

5. In section 1816.405-275, paragraph (b)(2) is revised to read as follows:

**1816.405-275 Award fee evaluation scoring.**

\* \* \* \* \*

(b) \* \* \*  
(2) *Very good* (90-81): Very effective performance, fully responsive to contract requirements; contract requirements accomplished in a timely, efficient, and economical manner for the most part; only minor deficiencies.

\* \* \* \* \*

6. Section 1816.405-276 is added to read as follows:

**1816.405-276 Award fee payments and limitations.**

(a) *Interim award fee payments.* The amount of an interim award fee payment (see 1816.405-273(b)) is limited to the lesser of the interim evaluation score or 80 percent of the fee allocated to that interim period less any provisional payments (see paragraph (b) of this subsection) made during the period.

(b) *Provisional award fee payments.* Provisional award fee payments are payments made within evaluation periods prior to an interim or final evaluation for that period. Provisional payments may be included in the contract and should be negotiated on a case-by-case basis. For a service contract, the total amount of award fee available in an evaluation period that may be provisionally paid is the lesser of a percentage stipulated in the contract (but not exceeding 80 percent) or the prior period's evaluation score. For an end item contract, the total amount of provisional payments in a period is limited to a percentage not to exceed 80 percent of the prior interim period's evaluation score.

(c) *Fee payment.* The Fee Determination Official's rating for both interim and final evaluations will be provided to the contractor within 45 calendar days of the end of the period being evaluated. Any fee, interim or final, due the contractor will be paid no later than 60 calendar days after the end of the period being evaluated.

**1816.406-70 [Amended]**

7. In paragraph (a) of section 1816.406-70, the last sentence is removed.

**PART 1852—SOLICITATION PROVISIONS AND CONTRACT CLAUSES**

8. In section 1852.216-76, the clause date is revised, the designated paragraph (f) is redesignated as paragraph (g) and republished, a new

paragraph (f) is added, and Alternate I to the clause is removed, to read as follows:

**1852.216-76 Award fee for service contracts.**

As prescribed in 1816.406-70(a), insert the following clause:

**Award Fee for Service Contracts**

*March 1998*

\* \* \* \* \*

(f)(1)Provisional award fee payments [*insert "will" or "will not", as applicable*] be made under this contract pending the determination of the amount of fee earned for an evaluation period. If applicable, provisional award fee payments will be made to the Contractor on a [*insert the frequency of provisional payments (not more often than monthly)*] basis. The total amount of award fee available in an evaluation period that will be provisionally paid is the lesser of [Insert a percent not to exceed 80 percent] or the prior period's evaluation score.

(2) Provisional award fee payments will be superseded by the final award fee evaluation for that period. If provisional payments exceed the final evaluation score, the Contractor will either credit the next payment voucher for the amount of such overpayment or refund the difference to the Government, as directed by the Contracting Officer.

(3) If the Contracting Officer determines that the Contractor will not achieve a level of performance commensurate with the provisional rate, payment of provisional award fee will be discontinued or reduced in such amounts as the Contracting Officer deems appropriate. The Contracting Officer will notify the Contractor in writing if it is determined that such discontinuance or reduction is appropriate. This determination is not subject to the Disputes clause.

(4) Provisional award fee payments [*insert "will" or "will not", as appropriate*] be made prior to the first award fee determination by the Government.

(g) Award fee determinations made by the Government under this contract are not subject to the Disputes clause.

\*[A period of time greater or lesser than 6 months may be substituted in accordance with 1816.405-272(a).]

(End of clause)

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**DEPARTMENT OF THE INTERIOR**

**Fish and Wildlife Service**

**50 CFR Part 17**

RIN 1018-AB73

**Endangered and Threatened Wildlife and Plants; Endangered Status for the Peninsular Ranges Population Segment of the Desert Bighorn Sheep in Southern California**

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

**ACTION:** Final rule.

**SUMMARY:** The U.S. Fish and Wildlife Service (Service) determines the distinct vertebrate population segment of bighorn sheep (*Ovis canadensis*) (Peninsular bighorn sheep) occupying the Peninsular Ranges of southern California, to be an endangered species pursuant to the Endangered Species Act of 1973 (16 U.S.C. 1531 *et seq.*), as amended (Act). The Service originally proposed to list the Peninsular bighorn sheep throughout its range, which extends into Baja California, Mexico. However, because new information received during the comment periods indicated listing bighorn sheep populations in Baja California is not warranted, the final listing determination includes only the Peninsular bighorn sheep population segment in the United States. The synergistic effects of disease; low recruitment; habitat loss, degradation, and fragmentation; non-adaptive behavioral responses associated with residential and commercial development; and high predation rates coinciding with low bighorn sheep population numbers threaten the continued existence of these animals in southern California. This rule implements Federal protection and recovery provisions of the Act for the Peninsular bighorn sheep. Critical habitat is not being designated.

**DATES:** This rule is effective March 18, 1998.

**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, Carlsbad Field Office, 2730 Loker Avenue West, Carlsbad, California 92008.

**FOR FURTHER INFORMATION CONTACT:** Arthur Davenport, at the above address (telephone: 760/431-9440).

**Background**

The bighorn sheep (*Ovis canadensis*) is a large mammal (family Bovidae) originally described by Shaw in 1804

(Wilson and Reeder 1993). Several subspecies of bighorn sheep have been recognized on the basis of geography and differences in skull measurements (Cowan 1940, Buechner 1960). These subspecies of bighorn sheep, as described in this early work, include *O. c. cremnobates* (Peninsular bighorn sheep), *O. c. nelsoni* (Nelson bighorn sheep), *O. c. mexicana* (Mexican bighorn sheep), *O. c. weemsi* (Weems bighorn sheep), *O. c. californiana* (California bighorn sheep), and *O. c. canadensis* (Rocky Mountain bighorn sheep). However, as discussed later, recent genetic studies question the validity of some of these subspecies and reveal the need to reevaluate bighorn sheep taxonomy. Regardless of the taxonomy, Peninsular bighorn sheep in southern California meet the Service's criteria for consideration as a distinct vertebrate population segment and are treated as such in this final rule.

Bighorn sheep (*Ovis canadensis*) are found along the Peninsular Mountain Ranges from the San Jacinto Mountains of southern California south into the Volcan Tres Virgenes Mountains near Santa Rosalia, Baja California, Mexico, a total distance of approximately 800 kilometers (km) (500 miles (mi)). The area occupied by the distinct vertebrate population segment covered in this final rule coincides with the range of the currently questioned subspecies *O. c. cremnobates* in California. The California Fish and Game Commission listed *O. c. cremnobates* as "rare" in 1971. The designation was changed to "threatened" by the California Department of Fish and Game (CDFG) to conform with terminology of the amended California Endangered Species Act (CESA).

The Peninsular bighorn sheep is similar in appearance to other desert associated bighorn sheep. The species' pelage (coat) is pale brown, and its permanent horns, which become rough and scarred with age, vary in color from yellowish-brown to dark brown. The horns are massive and coiled in males; in females, they are smaller and not coiled. In comparison to other desert bighorn sheep, the Peninsular bighorn sheep is generally described as having paler coloration and larger and heavier horns that are moderately divergent at the base (Cowan 1940).

The habitat still remaining for the Peninsular bighorn sheep in the United States is managed by the California Department of Parks and Recreation (CDPR) (46 percent), Bureau of Land Management (BLM) (27 percent), private landowners (24 percent), Bureau of Indian Affairs (1 percent), U.S. Forest

Service (USFS) (1 percent), and other State agencies (1 percent) (BLM 1993).

The Peninsular bighorn sheep occurs on open slopes in hot and dry desert regions where the land is rough, rocky, sparsely vegetated and characterized by steep slopes, canyons, and washes. Most of these sheep live between 91 and 1,219 meters (m) (300 and 4,000 feet (ft)) in elevation where average annual precipitation is less than 10 centimeters (cm) (4 inches (in)) and daily high temperatures average 104° Fahrenheit in the summer. Caves and other forms of shelter (e.g., rock outcrops) are used during inclement weather. Lambing areas are associated with ridge benches or canyon rims adjacent to steep slopes or escarpments. Alluvial fan areas are also used for breeding and feeding activities.

From May through October, bighorn sheep are dependent on permanent sources of water and are more localized in distribution. Bighorn sheep populations aggregate during this period due to a combination of breeding activities and diminishing water sources. Summer concentration areas are associated primarily with dependable water sources, and ideally provide a diversity of vegetation to meet the forage requirements of bighorn sheep.

Bighorn sheep species are diurnal. Their daily activity pattern consists of feeding and resting periods that are not synchronous either within or between groups, as some sheep will be resting while others are feeding. Browse is the dominant food of desert-associated bighorn sheep. Plants consumed may include brittlebrush (*Encelia* sp.), mountain mahogany (*Cercocarpus* sp.), Russian thistle (*Salsola* sp.), bursage (*Hyptis* sp.), mesquite (*Prosopis* sp.), palo verde (*Cercidium* sp.), and coffeeberry (*Rhamnus* sp.). During the dry season, the pulp and fruits of various cacti are eaten. Native grasses are eaten throughout the year and are important food, especially near waterholes.

Bighorn sheep species produce only one lamb per year. The gestation period is about 5 to 6 months (Geist 1971). Lambing occurs between January and June, with most lambs being born between February and May. Lactating ewes and young lambs congregate near dependable water sources in the summer. Ewes and lambs frequently occupy steep terrain that provides a diversity of slopes and exposures for escape cover and shelter from excessive heat. Lambs are precocial and within a day or so climb as well as the ewes. Lambs are able to eat native grass within 2 weeks of their birth and are weaned

between 1 and 7 months of age. By their second spring, bighorn sheep lambs are independent of the ewes and, depending upon physical condition, may attain sexual maturity during the second year of life (Cowan and Geist 1971, Geist 1971).

### Distinct Vertebrate Population Segment

Recent analyses of bighorn sheep genetics and morphometrics suggest that the taxonomy of Peninsular bighorn sheep needs to be reevaluated (Ramey 1991, Whehausen and Ramey 1993, Boyce *et al.* 1997). A recent analysis of the taxonomy of bighorn sheep using morphometrics (e.g., size and shape of skull components) failed to support the current taxonomy (Wehausen and Ramey 1993). Ramey (1995) found little genetic variation among desert bighorn sheep using restriction fragment length polymorphism (RFLP) analysis.

By contrast, Boyce *et al.* (1997) found high genetic diversity within and between populations of desert bighorn sheep. In this study, microsatellite loci (MS) and major histocompatibility complex (MHC) were analyzed. It appears that the results of Ramey (1995) and Boyce *et al.* (1997) differ because dissimilar molecular markers were analyzed. That is, the choice of molecular markers (e.g., mtDNA, microsatellites, allozymes) and analytical techniques (RFLP, DNA sequencing, etc.) apparently influence both the discriminating power of the techniques and conclusions relating to the genetic variability of a species.

Ongoing research into the genetic variation of bighorn sheep using a refined technique of mtDNA analysis (i.e., DNA sequencing) has resulted in the discovery of significantly higher genetic variation in mtDNA of the Peninsular bighorn sheep than was found by Ramey (Walter Boyce, DVM, Ph.D. and Esther Rubin, University of California at Davis, *in litt.*, 1997). Boyce and Rubin found several matriarchal lines where Ramey (1995) found only one. The difference in results apparently is a result of the increased resolution provided by the technique used by Boyce and Rubin (Walter Boyce, DVM, Ph.D. and Esther Rubin, University of California at Davis, *in litt.*, 1997). Regardless how the taxonomy issue is finally resolved, the biological evidence supports recognition of Peninsular bighorn sheep as a distinct vertebrate population segment for purposes of listing as defined in the Service's February 7, 1996, Policy Regarding the Recognition of Distinct Vertebrate Population Segments (61 FR 4722).

The definition of "species" in section 3(16) of the Act includes "any distinct

population segment of any species of vertebrate fish or wildlife which interbreeds when mature." For a population to be listed under the Act as a distinct vertebrate population segment, three elements are considered—(1) the discreteness of the population segment in relation to the remainder of the species to which it belongs; (2) the significance of the population segment to the species to which it belongs; and (3) the population segment's conservation status in relation to the Act's standards for listing (i.e., is the population segment, when treated as if it were a species, endangered or threatened?) (61 FR 4722).

