposal for a 2-mile wide utility corridor alternative across the Beaver Dam Slope in Arizona.

Land exchanges indirectly may result in habitat loss and increased fragmentation of populations. Even where tortoise habitat is exchanged by the Bureau for other tortoise habitat, there is an increased likelihood of development, resulting in loss of habitat on the new private holdings (Sievers *et al.*, 1988).

The Bureau recently transferred 3,067 acres of moderate density lands, west of Las Vegas, Nevada to Summa Corporation. The Desert Tortoise Council (Council) estimated that from 300 to 800 tortoises would be displaced by the exchange, and 3,470 acres of crucial tortoise habitat, as defined by the Council, would be lost to private



development (Desert Tortoise Council 1987). Recent legislation directs the Secretary of the Interior (Secretary) to sell 3,700 acres of moderate-to-high density tortoise habitat, 20 miles northeast of Las Vegas, to Clark County. The Secretary also is authorized to offer for sale up to 17,000 additional acres in the same area (Pub. L. 101-67. Apex Project, Nevada Land Transfer and Authorization Act of 1989, July 31, 1989).

**B. Overutilization for commercial, recreational, scientific, or educational purposes.** Desert tortoises have long been a popular pet in the southwest. It is not known to what extent collecting has reduced wild populations. Collection of tortoises on the Beaver Dam Slope has occurred in the past, and although the species is now protected in Utah, some collecting may still occur. On the Beaver Dam Slope in Arizona, heavy collection for the pet trade took place until the 1970s (Coomb 1977). Although prohibited, removal of tortoises from the wild probably continues. The California Department of Fish and Game recently cited an individual for collecting desert tortoises.

Vandalism, including shooting and crushing of tortoises under vehicles, has been documented by the Bureau and is considered a factor in reducing the number of tortoises in their natural habitat. Bureau studies (Sievers *et al.* 1988) in the western Mojave Desert of California on 11 permanent study plots showed 14.3 percent of the carcasses with evidence of gunshot. At one plot, 28.9 percent of the carcasses had evidence of gunshot. Loss of tortoises from vandalism has also been reported in northwest Arizona. Approximately 10 percent of shell remains from a tortoise study plot near Littlefield, Arizona, had gunshot wounds (Charles Pregler, Bureau of Land Management 1989).

**C. Disease or Predation.** Predation of young tortoises by ravens is a local and potentially growing threat to the species. In recent years, raven predation on juvenile desert tortoises has been documented in several locations and tortoises in certain smaller size classes could not be found. Recruitment of young tortoises into the adult population probably has been significantly reduced in these localities. For example, at the Desert Tortoise Natural Area, a protected area of 21,320 acres in the western Mojave Desert in California, tortoise eggs are still being laid and hatched, as shown by the presence of very small tortoises. However, raven predation seems to have severely curtailed the abundance of young tortoises (Bureau of Land Management 1989). Tortoise remains were found

under raven nests or perches at four study plots in the western Mojave Desert and in the Ward Valley and near Goffs in the eastern Mojave, as well. Preliminary indications from a 1989 Bureau-funded tortoise study at the Piute Valley study plot in Nevada include a relatively large number of young tortoise mortalities due to ravens. In 1986, tortoise remains were found around a raven nest and roost site at the Christmas Tree Pass study plot in Nevada (Sid Sloan, Bureau of Land Management, pers. comm. 1989). The carcasses have not been extensively examined in the laboratory and may represent scavenging rather than predation.

