
50 CFR Part 17

Endangered and Threatened Wildlife and Plants; Determination of Endangered Status for the Shasta Crayfish

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Final rule.

SUMMARY: The U.S. Fish and Wildlife Service (Service) determines the Shasta (placid) crayfish (*Pacifastacus fortis*) to be an endangered species. This species

occurs only in Shasta County, California, within the Pit River drainage system including tributaries of the Hat Creek and Fall River subdrainages. This crayfish is a slow-maturing, relatively long-lived, passive species with low fecundity. Its preferred habitat is spring-fed lakes and slowly to moderately flowing cool rivers and streams. These waters typically have low turbidity, few suspended particles, excellent water quality, little vegetation, and adequate rubble substrate. The Shasta crayfish is uncommon and the overall population

could number fewer than 3,000 individuals located in the Fall River and Hat Creek subdrainages. A survey conducted in 1985 by the California Department of Fish and Game (CDFG) showed that the Shasta crayfish has been extirpated from approximately one-half of its known range since 1978. Throughout the approximate remaining 2,000 acres of habitat, the Shasta crayfish is endangered by: competition for food and space with two aggressive, adaptive, exotic crayfish species; agricultural development; increased residential development; and aquatic habitat loss because of water diversion and impoundment projects. Continued habitat loss and degradation present substantial threats to the existence of this crayfish. This rule implements the protection provided under the Endangered Species Act of 1973, as amended (Act), for the Shasta crayfish.

EFFECTIVE DATE: October 31, 1988.

ADDRESSES: The complete file for this rule is available for inspection, by appointment, during normal business hours at the Endangered Species Office, U.S. Fish and Wildlife Service, 2800 Cottage Way, Room E-1823, Sacramento, California 95825.

FOR FURTHER INFORMATION CONTACT: Mr. Gail C. Kobetich, Field Supervisor, Endangered Species Office, at the above address (916/978-4866 or FTS 460-4866).

SUPPLEMENTARY INFORMATION:

Background

The Shasta crayfish [*Pacifastacus fortis* (Faxon)] is a decapod crustacean of the family Astacidae. William Faxon (1914) originally described this crayfish as *Astacus nigrescens fortis* from specimens taken from Fall River and Hat Creek near Cassel in 1898. Bott (1950) revised the subfamily Astacinae, creating the new genus *Pacifastacus*, which contained most of the western North American species of the subfamily. Bott (1950) limited the members of the genus *Astacus* to the Eurasian species. Bouchard (1977a) subdivided the genus *Pacifastacus* into two subgenera, *Pacifastacus* and *Hobbsastacus*. *Pacifastacus fortis*, which Hobbs (1972) elevated to a species, belongs to the subgenus *Hobbsastacus*.

Adult Shasta crayfish are small- to medium-sized crayfish which may reach 25 to 50 millimeters (1–2 inches) total length of the carapace (shell covering the back over the walking legs). The color is variable and may range from dark brownish-green to dark brown on the topside and bright orange on the underside. Occasional blue-green to light blue individuals are found in

isolated populations (McGriff, personal communication 1986). These blue crayfish have a light salmon color on their undersides. Members of the Fall River population are dark orange-brown on the topside and bright red on the underside, especially on the chelae (pinchers) (Eng and Daniels 1982). These colors (except the blue) provide camouflage for the crayfish among the volcanic rubble substrates of its habitat.

The adults of *P. fortis* are sexually dimorphic and can easily be distinguished because the males have narrower abdomens and larger chelae than the females. The first two pair of swimmerets (tiny swimming legs) of the males are hard and modified for sperm transfer to the female during mating. These notable sexual characteristics can be seen in young larvae that are less than 11 millimeters (.4 inches) in total carapace length (Eng and Daniels 1982).

Pacifastacus fortis is found only in Shasta County, California, in the Pit River drainage and two tributary systems, Fall River and Hat Creek subdrainages. In the Hat Creek subdrainage, populations have been found in Lost Creek and in Crystal, Baum, and Rising River Lakes. In the Fall River subdrainage, populations occur in the following bodies of water: Fall River; Big Lake (Horr Pond); Bit Tule River; Spring, Mallard, Squaw, and Lava Creeks; and in Crystal, Thousand, and Rainbow Springs. An additional population was extirpated in Sucker Spring Creek, a tributary of the Pit River at Powerhouse I, which lies between the two subdrainages (Bouchard 1978, Eng and Daniels 1982). The populations in Lake Britton, and in Burney, Clark, Kosk, Goose, Lost, and Rock Creeks were extirpated prior to 1974 (Bouchard 1977b). Since 1978, the Shasta crayfish has been extirpated from Baum Lake and Spring Creek near its confluence with the Pit River (Darlene McGriff CDFG, personal communication 1986).