The distinct population segment of bighorn sheep in the Peninsular Ranges is discrete in relation to the remainder of the species as a whole. This population segment is geographically isolated and separate from other desert bighorn sheep. This is supported by an evaluation of the population's genetic variability and metapopulation structure (Boyce *et al.* 1997). The genetic distance found to exist between the Peninsular bighorn sheep and their nearest neighbors at the north end of the range (i.e., bighorn sheep occupying the Orocopia, Eagle, and San Geronio mountains) was three times greater than that found within subpopulations of Peninsular bighorn sheep sampled (Boyce *et al.* 1997). Genetic distance is a measure of the degree of genetic difference (divergence) between individuals, populations, or species.

The distinct vertebrate population segment covered in this final rule extends from the northern San Jacinto Mountains to the international border between the United States and Mexico. The range of Peninsular bighorn sheep in Mexico extends southward into the Volcan Tres Virgenes Mountains, located just north of Santa Rosalia, Baja California, Mexico, and is not addressed in this rulemaking. In accordance with distinct vertebrate population segment policy, the Service may determine a population to be discreet at an international border where there are significant differences in (1) the control of exploitation; (2) management of habitat; (3) conservation status, or (4) regulatory mechanisms (61 FR 4722). In the case of the Peninsular bighorn sheep, there are significant differences between the United States and Mexico in regard to the species' conservation status.

Information received from the Mexican Government indicates the population in Baja California is not likely to be in danger of extirpation within the foreseeable future because there are significantly more animals

there than occur in the United States (Felipe Ramirez, Mexico Institute of Ecology, *in litt.* 1997). Based on DeForge *et al.* (1993) there are estimated to be between 780 and 1,170 adult Peninsular bighorn sheep in Baja California, Mexico, north of Bahia San Luis Gonzaga. In addition to the higher population numbers, the Mexican Government has initiated a conservation program for bighorn sheep that should improve the status of these animals. Based on information received from the Mexican Government, components of the conservation program include the involvement of the local people in the establishment of conservation and management units that allow some use of the bighorn sheep while promoting its conservation and recovery. Approximately 1,199,175 ha (485,306 ac) have been included in this program for Peninsular bighorn sheep.

Peninsular bighorn sheep are biologically and ecologically significant to the species in that they constitute one of the largest contiguous metapopulations of desert bighorn sheep. The metapopulation spans approximately 160 km (100 mi) of contiguous suitable habitat in the United States. The loss of Peninsular bighorn sheep in the United States would isolate bighorn sheep populations in Mexico, including the Weems subspecies, from all other bighorn sheep, thereby producing a significant gap in the range of bighorn sheep. In addition, the Peninsular bighorn sheep occur in an area that has marked climatic and vegetational differences as compared to most other areas occupied by bighorn sheep. The majority of the range of the Peninsular bighorn sheep is classified as Colorado Desert, a subarea of the Sonoran Desert. This area experiences significantly different climatic variation (e.g., timing and/or intensity of rainfall) than the Mojave or other Sonoran deserts and contains a somewhat different flora (Monson and Sumner 1990, Hickman 1993). Though rainfall is greater in the higher mountains (e.g., San Jacintos), rainfall averages less than 13 mm (5 in) and snow is almost unknown in most of this area (Monson and Sumner 1990). It is important to note that the Peninsular bighorn sheep do not typically occur above 1,200 m (4,000 ft) in the higher mountains (Monson and Sumner 1990). This is unusual because bighorn sheep typically occupy higher elevational habitat that contains sparse vegetative cover. The low amount of rainfall, high evapotranspiration rate, and temperature regime in the majority of the Peninsular bighorn sheep's range is

notably different from other North American deserts. The species' ability to exist under these conditions suggests unique behavioral and/or physiological adaptations.

Recent information further supports the significance of the Peninsular bighorn sheep to the overall species. Based on an evaluation of the population's genetic variability by Boyce *et al.* (1997) and Ramey (1995), the Peninsular bighorn sheep contain a large portion of the total genetic diversity of the species. Based on these initial studies, there is at least one distinct haplotype (Ramey 1995) and one unique MS allele (Boyce *et al.* 1997) that are restricted entirely to Peninsular bighorn sheep. High genetic diversity indicates a capacity to adapt to a changing environment.

### Status and Distribution

The Peninsular bighorn sheep in the United States declined from an estimated 1,171 individuals in 1971 to about 450–600 individuals in 1991 (CDFG 1991). Recent population estimates indicate continued decline, and Peninsular bighorn sheep in the United States now number approximately 280 (DeForge *et al.* 1995, J. DeForge, *in litt.*, 1997, E. Rubin and W. Boyce, *in litt.*, 1996, W. Boyce and E. Rubin, *in litt.*, 1997). The population of Peninsular bighorn sheep in the United States is currently divided amongst approximately eight ewe groups.

About 20 Peninsular bighorn sheep are held in captivity at the Bighorn Institute in Palm Desert, California. The Bighorn Institute, a private, nonprofit organization, was established in 1982 to initiate a research program for the Peninsular bighorn sheep. The Living Desert, an educational and zoo facility also located in Palm Desert, California, maintains a group of 10 to 12 Peninsular bighorn sheep at its facility.

The continuing decline of the Peninsular bighorn sheep is attributed to a combination of factors, including: (1) the effects of disease (Buechner 1960, DeForge and Scott 1982, DeForge *et al.* 1982, Jessup 1985, Wehausen *et al.* 1987, Elliott *et al.* 1994); (2) low recruitment (DeForge *et al.* 1982, Wehausen *et al.* 1987, DeForge *et al.* 1995); (3) habitat loss, degradation, and fragmentation (J. DeForge, *in litt.*, 1997, David H. Van Cleve, CDPR, *in litt.*, 1997, USFWS, unpub. info., 1997); (4) and, more recently, high rates of predation coinciding with low population numbers (W. Boyce and E. Rubin, *in litt.* 1997).

### Previous Federal Action

On September 18, 1985, the Service designated the Peninsular bighorn sheep as a category 2 candidate and solicited status information (50 FR 37958). Category 2 included taxa for which the Service had information indicating that proposing to list as endangered or threatened was possibly appropriate, but for which sufficient data on biological vulnerability and threats were not currently available to support a proposed rule. In the January 6, 1989 (54 FR 554), and November 21, 1991 (56 FR 58804), Notices of Review, the Peninsular bighorn sheep was retained in category 2. In 1990, the Service initiated an internal status review of these animals. This review was completed in the spring of 1991 resulting in a change from category 2 to category 1 designation. Category 1 were those taxa for which the Service had sufficient information on biological vulnerability and threats to support proposals to list them as endangered or threatened. This change to category 1 was inadvertently omitted from the November 21, 1991, Animal Notice of Review (56 FR 58804).

On July 15, 1991, the Service received a petition from the San Geronio Chapter of the Sierra Club to list the Peninsular bighorn sheep as an endangered species. The petition requested that the Service list the Peninsular bighorn sheep throughout its entire range, or, at least, list the population occurring in the Santa Rosa and San Jacinto mountains of southern California, through emergency or normal procedures. The Service used information from the status review and the July 15, 1991, petition to determine that substantial information existed indicating that the Peninsular bighorn sheep may be in danger of extinction throughout all or a significant portion of its range. This finding was made on December 30, 1991, pursuant to section 4(b)(3)(A) of the Act and was published in the **Federal Register** on May 8, 1992, as a proposed rule to list the Peninsular bighorn sheep as endangered (57 FR 19837). The proposed rule constituted the 1-year finding for the July 15, 1991, petitioned action. The proposed listing status was reconfirmed in the November 15, 1994 (59 FR 58982), and February 28, 1996, (61 FR 7596), and September 19, 1997 (62 FR 49398) Notices of Review. On February 14, 1995, the Sierra Club Legal Defense Fund (plaintiff) filed suit in Federal District Court for the Eastern District of California to compel the Secretary of the Interior and the Director of the Service to make a final determination to list the

Peninsular bighorn sheep as an endangered or threatened species.

On April 10, 1995, Congress enacted a moratorium prohibiting work on listing actions (Public Law 104-6), thus preventing the Service from taking final listing action on the Peninsular bighorn sheep. The moratorium was lifted on April 26, 1996, by means of a Presidential waiver, at which time limited funding for listing actions was made available through the Omnibus Appropriations Act (Pub. L. No. 104-134, 100 Stat. 1321, 1996). The Service published guidance for restarting the listing program on May 16, 1996 (61 FR 24722).

In response to the Sierra Club Legal Defense Fund suit, the District Court issued a stay order on April 10, 1996. On October 15, 1996, the plaintiff asked the Court to lift the stay and require the final Peninsular bighorn sheep listing decision within 30 days. On November 26, the District Court entered an order denying the plaintiff's request to lift the stay, but certified the issue underlying that denial for interlocutory appeal. The case is currently on interlocutory appeal before the Ninth Circuit Court of Appeals.

Due to new information becoming available during the lapse between the original comment period (November 4, 1992) and lifting of the listing moratorium, the Service reopened the public comment period on April 7, 1997, for 30 days (62 FR 16518). That comment period closed May 7, 1997. Because of additional requests, the Service reopened the public comment period on June 17, 1997, for an additional 15 days (62 FR 32733), and then again on October 27, 1997, for another 15 days (62 FR 55563).

The processing of this final rule conforms with the Service's final listing priority guidance as published in the **Federal Register** on December 5, 1996 (61 FR 64475) and subsequently extended on October 23, 1997 (62 FR 55268). The guidance clarifies the order in which the Service will process rulemakings. The guidance calls for giving highest priority to handling emergency situations (Tier 1), second highest priority (Tier 2) to resolving the listing status of the outstanding proposed listings, third priority (Tier 3) to new proposals to add species to the list of threatened and endangered plants and animals and fourth priority (Tier 4) to processing critical habitat determinations and delistings. This final rule constitutes a Tier 2 action. This rule constitutes the final determination resulting from the listing proposal and all comments received during the comment periods.

### Summary of Comments and Recommendations

In the May 8, 1992, proposed rule (57 FR 19837) and associated notifications, all interested parties were requested to submit factual reports or information that might contribute to the development of a final rule for the Peninsular bighorn sheep. Appropriate State agencies, county governments, Federal agencies, scientific organizations, and other interested parties were contacted and requested to comment. Legal notices were published in the *Riverside Press-Enterprise* and the *San Diego Union-Tribune* on May 26, 1992, and invited general public comment on the proposal. No public hearings were conducted.

In compliance with Service policy on information standards under the Act (59 FR 34270; July 1, 1994), the Service solicited the expert opinions of three appropriate and independent specialists regarding pertinent scientific or commercial data and issues relating to the taxonomy, population models, and supportive biological and ecological information for the Peninsular bighorn sheep. In addition, their opinions were solicited on the discreteness and significance of the Peninsular bighorn sheep. The responses received from two of the reviewers supported the proposed listing action and provided additional insight into the discreteness and significance of the population. All three reviewers commented on the taxonomy of bighorn sheep and the general need for a reevaluation of this group. The third reviewer did not comment on the discreteness or significance of the Peninsular bighorn sheep nor make a recommendation concerning the listing action. Information and suggestions provided by the reviewers were considered in developing this final rule, and incorporated where applicable.

During the initial 6-month comment period the Service received a total of 56 comments, including 14 that were submitted after the comment period closed. (Multiple comments from the same party on the same date were regarded as one comment.) Of these, 40 (71 percent) supported the listing, ten (18 percent) opposed the listing, and six (11 percent) were non-committal. During this initial period, the BLM and the Bighorn Institute took a neutral stance on the proposal. The CDPR, six conservation organizations, four local governments, and 30 other groups or individuals supported listing. The CDFG, the Desert Bighorn Council, and several property owners opposed the listing.

During the three subsequent extensions of the public comment period, the Service received a total of 49 responses (multiple/same issue comments received from a single party were regarded as one comment). Of these, 36 (73 percent) supported the listing, ten (20 percent) opposed the listing, and four (8 percent) were non-committal.

