SUMMARY: The FCC published a document in the **Federal Register** of June 15, 2010, (75 FR 33729), clarifying the requirements necessary for Broadband Radio Service (BRS) and Educational Broadband Service (EBS) licensees to demonstrate substantial service and ensure that BRS licensees of new initial licenses are given a reasonable period of time to deploy service, while ensuring that spectrum is rapidly placed in use. The document contained an incorrect page number in reference to the BRS/EBS Third Further Notice of Proposed Rulemaking citation.

DATES: Effective July 15, 2010.

FOR FURTHER INFORMATION CONTACT: Nancy M. Zaczek, Wireless Telecommunications Bureau, Broadband Division, Federal Communications Commission, 445 12th Street, SW., Washington, DC 20554, at (202) 418–0274 or via the Internet to *Nancy.Zaczek@fcc.gov*.

Correction

In the **Federal Register** 75 FR 33729 published on Tuesday, June 15, 2010, the following correction is made: On page 33730, second column, paragraph 3, first sentence, remove the phrase "74 FR 49335" and insert "74 FR 49356."

Marlene H. Dortch,

Secretary, Federal Communications Commission.

[FR Doc. 2010–15348 Filed 6–23–10; 8:45 am]

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DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

[Docket No. FWS-R1-ES-2009-0036]
[MO 92210-0-0008]

RIN 1018-AV47

Endangered and Threatened Wildlife and Plants; Listing the Flying Earwig Hawaiian Damselfly and Pacific Hawaiian Damselfly As Endangered Throughout Their Ranges

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Final rule.

SUMMARY: We, the U.S. Fish and Wildlife Service (Service), determine endangered status under the Endangered Species Act of 1973, as amended (Act), for two species of Hawaiian damselflies, the flying earwig Hawaiian damselfly (*Megalagrion nesiotes*) on the island of Maui and the Pacific Hawaiian damselfly *(M. pacificum*) on the islands of Hawaii, Maui, and Molokai. This final rule implements the Federal protections provided by the Act for these species. We also determine that critical habitat for these two Hawaiian damselflies is prudent, but not determinable at this time.

DATES: This rule becomes effective July 26, 2010.

ADDRESSES: This final rule is available on the Internet at *http://www.regulations.gov* and *http://www.fws.gov/pacificislands*. Comments and materials received, as well as supporting documentation used in the preparation of this rule, will be available for public inspection, by appointment, during normal business hours at: U.S. Fish and Wildlife Service, Pacific Islands Fish and Wildlife Office, 300 Ala Moana Boulevard, Room 3-122, Box 50088, Honolulu, HI 96850; telephone, 808-792-9400; facsimile, 808-792-9581.

FOR FURTHER INFORMATION CONTACT: Loyal Mehrhoff, Field Supervisor, Pacific Islands Fish and Wildlife Office (see **ADDRESSES**). If you use a telecommunications device for the deaf (TDD), call the Federal Information Relay Service (FIRS) at 800-877-8339.

SUPPLEMENTARY INFORMATION:

Background

Damselflies are insects in the order Odonata, and are close relatives of dragonflies, which they resemble in appearance. Damselflies, however, are slender-bodied and fold their wings parallel to the body while at rest, which readily distinguishes them from their dragonfly relatives, which hold their wings out perpendicular to the body while not in flight.

The flying earwig Hawaiian damselfly and the Pacific Hawaiian damselfly are unique, endemic insects found only in the Hawaiian Islands. Historically found on the islands of Hawaii and Maui, the flying earwig Hawaiian damselfly has not been seen on the island of Hawaii for over 80 years. Currently, the species is known only from one location on Maui. The Pacific Hawaiian damselfly was historically found on all of the main Hawaiian Islands except Kahoolawe and Niihau. Currently, the Pacific Hawaiian damselfly is known only from the islands of Hawaii, Maui and Molokai.

The Hawaiian Islands are well known for several spectacular evolutionary radiations (the rapid evolution of new species from a single ancestral type, as a result of adaptation and divergence in response to new ecological conditions) resulting in unique insect fauna found nowhere else in the world. One such group, which began its evolution perhaps as long as 10 million years ago (Jordan *et al.* 2003, p. 89), is the narrow-winged Hawaiian damselfly genus *Megalagrion*. This genus appears to be most closely related to species of *Pseudagrion* elsewhere in the Indo-Pacific (Zimmerman 1948a, pp. 341, 345). The *Megalagrion* species of the Hawaiian Islands have evolved to occupy as many larval breeding niches (different adaptations and ecological conditions for breeding and development of larvae, including chemical, physical, spatial, and temporal factors) as all the rest of the world's damselfly species combined, and in terms of the number of insular-endemic (native to only one island) species, are exceeded only by the radiation of damselfly species of Fiji in the Pacific (Jordan *et al.* 2003, p. 91).

Native Hawaiians apparently did not differentiate the various species, but referred to the native damselflies (and dragonflies) collectively as "pinao," and to the red-colored damselflies specifically as "pinao ula." There has been no traditional European use of a common name for species in the genus *Megalagrion*. In his 1994 taxonomic review of the candidate species of insects of the Hawaiian Islands, Nishida (1994, pp. 4-7) proposed the name "Hawaiian damselflies" as the common name for species in the genus *Megalagrion*. Because this name reflects the restricted distribution of these insects and is nontechnical, the common name "Hawaiian damselflies" is adopted for general use here, and we use the common names flying earwig Hawaiian damselfly and Pacific Hawaiian damselfly to identify the two species addressed in this final rule.

The general biology of Hawaiian damselflies is typical of other narrow-winged damselflies (Polhemus and Asquith 1996, pp. 2-7). The males of most species are territorial, guarding areas of habitat where females lay eggs (Moore 1983a, p. 89). During copulation, and often while the female lays eggs, the male grasps the female behind the head with terminal abdominal appendages to guard the female against rival males; thus males and females are frequently seen flying in tandem.

Female damselflies lay eggs in submerged aquatic vegetation or in mats of moss or algae on submerged rocks, and hatching occurs in about 10 days (Williams 1936, pp. 303, 306, 318; Evenhuis *et al.* 1995, p. 18). In most species of Hawaiian damselflies, the immature larval stages (naiads) are aquatic, breathing through three flattened abdominal gills, and are predaceous, feeding on small aquatic

invertebrates or fish (Williams 1936, p. 303). Naiads may take up to 4 months to mature (Williams 1936, p. 309), after which they crawl out of the water onto rocks or vegetation to molt into winged adults, typically remaining close to the aquatic habitat from which they emerged. The Pacific Hawaiian damselfly exhibits this typical aquatic life history.

In contrast, the naiads of a few species of Hawaiian damselflies are terrestrial or semiterrestrial, living on wet rock faces or in damp terrestrial conditions, inhabiting wet leaf litter or moist leaf axils (the angled juncture of the leaf and stem) of native plants up to several feet above ground (Zimmerman 1970, p. 33; Simon *et al.* 1984, p. 13; Polhemus and Asquith 1996, p. 17). The naiads of these terrestrial and semiterrestrial species have evolved short, thick, hairy gills and in many species are unable to swim (Polhemus and Asquith 1996, p. 75). The flying earwig Hawaiian damselfly is believed to exhibit this terrestrial or semiterrestrial naiad life history.

The Hawaiian damselflies are represented by 23 species and 5 subspecies, and are currently found on 6 of the Hawaiian Islands (Kauai, Oahu, Molokai, Maui, Lanai, and Hawaii). There are more species of *Megalagrion* on the geologically older islands (12 species on Kauai) than on the geologically youngest island (8 species on Hawaii), and there are more single-island endemic species on the older islands (10 on Kauai) than on the youngest island (none on Hawaii) (Jordan *et al.* 2003, p. 91). Historically, *Megalagrion* damselflies were among the most common and conspicuous native Hawaiian insects. Some species commonly inhabited water gardens in residential areas, artificial reservoirs, and watercress farms, and were even abundant in the city of Honolulu, as noted by early collectors of this group (Perkins 1899, p. 76; Perkins 1913, p. clxxviii; Williams 1936, p. 304).

Beginning with the extensive stream and wetland conversion, alteration, and modification, and degradation of native forests through the 20th century, Hawaii's native damselflies, including the two species that are the subject of this final listing action, experienced a tremendous reduction in available habitat. In addition, predation by a number of nonnative species that have been both intentionally and, in some cases, inadvertently introduced into the Hawaiian Islands is a significant and ongoing threat to all native Hawaiian damselflies.

Previous Federal Actions

Both the flying earwig Hawaiian damselfly and the Pacific Hawaiian damselfly were first designated as candidate species on May 22, 1984 (49 FR 21664). Candidate species are those taxa for which the Service has sufficient information on their biological status and threats to propose them for listing under the Act (16 U.S.C. 1531 *et seq.*), but for which the development of a listing regulation has been precluded by other higher-priority listing activities. The flying earwig Hawaiian damselfly was removed from the candidate list on November 21, 1991 (56 FR 58804), whereas the Pacific Hawaiian damselfly retained its status as a candidate species. On November 15, 1994 (59 FR 58982), the flying earwig Hawaiian damselfly was added back onto the candidate list. In the Candidate Notice of Review (CNOR) published on February 28, 1996 (61 FR 7595), we announced a revised list of plant and animal taxa that we regarded as candidates for possible addition to the Lists of Threatened and Endangered Wildlife and Plants. This revision also included a new ranking system, whereby each candidate species was assigned a Listing Priority Number (LPN) from 1 to 12. Both the flying earwig Hawaiian damselfly and the Pacific Hawaiian damselfly were assigned an LPN of 2 on February 28, 1996 (61 FR 7595).

On May 4, 2004, the Center for Biological Diversity petitioned the Secretary of the Interior to list 225 species of plants and animals that were already candidates, including these two Hawaiian damselfly species, as endangered or threatened under the provisions of the Act. In our annual CNOR, dated May 11, 2005 (70 FR 24870), we retained a listing priority number of 2 for both of these species in accordance with our listing priority guidance published on September 21, 1983 (48 FR 43098). A listing priority number of 2 reflects threats that are both imminent and high in magnitude, as well as the taxonomic classification of each of these two Hawaiian damselflies as distinct species. At the time, we determined that publication of a proposed rule to list these species was precluded by our work on higher priority listing actions. Since then, we have published our annual findings on the May 4, 2004, petition (including our findings on these two candidate species) in the CNORs dated September 12, 2006 (71 FR 53756), December 6, 2007 (72 FR 69034), and December 10, 2008 (73 FR 75176).

In fiscal year 2007, we determined that funding was available to initiate work on listing determinations for these two species. On July 8, 2009, we published a proposed rule to list the flying earwig Hawaiian damselfly and the Pacific Hawaiian damselfly as endangered (74 FR 32490). We solicited data and comments from the public on the proposed rule for 60 days, ending September 8, 2009. To allow the public and interested parties additional time to submit comments on the proposed rule, we reopened the comment period on November 19, 2009 (74 FR 59956), and accepted comments until December 21, 2009.

Species Information

Flying Earwig Hawaiian Damselfly

The flying earwig Hawaiian damselfly was first described from specimens collected in the 1890s in Puna on Hawaii Island by R.C.L. Perkins (1899, p. 72). Kennedy (1934, pp. 343-345) described what was believed at the time to be a new species of damselfly based on specimens from Maui; these were later determined to be synonymous with the specimens collected by Perkins. The flying earwig Hawaiian damselfly is a comparatively large and elongated species. The males are blue and black in color and exhibit distinctive, greatly enlarged, pincer-like cerci (paired appendages on the rearmost segment of the abdomen used to clasp the female during mating). It is for the males' elongated abdominal appendages and their resemblance to those found on earwigs (order Dermaptera) that the species is named. Females are predominantly brownish in color. The adults measure from 1.8 to 1.9 inches (in) (46 to 50 millimeters (mm)) in length and have a wingspan of 1.9 to 2.1 in (50 to 53 mm). The wings of both sexes are clear except for the tips, which are narrowly darkened along the front margins. Naiads of this species have never been collected or found (Polhemus and Asquith 1996, p. 69), but they are believed to be terrestrial or semiterrestrial in habit (Kennedy 1934, p. 345; Preston 2007a).

The biology of the flying earwig Hawaiian damselfly is not well understood, and it is unknown if this species is more likely to be associated with standing water or flowing water (Kennedy 1934, p. 345; Polhemus 1994, p. 40). The only confirmed population found in the last 6 years occurs along a single East Maui stream and the adjacent steep, moist, riparian talus slope (a slope formed by an accumulation of rock debris), which is densely covered with *Dicranopteris*

linearis (uluhe), a native fern. Adults of the flying earwig Hawaiian damselfly have been observed to perch on vegetation and boulders, and to fly slowly for short distances above this particular stream within the one known remaining habitat site. When disturbed, the adults fly downward within nearby vegetation or between rocks, rather than up and away as is usually observed with aquatic Hawaiian damselfly species. Although immature individuals have not been located, based on the habitat and the behavior of the adults, it is believed that the naiads may be terrestrial or semiterrestrial, occurring among damp leaflitter (Kennedy 1934, p. 345) or possibly within moist soil or seeps between boulders in suitable habitat (Preston 2007a). The highest elevation at which this species has been recorded is 3,000 feet (ft) (914 meters (m)), but its close association with uluhe habitat suggests that its range may extend upward to close to 4,000 ft (1,212 m) (Foote 2007).

Historically, the flying earwig Hawaiian damselfly was known from the islands of Hawaii and Maui. On Hawaii, it was originally known from seven or more general localities. The species has not been seen on Hawaii for over 80 years, although extensive surveys within apparently suitable habitat in the Kau and Olaa areas were conducted from 1997 to 2008 (Polhemus 2008). On Maui, the flying earwig damselfly was historically reported from five general locations on the windward side of the island (Kennedy 1934, p. 345). Since the 1930s, however, the flying earwig Hawaiian damselfly has only been observed in a single area along a particular stream on the windward side of east Maui, despite surveys from 1993 through 2008 at several of its historically occupied sites. Although presumed extant, the last observation of the species was in 2005 (Foote 2008); the species was not observed during the last survey at this location in 2008. No quantitative estimate of the size of this remaining population is available.

It is hypothesized that the flying earwig Hawaiian damselfly may now be restricted to what is perhaps suboptimal habitat, where periodic absences of the species due to drought may be expected and might explain the lack of observations of the species (Foote 2007). Some researchers also believe that overcollection of this species by enthusiasts may have impacted some populations in the past (Polhemus 2008). It is further possible that the individuals observed in this area are actually part of a larger population that may be located in the extensive belt of uluhe habitat located upslope, where the habitat is predominantly native shrubs and matted fern understory (Foote 2007; Hawaii Biodiversity and Mapping Program (HBMP) 2006). Unsurveyed areas containing potentially suitable habitat for this species include the Hana coast of east Maui, and the east rift zone of Kilauea and the Kona area on the island of Hawaii (Foote 2007).

Pacific Hawaiian Damselfly

The Pacific Hawaiian damselfly was first described by McLachlan (1883, p. 234), based on specimens collected by R.C.L. Perkins from streams on the islands of Lanai and Maui. This damselfly is a relatively small, dark-colored species, with adults measuring 1.3 to 1.4 in (34 to 37 mm) in length and having a wingspan of 1.3 to 1.6 in (33 to 42 mm). Both adult males and females are mostly black in color. Males exhibit brick-red striping and patterns, while females exhibit light-green striping and patterns. The only immature individuals of this species that have been collected were early-instar (an intermoult stage of development) individuals, and they exhibit flattened, leaf-like gills (Polhemus and Asquith 1996, p. 83). This species is most easily distinguished from other Hawaiian damselflies by the extremely long lower abdominal appendages of the male, which greatly exceed the length of the upper appendages.

Historically, the Pacific Hawaiian damselfly was known from lower elevations (below 2,000 ft (600 m)) on all of the main Hawaiian Islands except Kahoolawe and Niihau (Perkins 1899, p. 64). This species was known to breed primarily in lentic (standing water) systems such as marshes, seepage-fed pools, large ponds at higher elevations, and small, quiet pools in gulches that have been cut off from the main stream channel (Moore and Gagne 1982, p. 4; Polhemus and Asquith 1996, p. 83). The Pacific Hawaiian damselfly is no longer found in most lentic habitats in Hawaii, such as ponds and taro (*Colocasia esculenta*) fields, due to predation by nonnative fish that now occur in these systems (Moore and Gagne 1982, p. 4; Englund *et al.* 2007, p. 215). Observations have confirmed that the Pacific Hawaiian damselfly is now restricted almost exclusively to seepage-fed pools along overflow channels in the terminal reaches of perennial streams, usually in areas surrounded by thick vegetation (Moore and Gagne 1982, pp. 3-4; Polhemus 1994, p. 54; Englund 1999, p. 236; Englund *et al.* 2007, p. 216; Polhemus 2007, p. 238). Adults usually do not stray far from the vicinity of the breeding pools, perching on bordering vegetation and flying only short distances when disturbed (Polhemus and Asquith 1996, p. 83). This species is rarely seen along main stream channels, and its ability to disperse long distances over land or water is suspected to be poor compared to other Hawaiian damselflies (Jordan *et al.* 2007, p. 254).

