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Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the Kauai Cave Wolf Spider and Kauai Cave Amphipod; Final Rule

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RIN 1018–AH01

Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the Kauai Cave Wolf Spider and Kauai Cave Amphipod

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Final rule.

SUMMARY: We, the U.S. Fish and Wildlife Service (Service), designate critical habitat for the Kauai cave wolf spider (*Adelocosa anops*) and the Kauai cave amphipod (*Spelaeorchestia koloana*) pursuant to the Endangered Species Act of 1973, as amended (Act). The critical habitat designation consists of 14 units whose boundaries encompass an area of approximately 110 hectares (ha)(272 acres (ac)) on the island of Kauai, Hawaii. This critical habitat designation requires the Service to consult under section 7 of the Act with regard to actions carried out, funded, or authorized by a Federal agency. Section 4 of the Act requires us to consider economic and other relevant impacts when specifying any particular area as critical habitat. We solicited data and comments from the public on all aspects of the proposed rule, including data on economic and other impacts of the designation.

DATES: This rule becomes effective on May 9, 2003.

ADDRESSES: Comments and materials received, as well as supporting documentation, used in the preparation of this final rule will be available for public inspection, by appointment, during normal business hours at U.S. Fish and Wildlife Service, Pacific Islands Office, 300 Ala Moana Blvd., Room 3–122, Box 50088, Honolulu, HI 96850–0001.

FOR FURTHER INFORMATION CONTACT: Paul Henson, Field Supervisor, Pacific Islands Office, at the above address (telephone: 808/541–3441; facsimile: 808/541–3470).

SUPPLEMENTARY INFORMATION:

Background

The Hawaiian archipelago consists of eight main islands and the numerous shoals and atolls of the northwestern Hawaiian Islands. The islands were formed sequentially by basaltic lava that emerged from a hot spot in the earth's crust located near the current southeastern coast of the island of Hawaii (Stearns 1985). Kauai is the oldest of the main islands, with most of its land mass being formed between 3.6 and 5.6 million years ago (MYA) from a single, large shield volcano, now represented by the Alakai Plateau and adjacent ridges. Younger, secondary eruptions occurred over the eastern portion of the island as recently as the Pleistocene era (approximately 0.6 MYA). Due to the age of the island, the terrain is heavily eroded, with steep water-carved valleys and gulches characterizing the slopes of the Alakai Plateau and other isolated ridges. The Alakai Plateau is one of the wettest places on earth, receiving an average of 1.3 meters (m) (444 inches (in)) of rain annually (Juvik and Juvik 1998). Rain is delivered to the island by prevailing trade winds which come from the northeast. Southern and southwestern portions of the island lie in the rain shadow of the Alakai Plateau, ridges, or other uplands, and receive relatively little rain (NOAA 1990–1999).

The Koloa District lies in the southeast corner of Kauai and includes the town of Koloa and the community and resort area of Poipu. The area is dry to mesic (moderate rainfall), receiving an average of 107 to 223 centimeters (cm) (42 to 88 in) of rain annually. Although the Koloa District includes upland areas such as ridge lines derived from the Alakai Plateau and Haupu ridge, most human-occupied areas lie between sea level and about 183 m (600 feet (ft)) in elevation.

The Koloa area is composed of the youngest rock on Kauai, the Koloa Volcanics (MacDonald *et al.* 1960; Langenheim and Clague 1987), with flows dating from between 0.6 and 1.4 million years. Younger, consolidated marine deposits and lithified sand dunes lie on top of some coastal portions of the older Koloa Volcanics. The great age and subsequent weathering that has occurred on Kauai has resulted in most lava tubes having been collapsed or filled with sediments (MacDonald *et al.* 1960; Howarth 1973; Berger *et al.* 1981; Howarth 1987b), relative to younger islands (*e.g.,* Hawaii) where lava tubes are common features (Howarth 1983a). It is only in portions of the Koloa District, with its younger, cave-bearing rock, relative lack of developed soils, and minimal rainfall and subsequent sedimentation, that caves are known to be relatively common features on Kauai (Howarth 1981).