During the first comment period extension, the BLM and the Bighorn Institute recommended listing the Peninsular population as endangered. The CDPR and one conservation organization reaffirmed their support for the listing of the Peninsular bighorn sheep as endangered. On May 6, 1997, MCO Properties, Inc. made an untimely request for public hearing. In lieu of a hearing, the Service extended the public comment period a second time.

Subsequent to the second public comment period extension, the Mexican Government expressed an interest in the potential listing of the Peninsular bighorn sheep. To acquire additional information on the status, distribution, and management of bighorn sheep in Baja California, Mexico, the public comment period was reopened on October 27, 1997 (62 FR 55563). During this third and last comment period extension, the Mexican Government submitted information pertinent to the listing proposal (F. Ramirez, *in litt.* 1997). In particular, the Mexican Government reported on population numbers and the institution of a new conservation program for bighorn sheep. Due in part to the implementation of this conservation program, the southern boundary of the distinct vertebrate population segment was re-delineated at the United States/Mexico International Border.

The Service reviewed all of the written comments referenced above. The comments were grouped and are discussed under the following issues. In addition, all biological and commercial information obtained through the public comment period have been considered and incorporated, as appropriate, into the final rule.

**Issue 1:** Several commenters contended that the subspecific taxonomy of *Ovis canadensis* was the subject of scientific debate that should be resolved before the Service finalizes this action. At a minimum, the Service should consider a listing of *O. c. cremnobates* rather than a population.

**Service Response:** The Service concurs that the taxonomy of the Peninsular bighorn sheep is in need of further scientific review. However, the final listing determination for the Peninsular bighorn sheep was based on

analysis as a distinct vertebrate population segment. Section 3(16) of the Act defines a species to include “\* \* \* any distinct population segment of any species of vertebrate fish or wildlife which interbreeds when mature.” To guide decisions to recognize distinct vertebrate population segments the Service established policy on February 7, 1996 (61 FR 4722). The recognition of Peninsular bighorn sheep as a distinct vertebrate population segment is consistent with this policy and the biological status of this bighorn sheep group warrants such designation. See further discussion of this issue under the Distinct Vertebrate Population Segment section of this rule.

**Issue 2:** One commenter stated that bighorn sheep in Baja California, Mexico, were distinct from those occurring in southern California, and should therefore not be listed.

**Service Response:** The southern demarcation for the distinct vertebrate population segment was moved to the United States/Mexico International Border because a discreteness condition regarding a political boundary between two countries was satisfied. However, based on the best available biological information there is no indication that Peninsular bighorn sheep in Baja California, Mexico, are biologically distinct from those in California. The commenter did not provide additional information supporting this statement.

**Issue 3:** One commenter observed that the proposed rule did not comply with the policy on recognizing distinct vertebrate population segments.

**Service Response:** The proposed rule was published prior to the publication of the Service's policy on recognizing distinct vertebrate population segments (61 FR 4722). The final rule, in addressing only Peninsular bighorn sheep occurring in southern California, satisfies the policy. A discreteness condition of the policy recognizes the validity of delimiting population segments “by international governmental boundaries within which differences in control of exploitation, management of habitat, conservation status, or regulatory mechanisms exist.” See the section on Distinct Vertebrate Population Segment and its relation to the Peninsular bighorn sheep for further discussion of this issue.

**Issue 4:** Several commenters expressed concern that data from only a limited portion of the Peninsular Ranges in California (i.e., the Santa Rosa Mountains) was being used to characterize the overall status of the Peninsular bighorn sheep. In addition, the commenters stated that no attempt was made to gather and analyze data for

other portions of this population's range (e.g., Mexico, Anza Borrego State Park).

**Service Response:** The Service has sought and evaluated all available information submitted during the public comment periods or otherwise available to determine this final listing action including information specifically related to Peninsular bighorn sheep populations located in areas other than the Santa Rosa Mountains. Information on threats and impacts to Peninsular bighorn sheep was obtained from those conducting research specific to this population segment. In addition, information on threats affecting bighorn sheep throughout the United States (e.g., see Geist 1971, Krausman and Leopold 1986) also was used as a reference to evaluate potential impacts on Peninsular bighorn sheep.

Although data were not available to plot specific population trends for all portions of the Peninsular bighorn sheep range (such as that in Mexico) (Alvarez 1976, Sanchez *et al.* 1988, Monson 1980, DeForge *et al.* 1993, Lee and Mellink 1996), there is a marked difference in recent and historic population estimates. Based on these estimates, there appears to have been a decline in the number of Peninsular bighorn sheep in Baja California, Mexico. It is not surprising that Peninsular bighorn sheep have declined in Baja California, Mexico, given the presence of the same factors identified for the decline in the United States (e.g., introduced pathogens). Although there is no empirical evidence that active epizootics are occurring at this time, the same diseases that have been implicated in the mortality of Peninsular bighorn sheep in the Santa Rosa Mountains have been detected in Peninsular bighorn sheep within Anza Borrego State Park (Clark *et al.* 1985), and Baja California, Mexico (J. DeForge, pers. comm., 1997). However, recent information provided by the Mexican government (F. Ramirez, *in litt.* 1997), regarding bighorn sheep found on the peninsula of Baja California, Mexico, supports the position that the Mexican population is not likely to be in danger of extirpation within the foreseeable future. Therefore, Peninsular bighorn sheep are not being listed in Mexico at this time.

**Issue 5:** Several commenters questioned a decline in the population numbers of Peninsular bighorn sheep. In addition, two of the commenters stated the information used in the proposed rule was speculative in nature. Another commenter observed that the population had remained stable over the past 7 years and, therefore, it was premature to list this species.

*Service Response:* The Service is required to base listing decisions on the best available scientific and commercial information available. Based on this information, the Service concludes that the Peninsular bighorn sheep has undergone a significant decline over much of its range since 1971 and there is a danger of extinction of this distinct population segment. See sections on Status and Distribution and Summary of Factors Affecting the Species for further discussion of this issue.

*Issue 6:* One commenter claimed that inadequate surveys have been conducted for Peninsular bighorn sheep in Baja California, Mexico.

*Service Response:* The Service agrees that, even under optimum conditions, it is difficult to detect each individual animal in a population during a survey. However, the survey methodology used by DeForge *et al.* (1993) (i.e., the use of a helicopter) is an accepted reliable method for censusing bighorn sheep populations.

*Issue 7:* One commenter expressed concern regarding the use of single-year data for sheep recruitment rates. The commenter stated that this use was not statistically valid or indicative of long-term trends and argued that high adult survivorship combined with pulses of good recruitment can counter a year of poor recruitment and allow the bighorn sheep to thrive. The commenter further suggested that data from Anza Borrego Desert State Park did not suggest clear and consistent declines in recruitment.

*Service Response:* The Service concurs with the general concerns of the commenter regarding the use of single year data versus long-term data in determining population trends. Single-year data were used as an example, in the proposed rule, of the potential effects of introduced disease on Peninsular bighorn sheep. Moreover, the example of low recruitment was also used for purposes of clarification. There is substantial information to support the conclusion that poor recruitment has been one of several factors contributing to the species' decline since at least 1977 (DeForge and Scott 1982, DeForge *et al.* 1982, Wehausen *et al.* 1987, Weaver 1989, Elliott *et al.* 1994, DeForge *et al.* 1995). As for the status of the Peninsular bighorn sheep, the population in the United States has declined from an estimated 1,171 individuals in 1971 to approximately 280 in 1997 (CDFG 1991, E. Rubin and W. Boyce, *in litt.* 1996; W. Boyce and E. Rubin, *in litt.* 1997). The overall precipitous decline is evident from years of data from representative portions of the range of the Peninsular bighorn sheep, (Wehausen *et al.* 1987,

Sanchez *et al.* 1988, Weaver 1989, CDFG 1991, DeForge *et al.* 1995, Rubin *et al.* 1997).

*Issue 8:* One commenter questioned the validity of portions of the Service's analysis under Factor E (natural or manmade threats) in the proposed rule. The commenter additionally stated that the relative importance of population size, recruitment, and inbreeding in influencing the species' status was diminished because the Service did not take the metapopulation structure of the population into consideration. The commenter went on to contend the factors acting on small populations that Berger (1990) investigated were not necessarily limiting the Peninsular bighorn sheep and that his conclusions were speculative in nature. Another commenter questioned the scientific validity of Berger's study, because of issues of scale, and submitted a draft copy of a paper in support of their position.

*Service Response:* Although the metapopulation structure of the Peninsular bighorn sheep was not specifically mentioned in the proposed rule, the importance of maintaining connectivity within the range was stressed. In this regard, the potential impacts of isolation (e.g., inbreeding) were discussed.

The Service agrees that the factors affecting the populations Berger (1990) studied are not necessarily the same factors affecting the Peninsular bighorn sheep. However, the Service did not state the factors were the same in the proposed rule, but, referenced the conclusion of Berger (1990) that populations containing less than 50 bighorn sheep became extinct within 50 years. Again, the discussion on this issue in the proposed rule focused on the potential problems of isolation. Regardless of the metapopulation structure of Peninsular bighorn sheep, isolation compromises long-term viability. The Service finds no basis to support the statement that Berger's (1990) results were speculative. Berger's (1990) results appear to have been based on observed (reported) population numbers of several populations of bighorn sheep over an extended period of time. The Service concurs that the scale of a study can affect the results and ensuing interpretations. However, the issues facing the Peninsular bighorn sheep include fragmentation of habitat and the isolation of ewe groups. It is well known that small isolated groups are subject to a variety of genetic problems (Lacy 1997).

*Issue 9:* One commenter recommended the Service address the introduction and spread of disease due

to equestrian use in Peninsular bighorn sheep habitat.

*Service Response:* The Service is unaware of any data that support the notion that disease transmission occurs between horses and bighorn sheep. If such information becomes available, this issue will be taken into consideration during the development and implementation of a recovery plan.

*Issue 10:* A commenter indicated the Service generally described the habitat of the Peninsular bighorn sheep in the proposed rule but did not specifically mention the habitat conditions that exist in the Santa Rosa Mountains or any other Peninsular Range. Furthermore, without this information, no specific management strategies can be formulated to protect the species.

*Service Response:* The Service agrees that specific management strategies will have to be based on more detailed ecological data. The CDFG has been sponsoring studies that will generate data needed to determine conservation requirements for the survival and recovery of the Peninsular bighorn sheep. The draft Peninsular Ranges Coordinated Bighorn Sheep Metapopulation Management Plan (BLM *et al.* 1993) describes the Peninsular Ranges' ecosystems and delineates Peninsular bighorn sheep historic, core, lambing, and movement habitat. These data will be used to develop conservation and recovery strategies.

*Issue 11:* One commenter pointed out that neither burros nor javelina (collared peccary) occur in the California Peninsular Ranges. Therefore, these species could not compete with the Peninsular bighorn sheep for food.

*Service Response:* The Service concurs. Javelina (collared peccary) and burros were mentioned in the proposed rule in an opening background paragraph describing potential competitors of bighorn sheep. The Service did not intend to suggest that javelina specifically competed with Peninsular bighorn sheep. Although not an issue for Peninsular bighorn sheep in the United States, burros have been documented in bighorn sheep habitat in Baja California, Mexico (DeForge *et al.*, 1993).

*Issue 12:* One commenter stated that the depleted status of Peninsular bighorn sheep was due more to mountain lion predation, conflicts with autos, and low population numbers than from impacts related to the construction and operation of golf courses.

*Service Response:* The decline of the Peninsular bighorn sheep is attributable to a number of factors that, in combination, are threatening the survival of this distinct population

segment. See the Summary of Factors Affecting the Species section for further discussion.

*Issue 13:* Several commenters observed that many of the conclusions presented in the proposed rule appear to be based on information provided by the Bighorn Institute.

*Service Response:* In accordance with the Act and its implementing regulations, the Service has used the best scientific and commercial data available in assessing the status of the Peninsular bighorn sheep and making the final listing determination. The Service obtained information from various sources including the CDFG, CDPR, the Desert Bighorn Council, published articles from scientific journals, and the Bighorn Institute.