Common raven populations in the southwestern deserts have increased significantly since the early 1940s, presumably in response to expanding human use of the desert. Sewage ponds, landfills, power lines, roads, and other uses have increased available foraging, roosting, and nesting opportunities for ravens. The Bureau's Environmental Assessment (Bureau of Land Management 1989) for the Selected Control of the Common Raven to Reduce Desert Tortoise Predation in the Mojave Desert, California, summarizes the annual trend (percent annual change) and the change (percent) of raven numbers in the last 20 years. In the western Mojave Desert, raven populations have increased 1528 percent between 1968 and 1988, at a rate of nearly 15 percent per year. In the Colorado-Sonoran Deserts, raven populations have increased 474 percent in 20 years, at a rate of over 9 percent per year. Whereas all ravens probably do not include tortoises as significant components of their diet, these birds are highly opportunistic in their feeding patterns and concentrate on easily available seasonal food sources such as juvenile tortoises. The overall augmentation in raven numbers increase the likelihood that some ravens will preferentially select young tortoises. Given the adaptiveness and large foraging area of individual ravens, even a few individuals have the potential to significantly reduce the number of young tortoises over large areas.

In addition to common ravens, coyotes (*Canis latrans*) and golden eagles (*Aquila chrysaetos*) have been known to prey on desert tortoises, including adults. While eagles in general do not commonly forage on tortoises, a few pairs in the California desert are known to regularly take tortoises. Their overall impact probably can be significant in scattered localities throughout the desert.

Coyote predation could have significant impacts on tortoise populations because of the animal's wide range and omnivorous nature. Coyote populations have expanded as a result of water developments in the desert, such as irrigation canals and livestock watering areas; these watering sites may allow the coyote to increase its local distribution (Luckenbach 1982). These expansions would potentially extend the area of sympatry between the tortoise and the coyote. Additionally, variability in abundance of the coyote's food base, such as desert cottontails (*Sylvilagus audubonii*) and black-tailed hares (*Lepus californicus*), could result in a shift in prey items and an increased take of tortoises. Tortoises have also been taken by feral and pet dogs, though such instances of this nature are more likely to occur near urbanized areas.

In general, predation on tortoises is known to have significant localized effects, especially when considered synergistically with other stress-causing factors resulting from human-induced environmental changes. Moreover, the predation impacts of particular concern largely result from and magnify human-caused impacts in the desert (i.e., common raven increases attributable to garbage dumps, etc.; dogs as a result of urbanization; and coyote expansion resulting from water developments).

A new, recently identified, upper respiratory disease (URDS) has been observed in a number of widely dispersed groups of tortoises throughout the range of the desert tortoise in the United States. URDS has been known for some time in captive tortoises throughout the world (Fowler 1985), although the exact cause(s) or etiological agent(s) have not been clearly identified. Recent investigations have established that the URDS found in wild desert tortoises in the Mojave desert is clinically similar to that described in captive tortoises (Jacobsen and Gaskin 1990). Researchers have observed this disease in captive groups of other species of tortoises including red-footed tortoises (*Geochelone carbonaria*), leopard tortoises (*G. pardalis*), Indian star tortoises (*G. elegans*), radiated tortoises (*G. radiata*), and gopher tortoises (*Gopherus polyphemus*) (Jacobsen and Gaskin 1990).

Rhinitis, or inflammation of the nasal cavities, with accumulation of a caseous exudate, is the significant feature of URDS. Only chronically ill tortoises have been examined to date, so the signs of the disease in its early stages are not known. Chronically ill animals

show discharge from the nares, which can be intermittent, but can become severe enough to completely occlude the nasal passages. A wet, bubbly nose, with or without mucous, is a common diagnostic sign; however, this sign may not be evident if tortoises "wipe" their noses with their forelimbs, or if the nasal passages are completely blocked. Tortoises in the advanced stages of the disease appear listless with dull skin and recessed eyes indicating a dehydrated condition (Jacobson and Gaskin 1990).

This disease appears to affect primarily the upper respiratory tract (i.e., nasal passages) with minimal effects to the lower respiratory tract (trachea, bronchial tubes, lungs). Antibiotic treatment has not been successful and the duration of illness is unknown (Jacobson and Gaskin 1990), although animals with URDS have survived up to one year. If the disease remission does occur, relapse may occur under stress conditions (Roszkopf 1988).