Kauai Cave Wolf Spider

The Kauai cave wolf spider (*Adelocosa anops*) is a member of the wolf spider family (Lycosidae). Spiders in this family are characterized by a distinctive eye pattern, including two particularly large eyes located within the middle row of eight eyes (Foelix 1982). While wolf spiders are typically visual predators, the most conspicuous physical character of the Kauai cave spider is its complete lack of eyes. This character is unique among wolf spiders and, in part, provides justification for the recognition of a separate genus for this taxon (Gertsch 1973). A few species of wolf spider have reduced eyes, including another cave-adapted species on the island of Hawaii, but only in the Kauai cave wolf spider are the eyes entirely absent. Adults of the Kauai cave wolf spider are about 12.7 to 19.0 millimeters (mm) (0.5 to 0.75 in) in total body length with a reddish-brown carapace, pale to silvery abdomen, and beige to pale orange legs. The hind margin of each chelicera (biting jaw) bears three large teeth, two situated basally, and the third at the outer end of the chelicera. The tibiae (the fifth segment of the leg) of the two front pairs of legs have four pairs of ventral spines, and the tarsi (ultimate segments) and metatarsi (penultimate segments) of all legs bear unusually long, silky, and shiny trichobothria (sensory hairs) (Gertsch 1973).

Dr. Frank Howarth, of the Bishop Museum, first discovered the Kauai cave wolf spider in Koloa in 1971, and it was formally described by Willis Gertsch of the Bishop Museum (Gertsch 1973). The Kauai cave wolf spider is a predator, and although blind, can detect the presence of potential food items through chemo-tactile sensory organs and actively stalks its prey (Howarth 1983a). Although predation has not been observed in the field, the spider probably feeds on the Kauai cave amphipod, other cave-inhabiting arthropods, and alien species of arthropods that enter the cave system. Compared to most wolf spiders, the reproductive capacity of the Kauai cave wolf spider is extremely low, with only 15 to 30 eggs produced in each egg sac (Wells *et al.* 1983; Howarth 1991). Newly hatched spiderlings are unusually large for wolf spiders, and are carried on the back of the female for only a few days (Howarth 1991; Howarth and Mull 1992). Other species of wolf spider may have in excess of 100 offspring per clutch and the newly hatched spiderlings are relatively small (Foelix 1982; Howarth 1991; Howarth and Mull 1992).

Kauai Cave Amphipod

The Kauai cave amphipod (*Spelaeorchestia koloana*) was discovered in some of the same caves as

the Kauai cave wolf spider in 1971 (Bousfield and Howarth 1976). Because of the unusual attributes of a highly reduced pincher-like condition of the first gnathopod (thoracic appendage) of the amphipod, and the second gnathopod being mitten-like in both sexes, this taxon is placed in its own unique genus (*Spelaeorchestia*) within the family Talitridae (Bousfield and Howarth 1976). This species is also distinctive in its lack of eye facets and pigmentation, and extremely elongate, spiny, post-cephalic appendages. Adult cave amphipods are 7 to 10 mm (0.25 to 0.4 in) in length with a slender, laterally compressed body and a hyaline (nearly transparent) cuticle, giving it a shiny, translucent appearance. The second pair of antenna are slender and elongate, with the flagellum (slender outer part of the antenna) only slightly longer than the peduncle (narrow stalk attaching to the body). Peraeopods (abdominal walking legs) are very elongate, with slender, attenuated claws. All pleopods (swimming legs) are reduced, with branches vestigial or lacking. Uropods (tail-like appendages) 1 and 2 have well-developed pre-peduncles, and brood plates in the mature female are vestigial or entirely absent (Bousfield and Howarth 1976).