*Issue 14:* One commenter disagreed with the suggestion in the proposed rule that depressed recruitment was probably linked to disease throughout most of the Peninsular bighorn sheep's range. The commenter went on to state that exposure to disease did not demonstrate a population was declining because bighorn sheep populations commonly are exposed to disease organisms. The commenter also recommended that listing be delayed until further research could determine the different factors affecting the Peninsular bighorn sheep and its decline.

*Service Response:* The proposed rule indicated that depressed recruitment probably was linked to a disease epizootic. This was the most reasonable conclusion at that time based on available information regarding the effects of disease in the Santa Rosa Mountains and the general decline in the number of Peninsular bighorn sheep. The presence of recurrent disease remains a likely cause for the overall continuing decline of Peninsular bighorn sheep numbers. However, disease is not the only factor negatively affecting this species. The Peninsular bighorn sheep in the United States has declined by at least 76 percent since 1971. Another factor, in addition to disease, that has contributed to low recruitment is an increase in predation rates (W. Boyce and E. Rubin, *in litt.* 1997). The final rule indicates that exposure to diseases such as blue tongue occurs in a significant portion of the Peninsular bighorn sheep's range. Any delay in listing this distinct population segment to await the results of research on the interaction of the various threats could result in postponement of implementation of conservation and recovery measures, thus, contributing further to the Peninsular bighorn sheep's decline. See

Factor C in the Summary of Factors Affecting the Species Section for a discussion of this topic.

*Issue 15:* One commenter stated that the effects of cattle grazing on wild sheep needed to be re-examined because the pathogen *Pasteurella* is not transmitted by cattle, but by domestic sheep. Another commenter stated that *Pasteurella* had not been a problem for the Peninsular bighorn sheep and was, therefore, not relevant to the listing.

*Service Response:* The Service's concerns about cattle grazing relative to the conservation of Peninsular bighorn sheep is prompted by the potential of cattle to harbor pathogens such as PI-3 and blue tongue. Both of these viruses have likely contributed to Peninsular bighorn sheep mortality. In addition, *Pasteurella* sp. also infect mule deer and there is overlap in the range of mule deer, domestic sheep, and Peninsular bighorn sheep. Although the Service is unaware of *Pasteurella* sp. infections in Peninsular bighorn sheep, domestic sheep use areas adjacent to San Jacinto Mountain and could be a source for this infection.

*Issue 16:* One commenter stated that data are inadequate to demonstrate an increase in predation, and the potential effect of this threat on Peninsular bighorn sheep had not been assessed in the defined range.

*Service Response:* The Service concurs that predation and its effect on Peninsular bighorn sheep has not been conclusively assessed. However, an increase in predation in the northern Santa Rosa Mountains had been noted. Since publication of the proposed rule, further indication of an increase in predation due to mountain lions has been documented (W. Boyce and E. Rubin, *in litt.* 1997).

*Issue 17:* Several commenters expressed concern about the use of current information and recommended the Service use information that is unbiased and peer-reviewed. One commenter questioned how a listing decision could be rendered when information is unavailable for review or has not undergone the scrutiny of impartial analysis. This commenter made specific reference to work being conducted by Oliver Ryder, Ph.D. of CRES, on Weems bighorn sheep.

*Service Response:* As required, the Service used the best available scientific and commercial information for the final listing decision and all such information was accessible for public review and analysis. However, only information related to Peninsular bighorn sheep ecology or otherwise relevant to determining whether listing this distinct population segment was

warranted was the subject of this review. Moreover, peer review of the listing proposal by three appropriate and independent specialists was solicited to ensure the best biological and commercial information was used.

*Issue 18:* Several commenters suggested that development within and adjacent to Peninsular bighorn sheep habitat was not detrimental and that the Service should focus on other causes of the decline, such as grazing of cattle in bighorn sheep habitat. One of the commenters stated that current mitigation measures needed to be compiled and analyzed to determine if listing of the Peninsular bighorn sheep was warranted.

*Service Response:* Populations of Peninsular bighorn sheep located adjacent to urban development, such as golf courses and suburban housing areas, are known to modify their behavior in non-adaptive ways. For example, abnormally high concentrations of ewes, rams, and lambs regularly forage and water at such developments in the Rancho Mirage area of California throughout all months of the year (DeForge and Osterman, pers. comm., 1997).

This altered behavior has exposed the northern Santa Rosa Mountains ewe group to several unnatural conditions leading to relatively high levels of mortality (DeForge 1997): excessive exposure to high levels of fecal material increasing the chance for the spread of disease; excessive use of an unnaturally moist environment suitable for harboring infectious disease and parasites; unusually high levels of adult mortality associated with predation; exposure to non-native and potentially toxic plants; short-term lamb abandonment leading to increased risk of lamb predation; and loss of ewe group "memory" of other available water and forage areas in their historic home range (Rubin, Ostermann, and DeForge, pers. comm., 1997). See Factors C and E for further discussion of these issues.

*Issue 19:* One commenter stated that the Service had not monitored or considered the population numbers of bighorn sheep in some mountain ranges, such as the Little San Bernardino and Chocolate mountains.

*Service Response:* The bighorn sheep occurring in the Little San Bernardino and Chocolate mountains are not a component of the distinct vertebrate population segment under consideration in this final listing rule. Besides the geographic separation, recent genetic research (Boyce *et al.* 1997) concluded the Peninsular bighorn sheep population "formed a discrete group



with relatively high gene flow," whereas, the genetic distance between three nearby Mojave populations of desert sheep including the bighorn sheep occurring in the Little San Bernardino and Chocolate mountains was more than three times greater. That is, the genetic distance between the Peninsular bighorn sheep and their nearest neighbors supports the conclusion that the Peninsular group is discrete and meets the definition of a distinct vertebrate population segment.

*Issue 20:* One commenter stated there is no evidence to support the conclusion that hikers are contributing to the decline of Peninsular bighorn sheep.

*Service Response:* Peninsular bighorn sheep are sensitive to human disturbance during critical periods, such as lambing. For example, hikers detrimentally affect survival and recovery of this species when this activity is in proximity to lambing areas and bighorn sheep abandon these areas. Additional impacts occur when human activity hinders the access of Peninsular bighorn sheep to water during times of stress. MacArthur *et al.* (1979) documented a 20 percent rise in mean heart rate when bighorn sheep were continuously exposed to people. Another study found that areas experiencing more than 500 visitor-days of use per year resulted in a decline of use by bighorn sheep (Graham 1971 in Purdy and Shaw 1980).

*Issue 21:* Several commenters stated that the bighorn sheep decline could have been avoided. The Service should have been proactive and worked with local land use planning agencies by providing guidance concerning potential project-related impacts on Peninsular bighorn sheep. In addition, one of the commenters recommended that communication between land-use planning agencies and the Service commence immediately and that private, State, and Federal parties be treated equitably in the conservation process.

*Service Response:* The Service has long been involved with local planning agencies within the range of the Peninsular bighorn sheep as a technical adviser. Recommendations of the Service have not always been incorporated into project design and location resulting in irretrievable impacts (see Response to *Issue 18*). The Service concurs that all involved parties should be treated equitably during future efforts to conserve and recover the species.

*Issue 22:* One commenter stated that the grazing of cattle on Federal lands should be terminated where the activity may impact Peninsular bighorn sheep.

The commenter also stated that movement corridors should be conserved.

*Service Response:* The Service contends that activities impacting Peninsular bighorn sheep should be avoided to the extent possible and endorses the conservation of movement corridors. Upon the listing of the Peninsular bighorn sheep, the issue of cattle grazing and movement corridors will be evaluated, and appropriate actions to be taken will be identified as part of the species conservation and recovery process.

*Issue 23:* One commenter stated that the Peninsular bighorn sheep would benefit from the addition of golf courses.

*Service Response:* The Service is unaware of scientific information demonstrating that golf courses are beneficial to the long-term survival and recovery of Peninsular bighorn sheep. There is evidence that golf courses negatively impact Peninsular bighorn sheep through the spread of parasites (e.g., hookworms) and availability of toxic plants such as oleander. Furthermore, golf courses do not provide ideal forage for this species and the associated human activity disrupts the normal behavioral patterns of bighorn sheep (see Response to *Issue 18*).

*Issue 24:* One commenter recommended that the Peninsular bighorn sheep be relocated where interaction with people would be less likely to occur.

*Service Response:* The Peninsular bighorn sheep have specific habitat requirements within the Peninsular Mountain Ranges of southern California. The removal of an animal from its native habitat to another location provides no assurance of survival. For listed species, such removal and relocation would have to meet recovery and conservation objectives to be consistent with purposes of the Act.

*Issue 25:* Several commenters suggested it was unlikely that Federal listing of this population would result in protection beyond that already provided by the California Environmental Quality Act (CEQA) and CESA. In addition, the commenters predicted that Federal listing may be detrimental by making the approval process for bighorn sheep reintroductions or management actions more complex.

*Service Response:* Federal listing of the Peninsular bighorn sheep will complement the protection options available under State law through measures discussed below in the "Available Conservation Measures" section. The Service will use established

procedures to evaluate management actions necessary to achieve recovery of the species and thereby avoid any undue implementation delays. In addition, Federal listing would provide additional resources for the conservation of the species through sections 6 and 8 of the Act.

*Issue 26:* Several commenters stated that listing of the Peninsular bighorn sheep was unnecessary because effective voluntary efforts exist for safeguarding this species at no public cost. Furthermore, the existing population occurs almost exclusively on lands administered by State or Federal agencies on which private actions will not occur.

*Service Response:* Voluntary efforts are important to conservation of Peninsular bighorn sheep, but, to date, these efforts have not stabilized or reversed the numerical decline. The effects of urban and commercial development, disease, and predation continue to represent foreseeable threats to this distinct population segment. The inadequacy of existing regulatory mechanisms to stabilize or reverse the decline is discussed in Factor D.

*Issue 27:* Several commenters stated that the Service has ignored existing efforts to conserve the Peninsular bighorn sheep. In addition, one of these commenters recommends the Service consider the metapopulation approach to the management of wild sheep in California. This same commenter explained that the Peninsular Ranges population of bighorn sheep probably represents one of the most intact metapopulations of this species from the standpoint of demography and corridors connecting demes.

*Service Response:* Several State and Federal management plans have been prepared for bighorn sheep. However, these plans have not effectively reversed the decline of the Peninsular bighorn sheep population. Federal listing will complement and add to these conservation efforts. Existing management plans and the population ecology of the Peninsular bighorn sheep will be important components in the development of a recovery plan.

*Issue 28:* One commenter discussed the history of bighorn sheep management in Mexico and indicated that it had been ineffective in the past. The commenter also stated that the current program has inadequate resources for addressing threats on bighorn sheep such as poaching, disease exposure, and habitat loss from feral livestock. The commenter concluded that listing of the Peninsular bighorn sheep may substantially contribute to



the conservation and recovery of these animals.

*Service Response:* Based on information received during the last comment period extension, the Mexican Government established a new conservation program in April 1997 for bighorn sheep in Baja California, Mexico. Given that there are significantly more bighorn sheep in Baja California, Mexico, as compared to southern California, there is more time to ascertain the effectiveness of the conservation program and the status of Peninsular bighorn sheep in this area. If the population of Peninsular bighorn sheep decline under the Mexican Government's conservation program, future listing of the animals may be appropriate.

*Issue 29:* One commenter stated that Mexican authorities had not been properly consulted and these authorities did not support listing.

*Service Response:* As required, the Service corresponded on February 21, 1992, and June 8, 1992, with the Mexican government when the Peninsular bighorn sheep was proposed for listing. Moreover, the Service reopened the public comment period on October 27, 1997, for an additional 15 days to acquire additional information on the status, distribution, and management of bighorn sheep in Baja California, Mexico. Comments were received from the Mexican government during this third, and last, comment period extension and were considered in making the final listing determination.

*Issue 30:* One commenter stated the Service that the purpose of the Act was to conserve wild species. The commenter stated that the proximity of the Bighorn Institute to private development was, therefore, not a legitimate justification for proposing the species as endangered.