Daniels (1980) reported the relative density of *P. fortis* in Crystal Lake as 6.89 crayfish per square meter versus 0.09 crayfish per square meter for Baum Lake in 1978. He also reported an average density of 3.81 crayfish per square meter for the introduced signal crayfish (*Pacifastacus leniusculus*) in Baum Lake. Although Daniels observed one gravid signal crayfish in Crystal Lake, this exotic was not considered established at that time, and a density estimate was not calculated for it at this site. The signal crayfish is a known competitor of the Shasta crayfish and seemingly was responsible for the low density of the native crayfish in Baum Lake. Recent surveys (1986) by CDFG confirmed the loss of the Shasta crayfish

population in Baum Lake and a large decline in numbers in Crystal Lake, and attributed these changes to the establishment of exotic crayfish.

During 1985 and 1986, surveys revealed that most Shasta crayfish were found in the Fall River subdrainage (McGriff, personal communication 1986). At the Spring Creek confluence with the Pit River, *P. leniusculus* and a second exotic crayfish species, *Orconectes virilis* were present, but there were no *P. fortis* in 1985 (McGriff, personal communication 1986). In a few locations, the Shasta crayfish occurs sympatrically with both exotic species; however, it is much less common at these sites. It is not known if the Shasta crayfish and the two exotic crayfish species can coexist permanently. Cases of apparent sympatry may be the result of Shasta crayfish having washed down from upstream populations and may not reflect coexisting breeding populations. All distributional information indicates that these two exotic species can outcompete native species (Bouchard 1977, Riegel 1959, Schwartz *et al.* 1963).

Shasta crayfish occur in cool, clear, spring-fed lakes, rivers, and streams, usually at or near a spring inflow source, where waters show relatively little annual fluctuation in temperature and remain cool during the summer. Most are found in lentic and slowly to moderately flowing waters. Although Shasta crayfish have been observed in groups under large rocks situated on clean, firm sand or gravel substrates (Bouchard 1978, Eng and Daniels 1982), they also have been observed on a fine, probably organic, material 1–3 centimeters (.4 to ½ inches) thick on the bottom of Crystal Lake. *Pacifastacus fortis* is most abundant where plants are absent. Another important habitat requirement appears to be the presence of adequate volcanic rock rubble to provide escape cover from predators.

Although the food habits of the Shasta crayfish are not well known, the morphology of the mouthparts suggests that the species relies primarily on predation, browsing on encrusting organisms, and grazing on detritus to obtain food. Aquatic invertebrates and dead fish probably provide food for the crayfish, although its main food source is unknown. Unlike most crayfish that feed during the day, the Shasta crayfish probably feeds mainly at night (Eng and Daniels 1982).

P. fortis, like most crayfish, is solitary, but may tolerate the proximity of other crayfish if space is limited or during courtship and mating. Similar to its congeners in its mating habits, the Shasta crayfish mates in late September

and October after the final molt (loss of previous skin and the growth of a new larger skin) of the season. Reproductive maturity of the Shasta crayfish occurs in the fifth year of life, while in the two exotic crayfish species that occur within the range, reproductive maturity occurs in the second year. Eggs of the Shasta crayfish are laid during the fall, and hatching occurs in the following spring when the water temperature increases slightly. Each newly mature mated female lays 10-70 eggs, with an average of 40 per female. The two exotic crayfish, *Orconectes virilis* and *Pacifiastacus leniusculus*, average 110 and 150 eggs, respectively, per female. In general, crayfish fecundity increases with the age of the female; older *P. fortis* females produce an average of 60 eggs per female, whereas the exotic species produce up to 200-300 eggs per female. Therefore, the introduced crayfish species have a reproductive advantage over the Shasta crayfish (Eng and Daniels 1982).