The Kauai cave amphipod is a detritivore and has been observed feeding on the roots of *Pithecellobium dulce* (Manila tamarind) and *Ficus* sp. (fig), rotting roots, sticks, branches, and other plant material washed into, or otherwise carried into, the caves, as well as the fecal material of other arthropods. In large cave passages, most individuals are found in association with roots or rotting plant debris. When disturbed, this cave amphipod typically moves slowly away rather than jumping like other amphipods. Nothing is known of the reproductive biology of this amphipod, but the vestigial brood plates of the female suggest they give birth to a small number of large offspring (Poulson and White 1969; Bousfield and Howarth 1976).

Cave Habitat

Cave habitats have a high degree of zonation which plays a major role in the distribution of cave-dwelling organisms. Howarth and Stone (1990) recognize five distinct zones, not all of which are always present within any one cave. The first zone, the ''entrance zone,'' typically receives large amounts of solar radiation and is often vegetated with surface plants. Within the second zone, the ''twilight zone,'' ambient light levels decrease as one moves away from the entrance and photosynthesizing plants that may be present in the entrance decline. The third zone is referred to as the ''transition zone.'' The transition zone lacks light penetrance from the entrance, but other outside factors still greatly influence the cave habitat (*e.g.,* ample air movement and daily temperature fluctuations). All of the above described zones (entrance, twilight, and transition) are typically influenced by surface conditions, daily cycles of warming and cooling, surface humidity, and a fair degree of air exchange occurring between these zones and surface habitats over relatively short periods of time (daily). The fourth cave zone, the ''dark zone,'' typically exhibits a sharp climatological change from the three previously described zones. The dark zone largely lacks daily air exchange with the surface and the three previously described zones. The relatively constant conditions encountered in the dark zone are often the result of a narrowing cave passage or low ceiling(s) that serve as physical barriers that restrict air exchange with other cave zones, or may be due to an up-slope orientation into a dead-end passage that traps warm, moist air. While the dark zone may undergo drastic changes in temperature and relative humidity, this more often is associated with seasonal rather than diurnal changes in air temperature. As a result of this, dark zones are seasonally stable in their micro-climatic conditions, remaining warm and humid during warm seasons. The final recognized cave zone is that of the ''stagnant'' zone (Howarth and Stone 1990). This zone lies deeper than the dark zone, receiving significantly less air exchange. As a consequence, the composition of gasses within this last zone is often largely controlled by the decomposition of organic matter and maintains high concentrations of carbon dioxide and low concentrations of oxygen. While considered inhospitable by human standards, field observations have indicated that obligate cave-dwelling species are highly tolerant of these conditions and many may, in fact, thrive in the stagnant air zone of caves (Howarth and Stone 1990).

Cave habitats almost always contain small voids, cracks, and passages (mesocaverns) that cannot be accessed by researchers (Howarth 1983b), but remain readily accessible (or preferred) by small troglobites (obligate cave-dwelling animals). Although such voids and cracks can occur in any zone and possess characteristics of each of the five zones, they frequently represent areas of reduced air flow and consequently are most similar to the dark and stagnant air zones. Passages and mesocaverns in limestone caves can form or be destroyed at almost anytime in the life of the cave, depending on the chemical characteristics of the rock and normal geologic processes. Limestone caves often become larger over time as acidic waters from the surface dissolve away the calcium carbonate bedrock. Since water flow enlarges and creates caves in limestone by solution, subterranean voids do not fill through erosion. If any do, the water quickly finds a different path and enlarges a new void. Limestone caves grow deeper as the water table sinks and the surface over the caves dissolves away. Limestone caves improve with age because, although individual voids and passages may be short-lived, limestone caves continuously reform so that habitat can remain suitable for very long time spans. Caves derived from lava tube systems are fundamentally different from limestone in that basalt is not as readily soluble. Hence, lava tube passages and mesocaverns do not typically dissolve away and become larger (formed), but are subject to filling with sediments (destroyed).