*Service Response:* The Service concurs with the commenter about conservation of species in the wild (i.e., "conserve wild species"). The Bighorn Institute and Living Desert Museum maintain captive populations of Peninsular bighorn sheep for scientific and educational purposes. This use is thought to have no negative impact on free-ranging bighorn. However, the fact that the Bighorn Institute is located close to residential/commercial development was mentioned in the proposed rule as an indirect factor affecting Peninsular bighorn sheep.

*Issue 31:* Several commenters criticized the Service for not addressing the economic impacts of listing the Peninsular bighorn sheep population as endangered. One of these commenters

stated that the Peninsular bighorn sheep should not be listed if it would stifle economic development.

*Service Response:* In accordance with 16 U.S.C. § 1533(b)(1)(A) and 50 CFR 424.11(b), listing decisions are made solely on the basis of the best scientific and commercial data available. In adding the word "solely" to the statutory criteria for listing a species, Congress specifically addressed this issue in the 1982 amendments to the Act. The legislative history of the 1982 amendments states: "The addition of the word 'solely' is intended to remove from the process of the listing or delisting of species any factor not related to the biological status of the species. The Committee strongly believes that economic considerations have no relevance to determinations regarding the status of species and intends that the economic considerations have no relevance to determinations regarding the species' status."

*Issue 32:* One commenter indicated that a 30 day comment period for the listing proposal was inadequate and the continued processing of the proposed rule was prohibited by the Act.

*Service Response:* The Service has provided ample opportunity for public comment during this rule making process. The initial comment period for the proposed rule was open for 6 months. The Service reopened the comment period for an additional 30 days on April 7, 1997 (62 FR 16518), for an additional 15 days on June 17, 1997 (62 FR 32733), and then again for an additional 15 days on October 27, 1997 (62 FR 55564). See discussion under Previous Federal Action for added details.

*Issue 33:* One commenter stated that the Peninsular bighorn sheep should not be listed because once listed it becomes impossible to remove species from the list, and expressed concern regarding the closure of mountain areas to recreationists.

*Service Response:* A principal goal of the Service for listed species is to recover species to a point at which protection under the Act is no longer required. When the recovery goals for a species have been met, the Service may prepare a proposal to delist or reclassify the species based on the best available scientific and commercial information. The process for delisting or reclassifying a species, per section 4(b)(3)(A) of the Act, is similar to that used for listing. Regarding closure of mountain areas to recreationists, certain locations of special sensitivity, such as lambing areas, may be closed to prevent disturbance and promote the recovery of

the Peninsular bighorn sheep. Most other recreational use restrictions would be unchanged.

*Issue 34:* One commenter recommended that the Service designate critical habitat concurrently with the listing of the Peninsular bighorn sheep. A second commenter disagreed with the Service's rationale for not proposing critical habitat but made no recommendation concerning the designation of critical habitat. Another commenter indicated that designation of critical habitat would not lead to increased poaching of the Peninsular bighorn sheep because of State listing and protection regulations. Commenters also stated that the discussions under the Critical Habitat and Available Conservation Measures sections in the proposed rule were contradictory.

*Service Response:* The Service has determined that designation of critical habitat would increase the threat of human activities to Peninsular bighorn sheep and that such a designation would not be beneficial to the species. The identification of such areas on critical habitat maps would likely call attention to the locations of bighorn sheep (especially lambing areas) and increase the degree of threat from human intrusion. Moreover, protection of habitat and other conservation actions are better addressed through recovery planning and section 7 consultation processes.

The discussions under Critical Habitat and Available Conservation Measures are not contradictory with respect to section 7. The Available Conservation Measures section addresses the conservation actions that result from listing. With or without critical habitat, Federal agencies are required to consult with the Service if an action may affect a listed species. Critical habitat is mentioned under Available Conservation Measures because regulations pertaining to section 7(a), 7(a)(2) and 7(a)(4) are reiterated. The responsibility of Federal agencies is discussed in general, and not in terms specifically related to the Peninsular bighorn sheep. For further discussion of this issue see the Critical Habitat section.

### Summary of Factors Affecting the Species

After a thorough review and consideration of all information available, the Service has determined that the Peninsular bighorn sheep should be classified as an endangered distinct population segment. Procedures found at section 4 of the Act and regulations (50 CFR part 424) promulgated to implement the listing

provisions of the Act set forth the procedures for adding species to the Federal Lists. A species may be determined to be endangered or threatened due to one or more of the five factors described in section 4(a)(1). These factors and their application to the Peninsular bighorn sheep distinct population segment (*Ovis canadensis*) are as follows:

A. *The present or threatened destruction, modification, or curtailment of its habitat or range.* Peninsular bighorn sheep have been extirpated from several historic locations, including the Fish Creek Mountains (Imperial County) and the Sawtooth Range (San Diego County) (DeForge *et al.*, 1993). In the United States, the number of Peninsular bighorn sheep has declined from an estimated 1,171 individuals in 1971 to about 280 individuals in 1997 (DeForge *et al.* 1995; J. DeForge, *in litt.* 1997; E. Rubin and W. Boyce, *in litt.* 1996; W. Boyce and E. Rubin, *in litt.* 1997). Habitat loss (especially canyon bottoms), degradation, and fragmentation associated with the proliferation of residential and commercial development, roads and highways, water projects, and vehicular and pedestrian recreational uses are threats contributing to the decline of Peninsular bighorn sheep throughout its range.

Peninsular bighorn sheep are susceptible to fragmentation due to the distribution of habitat (narrow band at low elevation), use of habitat (e.g., occupying low elevations), and population structure. Restricted to elevations below the distribution of chaparral habitat (typically about 1,050 m (3,500 ft)), encroaching urban development and human related disturbance have the dual effect of restricting remaining animals to a smaller area and severing connections between ewe groups. The Peninsular bighorn sheep distinct population segment, like other bighorn sheep populations, is composed of ewe groups that inhabit traditional areas (cluster of canyons) and rams that move among these groups exchanging genetic material. Maintenance of genetic diversity allows small ewe groups to persist. The inability of rams and occasional ewes to move between groups erodes the genetic fitness of isolated groups. Urban and commercial development may ultimately fragment the metapopulation into isolated groups too small to maintain long-term viability, as apparently was the case in the extirpation of one ewe group in the United States in the recent past.

Urban development and associated increases in human activities in bighorn sheep habitat were reported to be the leading cause of extinction of an entire bighorn sheep population (ewes, rams, and lambs) in Tucson, Arizona (Krausman, pers. comm. 1997). In the River Mountains, Nevada, 9 of 17 marked desert bighorn sheep ewes altered their normal watering patterns; seven of these ewes abandoned the site (Leslie and Douglas 1980). Leslie and Douglas (1980) noted that, because ewes are more restricted in their movements and display a relatively high degree of fidelity to water sources, such abrupt changes in watering patterns are probably the result of extrinsic disturbances. Development has resulted in habitat abandonment in other bighorn sheep populations (Ferrier 1974). Other researchers have maintained that recreational encroachment can be most damaging during critical periods of the year for bighorn sheep, such as lambing (Geist 1971, Light 1973, Cowan 1974).

Abandonment of preferred habitat is anticipated to be detrimental to the long-term survival of Peninsular bighorn sheep. Abandonment of a lambing area in the Peninsular Ranges has been reported, and it has been attributed to human activities. The construction of a flood control project took place in Magnesia Canyon within the City of Rancho Mirage in 1982. This construction took place below a lambing area that was occupied by the northern Santa Rosa Mountains (SRM) ewe group. During the construction of the flood control project, the northern SRM ewe group relocated their lambing area from Bradley Peak (above Magnesia Canyon, and in direct line of site to the flood control project area) to Ramon Peak (DeForge, pers. comm., 1997). The distance between these two lambing areas is estimated at about 2.4 km (1.5 mi). Ramon Peak is situated away from areas occupied by humans, and human activities were correspondingly absent compared to Magnesia Canyon during construction. This relocation corresponded to the shift in habitat use and abandonment of some areas affected by the noise and view of humans during construction observed by DeForge and Scott (1982). DeForge and Scott (1982) also observed a marked difference in behavior when ewes with lambs used a watering area located 200 to 500 m (660 to 1650 ft) from the construction area. As further evidence that the abandonment of the lambing area was attributable to human activities, DeForge (pers. comm., 1997) also indicated that the ewe group re-occupied the Bradley Peak lambing area

the following year after construction and human activities subsided. Approved and future projects such as Shadowrock Golf Course and Mountain Falls Golf Course, respectively, may result in the abandonment of the main remaining lambing area in the San Jacinto Mountains.

The Coachella Valley Association of Governments anticipates that by the year 2010 the human population there will increase from 227,000 to over 497,000, not including 165,000 to 200,000 seasonal residents. In 1989, the population of Imperial County was 116,000. The cities of El Centro, Imperial, and Calexico grew by about one-third between 1980 and 1989 (Bureau of Reclamation 1991). Increased human populations and associated commercial and residential development will likely continue to increase destruction of habitat and disrupt sheep behavioral patterns.

B. *Overutilization for commercial, recreational, scientific, or educational purposes.* There is no open hunting season for Peninsular bighorn sheep in the United States. Although the limited opportunities for desert bighorn hunting in California create a temptation for taking without a license, poaching does not appear to be a problem at this time.

The Bighorn Institute and Living Desert Museum maintain captive populations of Peninsular bighorn sheep for scientific and educational purposes. This use is thought to have no negative impact on free-ranging bighorn.

C. *Disease or predation.* Disease is a major factor responsible for the precipitous decline of Peninsular bighorn sheep in the northern Santa Rosa Mountains and appears to significantly contribute to population declines elsewhere throughout its range. Elliott *et al.* (1994) found a higher level of exposure to viral and bacterial pathogens in the Peninsular bighorn sheep population than in other California bighorn sheep populations. Past higher exposure to pathogens suggests that disease may have been a major contributing factor in this distinct population segment's decline.

Bighorn sheep are susceptible to a variety of bacterial, fungal, and viral infections (DeForge *et al.* 1982, Turner and Payson 1982, Clark *et al.* 1985). Lambs and older sheep may be most susceptible to disease. Numerous endoparasites and ectoparasites are known to occur in this species (Russi and Monroe 1976, Lopez-Fonseca 1979). The relationship between disease, its transmission, and factors such as stress, density, competition, water availability, and disturbance are not well understood. Disease manifestation

probably occurs during stressful periods such as high or low population levels, reproductive activity, low nutrient availability, and climatic extremes (Taylor 1976, Turner and Payson 1982).

Disease is responsible for high lamb mortality rates in Peninsular bighorn sheep (Sanchez *et al.* 1988). In the northern Santa Rosa Mountains, excessive lamb mortality has occurred since 1977 (DeForge *et al.* 1995). DeForge *et al.* (1982) reported evidence that bighorn sheep lamb mortality in the Santa Rosa Mountains was due to pneumonia. Bacterial pneumonia is usually a sign of weakness caused by another agent such as a virus, parasite, or environmental stress that lowers an animal's resistance to disease. DeForge and Scott (1982) reported serological evidence that a combination of parainfluenza-3 (PI-3), blue tongue (BT), epizootic hemorrhagic disease (EHD), and contagious ecthyma (CE) viruses may be contributing initiating factors for the development of pneumonia in the Santa Rosa Mountains ewe group. In addition to exposure to the above mentioned diseases, antibody titers to respiratory syncytial virus (RSV) have been found in Peninsular bighorn sheep (Clark *et al.* 1985). Poor nutrition, predation, climatic changes, and human related impacts may contribute to high lamb mortality. Vaccination experiments have been conducted for BT and PI-3. Vaccines for PI-3 have been used with limited success in captive and wild sheep (Jessup *et al.* 1990).

Domestic and feral cattle can act as disease reservoirs. Several viruses discovered in sick bighorn sheep lambs were non-native and thought to be introduced by domestic livestock (DeForge, *in litt.* 1988). However, the potential role of livestock in disease transmission is not well understood. Staff of the Anza-Borrego Desert State Park (Park) completed a project to remove 119 feral cattle from the Park in 1990. Six types of viruses were detected in these cattle. Blood samples taken from cattle grazing in allotments adjacent to Peninsular bighorn sheep habitat within the Park have contained several viruses. Peninsular bighorn sheep in Mexico have also tested positive to exposure to viral and bacterial diseases (J. DeForge, pers. comm., 1997).