The Pacific Hawaiian damselfly is now believed to be extirpated from the islands of Oahu, Kauai, and Lanai (Polhemus and Asquith 1996, p. 83). On the island of Oahu, due to its occupation of particularly vulnerable habitat within sidepools of lowland streams, the Pacific Hawaiian damselfly was rare by the 1890s and appears to have been extirpated from this island by 1910 (Liebherr and Polhemus 1997, p. 494). It is unknown when the Kauai and Lanai populations of the Pacific Hawaiian damselfly disappeared. Until 1998, it was believed that the species was extirpated from the island of Hawaii. That year, one population was discovered within a small stream located just above, but isolated from, Maili Stream, which is known to be occupied by nonnative fish (Englund 1998, pp. 15-16). On Maui and Molokai, fewer than six populations of the Pacific Hawaiian damselfly could be located by the 1970s (Harwood 1976, pp. 251-253; Gagne 1980, pp. 119, 125; Moore and Gagne 1982, p. 1). The conservation of this species was identified as a priority by the International Union for the Conservation of Nature and Natural Resources (Moore 1982, p. 209).

The Pacific Hawaiian damselfly is currently found in at least seven streams on Molokai and may possibly be extant in other unsurveyed streams on Molokai's northern coast that have not been invaded by nonnative fish (Englund 2008). On the island of Maui, the species is currently known from 14 streams. The Pacific Hawaiian damselfly is no longer found along the entire reaches of these Maui streams, but only in restricted areas along each stream where steep terrain prevents access by nonnative fish, which inhabit degraded, lower stream reaches (Polhemus and Asquith 1996, p. 13; Englund *et al.* 2007, p. 215). The species is known from a single population on the island of Hawaii, last observed in 1998.

No quantitative estimates of the size of the extant populations are available. Howarth (1991, p. 490) described the Pacific Hawaiian damselfly as the most common and most widespread of the native damselfly species at the end of the 19th century, and yet a decline in this species was observed as early as

1905 due to the effects of nonnative fish introduced for control of mosquitoes.

Summary of Comments and Recommendations

In our proposed rule published on July 8, 2009 (74 FR 32490), we requested that all interested parties submit written comments on the proposal by September 8, 2009. We also contacted appropriate Federal and State agencies, scientific experts and organizations, and other interested parties and invited them to comment on the proposal. Newspaper notices inviting general public comment were published on the islands of Hawaii, Maui, Molokai, and Oahu. On November 19, 2009 (74 FR 59956), we reopened the comment period for an additional 30 days, ending December 21, 2009.

We received a total of five written comments and no requests for public hearings. Three comments were from State of Hawaii agencies and two were from the same nongovernmental organization. We received three comments supporting the listing of the two Hawaiian damselflies. Two comments neither supported nor opposed the listings, and one of these comments provided additional information on the two damselflies. We also requested peer review from potential peer reviewers.

Peer Review Comments

In accordance with our peer review policy published on July 1, 1994 (59 FR 34270), we solicited expert opinion from seven knowledgeable individuals with scientific expertise that included familiarity with the two Hawaiian damselflies and their habitat, biological needs, and threats. We received no written comments from any of the seven peer reviewers, although several offered their opinion that the two Hawaiian damselfly species meet the definition of an endangered species (A. Asquith, Hawaii Sea Grant, pers. comm. 2009; F. Howarth, Bishop Museum, pers. comm. 2009; K. Magnacca, University of Hawaii at Hilo, pers. comm. 2009; D. Polhemus, State of Hawaii Division of Aquatic Resources, pers. comm. 2009; D. Preston, Bishop Museum, pers. comm. 2009).

Comments from the State of Hawaii

The State of Hawaii's State Historic Preservation Division concurred that no historic properties would be affected by the listing of the two Hawaiian damselflies (McMahon 2009, pers. comm.). The State's Division of Forestry and Wildlife (DOFAW) and Office of Hawaiian Affairs supported listing the two damselflies as endangered (Conry 2009, pers. comm.; Namu'o 2009, pers. comm.).

Public Comments

(1) *Comment*: One commenter stated that there appears to be little, if any, empirical data indicating water diversions have any potential impact on the flying earwig Hawaiian damselfly.

Our response: While we acknowledge that the larval stage of the flying earwig Hawaiian damselfly has never been observed within stream water, repeated observations of the adults along the stream adjacent to its only known population site on east Maui indicate a strong biological association of an unknown nature with flowing stream water. This association is likely related to the species' natural history and may include the need for sufficient space or a stream setting for mating adults and territorial behavior of males. Additionally, the species' larval habitat is undoubtedly dependent on localized area hydrology. For example, should a stream experience either reduced flow or complete dewatering for an extended period of time, it is expected that the impact to surrounding soils and associated vegetation, including the uluhe ferns that are believed to be the species' likely larval-stage habitat, will be soil desiccation and concomitant prolonged vegetation dieback, resulting in degraded habitat conditions for the flying earwig Hawaiian damselfly.

(2) *Comment*: One commenter stated the reduction or modification of water flow in a stream should not be identified as an activity that could potentially result in violation of section 9 of the Act pertaining to the flying earwig Hawaiian damselfly.

Our response: As discussed in the previous response (see *Comment* 1), we believe there is a strong association with stream water flow and the species' life history requirements. Stream flow is likely essential to the adult damselfly's breeding requirements and is also essential to maintaining localized soil hydrology necessary for persistence of uluhe ferns, which are known foraging and mating sites for the adults and may provide habitat for the larval stage. Therefore, any permanent or prolonged reduction or modification of stream flow in a stream utilized by this species may result in a violation of section 9 of the Act.

(3) *Comment*: One commenter stated that distribution of both species is not fully known and recommended that the Service conduct additional surveys for both species prior to proceeding with listing.

Our response: In preparing both the proposed and final rules for these species, we reviewed the best scientific and commercial data available, including technical reports, published journal articles, and numerous other documents, including unpublished reports and surveys. In addition, we consulted with several species experts. We based our listing determination for the flying earwig Hawaiian damselfly and the Pacific Hawaiian damselfly on the best available information regarding the species' current known population status, the known condition of their habitat, and the current factors affecting the species, along with ongoing conservation efforts, as described in the **Summary of Factors Affecting the Species** (below) in this final rule. The Act neither provides for, nor requires, additional research effort prior to a listing decision. We acknowledge that uncertainties exist; however, under section 4 of the Act, we must make a listing determination based on the best scientific and commercial available at the time of our determination.

(4) *Comment*: One commenter disagreed with our analysis that stream diversions for agriculture have reduced stream habitat available to the Pacific Hawaiian damselfly, and currently pose a threat to this species.

Our response: Historically, the impacts of the plantation-era sugarcane irrigation system reduced stream habitat available to this species. The Pacific Hawaiian damselfly was once among the most commonly observed aquatic insects in the islands (Zimmerman 1948, p. 377). Because this species breeds in lentic habitats or stream terminal reaches, which experienced significant modification for agriculture beginning as early as the 19th century, the Pacific Hawaiian damselfly was extirpated from many of its historical habitat sites (Polhemus 2007, p. 236). By the 1930s, water diversions had been developed on all of the main Hawaiian Islands, and by 1978, the stream flow in over one-half of all of the 366 perennial streams in Hawaii had been altered in some manner (Brasher 2003, p. 1055). All or most of the low or average flow of the stream was, and often still is, diverted into fields or reservoirs, leaving many stream channels completely dry (Takasaki *et al.* 1969, pp. 27-28; Harris *et al.* 1993, p. 12; Wilcox 1996, p. 56).

With the nearly complete cessation of this industry in the Hawaiian Islands, it is unlikely that new irrigation-related water diversion activities will be initiated in the remaining streams that currently provide habitat for the Pacific Hawaiian damselfly. However, most of the historical water diversions remain in

place. The historical loss of stream habitat, resulting in the present curtailment of habitat available to the Pacific Hawaiian damselfly, combined with the threat of predation by nonnative fish in the remaining stream habitat, continues to restrict and reduce the amount of habitat potentially available to this species. Should some of this water be returned to stream systems, the amount of habitat available to this species may increase if the water return were to be implemented carefully to prevent the spread of nonnative fish species upstream.

(5) *Comment*: One commenter noted the Pacific Hawaiian damselfly, although historically known from lower elevations, is now known to have established successfully breeding populations at higher elevations above existing stream diversions.

Our response: Prior to the establishment of widespread stream diversions, the Pacific Hawaiian damselfly was considered one of the most abundant and frequently observed insects in Hawaii and was known from all of the main Hawaiian Islands, except Kahoolawe and Niihau. Previously known from suitable portions of many streams and water bodies from sea level to some higher elevation sites (Zimmerman 1948, p. 377), the Pacific Hawaiian damselfly is now extirpated from at least 18 known population sites on the islands of Hawaii, Kauai, Lanai, Oahu, Maui, and Molokai. Diversions changed the amount and flow rate of water within many lower stream sections, because the diversions either reduced the amount of water flow at the point of diversion, or captured all stream water (as they were designed to do) during times of drier weather or drought. The Pacific Hawaiian damselfly is currently found in approximately 22 streams on the islands of Hawaii, Maui, and Molokai, across a variety of elevations. All known populations are located within streams or bodies of water free of nonnative, predatory fish. We lack sufficient information to determine whether all stream reaches occupied by this damselfly species are now above manmade diversions, but we know the species is largely absent from areas below manmade diversions.

(6) *Comment*: One commenter stated that the current known range of the Pacific Hawaiian damselfly appears to be broader than the species' known range at the time it became a candidate for listing.

Our response: We acknowledged in our proposed rule that at the time we determined we had sufficient information on file to support a proposal to list the Pacific Hawaiian damselfly (1984), and elevated it to candidate status, it had been extirpated from Kauai, Oahu, and Lanai, and was also considered extirpated from the island of Hawaii. Subsequently in 1998, a single population was discovered on an isolated portion of a Hilo stream on the island of Hawaii. However, since then, the Pacific Hawaiian damselfly has not been reobserved on Kauai, Lanai, or Oahu, and remains only on Molokai and Maui, and one location on Hawaii Island. We do not consider the discovery of a single population on the island of Hawaii to represent a significant broadening of the range of the species.

(7) *Comment*: One commenter observed that water diversions may enhance the damselflies' chances for survival by isolating them from predatory, nonnative fish species.

Our response: We agree that existing diversions on some streams function as a manmade barrier and prevent the egress of nonnative, predatory fish into currently isolated, upstream damselfly habitat sites. However, existing diversions also alter the historical amount and flow rate of water within many lower stream sections because the diversions either reduce the amount of water flow at the point of diversion or capture all stream water during times of drier weather or drought. Therefore, the net impact of stream diversions in the Hawaiian Islands has been and continues to be an overall reduction in the amount of suitable stream habitat available to both the Pacific Hawaiian damselfly and the flying earwig Hawaiian damselfly.

(8) *Comment*: One commenter noted that the recently mandated interim in-stream flow standards (IIFS) established by the Commission for Water Resource Management (CWRM) for 10 east Maui streams diverted by the East Maui Irrigation Company (EMI) may either benefit existing damselfly populations or allow entry of nonnative fish species into currently fish-isolated damselfly habitat. The commenter further stated that the proposed rule incorrectly identifies the 1988 IIFS as current while newer standards have been mandated.

Our response: We agree that the potential release of additional water into streams that are currently being diverted is a complex issue, and that the outcome may be beneficial to damselflies or may increase the threat from nonnative predatory fish. As of the date of publication of this final rule, it is our understanding that the recently proposed IIFS have yet to be approved and implemented by the CWRM, and we therefore recognize the 1988 standards as current. Because the new standards have not yet been implemented, we are unable to determine their effectiveness in enhancing damselfly habitat.

Should the proposed IIFS be approved as the new standard, we will strongly support a collaborative conservation effort between our agency; the State; the CWRM; and affected landowners, leaseholders, and other entities, to analyze the potential return of water flow into currently diverted streams on a case-by-case basis, to ensure the protection of the Pacific Hawaiian and the flying earwig Hawaiian damselflies and their stream or stream-associated habitat.

(9) *Comment*: One commenter disagreed with our assessment that the damselflies were threatened by inadequate regulatory protections. The commenter stated that the State Water Code requires that the economic benefits of stream water removal be balanced against in-stream benefits, including benefits to aquatic fish and wildlife. The commenter further stated that the CWRM's IIFS standards provide adequate protection for aquatic wildlife, and the CWRM has, in the past, given considerable deference to in-stream benefits over stream water removal in setting IIFS.

Our response: We believe that the CWRM's stated requirements to provide protection for aquatic wildlife are insufficiently specific to adequately protect the damselflies or their habitat. The CWRM's IIFS standards do not include provisions that address the needs of the species. Additionally, we lack specific examples of past CWRM deference to in-stream benefits, and are thus unable to determine whether CWRM's IIFS standards have specifically benefited these damselflies.

(10) *Comment*: One commenter explained that several of the State's existing hydroelectric plants do not operate directly on streams but are located some distance away and are powered by water diverted from streams.

Our response: In this final rule, we have clarified that water is diverted to power hydroelectric facilities regardless of their location.

(11) *Comment*: One commenter noted that some of the hydroelectric projects identified as proposed may be developed without diverting additional water from streams.

Our response: We have modified the appropriate section of this final rule to clarify that in some cases, for some of the State's proposed hydroelectric facilities, no additional water might be diverted beyond what is currently removed for agriculture or other

purposes. However, the threats to the damselflies below the point of diversion within a given stream remain the same due to the existing diversion, and we believe that any additional increased water diversion for hydroelectric power could possibly impact damselfly populations.

(12) *Comment*: One commenter noted that water currently being diverted from streams to generate power for some hydroelectric projects is often returned downstream within the same stream system. Therefore, the potential to impact damselfly habitat will vary depending on location of the diversion and location of damselfly habitat within the respective stream system.

Our response: We have modified the appropriate section of this final rule to clarify that, in some streams, water diverted for the generation of power is returned to the same stream system. However, the threats to the damselflies below the point of diversion remain, and may depend upon the difference (if any) of the volume and quality of water returned and the point at which the water is returned to the stream system. The commenter did not provide specific examples or elaborate upon specific streams.

(13) *Comment*: One commenter clarified that the Hawaii Stream Assessment (HSA) (CWRM 1990) identifies 28, not 38, sites that have potential to be developed for hydropower. The commenter further noted that these sites have not been proposed for development, but rather that the sites have been identified as economically developable for hydroelectric use. Populations of the Pacific Hawaiian damselfly are located upon three of these streams identified only as potentially economically developable for hydroelectric use.

Our response: We have modified the appropriate section of this final rule to correct the information that 28, not 38, sites have been identified as potentially economically developable for hydroelectric use and that three of the streams harboring Pacific Hawaiian damselfly populations are not proposed for development but rather are identified as only potentially developable.

(14) *Comment*: One commenter observed that the HSA identifies 10 sites where hydropower developments have been proposed, several of which overlap with sites identified as potentially developable (see *Comment* 13). The commenter further noted that the list of 10 sites actually proposed for hydroelectric development does not include streams known to be occupied by the Pacific Hawaiian damselfly; therefore, future hydropower development is unlikely to impact this species. However, one proposed site does include the only known population of the flying earwig Hawaiian damselfly.

Our response: We have modified the appropriate section of this final rule to clarify that some of the 10 sites proposed for development in the HSA overlap with those sites identified as economically developable, and that none of the 10 proposed sites includes streams with Pacific Hawaiian damselfly populations. We have added the information regarding the proposed hydroelectric development on the stream site associated with the only known location of the flying earwig Hawaiian damselfly to our threats analysis (see *Factor A*).