The tendency for Hawaiian basalt to shrink and crack upon cooling results in younger lava flows having an abundance of mesocaverns throughout their structure that may serve as habitat or as corridors between habitats. However, the cave-building process typically stops some time after cave and crack formation, and is replaced by the cave-filling processes as weathering and sedimentation begin filling in mesocaverns and passages. On younger islands, the abundance of mesocaverns may allow cave animals to move among and between larger, adjacent lava tubes (Berger *et al.* 1981; Howarth 1991). However, because these smaller voids become filled with erosional sediment in older flows like the Koloa Volcanics, and as a result of surface disturbance (Mueller-Dombois and Howarth 1981; Adam Asquith, Service, *in litt.,* 1994a), it is less likely that the Kauai cave animals can readily move among separate lava tubes or other cave systems.

Cave ecosystems are typically regarded as being food limited, and in most caves, the resident food-web communities require food input which is derived from surface systems based upon a photo-autotrophic (*i.e.,* photosynthesizing plants) food base (Culver 1986). Nutrients may enter caves via subterranean streams or other surface runoff; as guano from bats, birds, rodents, or other cave visitors or residents; or from plant roots that penetrate the cave (Culver 1986). Of these methods, roots from surface plants

are the primary means by which Hawaiian caves receive nutrient input (Howarth 1973). Protection and restoration of surface plant communities is, therefore, an extremely important consideration for cave conservation in Hawaii, as it is elsewhere (Culver *et al.* 2000). Factors or activities that impact or modify surface vegetation over caves (*e.g.,* fire, replacement of native or other perennial vegetation with grasses or some nonnative plants) can damage or destroy the underlying cave community.

Adaptations of Troglobitic Animals

As discussed in the species descriptions of the Kauai cave wolf spider and cave amphipod, troglobites typically possess specialized anatomical characters that represent adaptations to life in the cave environment. Such anatomical adaptations include enlarged and/or elongate tactile-sensory appendages (*e.g.,* legs or other appendages, antennae), and the lack of, or reduced, pigmentation and/or eyes (Barr 1968). Less obvious adaptations are also present in the physiology of troglobites and this has the potential to restrict their distribution within various cave zones (Huppop 1985). Laboratory studies with Hawaiian crickets (*Caconemobius* spp.) were conducted that compared the abilities of closely related surface and cave-dwelling forms to cope with desiccation (Ahearn and Howarth 1982). Surface-dwelling species exhibited considerably lower evaporation/desiccation rates than did the troglobitic species, and in one case, the surface species became dehydrated at half the rate of its cave-inhabiting relative. This low desiccation threshold largely confines these troglobites to the high-humidity environment of the deeper portions of caves, the dark and stagnant air zones. While such tests have not been conducted on the Kauai cave species, a logical assumption is that they have similar humidity tolerances, and this has been supported by field studies and observations conducted in the Kauai caves (*see* below). Similar adaptations in other troglobitic faunas (Vandel 1965; Barr 1968; Huppop 1985) support the universality of these traits in troglobitic animals.

Given the great vulnerability of troglobites to desiccation, adjacent mesocavern habitats will contain appropriate microclimate conditions and provide habitat or serve as refugia for troglobites when conditions in the main cave passages become drier or otherwise less accommodating. For example, during a previous survey of one cave of the Koloa area, the Kauai cave amphipod was not observed (Miura and Howarth 1978). However, on a subsequent survey, the floor of a small, dead end passage was saturated with 40 liters (10 gallons) of water, and 24 hours later amphipods had moved into this area, presumably from the surrounding mesocaverns (Howarth 1983a, 1983b). The foraging activities of both the Kauai cave wolf spider and the Kauai cave amphipod are restricted to dark, moist areas of large caverns and mesocaverns, and it is possible that the majority of their time is spent within such spaces.

