

type of post-fire reproductive strategy "obligate-seeders." The Service also implied in the proposed rule that fire, which can remove competing vegetation and counter mechanisms that prevent seed germination (e.g., hormones, impervious seed coat), is necessary for the maintenance of *A. imbricata* because sexual reproduction by seed is important to the maintenance of genetic diversity. Although germination of its seed bank (seeds accumulated in the soil and canopy of mature shrubs) is triggered mainly by fire, occasional germination and establishment of *A. imbricata* does occur without the aid of fire (R. Gankin, *in litt.*, 1994). Moreover, *A. imbricata* can spread vegetatively and reportedly is spreading on San Bruno Mountain (R. Gankin, *in litt.*, 1994). Thus, fire is not necessary for maintenance of the species.

The Service asserted in the proposed rule that if the amount of time between fires were too long, *Arctostaphylos imbricata* would have little opportunity to reproduce sexually and individuals could become senescent. However, Keeley (1977) argued that the reproductive strategy of obligate-seeders such as the non-sprouting manzanita species is an adaptation to a long-interval fire cycle. Obligate-seeders tend to occur in less fire-prone areas, like San Bruno Mountain which is often shrouded in fog during the summer (D. Schooley, Bay Area Land Watch, *in litt.*, 1994), that generally burn more intensely when fires do occur (Keeley 1977). Consequently, *A. imbricata* and other obligate-seeders "are resilient to very long intervals [between fires] and successful seedling recruitment is observed after fires in stands which may exceed 100 years of age" (Keeley *et al.* 1988). In addition, fires burned colonies of *A. imbricata* on San Bruno Mountain in 1964 and in the late 1980's. Even though all of the individuals in the colony which burned in the 1980's were killed, significant regeneration did take place (R. Gankin, *in litt.*, 1994). Also, both regeneration from seed and spreading by layering has occurred in the colony which burned in 1964 (D. Schooley, *in litt.*, 1994). For these reasons, the Service concludes that the prolonged absence of fire does not threaten *A. imbricata* now and will not in the foreseeable future.

The Service also stated in the proposed rule that a reduction in fire frequency could pose a threat to the species because periodic fires reduce competition and shading by other plant species. On San Bruno Mountain, *Arctostaphylos imbricata* grows on rocky exposed areas such as open ridges. On such sites, the lack of soil

development precludes significant establishment of other plant species; the species most likely to pose a threat through overtopping and consequent shading, *Ceanothus thyrsiflorus*, is a short-lived species that does not do well on such undeveloped soils (R. Gankin, *in litt.*, 1994). The Service now concludes, on the basis of the foregoing evidence, that the prolonged absence of fire is not likely to result in significant establishment of other plant species and that therefore competition from (including shading by) other plant species does not pose a significant threat to the survival of *A. imbricata*.

Frequent fire, that is fire recurring within a short period of time (fewer than 15 years), can result in local extinctions (Zedler *et al.* 1983 in Keeley and Keeley 1988). As discussed above and in the proposed rule, on San Bruno Mountain *Arctostaphylos imbricata* grows on rocky exposed areas such as open ridges. Because such open sites lack sufficient fine fuels (i.e., dried grass and herbs) to sustain fire or carry fire from adjoining, more densely vegetated habitat, the Service concludes that fire is unlikely to occur frequently in *A. imbricata* habitat and that, therefore, frequent fire is not a significant threat to the species.

The Service has carefully assessed the best scientific and commercial information available regarding the past, present, and future threats faced by *Arctostaphylos imbricata* in determining to withdraw the proposed rule to list the species as threatened. The Service has determined that implementation of the San Bruno Mountain HCP, which includes monitoring and management of *A. imbricata*, sufficiently removes the threats to the species and provides for its conservation. Furthermore, the Service has determined that the threats identified in the proposed rule pertaining to fire frequency and overutilization for horticultural purposes are not likely to pose a significant risk to the survival of *A. imbricata*.

Author: The primary author of this document is Diane Windham, Sacramento Field Office (see ADDRESSES section).

Authority: The authority for this action is section 4(b)(6)(B)(ii) of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*).

Dated: April 8, 1997.

John G. Rogers,
Acting Director, U.S. Fish and Wildlife Service.

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DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

Endangered and Threatened Wildlife and Plants: Notice of Availability of a Draft Recovery Plan for the Lee County Cave Isopod for Review and Comment

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Notice of document availability.

SUMMARY: The U.S. Fish and Wildlife Service announces the availability for public review of a draft Recovery Plan for the Lee County Cave Isopod (*Lirceus usdagalun*). The Lee County cave isopod, a subterranean freshwater crustacean, is endemic to southwestern Virginia, where it has been documented from two cave systems and two resurgence springs in Lee County. The Lee County cave isopod was listed as endangered in 1992. The draft recovery plan sets recovery objectives and recommends recovery activities that, if implemented on schedule, may lead to delisting of this species by the year 2005. The Service solicits review and comment from the public on this draft plan.

DATES: Comments on the draft recovery plan must be received August 4, 1997.