Because of its placid behavior, low fecundity, slow maturity, restricted distribution, and specialized habitat requirements, the Shasta crayfish is particularly vulnerable to habitat loss or modification (e.g., changes in the substrates (from rubble to mud bottoms) resulting from siltation caused by increased erosion of its habitat, changes in water quality parameters (increase in temperature, turbidity, hydrogen ions, and nutrients)), water pollution, and displacement by exotic crayfish species. Other threats to the survival of this species include habitat loss through modifications from diking, dredging, water diversion projects, hydroelectric projects, agricultural development, water impoundments, and increased residential development. All these habitat modifications seem to favor the two exotic species which, as discussed above, have a great reproductive advantage over the Shasta Crayfish. A more subtle threat to the Shasta crayfish is the overall increase in human use of the area for outdoor recreational purposes. For example, off-road vehicle trails that cross creeks can cause bank erosion and siltation that degrade the habitat. Fishing with exotic crayfish bait may result in introductions of additional exotic competitors.

Most of the land in the range of the Shasta crayfish is in private ownership. The U.S. Forest Service and the Bureau of Land Management administer less than 10 acres each of the Shasta crayfish habitat. The State owns the 5,890 acre Ahjumawi Lava Springs State Park that includes about 10 acres of

Shasta crayfish habitat in the Fall River drainage.

The Shasta crayfish (under the common name of "placid crayfish") was proposed as a threatened species on January 12, 1977, in the *Federal Register* (42 FR 2507). Comments expressing support for the proposal were received from the CDFG and two private organizations. That proposal was withdrawn on December 10, 1979 (44 FR 70796), under a provision of the 1978 amendments to the Act that required withdrawal of all pending proposals that were not made within 2 years of the date of the proposal.

The Shasta crayfish was included in category 1 of the Service's Review of Invertebrate Wildlife for Listing and Endangered or Threatened Species (49 FR 21666; May 22, 1984). Category 1 comprises taxa for which the Service has substantial evidence to support the biological appropriateness of proposing endangered or threatened status. In that notice, the Service, following the suggestion of Eng and Daniels (1982), used the common name Shasta crayfish rather than placid crayfish, the name used in the earlier proposal of threatened status.

In the summer of 1978, the CDFG and the U.S. Forest Service initiated studies to further determine the distribution of *P. fortis* and gather biological and ecological information necessary for its conservation (see Eng and Daniels 1982). The maps of the distribution of the Shasta crayfish generated in 1979 by CDFG were amended from information gained during a 1985 survey of the distribution and population status of the crayfish. These updated maps and additional data constitute significant new information on which to make a determination of endangered status for the Shasta crayfish.

In the *Federal Register* of July 10, 1987 (52 FR 26036), the Service proposed the Shasta crayfish as an endangered species. A notification extending the comment period beyond September 8, 1987, to November 8, 1987, was published in the *Federal Register* (52 FR 22979) on September 9, 1987.

Summary of Comments and Recommendations

In the July 10, 1987, proposed rule and associated notifications, all interested parties were requested to submit factual reports or information that might contribute to the development of a final rule. Appropriate State agencies, county governments, Federal agencies, scientific organizations, and other interested parties were contacted and requested to comment. A newspaper notice was published in the *Record*

Searchlight (September 3, 1987) and the *News* (September 3, 1987), both of which invited general public comment.

During the comment period, totalling approximately 4 months, eight comments on the listing were received. Two additional comments were received after the close of the comment period and are noted as ex parte communications. Of the 10 letters of comment, 5 supported listing (two state agencies, one conservation organization, and two private citizens) and 2 did not (two private citizens); 3 offered no substantive information (two Federal agencies and one private citizen).

Support for the listing proposal was expressed by a conservation organization and two other interested parties. Ex parte comments from the CDFG and California Department of Parks and Recreation supported the listing and presented additional status information on the crayfish. Opposing comments and other comments questioning the rule can be placed in a number of general groups. These categories of comments and the Service's response to each are listed below.

Comment 1: Two questions from private citizens were raised pertaining to the available biological information on the crayfish. Have there been recent studies to determine that the species is continuing to decline? A request was made to conduct more studies on the species to determine if the crayfish is really endangered. One commenter stated that crayfish are abundant in irrigation canals. A commenter stated that the Shasta crayfish has made a comeback in the last 3 years. Concern was expressed about the possibility of a premature listing.