Other livestock may transmit diseases as well. Domestic sheep harbor bacteria (*Pasteurella* sp.) and viruses such as BT that can kill bighorn sheep, and close contact results in transmission to and the subsequent death of most or all of the exposed animals (Foreyt and Jessup 1982). Although no grazing allotments

for domestic sheep have been issued by BLM or USFS in the Peninsular Ranges, the potential for their presence exists. Domestic sheep associated with commercial operations have been observed in the San Jacinto River along the northern edge of the San Jacinto Mountains. In addition, small numbers of domestic sheep are raised by private individuals living along the northern edge of the San Jacinto Mountains (A. Davenport, Fish and Wildlife Service, pers. obs. 1993).

Cattle or domestic sheep do not have to occupy Peninsular bighorn sheep habitat for disease transmission to occur. For example, Jessup *et al.* (1985) has found antibodies for this pathogen in mule deer. Blue tongue, a disease transmitted by a biting midge (*Culicoides* sp.), occurs in animals such as cattle, sheep, goats, mule deer, and bighorn sheep. Cattle appear to be capable of harboring the virus (Wallmo 1981, Jessup 1985, Jessup *et al.* 1990). Overlap in habitat use by Peninsular bighorn sheep, southern mule deer, and the biting midge may provide a pathway for disease transmission from deer populations associated with livestock to bighorn sheep. This pathway may involve either movement of an infected individual or the progression of an epizootic through the general deer population to Peninsular bighorn sheep where the two species overlap.

Based on available information, and given the susceptibility of bighorn sheep to introduced pathogens, disease will continue to pose a significant and underlying threat to the survival of Peninsular bighorn sheep. This situation is exacerbated by the presence of cattle and other livestock in and adjacent to areas occupied by Peninsular bighorn sheep.

Urban developments such as golf courses and associated housing areas also influence the effect of disease and predation on the Peninsular bighorn sheep. For example, high concentrations of ewes, rams, and lambs regularly forage and water at such developments in the Rancho Mirage area of California throughout all months of the year (DeForge and Osterman, pers. comm., 1997).

This behavior has exposed the northern Santa Rosa Mountains ewe group to several unnatural conditions leading to relatively high levels of mortality (DeForge 1997): excessive exposure to high levels of fecal material increasing the chance for the spread of disease; excessive use of an unnaturally moist environment suitable for harboring infectious disease and parasites; unusually high levels of adult mortality associated with predation;

exposure to non-native and potentially toxic plants; short-term lamb abandonment leading to increased risk of lamb predation; and loss of ewe group "memory" of other available water and forage areas in their historic home range (Rubin, Osterman, and DeForge, pers. comm., 1997).

DeForge and Ostermann (in prep.) reported that urbanization was the leading known cause of death to Peninsular bighorn sheep occupying the northern Santa Rosa Mountains. During their investigation in the northern Santa Rosa Mountains, urbanization accounted for 34.2 percent of all recorded adult mortalities. Mortalities directly caused by urbanization were associated with ingestion of toxic, non-native plants, automobile collisions, and fences. Indirect causes of death associated with urbanization included parasite infestations and altered habitat use.

Exposure to high concentrations of feces can lead to unnaturally high levels of exposure to disease and parasites (Georgi 1969), and may contribute to Peninsular bighorn sheep population declines. Development in and adjacent to the Santa Rosa Mountains has established irrigated grass lawns, golf courses, and ponded waters providing environmentally suitable conditions for the strongyle parasite to successfully complete its life cycle, and increase its presence in a naturally arid environment. Sheep can be exposed to the strongyle parasite from the feces of an infected individual (Georgi 1969). Strongyle parasites have been reported in the northern Santa Rosa Mountains ewe group (DeForge and Osterman 1997). Animals exhibiting symptoms from the infection of a strongyle parasite are less active, forage less, tend to stay unusually close to water sources, become weak, are extremely emaciated, and exhibit anemia (Georgi 1969). Mortality from infection of the strongyle parasite may be experienced in sheep, particularly under situations that create additional stress (Georgi 1969).

Strongyle parasites are common in domestic ruminant, horse, and pig hosts, and require moist environments for the survival of its larval stages outside of the host. The strongyle parasite life cycle cannot be completed in arid environments, and strongyle infestations are generally rare in desert regions (Georgi 1969). However, between 1991 and 1996, more than 85 percent of the Peninsular bighorn sheep sampled in the Santa Rosa Mountains ewe group were infected with the strongyle parasite (DeForge and Osterman, unpubl. data). Ewes, rams, and lambs are susceptible to infection

with the strongyle parasite. Clinical signs of strongyle parasites in the Peninsular bighorn sheep have been reported only from the Santa Rosa Mountains ewe groups. Strongyle parasites have not been detected in the San Jacinto Mountains (SJM) ewe groups, and are considered rare or absent in other ewe groups.

Peninsular bighorn sheep exhibiting physiological stress related to an infestation of the strongyle parasite are at greater risk of predation, and less likely to successfully reproduce. Presently, there is no local or regional program to inoculate Peninsular bighorn sheep against non-native, introduced diseases, viruses, and parasites.

The reduction of disease outbreaks centers, in large part, on reducing factors that stress Peninsular bighorn sheep. Stress predisposes animals to disease (DeForge 1976). One of the major factors that stress bighorn sheep is human encroachment into their habitat. The decline of the Peninsular bighorn sheep is markedly steeper where the population borders the developing areas of the Coachella Valley. The decline in the population adjacent to urban areas in the Coachella Valley has been 35 percent greater than that occurring in Anza Borrego Desert State Park. Disease has been documented as an important factor in the decline of the population in the northern Santa Rosa Mountains (DeForge and Scott 1982, DeForge et al. 1982). Although the pathogens responsible for the diseases in the Santa Rosa Mountains have also been detected in Anza Borrego Desert State Park (Elliott et al. 1994), the population in Anza Borrego Desert State Park has declined at a slower rate (57 percent versus 92 percent).

Increased risk of predation has also been attributed to unnatural environments found at the urban interface. DeForge (pers. comm., 1997) has observed higher numbers of adult Peninsular bighorn sheep mortalities caused by mountain lions (*Felis concolor*) closer to the urban environment as compared to wild lands. Domestic dogs often occur along the urban-wild lands interface, and are also capable of injuring and killing lambs, ewes, and young or unhealthy rams. Encroaching development not only increases the abundance of domestic dogs along the urban-wild lands interface, but also creates unnatural landscape characteristics such as hedge rows, dense patches of tall vegetation, and other unnatural cover suitable for predators to hide and ambush potential prey. The Service has received complaints from residents of

Thunderbird Cove that the presence of Peninsular bighorn sheep feeding on lawns attracts mountain lions, which some of the residents have observed.

Natural predation is not known to be a limiting factor in free-roaming desert bighorn sheep populations having adequate escape cover (Blaisdell 1961, Elliot 1961, and Weaver 1961). According to Wilson (1980), predation, as a mortality factor, decreases in significance as the size of a population increases. In addition, major predation problems have occurred with populations occupying restricted home ranges or fenced areas (Cooper 1974, Kilpatrick 1975). Compared to the northern Santa Rosa Mountains ewe group, ewe groups to the south, the majority of which do not occupy restricted home ranges, have experienced high rates of natural predation compared to urban-related mortalities (Boyce 1995). Ewe group sizes in these areas are larger than the northern Santa Rosa Mountains and San Jacinto Mountains ewe groups, and can likely tolerate such predation levels.

Coyote (*Canis latrans*), bobcat (*Lynx rufus*), mountain lion, gray fox (*Urocyon cinereoargenteus*), golden eagle (*Aquila chryseus*), and free-roaming domestic dogs prey upon bighorn sheep. Predation generally has an insignificant effect except on small populations. In recent years, mountain lion predation of Peninsular bighorn sheep appears to have increased in the northern Santa Rosa Mountains (J. DeForge, pers. comm., 1991, W. Boyce and E. Rubin, *in litt.* 1997) and sheep encounters with domestic dogs are likely to increase with more urban development. The deaths of several radio-collared Peninsular bighorn sheep in Anza Borrego State Park have been attributed to mountain lions (W. Boyce and E. Rubin, *in litt.* 1997).

D. *The inadequacy of existing regulatory mechanisms.* The Peninsular bighorn sheep has been listed as threatened by the State of California since 1971 (CDFG 1991). Pursuant to the California Fish and Game Code and the CESA, it is unlawful to import or export, take, possess, purchase, or sell any species or part or product of any species listed as endangered or threatened. Permits may be authorized for certain scientific, educational, or management purposes. The CESA requires that State agencies consult with the CDFG to ensure that actions carried out are not likely to jeopardize the continued existence of listed species. However, most of the activities occurring within the range of the Peninsular bighorn sheep are not State authorized, funded,

or permitted, resulting in few consultations under the CESA.

Shadowrock Golf Course and Altamira represent examples of locally approved projects that could have significant adverse effects on the Peninsular bighorn sheep. The City of Palm Springs approved the Shadowrock project which would eliminate important canyon bottom habitat and compromise or curtail sheep movement corridors. In addition, a settlement agreement between the developer of Shadowrock and the CDFG allows the project to proceed with only minor changes from the original design. Similarly, the City of Palm Springs has processed the Andreas Cove project proposal under a Negative Declaration, rather than the more rigorous Environmental Impact Report analysis. Moreover, the General Plans for most of the cities in the Coachella Valley inadequately address potentially significant development threats to the long-term conservation of Peninsular bighorn sheep. The Service is aware of approximately 15 additional project proposals that have the potential to adversely effect this species.

Regional conservation planning efforts are underway within the range of the Peninsular bighorn sheep, but these efforts are either incomplete, awaiting funding and implementation, or unproven for this distinct population segment. Given the development pressures and history of project approval in the Coachella Valley, the Service is concerned for the remaining Peninsular bighorn sheep in this area.

The Peninsular bighorn sheep receives some benefit from the presence of least Bell's vireo (*Vireo bellii pusillus*) and southwestern willow flycatcher (*Empidonax traillii extimus*) in its range; both are federally listed species. However, this benefit is limited due to the specialized habitats (riparian woodland) utilized by these birds. Similarly, section 404 of the Clean Water Act provides limited protection to small portions of the Peninsular bighorn sheep's range through the U.S. Army Corps of Engineers' (Corps) regulation of the discharge of dredged and fill material into certain waters and wetlands of the United States.

The California Fish and Game Code provides for management and maintenance of bighorn sheep. The policy of the State is to encourage the preservation, restoration, utilization, and management of California's bighorn sheep. The CDFG supports the concept of separating livestock from bighorn sheep (to create buffers to decrease the potential for disease transmission) through purchase and elimination of

livestock allotments. However, it has not been a policy of the CDFG to revoke current State livestock permits (State of California 1988), nor does the State have authority to regulate grazing practices on Federal lands. Accordingly, State listing has not prompted the BLM or USFS to effectively address disease transmission associated with Federal livestock grazing programs.

Since the Peninsular bighorn sheep was listed by the State of California in 1971, the CDFG has: (1) prepared management plans for the Santa Rosa Mountains and for the McCain Valley area of eastern San Diego County; (2) acquired 30,000 acres of land in the Santa Rosa Mountains; (3) initiated demographic, distributional, and disease research; and (4) established three ecological reserves that protect important watering sites. These actions are important to Peninsular bighorn sheep conservation, but, are not sufficient to stem the long-term population decline.

The BLM and the USFS manage lands that contain habitat for Peninsular bighorn sheep. The BLM has management plans that include management activities for the Peninsular bighorn sheep. The San Bernardino National Forest Plan also addresses the Peninsular bighorn sheep. Both agencies administer grazing allotments on portions of their land. The Bureau of Indian Affairs, Bureau of Reclamation, and the Department of Defense also conduct activities within or adjacent to the range of this distinct population segment. The BLM, CDFG, CDPR, USFS Service, and Service are jointly developing the Peninsular Ranges Coordinated Bighorn Sheep Metapopulation Management Plan (BLM *et al.* 1993). The completion of this plan is pending. Current Federal management plans have not stopped the decline in numbers of Peninsular bighorn sheep on Federal lands.