ADDRESSES: Persons wishing to review the draft recovery plan can obtain a copy from the U.S. Fish and Wildlife Service, Southwestern Virginia Field Office, P.O. Box 2345, Abingdon, Virginia (telephone 540/623-1233; fax 540/623-1185) or U.S. Fish and Wildlife Service, Region Five, 300 Westgate Center Drive, Hadley, Massachusetts 01035, (telephone 413/253-8628; fax 413-253-8482). Comments should be sent to the U.S. Fish and Wildlife Service, Southwestern Field Office at the above mailing address, to the attention of Leroy Koch.

FOR FURTHER INFORMATION CONTACT: Leroy Koch at 540/623-1233 (see ADDRESSES).

SUPPLEMENTARY INFORMATION:

Background

Restoring an endangered or threatened animal or plant to the point where it is again a secure, self-sustaining member of its ecosystem is a primary goal of the U.S. Fish and Wildlife Service's endangered species program. To help guide the recovery effort, the Service is working to prepare recovery plans for most of the listed species native to the United States. Recovery plans describe actions considered necessary for conservation of

the species, establish criteria for the recovery levels for reclassifying or delisting them, and estimate time and cost for implementing the recovery measures needed.

The Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*) requires the development of recovery plans for listed species unless such a plan would not promote the conservation of a particular species. Section 4(f) of the Act, as amended in 1988, requires that public notice and an opportunity for public review and comment be provided during recovery plan development. The Service will consider all information presented during a public comment period prior to approval of each new or revised recovery plan. The Service and other Federal agencies will also take these comments into account in the course of implementing recovery plans.

The document submitted for review is the draft Lee County Cave Isopod (*Lirceus usdagalun*) Recovery Plan. The Lee County cave isopod is a cave-dwelling freshwater crustacean listed as an endangered species. It is endemic to southwestern Virginia, where it has been documented from only cave systems and two resurgence springs (presumably associated with undiscovered cave systems) in Lee County. The aquatic habitat of this isopod occurs in the central Lee County Karst, a gently rolling region characterized by exposed limestone ridges with karren development, numerous sinkholes, blind valleys, sinking streams, subterranean drainage, and caves. The historic distribution of the species within the four cave systems comprises six known site occurrences, one which is considered extirpated due to massive organic pollution of the cave stream ecosystem. The primary threat to the remaining sites is potential degradation of groundwater quality resulting from surrounding land uses. All known Lee County cave isopod sites are on private land, and many landowners in the region are unaware of the critical link between surface water

and groundwater quality, as is evident by the use of sinkholes as disposal areas for household, industrial, and agricultural waste products. Logging and sawmill operations are prominent uses of the lands surrounding the cave systems in Lee County; such operations represent a potentially significant threat to karst ecosystems because leachate from organic decomposition of the sawdust material can travel from surface to groundwater. Other potential threats to the species' habitat include non-point-source pollution, inadequate or failing septic systems, toxic spills along roadways, and accelerating development along U.S. Route 58.

To facilitate protection and recovery of this rare species, the following objectives and conditions for meeting objectives are recommended. To reclassify the Lee County cave isopod from endangered to threatened status: (1) Completely delineate the likely range, current and historical, of the species' distribution; (2) gain a sufficient understanding of the surface and subterranean drainage patterns with the species' known range to enable monitoring and management; (3) show that populations of the isopod in at least four cave systems are improving or stable over a two-year monitoring period; and (4) establish a groundwater monitoring program in systems known to contain the isopod, with results over a two-year period showing the groundwater quality and quantity are being maintained at levels needed to ensure the survival of this species. To delist the Lee County cave isopod in addition to the preceding conditions: (1) Show that populations of the isopod in at least four cave systems are stable over an additional three-year monitoring period; (2) demonstrate that groundwater quality and quantity are being maintained over an additional three-year monitoring period at levels needed to ensure the survival of this species; (3) achieve permanent protection from significant groundwater contamination for all sites known to support the Lee County cave isopod.

The Lee County cave isopod draft recovery plan also recommends a number of activities needed to achieve these recovery objectives. Ongoing and proposed recovery activities include: surveys to determine the location and extent of all area supporting this isopod; monitoring of Lee County cave isopod populations; life history and other research to determine what constitutes a viable and/or stable population of Lee County cave isopod; further studies and mapping of the surface and subterranean drainage systems in which the isopod occurs; monitoring of water quality and quantity and isopod habitat at selected sites; identification of those factors that adversely affect the species and actions to eliminate or minimize such impacts; implementation of habitat protection measures for known populations of Lee County cave isopod; educational and awareness programs for landowners, governmental agencies, and nongovernmental organizations; if and as needed, restoration of populations of the Lee County cave isopod to former habitat; and monitoring of recovery progress.

The draft recovery plan revision is being submitted for agency review. After consideration of comments received during the review period, the plan will be submitted for final approval.

Public Comments Solicited

The Service solicits written comments on the recovery plan described. All comments received by the date specified above will be considered prior to approval of the plan.

Authority

The authority for this action is Section 4(f) of the Endangered Species Act, 16 U.S.C. 1533(f).

Dated: June 10, 1997.

Adam O'Hara,

Acting Regional Director, Region 5.

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