Summary of Factors Affecting the Species

Section 4 of the Act (16 U.S.C. 1531 *et seq.*) and its implementing regulations (50 CFR part 424) set forth the procedures for adding species to the Federal Lists of Endangered and Threatened Wildlife and Plants. 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) of the Act. These five listing factors are: (A) The present or threatened destruction, modification, or curtailment of its habitat or range; (B) overutilization for commercial, recreational, scientific, or educational purposes; (C) disease or predation; (D) the inadequacy of existing regulatory mechanisms; and (E) other natural or manmade factors affecting its continued existence. Listing actions may be warranted based on any of the above threat factors, singly or in combination.

The threats to the flying earwig and Pacific Hawaiian damselfly species are summarized according to the five listing factors in Table 1, and discussed in detail below.

TABLE 1. SUMMARY OF THREATS TO THE FLYING EARWING HAWAIIAN DAMSELFLY AND PACIFIC HAWAIIAN DAMSELFLY.

5 FACTORS CATEGORY	THREATS	SPECIES	
		Flying Earwig Hawaiian Damselfly	Pacific Hawaiian Damselfly
FACTOR A	Agriculture/urban development	X	X
	Stream alteration	P	X
	Habitat modification by pigs	X	—
	Habitat modification by nonnative plants	X	X
	Stochastic events	X	X
	Climate change	P	P
FACTOR B	Overcollection	P	—
FACTOR C	Predation	A, BF (P)	A, B, F, BF
FACTOR D	Inadequate habitat protection	X	X
	Inadequate protection from nonnative aquatic species	X	X
FACTOR E	Limited populations	X	X

A = ants

B = backswimmers
F = fish
BF = bullfrogs
P = potential threat
X = known threat

Factor A. The Present or Threatened Destruction, Modification, or Curtailment of Its Habitat or Range

Freshwater habitats used by the flying earwig and Pacific Hawaiian damselflies on all of the main Hawaiian Islands are severely altered and degraded because of past and present land and water management practices, including: agriculture and urban development; development of groundwater, perched aquifer (aquifer sitting above main water table), and surface water resources; and the deliberate and accidental introductions of nonnative animals (Harris *et al.* 1993, pp. 12-13; Meier *et al.* 1993, pp. 181-183).

Habitat Destruction and Modification by Agriculture and Urban Development

Although there has not been a comprehensive, site-by-site assessment of wetland loss in Hawaii (Erikson and Puttock 2006, p. 40), Dahl (1990, p. 7) estimated that at least 12 percent of lowland to upper-elevation wetlands in Hawaii had been converted to non-wetland habitat by the 1980s. If only coastal plain (below 1,000 ft (305 m) elevation) wetlands are considered, it is estimated that 30 percent have been converted for agricultural and urban development (Kosaka l990, p. 1). These marshlands and wetlands provided habitat for several damselfly species, including the Pacific Hawaiian damselfly.

By the 1930s, water diversions had been developed on all of the main Hawaiian Islands, and by 1978, the stream flow in over one-half of all of the 366 perennial streams in Hawaii had been altered in some manner (Brasher 2003, p. 1055). All or most of the low or average flow of the stream was, and often still is, diverted into fields or reservoirs, leaving many stream channels completely dry (Takasaki *et al.* 1969, pp. 27-28; Harris *et al.* 1993, p. 12; Wilcox 1996, p. 56). The historical destruction and modification of habitat continues to impact the two Hawaiian damselflies, by restricting them to curtailed or isolated habitat areas that are often degraded in quality (for example, by the presence of predatory nonnative fishes). The present curtailment of the habitat or range of the flying earwig Hawaiian damselfly and Pacific Hawaiian damselfly due to past habitat destruction or modification in turn limits population size, distribution, and connectivity, resulting in an increased probability of local extirpation or even extinction of the two Hawaiian damselfly species.

Although extensive filling of freshwater wetlands is rarely permitted today, loss of riparian or wetland habitats utilized by the Pacific and flying earwig Hawaiian damselflies, such as smaller areas of moist slopes, emergent vegetation, and narrow strips of freshwater seeps within anchialine pool complexes (landlocked bodies of water with a subterranean connection to the ocean), still occurs. In addition, marshes have been, and continue to be, slowly filled and converted to meadow habitat due to increased sedimentation resulting from increased storm water runoff from upslope development, the accumulation of uncontrolled growth of invasive vegetation, and blockage of downslope drainage (Wilson Okamoto & Associates, Inc. 1993, pp. 3-4 to 3-5).

The effects of future conversion of wetland and other aquatic habitat for agriculture and urban development are immediate and significant for the following reason: As noted above, an estimated 30 percent of all coastal plain wetlands in Hawaii have already been lost to agriculture and urban development, while the loss of lowland freshwater habitat in Hawaii already approaches 80 to 90 percent (Kosaka 1990, p. 1). Lacking the aquatic habitat features that the damselflies require for essential life history needs, such as marshes, ponds, and sidepools along streams (Pacific Hawaiian damselfly) and riparian habitat (flying earwig Hawaiian damselfly), these modified areas no longer support populations of these two Hawaiian damselflies. Agriculture and urban development have thus contributed to the present curtailment of the habitat of these two Hawaiian damselflies, and we have no indication that this threat is likely to be significantly ameliorated in the foreseeable future.

Habitat Destruction and Modification by Stream Diversion

Stream modifications began with the early Hawaiians, who diverted water to irrigate taro. However, unlike modern stream diversions which often completely dewater streams all year around, early diversions often took no more than half the stream flow, and typically were periodic to occasionally flood taro ponds at different times through the year, rather than continuously flood them (Handy and Handy 1972, pp. 58-59). The advent of plantation sugarcane cultivation led to far more extensive stream diversions, with the first diversion built in 1856 on Kauai (Wilcox 1996, p. 54). These systems were designed to tap water at upper elevations (above 984 ft (300 m)) by means of a concrete weir in the stream (Wilcox 1996, p. 54). All or most of the low or average flow of the stream was, and often still is, diverted into fields or reservoirs, leaving many stream channels completely dry (Takasaki *et al.* 1969, pp. 27-28; Harris *et al.* 1993, p. 12; Wilcox 1996, p. 56).

As noted above, by the 1930s, water diversions had been developed on all of the main Hawaiian Islands, and by 1978, the stream flow in over one-half of all of the 366 perennial streams in Hawaii had been altered in some manner (Brasher 2003, p. 1055). Some stream diversion systems are extensive, such as the Waiahole Ditch, which diverts water from 37 streams within the range of the Pacific Hawaiian damselfly on the windward side of Oahu to the dry plains on the leeward side of the island via a tunnel cut through the Koolau mountain range (Stearns and Vaksvik 1935, pp. 399-403). On west Maui, as of 1978, over 49 miles (mi) (78 kilometers (km)) of stream habitat in 12 streams had been lost due to diversions, and all of the 17 perennial streams on west Maui are dewatered to some extent (Maciolek 1979, p. 605). This loss of stream habitat may have contributed to the extirpation of the Pacific Hawaiian damselfly population on west Maui. Given the affiliation of the flying earwig Hawaiian damselfly with riparian habitats, this loss of stream habitat may also potentially account for its absence on west Maui. Most lower-elevation stream segments on west Maui are now completely dry, except during storm-influenced flows (Maciolek 1979, p. 605).

The maintenance of natural hydrology is closely tied to the life history requirements of the Hawaiian damselflies, as the presence of standing or running water is essential to reproduction of the two species. In addition to providing breeding habitat for the adults, the aquatic larval stage of the Pacific Hawaiian damselfly is entirely dependent on water, and the maintenance of local soil hydrology is necessary for the persistence of uluhe

ferns, which provide habitat for the larval stage of the flying earwig Hawaiian damselfly. The reduced flow or complete dewatering of streams thus results in the destruction or degradation of habitat conditions for both the Pacific and flying earwig Hawaiian damselflies. The extensive diversion of streams on Maui island-wide has reduced the amount of stream habitat available to the Pacific Hawaiian damselfly, and potentially to the flying earwig Hawaiian damselfly as well.

In addition to diverting water for agriculture and domestic water supply, streams in Hawaii have also been diverted for use in hydroelectric power. In some cases, the water used for power generation is already being diverted for another use; in other cases the water is returned to the stream of origin. There are a total of 18 active hydroelectric plants operating on Hawaiian streams on the islands of Hawaii, Kauai, and Maui, only one of which is located on a stream where a historical population of the Pacific Hawaiian damselfly was known on Kauai (Waimea). Another 28 sites have been identified as feasible for hydroelectric development on the islands of Hawaii, Kauai, Maui, and Molokai (Hawaii Stream Assessment 1990, pp. xxi, 96-97). Three of the sites identified as developable include current populations of the Pacific Hawaiian damselfly. A total of 10 streams have actually been proposed for development, with some overlap between the 28 streams identified as feasible. Notably, the stream adjacent to the single current remaining population site for the flying earwig Hawaiian damselfly on Maui is included among those proposed for hydroelectric development. Any additional diversion of stream flow for use in hydroelectric power could contribute to further loss of stream habitat for the Pacific Hawaiian damselfly and for the flying earwig Hawaiian damselfly.

Habitat Modification and Destruction by Dewatering of Aquifers

In addition to the diversion of stream water and the resultant downstream dewatering, many streams in Hawaii have experienced reduced or zero surface flow as a result of the dewatering of their source aquifers. Often these aquifers, which previously fed the streams, were tapped by tunneling or the injudicious placement of wells (Stearns and Vaksvik 1935, pp. 386-434; Stearns 1985, pp. 291-305). These groundwater sources were captured for both domestic and agricultural use and in some areas have completely depleted nearby stream and spring flows. For example, the Waikolu Stream on Molokai has reduced flow due in part to groundwater withdrawal (Brasher 2003, p. 1,056), which may have reduced stream habitat available to the Pacific Hawaiian damselfly. Likewise, on Maui, streams in the west Maui Mountains that flow into the Lahaina District are fed by groundwater leaking from breached high-elevation dikes. Downstream of the dike compartments, stream diversions are designed to capture all of the low stream flow, causing the streams downstream to be frequently dry (U.S. Geological Survey 2008a, p. 1), likely impacting available habitat for the Pacific Hawaiian damselfly, and potentially for the flying earwig Hawaiian damselfly, in the Honolua and Honokohau streams.

The island of Lanai lies within the rain shadow of the west Maui Mountains, which reach 5,788 ft (1,764 m) in elevation. Lower in elevation than Maui, annual rainfall on Lanai's summit is 30 to 40 in (760 to 1,015 mm), but is much less over the rest of the island (University of Hawaii Department of Geography 1998, p. 13). Flows of almost every spring and seep on Lanai have been diverted (Stearns 1940, pp. 73-74, 85, 88, 95). Surface waters in streams have also been diverted by tunnels in stream beds. Historically, Maunalei Stream was the only perennial stream on Lanai, and Hawaiians constructed taro loi (ponds for cultivation of taro) in the lower portions of this stream system. In 1911, a tunnel was constructed at 1,100 ft (330 m) elevation that undercuts the stream bed, diverting both the surface and subsurface flows and dewatering the stream from this point to its mouth (Stearns 1940, pp. 86-88). The Pacific Hawaiian damselfly, which depends on stream habitat, was historically known from Lanai but is no longer extant on this island. The Pacific Hawaiian damselfly was most likely impacted by the dewatering of this stream because it was the only permanent stream on Lanai prior to its dewatering. This example of the negative impact of dewatering leads us to conclude that dewatering poses a threat to the Pacific Hawaiian damselfly and the flying earwig Hawaiian damselfly on the remaining islands where the species persist.

Habitat Modification and Destruction by Vertical Wells

Surface flow of streams has also been affected by vertical wells drilled in the past, because the basal aquifer (lowest groundwater layer) and alluvial caprock (sediment-deposited harder rock layer) through which the lower sections of streams flow can be pierced and hydraulically connected by wells (Stearns 1940, p. 88). This allows water in aquifers normally feeding the stream to be diverted elsewhere underground. Dewatering of the streams by tunneling and earlier, less-informed well placement near or in streams was a significant cause of habitat loss, and these effects continue today. Historically, for example, there was sufficient surface flow in Makaha and Nanakuli streams on Oahu to support taro loi in their lower reaches, but this flow disappeared subsequent to construction of vertical wells upstream (Devick 1995, p. 1). The inadvertent dewatering of streams through the piercing of their aquifers (which are normally separated from adjacent water-bearing layers by an impermeable layer), by tunneling or through placement of vertical wells, caused the loss of Pacific Hawaiian damselfly habitat, and contributed to the Pacific Hawaiian damselfly's extirpation on the islands of Oahu, Kauai, and Lanai (Polhemus and Asquith 1996, pp. 23-24). Such activities also reduced the extent of stream habitat for the Pacific Hawaiian damselfly on the islands of Maui, Molokai, and Hawaii. Most lower-elevation stream segments on west Maui and leeward east Maui are now completely dry, except during storm-influenced flows (Maciolek 1979, p. 605). The flow of nearly every seep and spring on Lanai has been captured or bored with wells (Stearns 1940, pp. 73-74, 85, 88, 95). The inadvertent drying of streams from earlier, uninformed well placement and other activities has contributed to the decline of the Pacific Hawaiian damselfly by reducing its habitat on all of the islands from which it was historically known. It should be noted that the Pacific Hawaiian damselfly was once among the most commonly observed aquatic insects in the islands (Howarth 1991, p. 40). The dewatering of streams on Maui and Hawaii may also have impacted habitat of the flying earwig Hawaiian damselfly.

Although the State of Hawaii's Commission on Water Resource Management is now more cognizant of the effects that groundwater removal has on streams via injudicious placement of wells, the Commission still routinely reviews new permit applications for wells (Hardy 2009, p. 1). Thus, the potential for additional well-drilling continues to be a threat (see further discussion under *Factor D, The Inadequacy of Existing Regulatory Mechanisms,* below), and the ongoing effects of previously constructed vertical wells continue to be an ongoing threat to the Hawaiian dragonflies.

Habitat Modification and Destruction by Channelization

In addition to the destruction of most of the stream habitat of the Pacific Hawaiian damselfly and the flying earwig Hawaiian damselfly, much of the remaining stream habitat has been, and continues to be, seriously degraded throughout the Hawaiian Islands. Stream degradation has been particularly severe on the island of Oahu where, by 1978, 58 percent of all the perennial streams had been channelized (lined, partially lined, or altered) to control flooding (Brasher 2003, p. 1055; Polhemus and Asquith 1996, p. 24), and 89 percent of the total length of these streams had been channelized (Parrish *et al.* 1984, p. 83). The channelization of streams creates artificial, wide-bottomed stream beds and often results in removal of riparian vegetation, increased substrate homogeneity, increased temporal water velocity (increased water flow speed during times of higher precipitation, including minor and major flooding), increased illumination, and higher water temperatures (Parrish *et al.* 1984, p. 83; Brasher 2003, p. 1052). Natural streams meander and are lined with rocks, trees, and natural debris, and during times of flooding, jump their banks. Channelized streams are straightened and often lack natural obstructions, and during times of higher precipitation or flooding, facilitate a higher water flow velocity. Hawaiian damselflies are largely absent from channelized portions of streams (Polhemus and Asquith 1996, p. 24). In contrast, undisturbed Hawaiian stream systems exhibit a greater amount of riffle habitat, canopy closure, higher consistent flow velocity, and lower water temperatures that are characteristic of streams to which the Hawaiian damselflies, in general, are adapted (Brasher 2003, pp. 1054-1057).

Channelization of streams has not been restricted to lower stream reaches. For example, there is extensive channelization of the Kalihi Stream, on the island of Oahu, above 1,000-ft (300-m) elevation. Extensive stream channelization has contributed to the extirpation of the Pacific Hawaiian damselfly on Oahu (Englund 1999, p. 236; Polhemus 2008, pp. 45-46).

Stream diversion, channelization, and dewatering represent significant and immediate threats to the Pacific Hawaiian damselfly for the following reasons: (1) They reduce the amount and distribution of stream habitat available to this species; (2) they reduce stream flow, leaving lower elevation stream segments completely dry except during storms, or leaving many streams completely dry year-round, thus reducing or eliminating stream habitat; and (3) they indirectly lead to an increase in water temperature that leads to the loss of Pacific Hawaiian damselfly naiads due to direct physiological stress. Because the probability of species extinction increases when ranges are restricted, habitat decreases, and population numbers decline, the Pacific Hawaiian damselfly is particularly vulnerable to extinction due to such changes in its stream habitats.