In captivity, the disease appears to be contagious and may be spread via physical contact between infected and non-infected animals (Roszkopf 1988), although evidence to date remains circumstantial (Jacobson and Gaskin 1990). Adult male tortoises may contact many females in a single breeding season and direct nose contact during courtship activities could spread the pathogen to susceptible tortoises.

The release of captive desert tortoises does not restore these captives to the wild because it is unlikely they will adapt and survive to reproduce. Further, such reintroduction efforts may damage resident tortoise populations from introduction of disease, disruption of their social system, and genetics contamination.

The proximate causative agent(s) of the disease or what ultimately kills the animal is still not known. Recent laboratory investigations have evaluated clinical and anatomic histopathological and microbial findings in a group of URDS and healthy tortoises (Jacobson and Gaskin 1990). These studies implicate two organisms, *Mycoplasma* and *Pasturella testudinis*, each or both of which may be, at least in part, responsible for this disease (Jacobson and Gaskin 1990). Both of these organisms are known to cause chronic upper and lower respiratory tract disease in a variety of domestic mammals and birds. Despite these preliminary indications, Jacobson and Gaskin (1990), caution that additional research (e.g., transmission studies) is essential in determining the significance (if any) of these organisms in the URDS found in desert tortoises.

The significance of these early results is limited due to the fact that the samples of ill tortoises have not included animals in the initial stages of the disease (difficult, if not impossible, to detect in wild tortoises) or in the moribund or final stages of the disease. For example, although no viruses have been identified in any diseased animals, a virus could be involved in the early stages of the disease that would require further viral isolation attempts to adequately detect (Jacobson and Gaskin 1990). They further suggest that the cause is probably multifactorial, involving a number of predisposing factors. Such factors may include introduction of extremely pathogenic organisms into the wild, habitat disturbance and degradation resulting in nutritional and behavioral stress, and subsequent impairment of proper immune function and potential effects of toxicogens (Miller 1985, Ullrey 1986, Nockels 1988).

Recently, it has been suggested that URDS may be widespread and causing significant problems in the western Mojave Desert (Faunawest 1989), although there is some evidence that the disease was present as early as 1977 (Fowler 1977). With the increased awareness generated by this survey, additional reports of URDS have come in from throughout the desert tortoise range. There is, as of yet, no standard criteria for the diagnosis of URDS in wild tortoises.

Signs suggestive of the disease were observed in up to 46 percent of adult tortoises examined during surveys of the Desert Tortoise Natural Area in the western Mojave Desert in southern California in the spring of 1988. In one portion of this range, the infection rate went from 9 percent in a 1988 survey to 52 percent in a 1989 survey. A loss of about 20 percent of the marked tortoise population with disease signs occurred in one year in this plot. While not all populations surveyed have such high mortality rates, these figures demonstrate the potential impact the disease could have on any given population.

In California, signs of the URDS have recently been identified in tortoises from several sites in the western Mojave Desert (Bureau of Land Management 1989). Recent field investigations at the following sites have discovered evidence of URDS: the Desert Tortoise Natural Area (9 percent, 25 percent, 43 percent, and 52 percent incidence of signs at four different locations); Honda properties near the Desert Tortoise Natural Area (4 sick tortoises found); Edwards Air Force Base (2 of 4); Stoddard Valley study plot (8 of 10);

Lucerne Valley study plot (3 of 8); Fremont Peak study plot (possible 2 of 29); and around Lenwood (2 of 13) (Bureau of Land Management 1989).

Evidence of URDS also exists from locations in the eastern Mojave including eastern California (Fenner-Chemehuevi), southern Nevada (east and north of Las Vegas at four locations), and northern Arizona and Utah (Beaver Dam Slope) (Bureau of Land Management 1989).

The potential exists for the URDS to reach epizootic proportions throughout the Mojave population. There appear to be no natural barriers that would prevent transfer of infectious agents from already infected groups of animals to other groups of animals anywhere in the Mojave Desert. The release of diseased captive tortoise may spread the disease faster than the natural movement of tortoises between areas. Our current knowledge of the distribution of the URDS is, at least in part, a function not only of where the disease has become established already but also where field biologists have looked in recent years. More field investigations could yield new locations of tortoises with the URDS.