Service response: The Service finds that surveys conducted between the 1960's and 1987 by qualified biologists familiar with the Shasta crayfish and its habitats provide adequate information on the distribution, habitat requirements, and most importantly, threats to the species to warrant the present action for the Shasta crayfish (See discussion under Factor A). Further studies on the distribution and actual numbers would consume additional time during which the crayfish would not be Federally protected. Pertinent studies on the habitat requirements of the crayfish are listed in the References Cited section of the proposed rule and the final rule. In some cases, the data were supplied by personal communications with field biologists and are noted in the text. The State of California, recognizing the decline in the Shasta crayfish, listed it as rare in 1980, and reclassified it as

endangered in 1987. The species continues to lose habitat and decline in distribution and population size. Therefore, based on the available information regarding the status of the Shasta crayfish, the Service believes immediate listing is warranted.

The numerous "crowdads" observed by one private citizen in the rice field drainage ditches and other degraded habitats, are not likely to be the Shasta crayfish but rather one or both species of exotic competitors. The Shasta crayfish cannot tolerate pollutants such as those that would be expected in agricultural drainage canals. In contrast, the competitors appear to thrive in nutrient enriched habitats. In the Background and Factors Affecting the Species sections, the biological and habitat requirements of the Shasta crayfish are described more fully.

Comment 2: One commenter (a private landowner) stated his belief that the Shasta crayfish was proposed for listing only to enable the CDFG to gain control of the Fall River and its tributaries.

Service response: The decision to list the species must be based on the best available biological information on the status of the Shasta crayfish. A species must qualify under at least one of the five factors specified in the Endangered Species Act to be listed. Furthermore, the Shasta crayfish was proposed for listing only because the Service believed the species met the requirements for endangered status as specified by the Act, and for no other reason.

Summary of Factors Affecting the Species

After a thorough review and consideration of all information available, the Service has determined that the Shasta crayfish (*Pacifastacus fortis*) should be classified as an endangered species. Procedures found at section 4(a)(1) of the Act (16 U.S.C. 1531 *et seq.*), and regulations (50 CFR Part 424) promulgated to implement the listing provisions of the Act were followed. A species may be determined to be an endangered or threatened species due to one or more of the five factors described in section 4(a)(1). These factors and their application to the Shasta crayfish (*Pacifastacus fortis*) are as follows:

A. The present or threatened destruction, modification, or curtailment of its habitat or range. The total population of Shasta crayfish, when sampled in 1978 by Daniels (1980), was estimated to be fewer than 6,000 individuals. With the recent confirmed loss of the population in Baum Lake and the large decline in Crystal Lake of the Hat Creek subdrainage, the total

population probably numbers fewer than 3,000 individuals. It has also been extirpated from a site in the Fall River subdrainage near its connection to the Pit River. At the present rate of extirpation, with at least three out of 15 sites being lost since 1978 and possibly only one site remaining in the Hat Creek subdrainage, it is conceivable that very shortly the Shasta crayfish may become restricted only to the Fall River subdrainage.

Water diversion and impoundment projects have adversely affected the Shasta crayfish by modifying the habitat into large quiet lakes with silt and mud bottoms and an increase in aquatic vegetation. These modifications have made the habitat more suitable for the two exotic crayfish species than the Shasta crayfish. The exotic species have done very well in these areas, and have displaced the Shasta crayfish. Lake Britton, and Baum and Crystal Lakes are examples of areas where these types of habitat modifications have led to the displacement of the Shasta crayfish in recent times.

Numerous hydroelectric projects have been constructed on Hat Creek and the Pit River since the early part of the century. Lake Britton and Baum Lake are manmade reservoirs used for hydroelectric power production, water impoundment, and recreation. These installations have adversely affected the Shasta crayfish by blocking access and egress to refugia in the remaining spring pools. These refugia formerly served as sources of immigrant individuals for re-establishing populations that had become locally extirpated from suitable habitat as the result of natural events (i.e., flooding, landslides, and log or debris jams). These manmade dam installations isolate and separate Shasta crayfish populations to such an extent that when habitats become available, they are unable to recolonize them.

Agricultural development and more recently residential development within the range of the Shasta crayfish have increased demands on the water resources, thus lowering the water table and causing seasonal interruptions of spring flow. This has occurred on some of the small unnamed tributaries of Fall River and Hat Creek (R. Brown, CDFG, personal communication, 1986). Increased residential development on Fall River, including the headwater spring areas at Lava Creek, is resulting in increased human use of the area and associated pollution that may adversely affect the crayfish (CDFG, letter dated November 23, 1987). In conjunction with the increase in water usage, an extensive, diverse agricultural industry has caused an increase in the use of

pesticides in the area. These pesticides, when washed into the waterways, can kill aquatic invertebrates directly or over a period of time by bioaccumulation.