In addition, stream diversion, dewatering, and vertical wells have the potential to negatively impact, and in some cases may have impacted, the flying earwig Hawaiian damselfly. Stream flow is essential to the adult flying earwig damselfly's breeding requirements and is also essential to maintaining localized soil hydrology necessary for persistence of uluhe ferns, which are known foraging and mating sites for the adults and may provide habitat for the larval stage. Should the species' population site stream experience either reduced flow or complete dewatering for an extended period of time, it is expected that the impact to surrounding soils and associated vegetation, including the uluhe ferns that are believed to be the species' likely larval-stage habitat, will be soil desiccation and prolonged vegetation dieback, respectively.

Habitat Destruction and Modification by Feral Pigs

One of the primary threats to the flying earwig Hawaiian damselfly is the ongoing destruction and degradation of its riparian habitat by nonnative animals, particularly feral pigs (*Sus scrofa*) (Polhemus and Asquith 1996, p. 22; Erickson and Puttock 2006, p. 42). Pigs of Asian descent were first introduced to Hawaii by the Polynesian ancestors of Hawaiians around 400 A.D. (Kirch 1982, pp. 3-4). Western immigrants, beginning with Captain Cook in 1778, repeatedly introduced European strains (Tomich 1986, pp. 120-121). The pigs escaped domestication and successfully invaded all areas, including wet and mesic forests and grasslands, on all of the main Hawaiian Islands.

High pig densities and expansion of their distribution have caused indisputable widespread damage to native vegetation on the Hawaiian Islands (Cuddihy and Stone 1990, p. 63). Feral pigs create open areas within forest habitat by digging up, eating, and trampling native plant species (Stone 1985, p. 263). These open areas become fertile ground for nonnative plant seeds spread through the excrement of the pigs and by transport in their hair (Stone 1985, p. 263). In nitrogen-poor soils, feral pig excrement increases nutrient availability, enhancing establishment of nonnative weeds that are more adapted to richer soils than are native plants (Cuddihy and Stone 1990, p. 65). In this manner, largely nonnative forests replace native forest habitat (Cuddihy and Stone 1990, p. 65). In addition, feral pigs will root and dig for plant tubers and worms in wetlands, including marshes, on all of the main Hawaiian Islands (Erikson and Puttock 2006, p. 42).

In a study conducted in the 1980s on feral pig populations in Kipahulu Valley on Maui, the deleterious effects of feral pig rooting on native forest ecosystems was documented (Diong 1982, pp. 150, 160-167). Rooting by feral pigs was observed to be related to the search for earthworms, with rooting depths averaging 8 in (20 cm), and rooting was found to greatly disrupt the leaf litter and topsoil layers, and contribute to erosion and changes in ground topography. The feeding habits of pigs were observed to create seed beds, enabling the establishment and spread of invasive weedy species such as *Clidemia hirta* (Koster's curse). The study concluded that all aspects of the feeding habits of pigs are damaging to the structure and function of the Hawaiian forest ecosystem (Diong 1982, pp. 160-167).

It is likely that pigs similarly impact the native vegetation used for perching by adult flying earwig Hawaiian damselflies. On Maui, feral pigs inhabit the uluhe-dominated riparian habitat of the flying earwig Hawaiian damselfly. Through their rooting and digging activities, they have significantly degraded and destroyed the habitat of the adult flying earwig Hawaiian damselfly (Foote 2008, p. 1).

In addition to creating conditions that enable the spread of nonnative plant species, Mountainspring (1986, p. 98) surmised that rooting by pigs depresses insect populations that depend upon the ground layer at some life stage or that exhibit diel (day and night) movements. As a result, it is likely that the presumed habitat (seeps or damp leaf litter) of the naiads of the flying earwig Hawaiian damselfly is negatively impacted by feral pig activity, including the uprooting and denuding of native vegetation (Foote 2008, p. 1; Polhemus 2008, p. 48).

Feral pigs are managed as a game animal for public hunting in the more accessible regions of the east Maui watershed (Jokiel 2008, p. 1). This management makes it likely that feral

pigs will continue to exist on Maui, and thus likely that pigs will continue to destroy and degrade habitat of the flying earwig Hawaiian damselfly on the island of Maui.

The effects from introduced feral pigs are immediate and ongoing because pigs currently occur in the uluhe-dominated riparian habitat of the flying earwig Hawaiian damselfly. The threat of habitat destruction or modification from feral pigs is significant for the following reasons: (1) Trampling and grazing directly impact the vegetation used by adult flying earwig Hawaiian damselflies for perching and by the terrestrial or semiterrestrial naiads; (2) increased soil disturbance leads to mechanical damage to plants used by adults for perching and by the terrestrial or semiterrestrial naiads; (3) creation of open, disturbed areas, conducive to weedy plant invasion and establishment of alien plants from dispersed fruits and seeds, results over time in the conversion of a community dominated by native vegetation to one dominated by nonnative vegetation (leading to all of the negative impacts associated with nonnative plants, detailed below); and (4) increased watershed erosion and sedimentation upstream may degrade adult breeding habitat for the flying earwig Hawaiian damselfly. These threats are expected to continue or increase without control or elimination of pig populations in these habitats.

Habitat Destruction and Modification by Nonnative Plants

The invasion of nonnative plants, including *Clidemia hirta* (Koster's curse), further contributes to the degradation of Hawaii's native forests, including the riparian habitat of the flying earwig Hawaiian damselfly on Maui (Foote 2008, p. 1). *Clidemia hirta* is the most serious nonnative plant invader within the uluhe-dominated riparian habitat where the flying earwig Hawaiian damselfly occurs on Maui and where it formerly occurred on the island of Hawaii (Foote 2008, p. 1). A noxious shrub first cultivated in Wahiawa on Oahu before 1941, this plant is now found on all of the main Hawaiian Islands (Wagner *et al.* 1985, p. 41). *Clidemia hirta* forms a dense understory, shading out native plants and hindering their regeneration; it is considered a major nonnative plant threat in wet forest areas because it inhibits and eventually replaces native plants (Wagner *et al.* 1985, p. 41; Smith 1989, p. 64). Invasive nonnatives such as *C. hirta* are capable of modifying the natural environment at the microhabitat level by altering light availability and soil-water regimes, and may eventually replace the native plant community (Cuddihy and Stone 1990, p. 74; Vitousek 1992, pp. 33-35). As *C. hirta* can outcompete the native uluhe fern, this invasive nonnative species poses a threat by altering and degrading the native plant community utilized by the flying earwig Hawaiian damselfly.

Presently, the most significant threat to natural ponds and marshes in Hawaii is the nonnative species *Urochloa mutica* (California grass). This sprawling perennial grass is likely from Africa (Erickson and Puttock 2006, p. 270). It was first noted on Oahu in 1924 and now occurs on all of the main Hawaiian Islands (O'Connor 1999, p. 1,504), where it is considered an aggressive invasive weed of marshes and wetlands (Erickson and Puttock 2006, p. 270). Found from sea level to 3,610 ft (1,100 m) in elevation (Erickson and Puttock 2006, p. 270), this plant forms dense, monotypic stands that can completely eliminate any open water by layering trailing stems (Smith 1985, p. 186). Marshlands eventually convert to meadowland when invaded by *U. mutica* (Polhemus and Asquith 1996, p. 23). At Kawainui Marsh, the most extensive marsh system remaining on Oahu, control of *U. mutica* to prevent conversion of the marsh to meadowland is an ongoing management activity (Wilson, Okamoto and Associates, Inc. 1993, pp. 3-4; Hawaii Ecosystems at Risk (HEAR) 2008, p. 1). The preferred habitat of the Pacific Hawaiian damselfly (primarily lowland, stagnant water, large ponds, and small pools) on all of the Hawaiian Islands has likely declined and continues to decline due to the spread of *U. mutica* (Polhemus and Asquith 1996, p. 23).

In conclusion, nonnative plants represent a significant and immediate and ongoing threat to the flying earwig Hawaiian damselfly through habitat destruction and modification for the following reasons: (1) They adversely impact microhabitat by modifying the availability of light; (2) they alter soil-water regimes; (3) they modify nutrient cycling processes; and (4) they outcompete, and possibly directly inhibit the growth of, native plant species; ultimately, native-dominated plant communities are converted to nonnative plant communities (Cuddihy and Stone 1990, p. 74; Vitousek 1992, pp. 33-35). This conversion negatively impacts and threatens the flying earwig Hawaiian damselfly, which depends upon native plant species, particularly uluhe, for essential life history needs. In addition, conversion of habitat from marshlands to meadowlands caused by the encroachment of the nonnative *Urochloa mutica* threatens the Pacific Hawaiian damselfly. These threats are expected to continue or increase without control or elimination of invasive nonnative plants in these habitats.

Habitat Destruction and Modification by Hurricanes, Landslides, and Drought

Stochastic (random, naturally occurring) events, such as hurricanes, landslides, and drought, alter or degrade the habitat of Hawaiian damselflies directly by modifying and destroying native riparian, wetland, and stream habitats (e.g., rocks and debris falling in a stream, by mechanical damage to riparian and wetland vegetation), and by indirectly by creating disturbed areas conducive to invasion by nonnative plants that outcompete the native plants used by damselflies for perching. We presume these events also alter microclimatic conditions (e.g., opening the tree canopy, leading to an increase in streamwater temperature; increasing stream sedimentation) so that the habitat no longer supports damselfly populations. Both the flying earwig Hawaiian damselfly and the Pacific Hawaiian damselfly may also be affected by temporary habitat loss (e.g., desiccation of streams, die-off of uluhe) associated with droughts, which are not uncommon on the Hawaiian Islands. With populations that have already been severely reduced in both abundance and geographic distribution, and particularly in the case of the flying earwig Hawaiian damselfly, with only one known population, even such a temporary loss of habitat can have a severe negative impact on the species.

Natural disasters such as hurricanes and drought, and local, random environmental events (such as landslides), represent a significant threat to native riparian, wetland, and stream habitat and the two damselfly species addressed in this final rule. These types of events are known to cause significant habitat damage (Polhemus 1993, p. 86). Because the two species addressed in this final rule now persist in low numbers or occur in restricted ranges, they are more vulnerable to these events and less resilient to such habitat disturbances. Hurricanes, drought, and landslides, even though unpredictable as to exact timing, have been and are expected to continue to be threats to the Hawaiian damselflies. Therefore, they pose immediate and ongoing threats to the two damselfly species and their habitat.

Habitat Destruction and Modification by Climate Change

Currently available information on global climate change is not sufficiently

precise to predict detailed changes in the habitats and ecosystems upon which these species rely. Consequently, the exact nature of the impacts of climate change on the aquatic and riparian habitats of the flying earwig Hawaiian damselfly and the Pacific Hawaiian damselfly, are unknown. However, increasing temperatures and altered patterns of precipitation may affect aquatic habitats through reduced stream flow, evaporation of standing water, increased streamwater temperature, and the loss of native riparian and wetland plants that comprise the habitat in which these two species occur (Pounds *et al.* 1999, pp. 611-612; Still *et al.* 1999, p. 610; Benning *et al.* 2002, pp. 14,246 and 14,248).

Oki (2004, p. 4) noted long-term evidence of decreased precipitation and stream flow in the Hawaiian Islands, based upon evidence collected by stream gauging stations. This long-term drying trend, coupled with existing ditch diversions and periodic El Niño–caused drying events, has created a pattern of severe and persistent stream dewatering events (Polhemus 2008, p. 52). Future changes in precipitation and the forecast of those changes are highly uncertain because they depend, in part, on how the El Niño–La Niña weather cycle (a disruption of the ocean atmospheric system in the tropical Pacific having important global consequences for weather and climate) might change (Hawaii Climate Change Action Plan 1998, pp. 2-10).

The flying earwig Hawaiian damselfly and the Pacific Hawaiian damselfly may be especially vulnerable to extinction due to anticipated environmental change that may result from global climate change. Environmental changes that may affect these species are expected to include habitat loss or alteration and changes in disturbance regimes (e.g., storms and hurricanes), in addition to direct physiological stress caused by increased streamwater temperatures to which the native Hawaiian damselfly fauna are not adapted. The probability of a species going extinct as a result of these factors increases when its range is restricted, habitat decreases, and population numbers decline (Intergovernmental Panel on Climate Change 2007, p. 8). Both of these damselfly species have limited environmental tolerance ranges, restricted habitat requirements, small population size, and a low number of individuals. Therefore, we would expect these species to be particularly vulnerable to projected environmental impacts that may result from changes in climate, and subsequent impacts to their aquatic and riparian habitats (e.g., Pounds *et al.* 1999, pp. 611-612; Still *et al.* 1999, p. 610; Benning *et al.* 2002, pp. 14,246 and 14,248). We believe changes in environmental conditions that may result from climate change will likely impact these two species and, according to current climate projections, we do not anticipate a reduction in this threat any time in the near future; however, the magnitude of this potential threat cannot be determined at this time.

Summary of Factor A

The effects of past, present, and potential future destruction, modification, and degradation of native riparian, wetland, and stream habitats threaten the continued existence of the flying earwig Hawaiian damselfly and the Pacific Hawaiian damselfly, which depend on these habitats throughout their respective ranges. These effects have been or continue to be caused by: Agriculture and urban development; stream diversion, well-drilling, channelization, and dewatering; introduced feral pigs; introduced plants; and hurricanes, landslides, and drought. The ongoing and likely increasing effects of global climate change, while currently unquantifiable, are also likely to adversely impact, directly or indirectly, the habitat of these two species.

Agriculture and urban development, to date, have caused the loss of 30 percent of Hawaii's coastal plain wetlands and 80 to 90 percent of lowland freshwater habitat in Hawaii. Extensive stream diversions and the ongoing dewatering of remaining wetland habitats continue to degrade the quality of Pacific Hawaiian damselfly habitat and its capability to support viable populations of this species and may also negatively affect the habitat of the flying earwig Hawaiian damselfly. Ongoing habitat destruction and degradation caused by feral pigs in remaining tracts of uluhe-dominated riparian habitat promote the establishment and spread of nonnative plants which, in turn, lower or destroy the capability of the habitat to support viable populations of the flying earwig Hawaiian damselfly. The invasive nonnative grass *Urochloa mutica* threatens to destroy the habitat of the Pacific Hawaiian damselfly through conversion of marshlands to meadowlands.

The above threats have caused the extirpation of many flying earwig Hawaiian damselfly and Pacific Hawaiian damselfly populations; as a result, their current ranges are very restricted. The combination of restricted range, limited habitat quantity and quality, and low population size makes each of these species especially vulnerable to extinction. Thus we consider the present or threatened destruction, modification, or curtailment of the habitat and range of the flying earwig Hawaiian damselfly and the Pacific Hawaiian damselfly to pose an immediate and significant threat to these species.

Factor B. Overutilization for Commercial, Recreational, Scientific, or Educational Purposes

Individuals from what may be the single remaining population of the flying earwig Hawaiian damselfly were collected by amateur collectors as recently as the mid-1990s (Polhemus 2008, pp. 14-15). Although it is not known how many individuals were collected at that time, Polhemus (2008, pp. 14-15) inferred that this collection resulted in a noticeable decrease in the population size. Furthermore, if there is only one population of the species left, the decreased reproduction that would result from the removal of potential breeding adults would have a significant negative impact on the species.

There is a market for damselflies that may serve as an incentive to collect them. There are internet websites that offer damselfly specimens or parts (e.g., wings) for sale. In addition, the internet abounds with "how to" guides for collecting and preserving damselfly specimens (e.g., Abbott 2000, pp. 1-3; van der Heijden 2005). After butterflies and large beetles, dragonflies and damselflies are probably the most frequently collected insects in the world (Polhemus 2008, pp. 14-15). A rare specimen such as the flying earwig Hawaiian damselfly may be particularly attractive to potential collectors (Polhemus 2008, pp. 14-15)). Based on the history of collection of the flying earwig Hawaiian damselfly, the market for damselfly specimens or parts, and the vulnerability of this small population to the negative impacts of any collection, we consider the potential overutilization of the flying earwig Hawaiian damselfly to pose an immediate and significant threat to this species.

Unlike the flying earwig Hawaiian damselfly, which is restricted to one remaining population site and which is known to have previously been of interest to odonata enthusiasts (collectors of insects in the order Odonata, including damselflies) (Polhemus 2008, pp. 14-15), we do not believe overcollection is currently a threat to the Pacific Hawaiian damselfly, because it is comparatively more widespread across several population sites on three islands and we are

unaware of hobbyist collection of this species.