In their recent study, Jacobson and Gaskin (1990) found elevated levels of mercury in the livers of ill tortoises as compared to the livers of healthy tortoises. While toxic levels and effects of mercury in desert tortoises must still be determined, elevated mercury levels in other species have been associated with altered resistance to infectious diseases and decreased immunocompetence.

Berry and Coffeen (1987) analyzed 100 remains of desert tortoises collected between 1982 and 1986 on the Beaver Dam Slope, Utah. Almost all of the remains were collected from two permanent study plots, Woodbury-Hardy and Beaver Dam Slope. Of the 72 tortoises found on the Woodbury-Hardy plot and one off the plot, 15 (20.6 percent) of the specimens showed thinning of the plastron (lower shell) and/or carapace (upper shell), holes in the bone, or a honeycomb structure. An additional five specimens (6.9 percent) had deformed bones (pelvic girdle) or eroded bones. Another 15 tortoises (20.6 percent) showed no evidence of abnormalities or thinning of bones. The remaining 38 specimens (52 percent) could not be evaluated. Of the 23 tortoises from the Beaver Dam Slope and 5 from nearby, 9 (32.1 percent) showed evidence of thin bones and/or holes on the plastron and/or carapace or honeycombing on the girdles. None

(32.1 percent) had normal bones and an additional nine could not be classified.

In 2,300 tortoise specimens observed in California, Berry found very few cases of bone abnormality, bone disease, and thinning of bones in young individuals. In contrast, young to middle-aged tortoises from Utah were found in substantial numbers with thin bones or bone disease.

A study by Jarchow (1989) indicated that osteoporosis (porous bones) and associated osteomalacia (soft bones) were found in tortoise shells and skeletons on the Beaver Dam Slope. These lesions could be nutritional in origin.

*D. The inadequacy of existing regulatory mechanisms.* All four States that the Mojave tortoise inhabits have laws that provide varying levels of protection for individual desert tortoises. However, even with these State protective measures, collection of tortoises has continued.

State of Nevada laws afford limited protection to the desert tortoise. Section 501.110.1(d) of the Nevada Revised Statutes (NRS) sets forth that reptiles must be classified as either protected or unprotected. NRS section 501.110.2 states that protected wildlife may be further classified as either sensitive, threatened, or endangered. Section 503.080.1(a) of the Nevada Administrative Code classifies the desert tortoise as protected and rare outside the urban areas of Clark County (Las Vegas). NRS Section 503.597 states that it is unlawful to transport a desert tortoise within the State or across State lines, without the written consent of the Nevada Department of Wildlife. Nevada does not have any laws that regulate the degradation of tortoise habitat.

The California Fish and Game Commission adopted a regulation change on June 22, 1989, to amend the California Code of Regulations, § 670.5(b)(4) of title 14, to add the desert tortoise as a State threatened species. Under the Fish and Game Code, article 3, section 2080 prohibits the import or export of endangered or threatened species. This section also indicates that no person shall take, possess, purchase, or sell within the State, any listed species, or any part or product thereof, except as otherwise provided in State law or regulation. California law does allow the lawful possession of tortoises that are hatched in captivity or that were previously captives. Owners of such tortoises are required to obtain a license from the California Department of Fish and Game for these animals.

The California Fish and Game Code, article 4, section 2090 requires that each State agency shall consult with the

California Department of Fish and Game to ensure that any action authorized, funded, or carried out by that State lead agency is not likely to jeopardize the continued existence of any State-listed species. This legislation authorizes the California Department of Fish and Game to regulate the modification of tortoise habitat that could occur through the actions of another State agency. California implemented this requirement in June 1989 and is the only State with such authority.