Livestock grazing near watercourses also leads to increased turbidity in some of the streams. Turbidity inhibits the penetration of sunlight to lower depths of the spring pools, where it promotes the growth of encrusting organisms on which the crayfish feeds. This increase in murkiness of the water also causes an increase in predation because the Shasta crayfish is unable to detect predators. Pasture runoff increases the nutrients in the streams, thus increasing planktonic (free-floating) algal and aquatic macrophyte growth. Because Shasta crayfish prefer areas with sparse plant growth, these areas become less suitable for the crayfish. Further, such conditions encourage invasion by the two exotic crayfish species that outcompete the Shasta crayfish.

B. Overutilization for commercial, recreational, scientific, or educational purpose. The incidental capture of Shasta crayfish for human consumption may occur. Although the Shasta crayfish is not the target of the catch, it is extremely vulnerable to such pressures because of its placid behavior. Its low fecundity, and long maturation period will result in low recruitment.

C. Disease or predation. Not applicable.

D. The inadequacy of existing regulatory mechanisms. In 1980, the California State Fish and Game Commission listed the Shasta crayfish as a rare species under State law. It was reclassified as endangered in 1987, thus offering protection from take, possession, or sale within the State of California. Other State regulations prohibit the take, possession, or use for bait of any crayfish species at any time of year within the range of *P. fortis*. These regulations were enacted to protect the Shasta crayfish and prevent the spread of exotic crayfish by unintentional introductions. Because of the large size and remoteness of the area, these regulations are difficult to enforce.

E. Other natural or manmade factors affecting its continued existence. The spread of the two exotic crayfish species, *Pacifastacus leniusculus* and *Orconectes virilis*, into the range of the Shasta crayfish continues at an alarming rate. Both species are recent introductions to the Pit River drainage (Daniels 1980). These species compete for food, space, and other resources with the Shasta crayfish. Because they are more fecund and mature much faster

than the Shasta crayfish, and have less specific habitat requirements, the exotic crayfish have been successful in colonizing the modified habitat and in displacing the Shasta crayfish. Since *O. virilis* is probably able to move overland under conditions of high humidity, it may invade the Fall River as it has Hat Creek. Both exotic species have displaced native species in other regions (Bouchard 1977a,b; Riegel 1959; Schwartz *et al.* 1963). If the habitat of *P. fortis* continues to be degraded and becomes better suited for the exotic species, the Shasta crayfish may be displaced from its remaining habitat in the near future. With the introduction of the exotic crayfish, the populations of Shasta crayfish in Crystal and Baum Lakes, Lake Britton, Clark, Rock, Goose, Kosk, Lost, and Spring Creeks have been lost, thus significantly reducing the limited range of the native crayfish. These extirpations occurred in less than 10 years.

The Service has carefully assessed the best scientific and commercial information available regarding the past, present, and future threats faced by this species in determining to make this rule final. Based on this evaluation, the preferred action is to list the Shasta crayfish as endangered. Its significantly reduced distribution, competition from exotic crayfish species, loss of habitat, and substantial potential for continued habitat modification or loss indicate that the species warrants endangered rather than threatened status. Critical habitat is not being designated for the species at this time for the reasons discussed below.

Critical Habitat

Section 4(a)(3) of the Act, as amended, requires that to the maximum extent prudent and determinable, the Secretary designate any habitat of a species which is considered to be critical habitat at the time the species is determined to be endangered or threatened. The Service finds that designation of critical habitat is not prudent for the Shasta crayfish at this time. As discussed under Factors D and E in the "Summary of Factors Affecting the Species," State laws to protect the Shasta crayfish from taking and from introductions of exotic crayfish species are difficult to enforce. Publication of critical habitat descriptions and maps in the **Federal Register** would make this species and its habitats more vulnerable to possible taking and vandalism and would increase enforcement problems. All involved parties and landowners will be notified of the locations and importance of protecting this species' habitat. Protection of the habitat of the Shasta

crayfish will be addressed through the recovery and Section 7 consultation processes. Therefore, it would not be prudent to determine critical habitat for the Shasta crayfish at this time.

Available Conservation Measures

Conservation measures provided to species listed as endangered or threatened under the Act include recognition, recovery actions, requirements for Federal protection, and prohibitions against certain practices. Recognition through listing encourages and results in conservation actions by Federal, State, and private agencies, groups, and individuals. The Act provides for possible land acquisition and cooperation with the States and requires that recovery actions be carried out for all listed species. Such actions are initiated by the Service following listing. The protection required of Federal agencies and the prohibitions against taking and harm are discussed, in part, below.