Factor C. Disease or Predation

The geographic isolation of the Hawaiian Islands restricted the number of original successful colonizing arthropods and resulted in the development of Hawaii's unusual fauna. Only 15 percent of the known families of insects are represented by native Hawaiian species (Howarth 1990, p. 11). Some groups of insects that often dominate continental arthropod fauna, including social Hymenoptera (e.g., ants and wasps), were absent during the evolution of Hawaii's unique arthropod fauna. Commercial shipping and air cargo, as well as biological introductions to Hawaii, have resulted in the establishment of over 3,372 species of nonnative insects (Howarth 1990, p. 18; Staples and Cowie 2001, p. 52), with an estimated continuing establishment rate of 20 to 30 new species per year (Beardsley 1962, p. 101; Beardsley 1979, p. 36; Staples and Cowie 2001, p. 52).

Nonnative arthropod predators and parasites have also been intentionally imported and released by individuals and governmental agencies for biological control of insect pests. Between 1890 and 1985, 243 nonnative species were introduced, sometimes with the specific intent of reducing populations of native Hawaiian insects (Funasaki *et al.* 1988, p. 105; Lai 1988, pp. 186-187). Nonnative arthropods, whether purposefully or accidentally introduced, pose a serious threat to Hawaii's native insects, including the flying earwig Hawaiian damselfly and the Pacific Hawaiian damselfly, through direct predation (Howarth and Medeiros 1989, pp. 82-83; Howarth and Ramsay 1991, pp. 81-84; Staples and Cowie 2001, pp. 54-57).

In addition to the problems posed by nonnative arthropods, the establishment of various nonnative fish, frogs, and toads that act as predators on native Hawaiian damselflies has also had a serious negative impact on the Pacific Hawaiian damselfly and flying earwig Hawaiian damselfly, as discussed below.

Predation by Nonnative Ants

Ants are not a natural component of Hawaii's arthropod fauna, and the native species of the islands evolved in the absence of predation pressure from ants. Ants can be particularly destructive predators because of their high densities, recruitment behavior, aggressiveness, and broad range of diet (Reimer 1993, pp. 17-18). The threat of ant predation on the flying earwig Hawaiian damselfly and the Pacific Hawaiian damselfly is amplified by the fact that most ant species have winged reproductive adults (Borror *et al.* 1989, p. 738) and can quickly establish new colonies in suitable habitats (Staples and Cowie 2001, p. 55). These attributes allow some ants to destroy otherwise geographically isolated populations of native arthropods (Nafus 1993, pp. 19, 22-23).

At least 47 species of ants are known to be established in the Hawaiian Islands (Hawaii Ants 2008, pp. 1-11), and at least 4 particularly aggressive species have severely impacted the native insect fauna, likely including native damselflies (Zimmerman 1948b, p. 173; Reimer *et al.* 1990, pp. 40-43; HEAR database 2005, pp. 1-2): The big-headed ant (*Pheidole megacephala*), the long-legged ant (also known as the yellow crazy ant) (*Anoplolepis gracilipes*), *Solenopsis papuana* (no common name), and *Solenopsis geminata* (no common name). Numerous other species of ants are recognized as threats to Hawaii's native invertebrates, with a trend of new species of ants being established every few years (Staples and Cowie 2001, pp. 53). Due to their preference for drier habitat sites, ants are less likely to occur in high densities in the riparian and aquatic habitat currently occupied by the flying earwig Hawaiian damselfly and the Pacific Hawaiian damselfly. However, some species of ants (e.g., the long-legged ant and *Solenopsis papuana*) have increased their range into these areas.

The presence of ants in nearly all of the lower elevation habitat sites historically occupied by the flying earwig Hawaiian damselfly and the Pacific Hawaiian damselfly may preclude the future recolonization of these areas by these two species. Damselfly naiads may be particularly susceptible to ant predation when they crawl out of the water or seek a terrestrial location for their metamorphosis into the adult stage. Likewise, newly emerged adult damselflies are susceptible to predation until their wings have sufficiently hardened to permit flight, or when the adults are simply resting on vegetation at night (Polhemus 2008, p. 59).

The long-legged ant appeared in Hawaii in 1952, and now occurs on Kauai, Oahu, Maui, and Hawaii (Reimer *et al.* 1990, p. 42). It inhabits low to mid-elevation (less than 2,000 ft (600 m)) rocky areas of moderate rainfall (less than 100 in (250 cm) annually) (Reimer *et al.* 1990, p. 42). Direct observations indicate that Hawaiian arthropods are susceptible to predation by this species. Hardy (1979, p. 34) documented the apparent eradication of native insects within the Kipahulu area on Maui after this area was invaded by the long-legged ant. Although only cursory observations exist, long-legged ants are thought to be a threat to populations of the Pacific Hawaiian damselfly in mesic areas within its elevation range due to their particularly aggressive nature and large colony sizes (Foote 2008, p. 1).

Solenopsis papuana is the only abundant, aggressive ant that has invaded intact mesic to wet forest from sea level to over 2,000-ft (600-m) elevation on all of the main Hawaiian Islands, and is still expanding its range (Reimer 1993, p. 14). Gillespie and Reimer (1993, p. 30) found a negative correlation between native spider diversity and areas invaded by this ant species. It is likely, based on our knowledge of the expanding range of this invasive ant, its aggressive nature, and dense populations (Reimer 1993, p. 14), that it may threaten populations of the Pacific Hawaiian damselfly in mesic areas up to 2,000-ft (600-m) elevation as well (Foote 2008, p. 1).

The rarity or disappearance of native damselfly species, including the two species in this final rule, from historical observation sites over the past 100 years, is likely due to a variety of factors. There is no documentation that conclusively ties the decrease in damselfly observations to the establishment of nonnative ants in low to montane, and mesic to wet, habitats on the Hawaiian Islands. However, we do have evidence that introduced ants prey on Hawaiian damselflies. In 1998, during a survey of an Oahu stream, researchers observed predation by ants upon another damselfly species, the orangeblack Hawaiian damselfly (*Megalagrion xanthomelas*) (Englund 2008, pp. 56-57). The presence of nonnative ants in these habitats and parallel decline of damselfly observations in these habitats suggest that nonnative ants may have played a role in the decline of some populations of the flying earwig Hawaiian damselfly and Pacific Hawaiian damselfly.

In summary, observations and reports have documented that ants are particularly destructive predators because of their high densities, broad range of diet, and ability to establish new colonies in otherwise geographically isolated locations, because the reproductive adult ants are able to fly. Damselfly naiads are particularly vulnerable to ant predation when they crawl out of water or seek a terrestrial location for metamorphosis into adults, and newly emerged adults are susceptible to predation until they

can fly. In particular, the long-legged ant and *Solenopsis papuana* are two aggressive species reported from sea level to 2,000-ft (610-m) elevation on all of the main Hawaiian Islands. Since their range overlaps that of both the flying earwig and Pacific Hawaiian damselfly species, we consider these introduced ants to pose an immediate and significant threat to both damselfly species. Unless these aggressive nonnative ant predators are eliminated or controlled, we expect this threat to continue or increase.

Predation by Nonnative Backswimmers

Backswimmers, so called because they swim upside down, are aquatic "true bugs" (Heteroptera). Backswimmers are voracious predators and frequently feed on prey much larger than themselves, such as tadpoles, small fish, and other aquatic insects, including damselfly naiads (Heads 1985, p. 559; Heads 1986, p. 369). Backswimmers are not native to Hawaii, but several species have been introduced. *Notonecta indica* (no common name) was first collected on Oahu in the mid-1980s and is presently known from Oahu, Maui, and Hawaii. Species of *Notonecta* are known to prey on damselfly naiads and the mere presence of this predator in the water can cause naiads to reduce foraging (which can reduce naiad growth, development, and survival) (Heads 1985, p. 559; Heads 1986, p. 369). While there is no documentation that conclusively ties the decrease in damselfly observations to the establishment of nonnative backswimmers in Hawaiian streams and other aquatic habitat, the presence of backswimmers in these habitats, the documented predation of backswimmers on the naiads of other damselfly species, and the concurrent decline of damselfly observations in some areas suggest that these nonnative aquatic insects may have played a role in the decline of some damselfly populations, including those of the Pacific Hawaiian damselfly.

We consider predation by nonnative backswimmers to pose a significant and immediate threat to the Pacific Hawaiian damselfly, because this species has an aquatic naiad life stage. In addition, the presence of these predators in damselfly aquatic habitat causes naiads to reduce foraging, which in turn reduces their growth, development, and survival. Backswimmers are reported on all of the main Hawaiian Islands except Kahoolawe. Without elimination or control of nonnative backswimmers, we expect this threat to continue or increase over time.

Predation by Nonnative Fish

Predation by nonnative fish is a significant threat to Hawaiian damselfly species with aquatic life stages, such as the Pacific Hawaiian damselfly. The aquatic naiads tend to rest and feed near or on the surface of the water, or on rocks where they are exposed and vulnerable to predation by nonnative fish. Hawaii has only five native freshwater fish species, comprised of gobies (Gobiidae) and sleepers (Eleotridae), that occur on all of the major islands. Because these native fish are benthic (bottom) feeders (Kido *et al.* 1993, pp. 43-44; Ego 1956, p. 24; Englund 1999, pp. 236-237), Hawaii's stream-dwelling damselfly species probably experienced limited natural predation pressure due to their avoidance of benthic areas in preference for shallow side channels, sidepools, and higher velocity riffles and seeps (Englund 1999, pp. 236-237). While fish predation has been an important factor in the evolution of behavior in damselfly naiads in continental systems (Johnson 1991, pp. 8), it is speculated that Hawaii's stream-dwelling damselflies adapted behaviors to avoid the benthic feeding habits of native fish species. Additionally, some species of damselflies, including some of the native Hawaiian species, are not adapted to cohabitate with some fish species, and are found only in bodies of water without fish (Henrikson 1988, p. 179; McPeek 1990a, p. 83). The naiads of the aquatic Pacific Hawaiian damselfly tend to occupy more exposed positions and engage in conspicuous foraging behavior, thereby increasing their susceptibility to fish predation (Englund 1999, p. 232), unlike damselflies that coevolved with predaceous fish (Macan 1977, p. 48; McPeek 1990b, p. 1,714). In laboratory studies, Englund (1999, p. 232) found that naiads of the orangeblack Hawaiian damselfly and the Pacific Hawaiian damselfly invariably were eaten due to their behavior of swimming to the water surface when exposed to two nonnative freshwater fish. In the same study, naiads of nonnative damselfly species avoided predation by the same fish species by remaining still and avoiding surface waters (Englund 1999, p. 232).

Over 70 species of nonnative fish have been introduced into Hawaiian freshwater habitats (Devick 1991, p. 190; Englund 1999, p. 226; Staples and Cowie 2001, p. 32; Brasher 2003, p. 1,054; Englund 2004, p.27; Englund *et al.* 2007, p. 232); at least 53 species are now established in the freshwater habitats of Hawaii (Freshwater Fishes of Hawaii 2008, p. 1). The initial introduction of nonnative fish to Hawaii began with the release of food stock species by Asian immigrants at the turn of the 20th century; however, the impact of these first introductions to Hawaiian damselflies cannot be assessed because they predated the initial collection of damselflies in Hawaii (Perkins 1899, pp. 64-76).

In 1905, three species of fish within the Poeciliidae family, including the mosquito fish (*Gambusia affinis*) and the sailfin molly (*Poecilia latipinna*), were introduced for biological control of mosquitoes (Van Dine 1907, p. 9; Englund 1999, p. 225; Brasher 2003, p. 1054). In 1922, several additional species were introduced for mosquito control, including the green swordtail (*Xiphophorus helleri*), the moonfish (*Xiphophorus maculatus*), and the guppy (*Poecilia reticulata*). By 1935, some Oahu damselfly species, including the orangeblack Hawaiian damselfly, were becoming less common, and fish introduced for mosquito control were the suspected cause of their decline (Williams 1936, p. 313; Zimmerman 1948b, p. 341). The literature clearly indicates that the extirpation of the Pacific Hawaiian damselfly from the majority of its historical habitat sites on the main Hawaiian Islands is the result of predation by nonnative fish (Moore and Gagne 1982, p. 4; Liebherr and Polhemus 1997, p. 502; Englund 1999, pp. 235-237; Brasher 2003, p. 1,055; Englund *et al.* 2007, p. 215; Polhemus 2007, pp. 238-239). From 1946 through 1961, several additional nonnative fish were introduced for the purpose of controlling nonnative aquatic plants, and for angling (Brasher 2003, p. 1,054). In the early 1980s, several additional species of nonnative fish began appearing in stream systems, likely originating from the aquarium fish trade (Devick 1991, p. 189; Brasher 2003, p. 1,054). By 1990, there were an additional 14 species of nonnative fish established in waters on Hawaii, Maui, and Molokai. By 2008, there were at least 17 nonnative freshwater fish established on one or more of these islands, including several aggressive predators and habitat-altering species such as the channel catfish (*Ictalurus punctatus*) and cichlids (*Tilapia* sp.) (Devick 1991, pp. 191-192; FishBase 2008).

The Pacific Hawaiian damselfly is currently found only in portions of stream systems without nonnative fish (Liebherr and Polhemus 1997, pp. 493-494; Englund 1999, p. 228; Englund 2004, p. 27; Englund *et al.* 2007, p. 215). There is a strong correlation between

the absence of nonnative fish species and the presence of Hawaiian damselflies in streams on all of the main Hawaiian Islands (Englund 1999, p. 225; Englund *et al.* 2007, p. 215), suggesting that the damselflies cannot coexist with nonnative fish. The distribution of some Hawaiian damselfly species is now reduced to stream reaches less than 312 ft (95 m) in length where invasive fish species do not occur (Englund 1999, p. 229; Englund 2004, p. 27). In 2007, a Statewide survey including 15 streams on the islands of Hawaii, Maui, and Molokai found the flying earwig Hawaiian damselfly was not observed in streams where the introduced Mexican molly (*Poecilia mexicana*) was present (Englund *et al.* 2007, pp. 214-216, 228). On Oahu, researchers found that the Oahu-endemic Hawaiian damselflies only occupied habitat sites without nonnative fish. For two of these species, a geologic or manmade barrier (e.g., waterfalls, steep gradient, dry stream midreaches, or constructed diversions) appears to prevent access by the nonnative fish species. For this reason, researchers have recommended that geologically isolated sites inaccessible to nonnative fishes, such as isolated anchialine ponds, high-gradient streams interrupted by manmade diversions, and streams entering the coast as waterfalls, be used as restoration sites for damselflies on all of the Hawaiian Islands (Englund 2004, p. 27).

Of the two damselfly species considered in this final rule, the aquatic Pacific Hawaiian damselfly appears to have had the greatest range contraction due to predation by nonnative fish (Englund 1999, p. 235; Polhemus 2007, p. 234, 238-240). Once found on all of the main Hawaiian Islands, it is now found only on Molokai, Maui, and one stream on the island of Hawaii below 2,000 ft (600 m) in elevation; all are in stream reaches free of nonnative fish. The Pacific Hawaiian damselfly was extirpated from Oahu by 1910 (Liebherr and Polhemus 1997, p. 502), although Englund (1999, p. 235) found that Oahu still has abundant and otherwise suitable lowland and coastal water habitat to support this species. However, this aquatic habitat is infested with nonnative fish, with some nonnative species occurring up to 1,300-ft (400-m) elevation. In contrast, Englund (1999, p. 236) found that even at sea level, artificial wetlands (resulting from taro cultivation) on the island of Molokai can support populations of the Pacific Hawaiian damselfly because nonnative fish are absent.

Even the geographically isolated stream headwaters and other aquatic habitats where the Pacific Hawaiian damselfly remains extant are not secure from the threat of predation by introduced fish species. There are many documented cases of people moving nonnative fish from one area to another (Brock 1995, pp. 3-4; Englund 1999, p. 237). Once nonnative fish species are introduced to aquatic habitats previously free of nonnative fish, they often become permanently established (Englund and Filbert 1999, p. 151; Englund 1999, pp. 232-233; Englund *et al.* 2007). An example of facilitated fish movement occurred in 2000, when an uninformed maintenance worker introduced *Tilapia* sp. into pools located on the grounds of Tripler Hospital that were maintained for the benefit of the remaining Oahu population of the orangeblack Hawaiian damselfly (Englund 2000).

The continued introduction and establishment of new species of predatory nonnative fish in Hawaiian waters, and the possible movement of these nonnative species to new streams and other aquatic habitat, is an immediate and significant threat to the survival of the aquatic Pacific Hawaiian damselfly. Unless nonnative predatory fish are eradicated or effectively controlled in the habitats utilized by the Pacific Hawaiian damselfly, we have no reason to believe that there will be any significant reduction in this threat at any time in the near future. The flying earwig Hawaiian damselfly is not known to be threatened by predation from nonnative fish species, due to the apparent absence of the larval stage within stream habitats.