On January 1, 1988, the Arizona Game and Fish Commission prohibited the take of desert tortoises from the wild (Arizona Game and Fish Commission 1989). The Commission also prohibits the sale of tortoises and the export of tortoises from the State. Prior to that date, anyone with an Arizona hunting license could take and possess one tortoise for each person in that household. No provisions have been made to permit or otherwise identify those tortoises that were in possession prior to January 1, 1988. Thus, enforcement of the State ban on take may not be possible unless the actual taking of a tortoise from the wild is observed. There is no State authority in Arizona to regulate the modification of desert tortoise habitat.

All Utah wildlife species are classified as prohibited, controlled, or noncontrolled. The desert tortoise is considered a "prohibited reptile" under Utah Rule *R608-3 Collection, Importation, Transportation, and Subsequent Possession of Zoological Animals* (Utah Division of Wildlife Resources 1987). Prohibited species are zoological animals that are prohibited from collection, importation, transportation, possession, sale, transfer, or release because they pose unacceptable disease, ecological, environmental, or human health or safety risks. No State regulations exist to stop loss of tortoise habitat through land development or other actions that result in habitat degradation or loss.

The desert tortoise has been considered a sensitive species by numerous government agencies, including perhaps most importantly the Bureau, for several years. However, sensitive species do not receive full consideration and mitigation when the authorities of other Federal laws, such as the Taylor Grazing Act and the 1872 Mining Law, are being implemented. However, under the auspices of the Act, Federal agencies must consult with the Service regarding all actions that may adversely affect the tortoise. The numerous activities occurring on the vast landholdings of the Bureau, Department of Defense, and National

Park Service within the tortoise's range will require extensive consultation between the Service and these Federal agencies.

During the period of emergency listing, the impacts of Federal actions have been subject to the rigorous evaluation that results from the Act's section 7 consultation process. The consultations completed to date have insured that actions authorized, funded, or carried out by Federal agencies have not been likely to jeopardize the continued existence of the Mojave desert tortoise.

*E. Other natural or manmade factors affecting its continued existence.* An ancillary effect of continued declines in a species' numbers and loss of habitat is the fragmentation of remaining populations. Long-term survival of these isolated pockets will be aggravated by normal random fluctuations in the population or the environment and catastrophic events that could lead to extirpation. Of particular concern with the tortoise is the continued drought that has affected most of its Mojave range over the past several years. The resulting physiological stress caused by poor nutrition can be accentuated by other perturbations in the environment, such as the increased presence of predators, fire, off-highway vehicles, and competition for existing forage. The synergistic effects of these disturbances could result in the complete inability of both individual animals and isolated groups to return to and maintain population levels that are viable on a long-term basis.

The Service has carefully assessed the best scientific and commercial information available regarding the past, present, and future threats faced by the Mojave population of the desert tortoise in determining to make this rule final. Based on this evaluation, the preferred action is to list the Mojave population of the desert tortoise as threatened. The Act states that the term "threatened species" means any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

The Mojave population of the desert tortoise was proposed to be an endangered species. At that time, information on hand indicated that the presence of a respiratory disease could cause the extinction of the population. Since then, the Service has learned that, although this disease is widespread, some areas appear to be unaffected or affected to a limited degree. Additional threats facing the Mojave population exist throughout its range. These factors, including urbanization, ag-land conversion, mineral and energy

developments, utility corridors, and off-road vehicles, are most pronounced near urban centers in the western Mojave Desert, near Las Vegas, Nevada, and near St. George, Utah. Other parts of the population's range in the eastern Mojave Desert of California and Nevada are under similar threats, but the land use pressures are not as intense. Declining populations of tortoises have not been clearly documented in these parts of the population's range. The same threats responsible for documented declines in the western Mojave Desert are present, but are not as severe in the eastern Mojave.