Section 7(a) of the Act, as amended, requires Federal agencies to evaluate their actions with respect to any species that is proposed or listed as endangered or threatened and with respect to its critical habitat, if any is being designated. Regulations implementing this interagency cooperation provision of the Act are codified at 50 CFR Part 402. Section 7(a)(2) of the Act requires Federal agencies to ensure that activities they authorize, fund, or carry out are not likely to jeopardize the continued existence of a listed species or destroy or adversely modify its critical habitat. If a Federal action may affect a listed species or its critical habitat, the responsible Federal agency must enter into formal consultation with the Service. Some Federal involvement with the U.S. Army Corps of Engineers and the Federal Energy Regulatory Commission (FERC) permitting processes for hydroelectric facilities is anticipated. Federal involvement with the Soil Conservation Service bank protection and repair projects addressing damage caused by cattle grazing is expected.

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. These prohibitions, in part, make it illegal for any person subject to the jurisdiction of the United States to take, import or export, ship 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 also is illegal to possess, sell, deliver, carry, transport, or ship any such wildlife that has been

taken illegally. Certain exceptions would 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 and 17.23. Such permits are available for scientific purposes, to enhance the propagation or survival of the species, and/or for incidental take in connection with otherwise lawful activities. In some instances, permits may be issued during a specified period of time to relieve undue economic hardship that would be suffered if such relief were not available.

National Environmental Policy Act

The 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, as amended. A notice outlining the Service's reasons for this determination was published in the **Federal Register** on October 25, 1983 (48 FR 49244).

References Cited

- Bott, R. 1950. Die flusskrebse Europas (Decapoda, Astacidae). *Abhandlungen Senckenbergischen Naturforschenden Gesellschaft* 483: 1-36.
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- Bouchard, R.W. 1978. Taxonomy, distribution, and general ecology of the genera of North America crayfishes. *Fisheries* 3:11-19.
- Daniels, R.A. 1980. Distribution and status of crayfishes in the Pit River drainage, California. *Crustaceana* 38:131-138.
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- Faxon, W. 1914. Notes on the crayfishes in the United States National Museum and the Museum of Comparative Zoology with descriptions of new species and subspecies to which is appended a catalogue of the known species and subspecies. *Memoirs of the Museum of Comparative Zoology*. (Harvard) 40: 351-427.
- Hobbs, H.H. 1972. Crayfishes (Astacidae) of North and Middle America. Identification Manual No. 9 in Biota of Freshwater Ecosystems. U.S. Environmental Protection Agency, Water Pollution Control Research Series. 18050, ELD05/72. 173 pp.

Riegel, J.A. 1959. The systematics and distribution of crayfishes in California. California Fish and Game 45:29-50.
 Schwartz, F.J., R. Rubelmann, and J. Allison. 1963. Ecological population expansion of the introduced crayfish, *Orconectes virilis*. Ohio Journal of Science. 63:266-273.

Author

The primary author of this rule is Dr. Jeurel Singleton, Sacramento Endangered Species Office, U.S. Fish and Wildlife Service, 2800 Cottage Way, Room E-1823, Sacramento, California (916/978-4866 or FTS 460-4866).

List of Subjects in 50 CFR Part 17

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

Regulation Promulgation

PART 17--[AMENDED]

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

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

Authority: Pub. L. 93-205, 87 Stat. 884; Pub. L. 94-359, 90 Stat. 911; Pub. L. 95-632, 92 Stat. 3751; Pub. L. 96-159, 93 Stat. 1225; Pub. L. 97-304, 96 Stat. 1411 (16 U.S.C. 1531 *et seq.*); Pub. L. 99-625, 100 Stat. 3500 (1986), unless otherwise noted.

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

§ 17.11 Endangered and threatened wildlife.

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Species		Historic range	Vertebrate population where endangered or threatened	Status	When listed	Critical habitat	Special rules
Common name	Scientific name						
CRUSTACEANS							
Crayfish, Shasta (=placid)	<i>Pacifastacus fortis</i>	U.S.A. (CA)	NA.....	E	337	NA	NA

Dated: September 22, 1988.
 Susan Recce,
 Acting Assistant Secretary for Fish and Wildlife and Parks.
 [FR Doc. 88-22399 Filed 9-29-88; 8:45 am]
 BILLING CODE 4310-53-M