Predation by Introduced Frogs and Toads

Currently, there are three species of introduced aquatic amphibians known in the Hawaiian Islands: The North American bullfrog (*Rana catesbeiana*), the cane toad (*Bufo marinus*), and the Japanese wrinkled frog (*Rana rugosa*). The bullfrog is native to the eastern United States and the Great Plains region (Moyle 1973, p. 18; Bury and Whelan 1985 in Earlham College 2002, p. 10), and was first introduced into Hawaii in 1899 (Bryan 1931, p. 63) to help control insects, specifically the nonnative Japanese beetle (*Popillia japonica*), a significant pest of ornamental plants (Bryan 1931, p. 62). Bullfrogs were first released and quickly became established in the Hilo region on the island of Hawaii (Bryan 1931, p. 63). Bullfrogs have demonstrated great success in establishing new populations wherever they have been introduced (Moyle 1973, p. 19), and now occur on the islands of Hawaii, Kauai, Lanai, Maui, Molokai, and Oahu (U.S. Geological Survey 2008b, p. 8). This species is flexible in both habitat and food requirements (Bury and Whelan 1985 in Earlham College 2002, p. 11), and can utilize any water source within its temperature range (60 to 75 degrees Fahrenheit (°F)) (16 to 24 degrees Celsius (°C)) (DesertUSA 2008). Introduced to areas outside its native range, the bullfrog's primary impact is typically the elimination of native frog species (Moyle 1973, p. 21). In Hawaii, where there are no native frogs, the bullfrog has not been definitively implicated in the extirpation of any particular native aquatic invertebrate species, but Englund *et al.* (2007, pp. 215, 219) found a strong correlation between the presence of bullfrogs and the absence of Hawaiian damselflies in their 2006 study of streams on all of the main Hawaiian Islands. As the bullfrog prefers habitats with dense vegetation and relatively calm water (Moyle 1973, p. 19; Bury and Whelan 1985 in Earlham College 2002, p. 9), it is likely of particular threat to the Pacific Hawaiian damselfly because this species also prefers calm water habitat that is surrounded by dense vegetation. Capable of breeding within small pools of water, bullfrogs are also a potential threat to the flying earwig Hawaiian damselfly within its uluhe-covered, steep, riparian, and moist talus-slope habitat on Maui.

Because the effects of possible predation by the cane toad and the Japanese wrinkled frog on the flying earwig Hawaiian damselfly and the Pacific Hawaiian damselfly are unknown at this time, the magnitude or significance of this potential threat cannot be determined.

We consider predation by bullfrogs to pose a significant and immediate threat to the Pacific Hawaiian damselfly, since Englund *et al.* (2007, pp. 215, 219) found a strong correlation between the presence of predatory nonnative bullfrogs and the absence of Hawaiian damselflies, and the preferred habitat of the bullfrog overlaps with that of the Pacific Hawaiian damselfly. Within its riparian habitat, the flying earwig Hawaiian damselfly may also be threatened by the bullfrog, which is capable of breeding within small pools of water. In the absence of the elimination or control of nonnative bullfrogs, we expect that this threat will continue or increase in the future.

Summary of Factor C

Predation by nonnative animal species (ants, backswimmers, fish, and bullfrogs) poses an immediate and significant threat to the Pacific and flying earwig Hawaiian damselflies

throughout their ranges for the following reasons:

- Damselfly naiads are vulnerable to predation by ants, and the ranges of both the Pacific and flying earwig Hawaiian damselflies overlap that of particularly aggressive, nonnative, predatory ant species that currently occur from sea level to 2,000 ft (610 m) elevation on all of the main Hawaiian Islands. We consider both the Pacific and flying earwig Hawaiian damselflies to be threatened by predation by these nonnative ants.
- Nonnative backswimmers prey on damselfly naiads in streams and other aquatic habitat, and are considered a threat to the Pacific Hawaiian damselfly since this species has an aquatic naiad life stage. In addition, the presence of backswimmers inhibits the foraging behavior of damselfly naiads, with negative consequences for development and survival. Backswimmers are reported on all of the main Hawaiian Islands except Kahoolawe.
- The absence of Hawaiian damselflies, including the aquatic Pacific Hawaiian damselfly, in streams and other aquatic habitat on the main Hawaiian Islands, is strongly correlated with the presence of predatory nonnative fish as documented in numerous observations and reports (Englund 1999, p. 237; Englund 2004, p. 27; Englund *et al.* 2007, p. 215), thereby suggesting that nonnative predatory fishes eliminated native Hawaiian damselflies from these aquatic habitats. There are over 51 species of nonnative fishes established in freshwater habitats on the Hawaiian Islands from sea level to over 3,800-ft (1,152-m) elevation (Devick 1991, p. 190; Staples and Cowie 2001, p. 32; Brasher 2003, p. 1054; Englund 1999, p. 226; Englund and Polhemus 2001; Englund 2004, p. 27; Englund *et al.* 2007, p. 232). Predation by nonnative fishes is considered to pose a significant and immediate threat to the Pacific Hawaiian damselfly.
- Englund *et al.* (2007, pp. 215, 219) found a strong correlation between the presence of nonnative bullfrogs and the absence of Hawaiian damselflies. Bullfrogs are reported on all of the main Hawaiian Islands, except Kahoolawe and Niihau. The Pacific Hawaiian damselfly is likely threatened by bullfrogs, due to their shared preference for similar habitat, and the flying earwig Hawaiian damselfly may also be threatened within its riparian habitat by the bullfrog, which is capable of breeding within small pools of water.

Factor D. The Inadequacy of Existing Regulatory Mechanisms

Inadequate Habitat Protection

Currently, there are no Federal, State, or local laws, treaties, or regulations that specifically conserve or protect the flying earwig Hawaiian damselfly or the Pacific Hawaiian damselfly from the threats described in this final rule. The State of Hawaii considers all natural flowing surface water (streams, springs, and seeps) as State property (Hawaii Revised Statutes 174c 1987), and the Hawaii Department of Land and Natural Resources (DLNR), Division of Aquatic Resources has management responsibility for the aquatic organisms in these waters (Hawaii Revised Statutes Annotated, 1988, Title 12; 1992 Cumulative Supplement). Thus, damselfly populations associated with streams, seeps, and springs are under the jurisdiction of the State of Hawaii, regardless of the ownership of the property across which the stream flows. This includes all populations of the Pacific Hawaiian damselfly and the flying earwig Hawaiian damselfly.

The State of Hawaii manages the use of surface and groundwater resources through the Commission on Water Resource Management (Water Commission), as mandated by the 1987 State Water Code (State Water Code, Hawaii Revised Statutes Chapter 174C-71, 174C-81-87, and 174C-9195, and Administrative Rules of the State Water Code, Title 13, Chapters 168 and 169). In the State Water Code, there are no formal requirements that project proponents or the Water Commission protect the habitats of fish and wildlife prior to issuance of a permit to modify surface or groundwater resources.

As noted above in *Factor A*, the Water Commission is now more cognizant of the effects that groundwater removal has on streams via injudicious placement of wells. The Commission routinely reviews new permit applications for wells (Hardy 2009, p. 1). All requests for new wells require a drilling permit, and, in some cases, a use permit is additionally required, depending upon the intended allocation and anticipated amount of water to be pumped from the well. Water Management Areas have been designated over much of Oahu and in some areas on other neighboring islands. Within these areas, a use permit for a new well is also required, which automatically triggers a greater review of the potential impacts. Any request for a permit to drill a well within proximity of streams or dike rock located at the headwaters of streams automatically triggers additional review (Hardy 2009). Permits to drill wells near streams or within dike complexes are now unlikely to be granted because a new well would require the amendment of in-stream flow standards for the impacted stream. However, such amendments are sometimes approved. One example is the long-contested case involving the Waiahole Ditch on the island of Oahu (Hawaii Department of Agriculture 2002, p. 3). In that case, the Commission supports the removal of several million gallons of water daily from windward Oahu streams (Hawaii Department of Agriculture 2002). Although a regulatory process is in place that can potentially address the effects of new requests for groundwater removal on streams, this process includes provisions for amendments that would result in adverse effects to groundwater that supports streamside habitat for the Pacific Hawaiian damselfly, and potentially for the flying earwig Hawaiian damselfly.

The maintenance of instream flow, which is needed to protect the habitat of damselflies and other aquatic wildlife, is regulated by the establishment of standards on a stream-by-stream basis (State Water Code, Hawaii Revised Statutes Chapter 174C-71, and Administrative Rules of the State Water Code, Title 13, Chapter 169). Currently, the interim instream flow standards represent the existing flow conditions in streams in the State (as of June 15, 1988, for Molokai, Hawaii, Kauai and east Maui; and October 19, 1988, for west Maui and leeward Oahu) (Administrative Rules of the State Water Code, Title 13, Chapter 169-44-49). However, the State Water Code does not provide permanent or minimal instream flow standards for the protection of aquatic wildlife. Instead, modification of instream flow standards and stream channels can be undertaken at any time by the Water Commission or via public petitions to revise flow standards or modify stream channels in a specified stream (Administrative Rules of the State Water Code, Title 13, Chapter 169-36). Additionally, the Water Commission must consider economic benefits gained from out-of-stream water uses, but is not required to balance these benefits against instream benefits or impacts to aquatic fish and wildlife. Consequently, any stabilization of stream flow for the protection of any native Hawaiian damselfly species habitat is subject to modification at a future date.

The natural value of Hawaii's stream systems has been recognized under the State of Hawaii Instream Use Protection Program (Administrative Rules of the State Water Code, Title 13, Chapter 169-20(2)). In the Hawaii Stream Assessment Report (1990), prepared in coordination with the National Park Service, the State Water Commission identified high-quality rivers or streams, or portions of rivers or streams, that may be placed within the Federal Wild and Scenic River system. This report recommended that streams meeting certain criteria be protected from further development. However, there is no formal or institutional mechanism within the State's Water Code to designate and set aside these streams, or to identify and protect stream habitat for Hawaiian damselflies. Furthermore, the setting of instream flow standards sufficient to conserve Hawaiian damselflies is currently not a condition that would be considered or included in a Hawaii Department of Agriculture individual permit (DLNR, Commission on Water Resource Management 2006, p. 2).

Existing Federal regulatory mechanisms that may protect Hawaiian damselflies and their habitat are also inadequate. The Federal Energy Regulatory Commission (FERC) has very limited jurisdiction in Hawaii. Hawaii's streams are isolated on individual islands and run quickly down steep volcanic slopes. There are no interstate rivers in Hawaii, few if any streams crossing Federal land, and no Federal dams. Many of Hawaii's streams are generally intermittent, or if perennial, not navigable. Thus, licensing of hydroelectric projects in Hawaii generally does not come under the purview of FERC, although hydropower developers in Hawaii may voluntarily seek licensing under FERC.

In contrast, the U.S. Army Corps of Engineers (Corps) has some regulatory control over modifications of freshwater streams in the United States, yet may assert discretion relative to jurisdictional determinations depending on the surface water connection of the stream to a tangible water of the United States. If the Corps finds the stream to be jurisdictional, certain activities such as road crossings for streams and bank stabilization can be subject to a streamlined permitting process (33 CFR 330). This process, called the nationwide permits program, can involve only limited public review if impacts are anticipated to be minimal, both individually and cumulatively.

The Service and the Hawaii DLNR have 15 days to provide substantive site-specific comments prior to the issuance of a nationwide permit. Given the complexity of the impacts on Hawaiian damselflies from stream modifications and surface water diversions, the remoteness of project sites, and the types of studies necessary to determine project impacts and mitigation, this limited comment period does not allow time for an adequate assessment of impacts. This regulation is inadequate to protect the damselflies because the Corps is under no obligation to modify the project based upon comments received.

However, if the stream is jurisdictional and impacts are expected to exceed the thresholds for a nationwide permit, the Corps can issue individual permits under section 404 of the Clean Water Act (33 U.S.C. 1251 *et seq.*). These permits are subject to public review, and must comply with the Environmental Protection Agency's 404(b)(1) guidelines and public comment requirements under the Clean Water Act. Compensatory mitigation may also be required to offset lost stream functions. However, in issuing these permits, the Corps does not establish instream flow standards as a matter of policy. The Corps normally considers that the public interest for instream flow is represented by the State water allocation rights or preferences (U.S. Army Corp of Engineers' Regulatory Guidance Letter No 85-6), and project alternatives that supersede, abrogate, or otherwise impair the State water quantity allocations are not normally addressed as alternatives during permit review.

In cases where the Corps district engineer does propose to impose instream flow standards on an individual permit, this flow standard must reflect a substantial national interest. Additionally, if this instream flow standard is in conflict with a State water quantity allocation, then it must be reviewed and approved by the Office of the Chief Engineer in Washington, D.C. (Regulatory Guidance Letter No 85-6).

One population of the Pacific Hawaiian damselfly occurs in Palikea Stream on Maui, which flows through Haleakala National Park. On Molokai, populations of this damselfly species occur at the mouth of Pelekunu Stream, which flows through a preserve managed by The Nature Conservancy, and in lower Waikolu Stream, which flows through Kalaupapa National Historic Park. However, the landowners do not own the water rights to any of the streams, and thus cannot fully manage the conservation of any of these damselfly populations.

Because there are currently no Federal, State, or local laws or treaties or regulations that adequately conserve or protect habitat of the flying earwig Hawaiian damselfly or the Pacific Hawaiian damselfly from the threats described in this final rule, and the regulations currently in place are inadequate to maintain stream and riparian habitats and protect the two damselfly species from stream modifications and surface water diversions, all of these threats remain immediate and significant. The habitat of both species continues to be reduced, degraded, and altered by past and present manmade alterations to streams and riparian zones.

Inadequate Protection from Introduction of Nonnative Species

As discussed above (see *Factor C. Disease or Predation*), predation by nonnative species (fish, insects, and bullfrogs) is one of the most significant threats to the survival of the flying earwig Hawaiian damselfly and the Pacific Hawaiian damselfly.

Based on historical and current rates of aquatic species introductions (both purposeful and accidental), existing State and Federal regulatory mechanisms are not adequately preventing the spread of nonnative species between islands and watersheds in Hawaii. The Hawaii Department of Agriculture has administrative rules in place that address importation of nonnative species and establish a permit process for such activities (Hawaii Administrative Rules sec. 4-71). The Division of Aquatic Resources within the Hawaii Department of Land and Natural Resources (HDLNR) has authority to seize, confiscate, or destroy as a public nuisance, any fish or other aquatic life found in any waters of the State and whose importation is prohibited or restricted under rules of the Department of Agriculture (Section 187A-2(4 H.R.S. sec. 187A-6.5)). Although State and Federal regulations are now firmly in place to prevent the unauthorized entry of nonnative aquatic species into the State of Hawaii, movement of species between islands and from one watershed to the next remains problematic even while prohibited (HDAR 2003, pp. 2/12 – 2/14). For example, while unauthorized movement of an aquatic species from one watershed to the next may be prohibited, there simply is not enough government funding to adequately enforce such regulation or to provide for sufficient inspection services and monitoring, although this priority need is recognized (Cravalho 2009, p. 1). Furthermore, due to the complexity of the pathways of invasion by aquatic species (i.e., intentional, inadvertent,

and by forces of nature), many components contributing to the problem may be better addressed through greater public outreach and education (Montgomery 2009, p. 1).

On the basis of the above information, we find that existing regulatory mechanisms do not adequately protect the flying earwig Hawaiian damselfly or the Pacific Hawaiian damselfly from the threat of established nonnative species (particularly fish and insect species) spreading between islands and watersheds, where they may prey upon or directly compete with the two damselfly species for food and space. Because current Federal, State, and local laws and treaties and regulations are inadequate to prevent the spread of nonnative aquatic animals between islands and watersheds, the impacts from these introduced threats remain immediate and significant. From habitat-altering, nonnative plant species to predation or competition caused by introduced frogs, nonnative fish, and insect species, the Pacific Hawaiian damselfly and the flying earwig Hawaiian damselfly are immediately and significantly threatened by former and new plant and animal introductions within the damselflies' remaining habitat.

Summary of Factor D

The aquatic habitat of the flying earwig and the Pacific Hawaiian damselflies is under the jurisdiction of the State of Hawaii, which also has management responsibility for aquatic organisms. However, the State Water Code has no regulatory mechanism in place to protect these species or their habitat. The State Water Code does not currently provide for permanent or minimum instream flow standards for the protection of aquatic ecosystems upon which these damselfly species depend, and does not contain a regulatory mechanism for identifying and protecting damselfly habitat under a Wild and Scenic River designation.