There is little difference in the protection given to an endangered versus a threatened species under the Act. The Service does not believe that the threats faced by tortoises in the western Mojave and northeastern corner of the population's range are severe enough to warrant listing of the entire Mojave population as endangered. However, given the loss of a substantial number of tortoises due to the respiratory disease, loss and degradation of habitat over much of their range, and losses due to raven predation, some subpopulations may be extirpated within the near future. If the declining trend is not reversed, the Mojave population of the species may warrant reconsideration as endangered in the future.

#### **Similarity of Appearance Treatment of the Sonoran Population**

Section 4(e) of the Act, as amended, provides that the Secretary of the Interior may, by regulation of commerce or taking, and to the extent he deems advisable, treat any species as an endangered or threatened species even though it is not listed pursuant to section 4(a)(1) of the Act if he finds that: (a) Such species so closely resembles in appearance an endangered or threatened species that enforcement personnel would have substantial difficulty in attempting to differentiate between the listed and unlisted species; (b) the effect of this substantial difficulty is an additional threat to the endangered or threatened species; and (c) such treatment of an unlisted species will substantially facilitate the enforcement and further the policy of the Act.

The Service makes the following findings: (1) That there are no visual differences, readily discernible by law enforcement personnel or the general public, between the tortoises in the Mojave and Sonoran populations; (2) that the similarity of appearance represents an additional threat to the Mojave population; and (3) that treating

the Sonoran population as threatened due to similarity of appearance, when located outside its natural range, would facilitate the enforcement of prohibitions under the Act regarding illegal trade in or possession of listed Mojave desert tortoises. Treating the Sonoran population as threatened due to similarity of appearance when outside its natural range would eliminate the necessity of Service special agents having to determine the origin of each desert tortoise prior to enforcing the prohibitions in section 9 of the Act. Inability of the Service to enforce the prohibitions in the Act would represent an additional threat to the listed Mojave population of the desert tortoise. By treating members of the Sonoran population of tortoises as threatened under the similarity of appearance provisions of the Act, when located outside their natural range, the Service believes that enforcement problems can be minimized, while at the same time, the conservation of listed Mojave populations can be ensured.

#### **Status of the Beaver Dam Slope Subpopulation**

The Beaver Dam Slope subpopulation of the desert tortoise in Utah was listed as threatened with critical habitat in 1980. Tortoises of the Beaver Dam Slope subpopulation that were in Nevada or Arizona were not listed as threatened. Publication of this rule recognizes the entire Beaver Dam Slope subpopulation as part of the Mojave population.

Monitoring of trend and other studies focused very narrowly on the Beaver Dam Slope in Utah as the only listed population (herein referred to as a subpopulation or portion of the Mojave Desert population).

A 50 percent population decline of the desert tortoise on a study plot on the Beaver Dam Slope, Utah, has been documented between 1981 and 1986. These data appear to be representative of a continuing decline of the entire Beaver Dam Slope subpopulation of Mojave desert tortoises. As discussed above, portions of the Mojave Desert population are under greater threat than others. The Service recognizes that portions of the population may become extirpated in the foreseeable future, but believes that these local extirpations do not constitute a large enough portion of the population's range to warrant listing as endangered. The Beaver Dam Slope subpopulation will retain its threatened status as part of the entire Mojave population, which is listed as threatened by this rule.

#### **Critical Habitat**

Section 4(a)(3) of the Act, as amended, requires that, to the maximum extent prudent and determinable, the Secretary designate critical habitat at the time a species is determined to be endangered or threatened. Critical habitat was designated for the Beaver Dam Slope subpopulation of the Mojave desert tortoise in 1980. The status of this previously designated critical habitat does not change with this final rule. The Service finds that designation of critical habitat for the remainder of the Mojave desert population is not presently determinable. The Service's regulations (50 CFR 424.12(a)(2)) state that critical habitat is not determinable if information sufficient to perform required analyses of the impacts of the designation is lacking or if the biological needs of the species are not sufficiently well known to permit identification of an area as critical habitat.