Both Howarth (1983a) and Huppop (1985) have postulated that troglobites may be adapted to cope with low levels of oxygen and/or elevated concentrations of carbon dioxide, similar to conditions that would be encountered in the stagnant air zone of caves. This ability has been substantiated from observations in known stagnant air zones (Howarth and Stone 1990), as well as under controlled laboratory experiments. Hadley *et al.* (1981) conducted experiments with Hawaiian wolf spiders, both troglobites (*Lycosa howarthi*) and a related surface-dwelling species (*Lycosa* sp.). These researchers found the surface-dwelling spider had a higher metabolic rate, requiring 2.5 times more oxygen than its cave-dwelling relative. The reduced need for oxygen would better allow these spiders to survive in stagnant air cave zones. Given the ability of at least some troglobites to cope with reduced oxygen and elevated carbon dioxide, as well as their ability to inhabit inaccessible mesocaverns, it is assured that many troglobites will be able to reside in areas not readily surveyed by biologists. Hence, cave habitats will extend well beyond those areas accessible by researchers (Howarth 1983a).

Species Distribution and Abundance

The Kauai cave wolf spider and Kauai cave amphipod are generally restricted to cave dark and stagnant air zones, or other subterranean habitats such as cracks, voids, and other mesocaverns containing microclimate conditions similar to those zones. However, both the cave wolf spider and amphipod may be found in sub-optimal cave habitats (*e.g.,* cave transition zone) when conditions are appropriate (*e.g.,* elevated humidity during periods of increased rainfall). All of the caves where the cave amphipod has been located contain penetrating plant roots and/or other decomposing plant material, which serves as a food source for this detritivore. Plant material upon which the amphipods feed need not be from native plants, although nonnative toxic or indigestible plants may be inappropriate or damaging for amphipod foraging. The Kauai cave wolf spider can be found in caves where the cave amphipod does not occur, but other nonnative arthropods (*e.g.,* cockroaches, wood lice, small spiders) can be used as food for this generalist predator.

Prior to the publication of the proposed rule to designate critical habitat for the Kauai cave wolf spider (67 FR 14671, March 27, 2002), the spider had been observed in only five caves in the Koloa area since its discovery in 1971. Through mapping of one of the caves, the Service considers two of the caves originally believed to be separate to actually be one system with two entrances. Since 1996, Service biologists have conducted annual surveys of the caves, and starting in 1998, we have conducted biannual monitoring visits to three of the known occupied caves. Observations recorded in these visits include a total count of animals within each cave, potential threats to the listed cave organisms or their habitat, and the cave's condition (*e.g.,* human disturbance, presence of standing water). The following information is based on these monitoring visits.

In two of the four known occupied caves, wolf spiders have been seen on only three occasions, but have been more often observed in two other caves. Of the two more frequently occupied caves, in only one of these wolf spiders have been encountered during every monitoring visit with 14 to 28 individuals observed (USFWS data from January 18, 1996 to November 20, 2002). The second cave contained a smaller number of wolf spiders when they were found there (one to four per monitoring visit). Since April 2000, no wolf spiders have been observed in this cave. The decline of wolf spiders in this cave has been matched with a corresponding increase in the number of resident brown violin spiders, an alien, web-building species that likely preys upon both the Kauai cave wolf spider and amphipod (A. Asquith, *in litt.* 1994b; David Hopper, Service, *in litt.* 1999). Although these data are not conclusive, the declining numbers of the Kauai cave wolf spider and their increased absence in the second of the regularly occupied caves warrants concern with regard to population persistence.

Since the publication of the proposed rule, more surveys have been conducted and the spider has been verified to occur in two additional caves (Tom Shigemoto, Vice President, Alexander and Baldwin, pers. comm., 2002; Gordon Smith, Service, *in litt.* 2002), one of which was previously unknown

and the other was known only to be occupied by amphipods. Therefore, the spider has verified occurrences in six caves.