To date, administration of the Clean Water Act permitting program by the U.S. Army Corps of Engineers has not provided substantive protection of damselfly habitat, including any requirements for retention of adequate instream flows.

Existing State and Federal regulatory mechanisms are not adequately regulating the spread of nonnative animal species between islands and watersheds. Predation by nonnative animal species poses a major ongoing threat to the flying earwig and the Pacific Hawaiian damselflies. Because existing regulatory mechanisms are inadequate to maintain aquatic habitat for the damselflies and to regulate the spread of nonnative species, the inadequacy of existing regulatory mechanisms is considered to be a significant and immediate threat.

Factor E. Other Natural or Manmade Factors Affecting the Species' Continued Existence

Small Numbers of Populations and Individuals

Species that are endemic to single islands or known from few, widely dispersed locations are inherently more vulnerable to extinction than widespread species because of the higher risks from genetic bottlenecks, random demographic fluctuations, climate change, and localized catastrophes such as hurricanes, landslides, and drought (Lande 1988, p. 1,455; Mangel and Tier 1994, p. 607; Pimm *et al.* 1988, p. 757). These problems are further magnified when populations are few and restricted to a limited geographic area, and the number of individuals is very small. Populations with these characteristics face an increased likelihood of stochastic extinction due to changes in demography, the environment, genetics, or other factors, in a process described as an "extinction vortex" by Gilpin and Soul´e (1986, pp. 24-25). Small, isolated populations often exhibit a reduced level of genetic variability or genetic depression due to inbreeding, which diminishes the species' capacity to adapt and respond to environmental changes, thereby lessening the probability of long-term persistence (Soul´e 1987, pp. 4-7). The problems associated with small population size and vulnerability to random demographic fluctuations or natural catastrophes are further magnified by synergistic interactions with other threats, such as those discussed above (Factors A–C).

Historically, the two damselfly species were more widespread, present on several Hawaiian islands. An important benefit of this greater historical range, especially the fact they were on several islands from which they are now extirpated, resulted in an advantage of redundancy: Additional populations separated by some distance likely allowed some populations to be spared the impacts of localized or more discrete catastrophic events, such as narrow-track hurricanes or mud slides. However, this advantage of redundancy has been lost with the great reduction in the damselflies' ranges.

Jordan *et al.* (2007, p. 247) showed in their genetic and comparative phylogeography analysis (study of historical processes responsible for genetic divergence within a species) of four *Megalagrion* species that the Pacific Hawaiian damselfly may be more susceptible to problems linked to low genetic diversity compared to other Hawaiian damselfly species. Both Maui and Molokai populations of this species were analyzed, and results suggested that the Pacific Hawaiian damselfly may not disperse well across both land and water, which may have led to the low genetic diversity observed in the two populations sampled. The authors proposed that populations of the Pacific Hawaiian damselfly be monitored and managed to help understand the conservation needs of this species and the threat of population bottlenecks (Jordan *et al.* 2007, p. 258). This study did not include an analysis of the flying earwig Hawaiian damselfly. However, given that this species may now be reduced to a single population, the potential loss of genetic diversity and threat of inbreeding depression is a concern for the flying earwig Hawaiian damselfly as well.

The small number of remaining populations of the flying earwig Hawaiian damselfly (now possibly reduced to a single remaining population) puts this species at significant risk of extinction from stochastic events, such as hurricanes, landslides, or prolonged drought (Jones *et al.* 1984, p. 209). For example, Polhemus (1993, p. 87) documented the extirpation of a related damselfly species, *Megalagrion vagabundum*, from the entire Hanakapiai Stream system on Kauai as a result of the impacts from Hurricane Iniki in 1992. Such stochastic events thus pose the threat of immediate extinction of a species with a very small and geographically restricted distribution, as in the case of the flying earwig Hawaiian damselfly.

Summary of Factor E

The threat to the flying earwig and Pacific Hawaiian damselflies from limited numbers of populations and individuals is significant and immediate for the following reasons:

- Each of these species is subject to potentially reduced reproductive vigor due to inbreeding depression, particularly the flying earwig Hawaiian damselfly, which is now apparently restricted to one population;
- Each of these species is subject to reduced levels of genetic variability that may diminish their capacity to adapt and respond to environmental changes, thereby lessening the probability of their long-term persistence;

- The potential benefits of redundancy resulting from the wider historical distribution of the species, in which some populations might survive stochastic events that impact other populations of the damselflies, has been lost as a result of the extreme reduction in the ranges of the two species;
- As there may be only one remaining population of the flying earwig Hawaiian damselfly that occurs in a relatively restricted geographic location, a single catastrophic event, such as a hurricane or landslide, could result in the extinction of the species. Likewise, the Pacific Hawaiian damselfly, with several small, widely dispersed populations, would be vulnerable to the extirpation of remaining populations; and
- Species with few populations and a small number of individuals, such as the Pacific Hawaiian damselfly and flying earwig Hawaiian damselfly, are less resilient to threats that might otherwise have a relatively minor impact on a larger population. For example, the reduced availability of breeding habitat or an increase in predation of naiads, which might be absorbed in a relatively large population, could result in a significant decrease in survivorship or reproduction of a relatively small, isolated population. The small population size of these two species thus magnifies the severity of the impact of the other threats discussed in this final rule.

Determination

We have carefully assessed the best scientific and commercial information available regarding the past, present, and future threats to the flying earwig Hawaiian damselfly and the Pacific Hawaiian damselfly. We find that both of these species face immediate and significant threats throughout their ranges:

- Both the Pacific Hawaiian damselfly and the flying earwig Hawaiian damselfly face threats from past, present, and potential future destruction, modification, and curtailment of their habitats, primarily from: Agriculture and urban development; stream diversion, well-drilling, channelization, and dewatering; feral pigs and nonnative plants; and from stochastic events like hurricanes, landslides, and drought. The changing environmental conditions that may result from climate change (particularly rising temperatures) are also likely to threaten these two damselfly species (compounded because of the two species' small population sizes and limited distributions), although currently there is limited information on the exact nature of these impacts (see discussion under Factor A).
- The only known population of the flying earwig Hawaiian damselfly is immediately and significantly threatened by potential recreational collection (see Factor B).
- Both the flying earwig Hawaiian damselfly and the Pacific Hawaiian damselfly are subject to an immediate and significant threat of predation by nonnative insects (ants) and bullfrogs. The Pacific Hawaiian damselfly is also similarly threatened by backswimmers and nonnative fish (see Factor C).
- The inadequacy of existing regulatory mechanisms (e.g., inadequate protection of stream habitat and inadequate protection from the introduction of nonnative species) poses a threat to both species of Hawaiian damselfly, as discussed under Factor D above.
- Both of these species face an immediate and significant threat from extinction due to factors associated with small numbers of populations and individuals as discussed under Factor E above.

All of the above threats are exacerbated by the inherent vulnerability of the flying earwig Hawaiian damselfly and the Pacific Hawaiian damselfly to extinction from stochastic events at any time because of their endemism (indigenousness), small numbers of individuals and populations, and restricted habitats.

The Act defines an endangered species as any species that is "in danger of extinction throughout all or a significant portion of its range" and a threatened species as any species "that is likely to become endangered throughout all or a significant portion of its range within the foreseeable future." We find that each of these two species endemic to Hawaii is presently in danger of extinction throughout its entire range, based on the immediacy, severity, and scope of the threats described above. Therefore, on the basis of the best available scientific and commercial information, we are listing the flying earwig Hawaiian damselfly and the Pacific Hawaiian damselfly as endangered in accordance with sections 3(6) and 4(a)(1) of the Act.

Under the Act and our implementing regulations, a species may warrant listing if it is endangered or threatened throughout all or a significant portion of its range. Each of the two endemic damselfly species designated as endangered in this final rule is highly restricted in its range, and the threats to its survival occur throughout its range and are not restricted to any particular significant portion of that range. Therefore, we assessed the status of each species throughout its entire range. Accordingly, our assessment and final determination apply to each species throughout its entire range.

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 results in public awareness and conservation by Federal, State, Tribal, and local agencies, private organizations, and individuals. The Act encourages cooperation with the States and requires that recovery actions be carried out for all listed species. The protection required by Federal agencies, and the prohibitions against certain activities are discussed, in part, below.

The primary purpose of the Act is the conservation of endangered and threatened species and the ecosystems upon which they depend. The ultimate goal of such conservation efforts is the recovery of these listed species, so that they no longer need the protective measures of the Act. Subsection 4(f) of the Act requires the Service to develop and implement recovery plans for the conservation of endangered and threatened species. The recovery planning process involves the identification of actions that are necessary to halt or reverse the species' decline by addressing the threats to its survival and recovery. The goal of this process is to restore listed species to a point where they are secure, self-sustaining, and functioning components of their ecosystems.

Recovery planning includes the development of a recovery outline shortly after a species is listed, preparation of a draft and final recovery plan, and revisions to the plan as significant new information becomes available. The recovery outline guides the immediate implementation of urgent recovery actions and describes the process to be used to develop a recovery plan. The recovery plan identifies site-specific management actions that will achieve recovery of the species, measurable criteria that determine when a species may be downlisted or delisted,

and methods for monitoring recovery progress. Recovery plans also establish a framework for agencies to coordinate their recovery efforts and provide estimates of the cost of implementing recovery tasks. Recovery teams (comprised of species experts, Federal and State agencies, nongovernment organizations, and stakeholders) are often established to develop recovery plans. When completed, the recovery outline, draft recovery plan, and the final recovery plan will be available from our website (*http://www.fws.gov/endangered*), or from our Pacific Islands Fish and Wildlife Office (see **ADDRESSES**).

Implementation of recovery actions generally benefits from the participation of a broad range of partners, including other Federal agencies, States, nongovernmental organizations, businesses, and private landowners. Examples of recovery actions include habitat restoration (e.g., restoration of native vegetation), research, captive propagation and reintroduction, and outreach and education. The recovery of many listed species cannot be accomplished solely on Federal lands because their range may occur primarily or solely on non-Federal lands. To achieve recovery of these species requires cooperative conservation efforts on private and State lands.

Upon listing, funding for recovery actions will be available from a variety of sources, including Federal budgets, State programs, and cost-share grants for non-Federal landowners, the academic community, and nongovernmental organizations. In addition, under section 6 of the Act, the State of Hawaii is eligible for Federal funds to implement management actions that promote the protection and recovery of the flying earwig Hawaiian damselfly and the Pacific Hawaiian damselfly. Information on our grant programs that are available to aid species recovery can be found at: *http://www.fws.gov/grants*.

Please let us know if you are interested in participating in recovery efforts for the flying earwig Hawaiian damselfly and the Pacific Hawaiian damselfly. Additionally, we invite you to submit any new information on these species whenever it becomes available and any information you may have for recovery planning purposes (see **ADDRESSES**).

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 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 consultation with the Service.

Federal agency actions within the species' habitat that may require consultation as described in the preceding paragraph include, but are not limited to: Army Corps of Engineers involvement in projects, such as the construction of roads, bridges, and dredging projects, subject to section 404 of the Clean Water Act (33 U.S.C. 1251 *et seq.*) and section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. 401 *et seq.*); U.S. Environmental Protection Agency–authorized discharges under the National Pollutant Discharge Elimination System (NPDES); U.S. Department of Agriculture involvement in the release or permitting of the release of biological control agents under the Federal Plant Pest Act (7 U.S.C. 150aa-150jj); military training and related activity carried out by the U.S. Department of Defense; and projects by the Natural Resources Conservation Service, National Park Service, U.S. Fish and Wildlife Service, Federal Highways Administration, and the U.S. Department of Housing and Urban Development.

The Act and its implementing regulations set forth a series of general prohibitions and exceptions that apply to all endangered and threatened wildlife. The prohibitions of section 9(a)(2) of the Act, codified at 50 CFR 17.21 for endangered wildlife, in part, make it illegal for any person subject to the jurisdiction of the United States to take (includes harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt any of these), import, export, ship in interstate commerce in the course of a commercial activity, or sell or offer for sale in interstate or foreign commerce any listed species. It is also illegal to possess, sell, deliver, carry, transport, or ship any such wildlife that has been taken illegally. Certain exceptions apply to our agents and State conservation agencies.

We may issue permits to carry out otherwise-prohibited activities involving endangered and threatened wildlife species under certain circumstances. Regulations governing permits are codified at 50 CFR 17.22 for endangered species. A permit must be issued for the following purposes: For scientific purposes, to enhance the propagation or survival of the species, and for incidental take in connection with otherwise lawful activities.

It is our policy, as published in the **Federal Register** on July 1, 1994 (59 FR 34272), to identify to the maximum extent practicable 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 proposed listing on proposed and ongoing activities within the range of species proposed for listing. The following activities could potentially result in a violation of section 9 of the Act; this list is not comprehensive:

(1) Unauthorized collecting, handling, possessing, selling, delivering, carrying, or transporting of the species, including import or export across State lines and international boundaries, except for properly documented antique specimens of these taxa at least 100 years old, as defined by section 10(h)(1) of the Act;

(2) Introduction of nonnative species that compete with or prey upon the two damselflies, such as the introduction of competing nonnative insects or predatory fish to the State of Hawaii;

(3) The unauthorized release of biological control agents that attack any life stage of these species;

(4) Unauthorized modification of the channel or water flow of any stream or removal or destruction of emergent aquatic vegetation in any body of water in which the flying earwig Hawaiian damselfly and the Pacific Hawaiian damselfly are known to occur; and

(5) Unauthorized discharge of chemicals or fill material into any waters in which the flying earwig Hawaiian damselfly and the Pacific Hawaiian damselfly are known to occur.

Questions regarding whether specific activities would constitute a violation of section 9 of the Act should be directed to the Pacific Islands Fish and Wildlife Office (see **ADDRESSES**). Requests for copies of the regulations concerning listed animals and general inquiries regarding prohibitions and permits may be addressed to the U.S. Fish and Wildlife Service, Endangered Species Permits, 911 N.E. 11th Avenue, Portland, OR 97232-4181 (telephone 503-231-2063; facsimile 503-231-6243).

Upon listing under the Act, the State of Hawaii's Endangered Species Act (HRS, Sect. 195D–4(a)) is automatically invoked, which would also prohibit take of these species and encourage conservation by State government agencies. Further, the State may enter into agreements with Federal agencies

to administer and manage any area required for the conservation, management, enhancement, or protection of endangered species (HRS, Sect. 195D–5(c)). Funds for these activities could be made available under section 6 of the Act (Cooperation with the States). Thus, the Federal protection afforded to these species by listing them as endangered species will be reinforced and supplemented by protection under State law.

Critical Habitat

Background

Critical habitat is defined in section 3 of the Act as:

(1) The specific areas within the geographical area occupied by the species, at the time it is listed in accordance with the provisions of section 4 of the Act, on which are found those physical or biological features

(a) Essential to the conservation of the species; and

(b) Which may require special management considerations or protections; and

(2) Specific areas outside the geographical area occupied by a species at the time it is listed in accordance with the provisions of section 4 of the Act, upon a determination by the Secretary of the Interior that such areas are essential for the conservation of the species.

Conservation, as defined under section 3 of the Act, means to use and the use of all methods and procedures that are necessary to bring an endangered or threatened species to the point at which the measures provided under the Act are no longer necessary. Such methods and procedures include, but are not limited to, all activities associated with scientific resources management such as research, census, law enforcement, habitat acquisition and maintenance, propagation, live trapping, and transplantation, and, in the extraordinary case where population pressures within a given ecosystem cannot be otherwise relieved, may include regulated taking.

Critical habitat receives protection under section 7 of the Act through the prohibition against Federal agencies carrying out, funding, or authorizing the destruction or adverse modification of critical habitat. Section 7(a)(2) of the Act requires consultation on Federal actions that may affect critical habitat. The designation of critical habitat does not affect land ownership or establish a refuge, wilderness, reserve, preserve, or other conservation area. Such designation does not allow the government or public access to private lands. Such designation does not require implementation of restoration, recovery, or enhancement measures by the landowner. Where a landowner seeks or requests Federal agency funding or authorization that may affect a listed species or critical habitat, the consultation requirements of section 7(a)(2) of the Act would apply, but even in the event of a destruction or adverse modification finding, the Federal action agency's and landowner's obligation is not to restore or recover the species, but to implement reasonable and prudent alternatives to avoid destruction or adverse modification of the critical habitat.