The range of the Mojave desert tortoise is extensive. Much of this habitat has been fragmented and degraded by a number of land-disturbing activities. Some remaining areas of good habitat are isolated from each other or are of such small size as not to support viable subpopulations of the tortoise. The specific size and partial configuration of these essential habitats, as well as vital connecting linkages between areas necessary for ensuring the conservation of the Mojave desert population throughout its range, cannot be determined at this time. Although the designation of critical habitat was raised by a number of those providing comments, no additional information was received that could contribute to determining critical habitat boundaries. These concerns will be considered as the Service addresses recovery of the population.

#### **Available Conservation Measures**

Conservation measures provided to species listed as endangered or threatened under the Act include recognition, recovery actions, requirements for Federal protection, and prohibitions against certain practices. Recognition through listing encourages and results in conservation actions by Federal, State, and private agencies, groups, and individuals. The Act provides for possible land acquisition and cooperation with States, and requires that recovery actions be carried out for all listed species. Such actions are initiated by the Service following listing. Such increased recognition and conservation efforts will provide a means to ensure survival for the Mojave

desert tortoise. Available funding will be used on research to determine the causes of and possible treatments for the disease currently infecting tortoise populations and to determine whether the disease can be passed on to hatchlings by infected females. Available funding will also be used for, but not necessarily limited to, the identification and isolation of healthy populations, carrying out predator control to reduce loss of immature tortoises, public education to discourage further releases of diseased captive tortoises, and addressing habitat issues including land acquisition, fencing, and habitat improvement.

The protection required of Federal agencies and the prohibitions against taking and harm are discussed, in part, below.

Section 7(a) of the Act, as amended, requires Federal agencies to evaluate their actions with respect to any species that is proposed or listed as endangered or threatened and with respect to its critical habitat if any is being designated. Regulations implementing this interagency cooperation provision of the Act are codified at 50 CFR part 402. Section 7(a)(2) of the Act requires Federal agencies to insure that activities they authorize, fund, or carry out are not likely to jeopardize the continued existence of a listed species or result in destruction or adverse modification of critical habitat. If a Federal action may affect a listed species or its critical habitat, the responsible Federal agency must enter into formal consultation with the Service.

At least 50 percent of occupied habitat within the range of the Mojave population of the desert tortoise is managed by the Bureau of Land Management. Other Federal managers of tortoise habitat include the Department of Defense, National Park Service, and the Fish and Wildlife Service. Tortoises are also found on lands managed by Indian tribes. Federal activities may include, but may not be limited to, actions resulting in grazing, ORV use, mining, construction of urban developments and rights-of-way, and military activities.

The Act and implementing regulations found at 50 CFR 17.21 and 17.31 set forth a series of general prohibitions and exceptions that apply to all threatened wildlife. These prohibitions, in part, make it illegal for any person subject to the jurisdiction of the United States to

take (includes harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect; or to attempt any of these), import or export, ship in interstate or foreign commerce in the course of a commercial activity, or sell or offer for sale in interstate or foreign commerce any listed species. It is also illegal to possess, sell, deliver, carry, transport, or ship any such wildlife that has been illegally taken. Certain exceptions apply to agents of the Service and State conservation agencies.

Permits may be issued to carry out otherwise prohibited activities involving threatened wildlife under certain circumstances. Regulations governing such permits are codified at 50 CFR 17.32. Such permits are available for scientific purposes, to enhance the propagation or survival of the species, zoological exhibition, educational purposes, or special purposes consistent with the purposes of the Act, and/or for incidental take in connection with otherwise lawful activities. In some instances, permits may also be issued during a specified period of time to relieve undue economic hardship that would be suffered if such relief were not available.

All *Gopherus* tortoises, including the desert tortoise, were listed on July 1, 1975, as Appendix II species under the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES Convention). The only exception within the genus is *G. flavomarginatus*, which was listed as an Appendix I species. The CITES Convention, as implemented by the Act and various regulations (50 CFR Part 23), imposes restrictions on importation and exportation of Appendix I and II species.