The Kauai cave amphipod has been recorded from six caves in the Koloa area but was only regularly encountered in only three of these caves. In one of these three caves, where the amphipod was found with the wolf spider, their numbers have ranged from 8 to 67 during the biannual monitoring visits. In another regularly occupied cave, amphipod numbers have increased steadily from 10 to 20 individuals per visit in pre-1998 counts to over 300 individuals during a visit in November 2000 (Service, unpub. data).

In the three caves less frequently occupied by the amphipod, the lack of observations of the species is probably due to several factors. In one of these caves, relative humidity is often below 100 percent, which is a suboptimal condition for troglobites. Amphipods have been found in this cave when humidity conditions are optimal, such as after heavy rains which saturate the soil and increase the relative humidity in the dark zone. In a second cave, amphipods appear to be resident but were only observed during two visits that were conducted soon after the cave had been exposed by heavy machinery, and prior to the cave being re-closed for road construction (A. Asquith, *in litt.* 1999). The last of these three caves has been visited infrequently and amphipods have been observed during some, but not all, visits (Bousfield and Howarth 1976; D. Hopper, *in litt.* 1998a; D. Hopper, *in litt.,* 2000a).

Since the publication of the proposed rule, the Service was notified of a seventh cave where the amphipod's occurrence was previously recorded (Bousfield and Howarth 1976). No additional information has been provided on this particular cave nor do we know the current status of the cave. Therefore, the amphipod has been known from seven caves.

Despite the data obtained in our biannual monitoring counts, the quantities of animals reported do not represent sound population estimates. The methods needed to conduct non-damaging, mark-recapture studies for accurate estimates of population size have not been developed for these animals, and no attempt to conduct such studies have been undertaken.

Cave systems may be separated by various physical barriers such as subterranean streams, or areas with developed soils that have filled in the mesocavern passages or habitats of these old caves (Mueller-Dombois and Howarth 1981). The degradation and loss of naturally occurring mesocavern habitats and corridors has likely been accelerated by development or other land uses that often require clearing of vegetation, blasting, and filling of trenches and construction sites. These activities, as well as modern agricultural practices, exacerbate the rates of sediment mobilization (Kirch 1982; Cuddihy and Stone 1990), resulting in the filling of caves and mesocaverns (Howarth 1973; Mueller-Dombois and Howarth 1981; Burney *et al.* 2001).

Because distinct species can evolve in adjacent lava tubes even when cave animals can move extensively through mesocaverns (Hoch and Howarth 1993), it is reasonable to consider the separate localities of these animals as different populations, even though intervening areas of potential habitat cannot be surveyed. Thus, we have currently verified a total of six spider populations and seven amphipod populations that are distributed throughout the Koloa district as follows: the Koloa Caves #1, #2, the newly discovered spider cave, and adjacent areas west of Waikomo Stream are considered to harbor three populations of the spider and two populations of the amphipod; the seaward Kiahuna Caves #267 and #276 likely harbor two populations of the spider and one of the amphipod; the Kiahuna Cave #210 harbors a separate population each of the spider and amphipod; the Mahaulepu Cave harbors a separate population each of the cave amphipod and the spider (Service, unpublished data, 1998–1999; G. Smith *in litt.* 2002); a small cave near the St. Raphael church harbors a population of the cave amphipod; and a small cave near the Koloa bypass road harbors a cave amphipod population.

Threats

Small populations are also demographically vulnerable to extinction caused by random fluctuations in population size and sex ratio and to catastrophes such as hurricanes (Soule 1983; Gilpin and Soule 1986). In addition, the low reproductive potential of both cave species (less than five percent of their surface relatives) means that they require more time and space to recover from a disturbance than would similar animals living on the surface (F. Howarth, *in litt.* 2001).