For inclusion in a critical habitat designation, the habitat within the geographical area occupied by the species at the time of listing must contain the physical and biological features essential to the conservation of the species, and be included only if those features may require special management considerations or protection. Critical habitat designations identify, to the extent known using the best scientific data available, habitat areas that provide essential life cycle needs of the species (i.e., areas on which are found the primary constituent elements (PCEs) laid out in the appropriate quantity and spatial arrangement for the conservation of the species). Under the Act, we can designate critical habitat in areas outside the geographical area occupied by the species at the time it is listed only when we determine that those areas are essential for the conservation of the species.

Section 4 of the Act requires that we designate critical habitat on the basis of the best scientific and commercial data available. Further, our Policy on Information Standards Under the Endangered Species Act (published in the **Federal Register** on July 1, 1994 (59 FR 34271)), the Information Quality Act (section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001 (Pub. L. 106-554; H.R. 5658)), and our associated Information Quality Guidelines issued by the Service, provide criteria, establish procedures, and provide guidance to ensure that our decisions are based on the best scientific data available. They require our biologists, to the extent consistent with the Act and with the use of the best scientific data available, to use primary and original sources of information as the basis for recommendations to designate critical habitat.

When we are determining which areas should be designated as critical habitat, our primary source of information is generally the information developed during the listing process for the species. Additional information sources may include the recovery plan for the species, if available; articles in peer-reviewed journals; conservation plans developed by States and counties; scientific status surveys and studies; biological assessments; or other unpublished materials and expert opinion or personal knowledge.

Habitat is often dynamic, and species may move from one area to another over time. Furthermore, we recognize that critical habitat designated at a particular point in time may not include all of the habitat areas that we may later determine are necessary for the recovery of the species. For these reasons, a critical habitat designation does not signal that habitat outside the designated area is unimportant or may not be required for recovery of the species.

Areas that are important to the conservation of the species, but are outside the critical habitat designation, will continue to be subject to conservation actions we implement under section 7(a)(1) of the Act. Areas that support populations are also subject to the regulatory protections afforded by section 9 prohibitions and the section 7(a)(2) jeopardy standard, as determined on the basis of the best available scientific information at the time of the agency action. Federally funded or permitted projects affecting listed species outside their designated critical habitat areas may still result in jeopardy findings in some cases. Similarly, critical habitat designations made on the basis of the best available information at the time of designation will not control the direction and substance of future recovery plans, habitat conservation plans, or other species conservation planning efforts if new information available at the time of these planning efforts warrants otherwise.

Prudency Determination

Section 4(a)(3) of the Act, as amended, and 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. Our 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 species is threatened by taking or other human activity, and 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.

In the absence of finding that the designation of critical habitat would increase threats to a species, if there are any benefits to a critical habitat designation, then we would determine that the designation of critical habitat is prudent. We find that the designation of critical habitat for the two damselfly species addressed in this rule will benefit them by: (1) Triggering consultation under section 7 of the Act for Federal actions where consultation would not otherwise occur because, for example, the affected area has become unoccupied by the species or the occupancy is in question; (2) focusing conservation efforts on the most essential habitat features and areas; (3) providing educational benefits about the species to State or County governments or private entities; and (4) preventing people from causing inadvertent harm to the species.

The primary regulatory effect of critical habitat is the section 7(a)(2) requirement that Federal agencies refrain from taking any action that destroys or adversely modifies critical habitat. On the island of Maui, one population of the Pacific Hawaiian damselfly occurs in a stream that flows through Haleakala National Park, and on the island of Molokai, one population of this species occurs in the lower section of a stream that flows through Kalaupapa National Historical Park. The National Park Service regulations and Federal laws protect native animals in National Parks from harassment or destruction. Nevertheless, lands that may be designated as critical habitat in the future for this species may be subject to Federal actions that trigger the section 7 consultation requirement, such as the granting of Federal monies for conservation projects or the need for Federal permits for projects, such as the construction and maintenance of aqueducts and bridges subject to section 404 of the Clean Water Act (33 U.S.C. 1251 *et seq.*).

There may also be some educational or informational benefits from the designation of critical habitat. Educational benefits include the notification of landowners, land managers, and the general public of the importance of protecting the habitat of these species.

Critical habitat may play a role in protecting habitat for future reintroductions of a species as well. For example, although the flying earwig Hawaiian damselfly formerly inhabited areas that are not currently occupied by the species, if those currently unoccupied areas are determined to be essential to the survival and recovery of the species, they may be proposed for designation of critical habitat. This would alert the public that these areas are important for the future recovery of the species, as well as invoke the protection of these areas under section 7 of the Act with regard to any possible Federal actions in that area.

These aspects of critical habitat designation would potentially benefit the conservation of both the flying earwig Hawaiian damselfly and the Pacific Hawaiian damselfly. Although collection has been identified as a threat to the flying earwig Hawaiian damselfly, we believe that collection poses a potential threat to this rare species regardless of the designation of critical habitat. Therefore, since we have determined that the identification of critical habitat will not increase the degree of threats to these species and because the designation may provide some measure of benefit, we find that designation of critical habitat is prudent for both the flying earwig Hawaiian damselfly and the Pacific Hawaiian damselfly.

Critical Habitat Determinability

As stated above, section 4(a)(3) of the Act requires the designation of critical habitat concurrently with the species' listing "to the maximum extent prudent and determinable." Our regulations at 50 CFR 424.12(a)(2) state that critical habitat is not determinable when one or both of the following situations exist:

(i) Information sufficient to perform required analyses of the impacts of the designation is lacking, or

(ii) The biological needs of the species are not sufficiently well known to permit identification of an area as critical habitat.

When critical habitat is not determinable, the Act provides for an additional year to publish a critical habitat designation (16 U.S.C. 1533(b)(6)(C)(ii)).

In accordance with section 3(5)(A)(i) of the Act and regulations at 50 CFR 424.12, in determining which areas occupied by the species at the time of listing to designate as critical habitat, we consider those physical and biological features essential to the conservation of the species that may require special management considerations or protection. We consider the physical or biological features essential to the species' conservation to be the primary constituent elements laid out in the appropriate quantity and spatial arrangement for the conservation of the species. The primary constituent elements include, but are not limited to:

(1) Space for individual and population growth, and for normal behavior;

(2) Food, water, air, light, minerals, or other nutritional or physiological requirements;

(3) Cover or shelter;

(4) Sites for breeding, reproduction, rearing (or development) of offspring; and

(5) Habitats that are protected from disturbance or are representative of the historical geographical and ecological distributions of a species.

We are currently unable to identify the physical and biological features that are considered essential to the conservation of either damselfly species, because necessary information is not available at this time. Key features of the life histories of these damselfly species, such as longevity, larval stage requirements, and fecundity, remain unknown. The aquatic and associated upland habitats where the populations of the Pacific Hawaiian damselfly are found have been modified and altered by development and agriculture; stream diversions, channelization, and dewatering; and nonnative plants. In addition, introduced ants, backswimmers, bullfrogs, and predatory nonnative fish have altered and degraded the habitat for the Pacific Hawaiian damselfly. Likewise, the uluhe-dominated, moist talus-slope habitats where populations of the flying earwig Hawaiian damselfly once occurred have been modified and altered by agriculture; stream diversions, channelization, and dewatering; and the presence of feral pigs, nonnative plants, and introduced ants and bullfrogs. Historically, both of these damselfly species were much more widespread and occurred in habitats found on several different islands. Because over a century has elapsed since these species were observed in an unaltered environment, the optimal natural conditions that provide the biological or ecological requisites of these species are not known. As described above, we can surmise that habitat degradation from a variety of factors and predation by a number of nonnative species has contributed to the decline of these species; however, we do not know the physical or biological features that are essential for either of the two damselflies addressed in this final rule. As we are unable to identify the physical and biological features essential to the conservation of these species, we are unable to identify areas that contain these features.

Although we have determined that the designation of critical habitat is

prudent for the flying earwig Hawaiian damselfly and the Pacific Hawaiian damselfly, the biological needs of these species are not sufficiently well known to permit identification of the physical and biological features that may be essential for the conservation of the species, or those areas essential to the conservation of the species. Therefore, we find that critical habitat for the flying earwig Hawaiian damselfly and the Pacific Hawaiian damselfly is not determinable at this time. Over the next year, we intend to continue gathering information regarding the essential life history requirements of the flying earwig Hawaiian damselfly and the Pacific Hawaiian damselfly to facilitate identification of essential features and areas. We also will evaluate the needs of the flying earwig Hawaiian damselfly and the Pacific Hawaiian damselfly within the ecological context of the broader ecosystems in which they occur, similar to the approach that we recently used in our designation of critical habitat for 47 species endemic to the island of Kauai (April 13, 2010; 75 FR 18959), and will consider the utility of using this approach for these damselfly species as well.

Required Determinations

Paperwork Reduction Act of 1995 (44 U.S.C. 3501 *et seq.*)

This rule does not contain any new collections of information that require approval by Office of Management and Budget (OMB) under the Paperwork Reduction Act. This rule will not impose recordkeeping or reporting requirements on State or local governments, individuals, businesses, or organizations. An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number.

National Environmental Policy Act (42 U.S.C. 4321 *et seq.*)

We have determined that environmental assessments and environmental impact statements, as defined under the authority of the National Environmental Policy Act of 1969, need not be prepared in connection with regulations adopted under section 4(a) of the Act. We published a notice outlining our reasons for this determination in the **Federal Register** on October 25, 1983 (48 FR 49244).

References Cited

A complete list of all references cited in this rule is available on the Internet at *http://www.regulations.gov* or upon request from the Field Supervisor, Pacific Islands Fish and Wildlife Office (see **ADDRESSES**).

Authors

The primary authors of this document are the staff members of the Pacific Islands Fish and Wildlife Office.

List of Subjects in 50 CFR Part 17

Endangered and threatened species, Exports, Imports, Reporting and recordkeeping requirements, Transportation.

Regulation Promulgation

■ Accordingly, we amend part 17, subchapter B of chapter I, title 50 of the Code of Federal Regulations, as follows:

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 entries for "Damselfly, flying earwig Hawaiian" and "Damselfly, Pacific Hawaiian" in alphabetical order under Insects to the List of Endangered and Threatened Wildlife to read as follows:

§17.11 Endangered and threatened wildlife.

* * * * *

(h) * * *

Species		Historic range	Vertebrate population where endangered or threatened	Status	When listed	Critical habitat	Special rules
Common name	Scientific name						
*	*	*	*	*	*		*
INSECTS							
*	*	*	*	*	*		*
Damselfly, flying earwig Hawaiian	*Megalagrion nesiotes*	U.S.A. (HI)	NA	E	271	NA	NA
Damselfly, Pacific Hawaiian	*Megalagrion pacificum*	U.S.A. (HI)	NA	E	271	NA	NA
*	*	*	*	*	*		*

* * * * *

Dated: June 11, 2010

Jeffrey L. Underwood,

Acting Director, U.S. Fish and Wildlife Service.

[FR Doc. 2010–15237 Filed 6–23– 10; 8:45 am]

BILLING CODE 4310–55–S

DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

50 CFR Part 648

[Docket No. 100201058–0260–02]

RIN 0648–AY50

Fisheries of the Northeastern United States; 2010 Specifications for the Spiny Dogfish Fishery

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

ACTION: Final rule.

SUMMARY: NMFS announces specifications and management measures for the spiny dogfish fishery for the 2010 fishing year (FY) (May 1, 2010, through April 30, 2011). NMFS is implementing a spiny dogfish quota of 15 million lb (6,803.89 mt) for FY 2010, and maintaining the possession limit of 3,000 lb (1.36 mt). These measures are consistent with the Spiny Dogfish Fishery Management Plan (FMP) and based on new biological reference points announced by peer reviewers of the Transboundary Resource Assessment Committee (TRAC), which indicated the stock is rebuilt.

DATES: Effective July 26, 2010 through April 30, 2011.

ADDRESSES: Copies of supporting documents used by the Mid-Atlantic Fishery Management Council (MAFMC), including the Environmental Assessment (EA) and Regulatory Impact Review (RIR)/Initial Regulatory Flexibility Analysis (IRFA), are available from: Richard Seagraves, Acting Deputy Director, Mid–Atlantic Fishery Management Council, Room 2115, Federal Building, 300 South New Street, Dover, DE 19904–6790. The revised EA/RIR/IRFA updated after the announcement of new biological reference points is also accessible via the Internet at *http://www.nero.noaa.gov*.

NMFS prepared a Final Regulatory Flexibility Analysis (FRFA), which is contained in the Classification section of the preamble of this rule. Copies of the FRFA and the Small Entity Compliance Guide are available from the Regional Administrator, Northeast Regional Office, NMFS, 55 Great Republic Drive, Gloucester, MA 01930–2276, and are also available via the internet at *http://www.nero.nmfs.gov*.

FOR FURTHER INFORMATION CONTACT: Lindsey Feldman, Fisheries Management Specialist, phone: 978–675–2179, fax: 978–281–9135.

SUPPLEMENTARY INFORMATION:

Background

A proposed rule for this action was published in the **Federal Register** on April 2, 2010 (75 FR 16716), with public comment accepted through May 3, 2010. NMFS proposed to establish a commercial quota of 12 million lb (5,443.11 mt), the level calculated to achieve the fishing mortality rate (F) that would rebuild the stock ($F_{rebuild}$) after accounting for other sources of fishing mortality. NMFS also proposed maintaining the possession limit of 3,000 lb (1.36 mt) for FY 2010. As noted in the preamble to the proposed rule, the proposed commercial quota of 12 million lb (5,443.11 mt) was consistent with the rebuilding F level ($F_{rebuild}$ = 0.11) in existence at that time. As also noted, the Transboundary Resource Assessment Committee (TRAC) conducted a benchmark stock assessment for spiny dogfish in February 2010, and planned to re-examine biological reference points. The proposed rule explained that the FMP provides a mechanism to allow updated stock status determination criteria to be used in setting final specifications. Details about the proposed measures were included in the preamble of the proposed rule and are not repeated here.

The TRAC met in early February 2010, and determined that additional analysis would be conducted by a group of selected peer reviewers to further define biological reference points, in particular to determine the status of the spiny dogfish stock for the purposes of U.S. management.

Revised Stock Status Determination Criteria

On April 6, 2010, the group of peer reviewers selected by the TRAC accepted a newly defined biomass target of 159,288 mt, based on analysis of information in the TRAC assessment. The reviewers concluded that the updated stochastic estimate of spawning stock biomass (SSB) for 2009 (163,256 mt) exceeded the newly defined biomass target, and that estimates of SSB have been above the new biomass target since 2008, consistent with a rebuilt stock. Therefore, the spiny dogfish stock can be considered rebuilt for the purposes of U.S. management. In addition, the peer reviewers agreed on a new fishing mortality rate target (F_{target}) of 0.207 (previously 0.28), which allows 1.5 pups per recruit, and a fishing mortality rate threshold ($F_{threshold}$) of 0.325 (previously 0.39). Based on the updated stock status determination criteria, NMFS sent a letter to the Councils that the spiny dogfish stock is rebuilt.

The F_{target} of 0.207 could allow the 2010 quota to be specified as high as 21.5 million lb (9,752.24 mt). However, the Mid-Atlantic and New England Fishery Management Councils' Joint Spiny Dogfish Committee (Committee) submitted a comment on the proposed rule that supported increasing the FY 2010 commercial quota to a level that employs a constant catch management approach and avoids dramatic fluctuations in annual quota levels. In addition, there are still a number of concerns about the spiny dogfish stock condition. The 2009 updated stock assessment shows evidence of strong recruitment; however, low pup production from 1997 through 2003 has been implicated by survey catches of pups and is further supported by subsequent low survey catches of the size categories these age classes have grown into. As such, a decline in the stock is expected when these small 1997–2003 year-classes recruit into the SSB (in approximately 2015). In addition, the current survival rate of pups may be lower than historic levels due to reduced maternal size and a skewed male-to-female sex ratio in the population. A harvest scenario of 21.6 million lb (9,797.6 mt) over the next 5 years has only a 27 percent chance of exceeding the biomass target (½ B_{msy}) when the small year classes from years of low pup production recruit into the fishery.

2010 Specifications and Management Measures

The commercial spiny dogfish quota for FY 2010 is 15 million lb (6,803.89 mt), the level that equates to an F of 0.167 when discard mortality and Canadian harvest estimates are accounted for. In setting the FY 2010 commercial quota at 15 million lb (6,803.89 mt), there is a 98–percent chance that the stock will not decline to the level where it would once again be deemed overfished, and a significant decrease in annual quota levels will not be necessary when the small year-classes from years of low pup production recruit into the fishery.

As specified in the FMP, quota Period 1 (May 1 through October 31) would be