#### Status of Feral Tortoises and Tortoises Currently Held in Captivity

Feral desert tortoises, which have been released inside the native habitat of the Mojave desert tortoise, are classified as a threatened species in the area north and west of the Colorado River and are protected under the Act.

Under Section 9(b)(1) of the Act, prohibitions applicable to the Mojave population do not apply to tortoises that were held in captivity or in a controlled environment prior to the date of the publication of the emergency rule (August 4, 1989), provided that such holding and any subsequent holding or

use of the tortoise was not in the course of a commercial activity.

#### National Environmental Policy Act

The Fish and Wildlife Service has determined that an Environmental Assessment or Environmental Impact Statement, as defined under the authority of the National Environmental Policy Act of 1969, need not be prepared in connection with regulations adopted pursuant to section 4(a) of the Endangered Species Act of 1973, as amended. A notice outlining the Service's reasons for this determination was published in the *Federal Register* on October 25, 1983 (48 FR 49244).

#### References Cited

A complete list of all references cited herein is available, upon request, from the Office Supervisor, Ventura Field Station, 2140 Eastman Ave., Suite 100, Ventura, California 93003.

#### Authors

The primary authors of this final rule are Judy Hohman, Peter Stine, Ray Bransfield, Ventura Office, Southern California Field Station, U.S. Fish and Wildlife Service, 2140 Eastman Avenue, Suite 100, Ventura, California 93003, 805/644-1766 or FTS 983-6039; and Karla Kramer, U.S. Fish and Wildlife Service, 1002 NE Holladay Street, Portland, Oregon 97232-4181, (503) 231-6131 or FTS 429-6131.

#### List of Subjects in 50 CFR Part 17

Endangered and threatened species, Fish, Marine mammals, Plants (agriculture).

#### Regulations Promulgation

#### PART 17—[AMENDED]

Accordingly, part 17, subchapter B of chapter I, title 50 of the Code of Federal Regulations, is amended as set forth below:

1. The authority citation for part 17 continues to read as follows:

Authority: 16 U.S.C. 1361-1407; 16 U.S.C. 1531-1543; 16 U.S.C. 4201-4245; Publ. L. 99-625, 100 Stat. 3500; unless otherwise noted.

2. § 17.11(h) is amended by revising the entry for "Tortoise, desert" under REPTILES in the List of Endangered and Threatened Wildlife to read as follows:

#### § 17.11 Endangered and threatened wildlife.

\* \* \* \* \*  
(h) \* \* \*

Species		Historic range	Vertebrate population where endangered or threatened	Status	When listed	Critical habitat	Special rules
Common name	Scientific name						
REPTILES							
Tortoise, desert .....	<i>Gopherus</i> (= <i>Xerobates</i> , = <i>Scaptochelys</i> ) <i>agassizii</i>	U.S.A. (AZ, CA, NV, UT), Mexico	Entire, except AZ, south and east of the Colorado River, and Mexico.	T	103, 357E, 378	17.95(c)	NA
Do .....	do .....	do .....	U.S.A. (AZ, south and east of Colorado River) and Mexico when found outside of AZ, south and east of Colorado River, and Mexico.	T(S/A)	357E, 378	NA	17.42(e)

3. § 17.42 is amended by adding a new paragraph (e) to read as follows:

§ 17.42 Special rules—reptiles.

(e) Desert tortoise (*Gopherus agassizii*)

(1) *Definition.* For the purposes of this paragraph (e) "desert tortoise" shall mean any member of the species *Gopherus agassizii*, whether alive or dead, and any part, product, egg, or offspring thereof, found outside of Arizona (south and east of the Colorado River) and Mexico, regardless of natal origin or place of removal from the wild.

(2) *Applicable provisions.* The provisions of § 17.31–17.32 shall apply to any desert tortoise subject to this paragraph (e).

Dated: March 29, 1990.

Richard N. Smith,

Acting Director, Fish and Wildlife Service.

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