*E. Other natural or manmade factors affecting its continued existence.* Recurrent drought, disturbance at watering sites, urban and agricultural water withdrawals, and domestic livestock use decrease the amount of water available for Peninsular bighorn sheep. In particular, small ewe groups are affected. Peninsular bighorn sheep, similar to other bighorn sheep, exhibit a seasonal pattern of distribution based on forage and water availability. Water is available via tenajas (natural catchment basins adjacent to streams), springs, and guzzlers. During late summer and early winter (July to November), when water requirements and breeding activities are at a peak, the sheep tend to concentrate near water

sources, particularly as tenajas and springs dry up. During this time, the sheep depend on reliable water and food sources. Bighorn sheep require a quantity of water approximately equal to 4 percent of their body weight (1 gallon) per day during the summer months and a dependable water supply is needed at about 2-mile intervals (Blong and Pollard 1968). When water is not available in sufficient quantities (especially during hot, dry weather) the mortality rate for older sheep, lambs, and sick or injured animals is likely to increase.

Several studies have shown that bighorn sheep respond to human presence (as well as roads and housing developments) by altering behavior patterns to avoid contact. This behavioral response may preclude or disrupt sheep use of essential water sources, mineral licks, feeding areas, or breeding sites (Hicks and Elder 1979, Hamilton *et al.* 1982, MacArthur *et al.* 1982, Miller and Smith 1985, Krausman and Leopold 1986, Sanchez *et al.* 1988). Proposed country club/residential developments that have been approved or proposed within or immediately adjacent to Peninsular bighorn sheep habitat will substantially increase human activity. Unrestricted use of hiking and mountain bike trails in sensitive areas could further disrupt bighorn behavior and negatively affect this species. A reversal in behavior has been noted by the immediate return of Peninsular bighorn sheep to areas that were recently closed off to hikers in the Santa Rosa Mountains (e.g., Magnesia Falls Canyon) (Ken Corey, U.S. Fish and Wildlife Service, pers. com., 1997).

Some species of ornamental plants, associated with urban developments, have been attributed to causes of mortality in bighorn sheep (Wilson *et al.* 1980, DeForge 1997). Between 1991 and 1996, five Peninsular bighorn sheep in the northern Santa Rosa Mountains ewe group died from ingesting ornamental, toxic plants such as oleander (*Nerium oleander*) and laurel cherry (*Prunus* sp.) (DeForge and Ostermann 1997). A toxic, ornamental nightshade plant may have caused the death of a young ram (a necropsy revealed an unknown species of nightshade) in Palm Springs in 1970 (Weaver and Mensch 1970). Due to the absence of comprehensive studies of the toxicity of ornamental plants to bighorn sheep, only the two plant species mentioned above are known to be poisonous to the Peninsular bighorn sheep. It is expected that more species of ornamental plants are toxic to this species (DeForge, pers. comm. 1997).

Collisions with vehicles also are a source of Peninsular bighorn sheep

mortality. Turner (1976) reported Peninsular bighorn sheep being killed as a result of automobile collisions on Highway 74 in areas where blind curves exist in known sheep movement areas. The Thunderbird Estates and golf course is located across Highway 111 (on the east side) from Peninsular bighorn sheep habitat in Rancho Mirage. Individuals from the northern Santa Rosa Mountains ewe group cross over Highway 111, or use a flood control channel that is under Highway 111, to access forage and water at this golf course (DeForge, pers. comm. 1997). Dominant ewes will lead five to seven other ewes and rams to the golf course across Highway 111 which has led to collisions with automobiles (DeForge, pers. comm. 1997). DeForge and Ostermann (1997) also reported that nine Peninsular bighorn sheep in the Santa Rosa Mountains were hit and killed by automobiles between 1991 and 1996, and in combination with other urban-related factors, accounted for the majority of mortalities.

The Peninsular bighorn sheep apparently is currently functioning as a metapopulation (BLM *et al.* 1993, Boyce *et al.* 1997); there is interaction between separate groups. However, the potential loss of dispersal corridors and habitat fragmentation by residential and commercial development and roads and highways may isolate certain groups. Isolation increases the chances for inbreeding depression by preventing rams from moving among ewe groups and eliminating exploratory and colonizing movements by ewe groups into new or former habitat. Inbreeding and the resultant loss of genetic variability can result in reduced adaptiveness, viability, and fecundity, and may result in local extirpations. Small, isolated groups are also subject to extirpation by naturally occurring events such as fire. Although inbreeding has not been demonstrated in the Peninsular bighorn sheep, the number of sheep occupying many areas is critically low. The minimum size at which an isolated group can be expected to maintain itself without the deleterious effects of inbreeding is not known. Researchers have suggested that a minimum effective population size of 50 is necessary to avoid short-term inbreeding depression, and 500 to maintain genetic variability for long-term adaptation (Franklin 1980). Berger (1990) studied bighorn sheep populations in the southwestern United States and found that all populations with less than 50 individuals became extinct within 50 years. Berger (1990) concluded that extinction in

populations of this size cannot be overcome without intensive management, because 50 individuals, even in the short-term, do not constitute a viable population size. This issue is complicated because of the structure and function of bighorn sheep populations. Because they appear to be functioning as a type of metapopulation, the effective size of a population is actually larger. That is, adjacent groups must be taken into consideration in determining the long-term viability of a group or an assemblage of groups. For example, connected groups (ewe herds) can be isolated from the other groups through the loss of intervening groups. The loss of an intervening group is detrimental to the long-term viability of the overall population due to the loss itself, and through the potential genetic and demographic isolation of the remaining groups. Other causes of mortality such as road kills may significantly affect the continued survival of small groups that are experiencing depressed recruitment.

The Service has carefully assessed the best scientific and commercial information available regarding the past, present, and future threats faced by this distinct vertebrate population segment in determining to make this rule final. Based on this evaluation, the Service finds that the Peninsular bighorn sheep is in danger of extinction throughout a significant portion of its range due to: (1) disease; (2) insufficient lamb recruitment; (3) habitat loss, degradation, and fragmentation by urban and commercial development; and (4) predation coinciding with low population numbers. Because of the threats and the decline of the species, the preferred action is to list the Peninsular bighorn sheep as endangered. Threatened status would not accurately reflect the rapid, ongoing decline of, and imminent threats to, the Peninsular bighorn sheep.

#### **Status of Peninsular Bighorn Sheep Currently Held in Captivity**

Under section 9(b)(1) of the Act, certain prohibitions applicable to listed species would not apply to Peninsular bighorn sheep held in captivity or in a controlled environment on the date of publication of any final rule, provided that such holding and subsequent holding or use of these sheep was not in the course of a commercial activity. In addition, certain prohibitions applicable to listed species would not apply to Peninsular bighorn sheep taken by hunters prior to publication of this final rule.

#### **Critical Habitat**

Critical habitat is defined in section 3 of the Act as: (i) the specific areas within the geographical area occupied by a species, at the time it is listed in accordance with the Act, on which are found those physical or biological features (I) essential to the conservation of the species and (II) that may require special management considerations or protection; and (ii) specific areas outside the geographical area occupied by a species at the time it was listed, upon a determination that such areas are essential for the conservation of the species. "Conservation" means the use of all methods and procedures needed to bring the species to the point at which listing under the act is no longer required.

Section 4(a)(3) of the Act, as amended, and its implementing regulations (50 CFR 424.12) require 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 designation of critical habitat is not prudent for the Peninsular bighorn sheep distinct population segment. Service regulations (50 CFR 424.12(a)(1)) state that designation of critical habitat is not prudent when one or both of the following situations exist: (1) the identification of critical habitat can be expected to increase the degree of threat to the species, or (2) such designation of critical habitat would not be beneficial to the species.

The Service concludes that critical habitat designation for the Peninsular bighorn sheep is not prudent because both of the described situations exist. Bighorn sheep life history research and population status surveys have been conducted for over 40 years (DeForge *et al.* 1995) and much of this work is ongoing. As a consequence, the distribution and location of Peninsular bighorn sheep in the United States are well known within the scientific community. The Peninsular bighorn sheep is a majestic and popular animal in the eyes of the general public. Attractive areas for recreational hiking and possible observation points for Peninsular bighorn sheep have been identified in commercially available information sources (Palm Springs Desert Access Guide (BLM 1978); Santa Rosa Mountains National Scenic Area Trails Map (Coachella Valley Trails Council 1995); Palm Canyon Trail Map 1995). The cumulative pressure of human attraction to the scenic canyons and mountains occupied by bighorn sheep has led to the proliferation of

new, unauthorized trails that are becoming an increasing concern of land management agencies and scientific organizations. Annual aerial censuses by the Bighorn Institute and CDFG recently identified several new trails through important habitat areas in the vicinity of La Quinta (J. DeForge, pers. comm., 1998). Similarly, BLM recently discovered a newly constructed trail on its lands in the hills above Cathedral City and Rancho Mirage, through a lambing area. BLM and others are attempting to rehabilitate the trail (J. Dugan, pers. comm. 1997).

The majority of sheep range is owned by State and Federal agencies and managed for multiple human uses, especially recreational pursuits. Four of eight ewe groups in the U.S. largely occur in the Anza Borrego State Park, renowned as a premier hiking and camping destination. The remaining four ewe groups largely occur within BLM's Santa Rosa Mountains National Scenic Area, which is intended to expand recreational opportunities through acquiring private lands for public use and enjoyment. Coachella Valley commercial interests are aggressively promoting and developing outdoor recreational industries that capitalize on the scenic beauty of the Santa Rosa and San Jacinto mountains. These industries and activities include jeep nature tours, mountain biking, hiking, horseback riding, dog walking, camping, sight-seeing, and other ecotourist forms of recreation in bighorn sheep habitat that often use bighorn sheep images as advertising themes, corporate and civic logos, etc. During the more temperate months of October through April, the Coachella Valley attracts millions of tourists and seasonal residents from across the Country and around the world. The timing of maximum human use levels corresponds with particularly sensitive periods in bighorn sheep life history, including the lambing season, rut, and the late summer water stress period.

Publication of detailed critical habitat maps and descriptions, as required with critical habitat designation, would make the location of bighorn sheep more readily available to the general public and serve as further advertisement for human uses in sensitive areas. Human activity in bighorn sheep habitat has been identified as a threat (see Factor E of "Summary of Factors Affecting the Species"). An increase in human activity, even when harm is not intended, would disrupt bighorn sheep behavior and could cause abandonment of essential environments (e.g., lambing areas or watering holes) (Cowan and Geist 1971, Hicks and Elder 1979,

MacArthur *et al.* 1982, Hamilton *et al.* 1982, Sanchez *et al.* 1988). Desert-dwelling bighorn sheep are inherently slow to recolonize vacant habitat (Bleich *et al.* 1990). Thus, critical habitat designation would increase the degree of threat to the Peninsular bighorn sheep and result in harm to this distinct population segment rather than aid in its conservation.

In addition, designation of critical habitat likely would not benefit the conservation of this distinct population segment. Section 7(a)(2) of the Act requires Federal agencies, in consultation with the Service, to ensure that any action authorized, funded or carried out by such agency, does not jeopardize the continued existence of a federally listed species or result in the destruction or adverse modification of designated critical habitat. This latter requirement is the only mandatory legal consequence of a critical habitat designation. Critical habitat designation provides protection only on Federal lands or on private or State lands when there is Federal involvement through authorization or funding of, or participation in, a project or activity. Almost half the habitat land area occupied by the Peninsular bighorn sheep in the United States is owned and managed by the State of California. The remainder is almost evenly divided between private and Federal ownership (see BACKGROUND section). The protection afforded under section 7 seldom extends onto State lands. Therefore, any potential designation of critical habitat on State lands (which account for about half of the U.S. range) would not be expected to benefit the bighorn sheep. Similarly, a section 7 nexus would seldom occur on private lands occupied by bighorn sheep because arid, upland habitats typically do not support jurisdictional waters or wetlands regulated under section 404 of the Clean Water Act.

Section 7 consultation is most likely to occur with the BLM concerning minerals rights for mining, granting of rights-of-way, recreational use permits, and management of grazing allotments. In addition, consultation with the Corps through permit application review under section 404 of the Clean Water Act may occur.

With about 75 percent of the U.S. range occurring on State and private lands with a limited section 7 nexus, potential benefits largely would be restricted to the remaining 25 percent of habitat that occurs on Federal lands. However, designation of those areas necessary for conservation (i.e., recovery) of the species cannot be accomplished primarily on Federal

lands. In addition, for recovery planning under section 4 of the Act, designating critical habitat would not aid in creating a Peninsular bighorn sheep management plan, addressing transmission of diseases and establishing numerical population goals for long-term survival of the species, nor directly affect areas not designated as critical habitat. These types of issues will be addressed through the recovery planning process, wherein the Service establishes a framework for cooperation among key stakeholders and interest groups to prepare and implement a recovery plan based on private and public sector collaboration in defining and achieving recovery.

The Service acknowledges that critical habitat designation may provide some benefits to a species by identifying areas important to a species' conservation and calling attention to those areas in special need of protection. A critical habitat designation contributes to species conservation primarily by highlighting important habitat areas and by describing the features within those areas that are essential to the species. However, the Service is pursuing alternative means to achieve the objective of disseminating information on important habitat areas by working directly with Federal and State land agencies and private landowners to develop a coordinated management plan for the Peninsular bighorn sheep.

In summary, there would be substantial risks to this bighorn sheep distinct population segment by publicizing maps of areas of occupancy and locations of habitats. Weighed against the fact that there would be little or no additional benefit to the species, the Service finds that designation of critical habitat for the Peninsular bighorn sheep is not prudent.

The Service will continue in its efforts to obtain more information on Peninsular bighorn sheep biology and ecology, including essential habitat characteristics, current and historic distribution, disease control, and other factors that would contribute to the conservation of the species. The information resulting from these efforts will be used to identify measures needed to achieve conservation of the species, as defined under the Act. Such measures could include, but are not limited to, development of a recovery plan, agency management plans, and conservation agreements with the State, other Federal agencies, local governments, and private landowners and organizations.

#### 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 activities. 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 the States and requires that recovery actions be carried out for all listed species. 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 Endangered Species Act are codified at 50 CFR part 402. Section 7(a)(4) of the Act requires Federal agencies to confer informally with the Service on any action that is likely to jeopardize the continued existence of a proposed species or result in destruction or adverse modification of proposed critical habitat. If a species is subsequently listed, section 7(a)(2) requires Federal agencies to ensure that activities they authorize, fund, or carry out are not likely to jeopardize the continued existence of such a species or to destroy or adversely modify its critical habitat. If a Federal agency action may affect a listed species or its critical habitat, the responsible Federal agency must enter into consultation with the Service.

Federal agency actions that may require conference and/or consultation as described in the preceding paragraph include those within the jurisdiction of the Bureau of Indian Affairs, BLM, USFS, Corps, and Department of Defense. The Peninsular bighorn sheep occurs on private and State-owned land as well. Where the Peninsular bighorn sheep occurs on private lands there is little or no Federal involvement except where access is provided over Federal lands or permits are required from the Corps under the Clean Water Act. The BLM and COE are currently conferencing with the Service under section 7 of the Act to address the impacts associated with granting rights-of-way for several activities (e.g., recreational access).

The Act and implementing regulations found at 50 CFR 17.21 set



forth a series of general prohibitions and exceptions that apply to all endangered wildlife. The prohibitions, as codified at 50 CFR 17.21, in part, make it illegal for any person subject to the jurisdiction of the United States to take (including harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt any such conduct), import or export, transport in interstate or foreign commerce in the course of 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 taken illegally. Certain exceptions apply to agents of the Service and State conservation agencies.

Permits may be issued to carry out otherwise prohibited activities involving endangered wildlife species under certain circumstances. Regulations governing permits are at 50 CFR 17.22, 17.23, and 17.32. For endangered species, such permits are available for scientific purposes, to enhance the propagation or survival of the species, or for incidental take in connection with otherwise lawful activities.

It is the policy of the Service, published in the **Federal Register** on July 1, 1994 (59 FR 34272), to identify to the maximum extent practical at the time a species is listed those activities that would or would not constitute a violation of section 9 of the Act. The intent of this policy is to increase public awareness of the effect of a listing on proposed and ongoing activities within a species' range. Activities that the Service believes could potentially harm the Peninsular bighorn sheep and result in take include, but are not limited to:

(1) Unauthorized trapping, capturing, handling or collecting of Peninsular bighorn sheep. Research activities, where sheep are trapped or captured, will require a permit under section 10(a)(1)(A) of the Endangered Species Act.

(2) Unauthorized destruction or degradation of habitat through, but not limited to, clearing vegetation, bulldozing terrain, and disturbing natural drainage systems;

(3) Unauthorized destruction of habitat that will likely lead to habitat fragmentation and isolation of ewe herds.

(4) Unauthorized livestock grazing that could result in transmission of disease or habitat destruction.

Activities that the Service believes are unlikely to result in a violation of section 9 are:

(1) Possession, delivery, or movement, including interstate transport and import into or export from the United States, involving no commercial activity, of dead specimens of this distinct population segment that were collected prior to the date of publication in the **Federal Register** of the final regulation adding this distinct population segment to the list of endangered species;

(2) Accidental roadkills or injuries by vehicles conducted in compliance with applicable laws, on designated public roads as constructed upon the date of publication in the **Federal Register** of the final regulation adding this distinct population segment to the list of endangered species;

(3) Normal, authorized recreational activities in designated campsites and on authorized trails.

(4) Lawful residential lawn maintenance activities including the clearing of vegetation as a fire break around one's personal residence.

Questions regarding any specific activities should be directed to the Service's Carlsbad Field Office (see **ADDRESSES** section). Requests for copies of the regulations regarding listed wildlife and about prohibitions and permits may be addressed to the U.S. Fish and Wildlife Service, Ecological Services, Endangered Species Permits, 911 Northeast 11th Avenue, Portland, Oregon 97232-4181 (503/231-6241; FAX 503/231-6243)

#### Reasons for Effective Date

The Service is concerned that the issuance of the final rule for the Peninsular bighorn sheep may result in the destruction of habitat essential for maintaining the San Jacinto and Santa Rosa Mountain herds. In addition, any delay in the effective date of this rule provides an opportunity for habitat destruction in other portions of its range in the United States. Habitat has been destroyed outside the regulatory process at the Traditions Project in La Quinta. There is an existing golf course development proposal to grade essential habitat in the Palm Springs area. Because of the immediate threat posed by these activities, the Service finds that

good cause exists for this rule to take effect immediately upon publication in accordance with 5 U.S.C. § 553(d)(3).

#### National Environmental Policy Act

The Fish and Wildlife Service has determined that an Environmental Assessment, 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).

#### Required Determinations

This rule does not contain collections of information that require approval by the Office of Management and Budget under 44 U.S.C. 3501 *et seq.*

#### References Cited

A complete list of references cited in this rule is available upon request from the Carlsbad Field Office of the U.S. Fish and Wildlife Service (see **ADDRESSES** section).

Author: The primary author of this final rule is Arthur Davenport of the Carlsbad Field Office (see **ADDRESSES** section).

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

Endangered and threatened species, Exports, Imports, Reporting and record-keeping requirements, Transportation.

#### Regulation Promulgation

Accordingly, the Service amends Part 17, Subchapter B of the Chapter I, Title 50 of the Code of Federal Regulations, as set forth below:

#### PART 17—[AMENDED]

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

**Authority:** 16 U.S.C. 1361–1407; 16 U.S.C. 1531–1544; 16 U.S.C. 4201–4245; Pub. L. 99–625, 100 Stat 3500; unless otherwise noted.

2. Amend § 17.11(h) by adding the following, in alphabetical order under MAMMALS, to the List of Endangered and Threatened Wildlife:

#### § 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						
Mammals:							
*	*	*	*	*	*	*	*
Bighorn sheep, (Peninsular Ranges population).	<i>Ovis canadensis</i> .....	U.S.A. (western conterminous states), Canada (southwest), Mexico (north).	U.S.A., Peninsular Ranges of CA.	E	634	NA	NA
*	*	*	*	*	*	*	*

Dated: March 6, 1998.

**Jamie Rappaport Clark,**

*Director, Fish and Wildlife Service.*

[FR Doc. 98-6998 Filed 3-17-98; 8:45 am]

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## DEPARTMENT OF COMMERCE

### National Oceanic and Atmospheric Administration

#### 50 CFR Part 679

[Docket No. 971208298-8055-02; I.D. 031398A]

#### Fisheries of the Exclusive Economic Zone Off Alaska; Inshore Component Pollock in the Aleutian Islands Subarea

**AGENCY:** National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Commerce.

**ACTION:** Closure.

**SUMMARY:** NMFS is prohibiting directed fishing for pollock by vessels catching pollock for processing by the inshore component in the Aleutian Islands subarea (AI) of the Bering Sea and Aleutian Islands management area (BSAI). This action is necessary to prevent exceeding the amount of the 1998 pollock total allowable catch (TAC) apportioned to vessels catching pollock for processing by the inshore component in the AI of the BSAI.

**DATES:** Effective 1200 hrs, Alaska local time (A.l.t.), March 13, 1998, until 2400 hrs, A.l.t., December 31, 1998.

**FOR FURTHER INFORMATION CONTACT:** Mary Furuness, 907-586-7228.

**SUPPLEMENTARY INFORMATION:** The groundfish fishery in the BSAI exclusive economic zone is managed by the NMFS according to the Fishery Management Plan for the Groundfish Fishery of the Bering Sea and Aleutian Islands Area (FMP) prepared by the North Pacific Fishery Management Council under authority of the Magnuson-Stevens Fishery Conservation and Management Act. Fishing by U.S. processors is governed by regulations implementing the FMP at subpart H of 50 CFR part 600 and 50 CFR part 679.

In accordance with § 679.20(c)(3)(iii), the amount of the 1998 pollock total allowable catch (TAC) apportioned to vessels catching pollock for processing by the inshore component in the AI of the BSAI was established as 7,705 metric tons (mt) by the Final 1998 Harvest Specifications of Groundfish for the BSAI (to be published March 16, 1998).

In accordance with § 679.20(d)(1)(i), the Administrator, Alaska Region, NMFS (Regional Administrator), has determined that the amount of the 1998 pollock TAC apportioned to vessels catching pollock for processing by the inshore component in the AI of the BSAI will soon be reached. Therefore, the Regional Administrator is establishing a directed fishing allowance of 7,205 mt, and is setting aside the remaining 500 mt as bycatch to support other anticipated groundfish fisheries. In accordance with § 679.20(d)(1)(iii), the Regional Administrator finds that this directed fishing allowance will soon be reached. Consequently, NMFS is prohibiting directed fishing for pollock by vessels catching pollock for processing by the

inshore component in the AI of the BSAI.

Maximum retainable bycatch amounts for applicable gear types may be found in the regulations at § 679.20(e) and (f).

#### Classification

This action responds to the best available information recently obtained from the fishery. It must be implemented immediately in order to prevent overharvesting the amount of the 1998 pollock TAC apportioned to vessels catching pollock for processing by the inshore component in the AI of the BSAI. A delay in the effective date is impracticable and contrary to the public interest. The fleet has already taken the amount of the 1998 pollock TAC apportioned to vessels catching pollock for processing by the inshore component in the AI of the BSAI. Further delay would only result in overharvest which would disrupt the FMP's objective of providing sufficient pollock as bycatch to support other anticipated groundfish fisheries. NMFS finds for good cause that the implementation of this action can not be delayed for 30 days. Accordingly, under 5 U.S.C. 553(d), a delay in the effective date is hereby waived.

This action is required by § 679.20 and is exempt from review under E.O. 12866.

**Authority:** 16 U.S.C. 1801 *et seq.*

Dated: March 13, 1998.

**Gary C. Matlock,**

*Director, Office of Sustainable Fisheries, National Marine Fisheries Service.*

[FR Doc. 98-7030 Filed 3-13-98; 3:48 pm]

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