One of the major threats facing the Kauai cave wolf spider and the Kauai cave amphipod is the introduction of invasive alien species (F. Howarth, *in litt.* 2001). For example, an alien terrestrial nemertine worm (*Argonemertes dendyi*) from Australia was discovered in the 1980s on the island of Hawaii (Howarth and Moore 1983). This animal can live and reproduce in caves and presumably feed on any invertebrates, such as the Kauai cave wolf spider and the Kauai cave amphipod. The impact on cave fauna is not known at this time (Howarth and Moore 1983). If portions of the habitat are more or less isolated and protected, the chances are greater that any one threat would not affect all occupied caves at the same time and animals that survive may eventually re-colonize their former habitat. This situation would also apply for other surface disturbances, such as oil spills, pollution, and pesticide application.

Human impacts in the Koloa caves, and resulting impacts on the Kauai cave wolf spider and Kauai cave amphipod, are another concern. Caves are frequently sought out by curiosity seekers, and over-use of caves occurs readily due to their fragile nature (Howarth 1982; Culver 1986). In addition, both natural and cultural features (*e.g.,* human burials and associated artifacts) of caves are often damaged or destroyed by collectors or vandals (Howarth 1982; N. McMahon, Hawaii Dept. Historic Preservation, pers. comm., 2001). Unauthorized visitation and vandalism is such an issue in caves that the Cave Resources Protection Act (16 U.S.C. 4301 *et seq.;* 102 Stat. 4546) was passed with the main intent of protecting cave-associated natural and cultural resources. Unauthorized entry and vandalism of the Koloa caves has been documented (D. Hopper, *in litt.,* 1998b, 2000a), and public interest in visiting caves is reflected in the publication of the location of two of these caves in a recent tourist guide (Doughty and Friedman 1998).

Human visitation to caves, even when not intentionally destructive, often results in severe impacts to the resident troglobites or other cave inhabitants. For example, nicotine is a potent insecticide that is easily introduced into the cave environment through cigarette smoke or discarded cigarette butts. Given the confined space and poor air circulation in caves supporting suitable troglobite habitat, the effects of cigarette smoke are far more pronounced in caves (Howarth 1982; Howarth and Stone 1993). The impacts of cigarette smoke are not restricted to the main cavern; the smoke will also impact mesocavern habitats, where its effects cannot be seen. Although less toxic than cigarette smoke, wood fire smoke may be equally damaging since far more smoke is produced and detrital food reserves may be burned. The use of cigarettes, as well as fire activity, have been documented

in the Koloa caves (D. Hopper, *in litt.,* 1998b, 2000a).

The narrow confines of most caves often result in focusing human travel and associated impacts to a small area, and increase the likelihood of troglobite mortality from unintentional trampling and the destruction or disturbance of food resources (*e.g.,* roots, detrital matter). In addition, human use of caves frequently results in the importation of garbage, which encourages the invasion of caves by potential competitors and predators such as cockroaches (F. Howarth, Bishop Museum, pers. comm., 1994; A. Asquith, *in litt.,* 1994a).

The restricted area in which the Koloa cave animals occur is rapidly undergoing development (KBGM Peat Marwick 1993). The shallow cave habitat has been, and continues to be, degraded or destroyed through surface alterations such as the removal of perennial vegetation, soil fill, grading, paving, collapsing and filling of caves, diversion of waste water into subterranean voids and spaces, and other activities associated with development and agriculture.

The Kauai cave wolf spider and Kauai cave amphipod are also increasingly at risk from predation and competition for space, water, and nutrients by introduced, nonnative animals (Howarth 1985, pers. comm., 1994; A. Asquith, *in litt.,* 1994a, b; D. Hopper, *in litt.,* 1999), biological and chemical pest control activities associated with residential and golf course development (Hawaii Office of State Planning 1992); and an increased likelihood of extinction from naturally occurring events due to the small number of remaining individuals, populations, and their limited distribution.

Due to the small number of known caves inhabited by these animals, we remain concerned that these threats may be exacerbated by the publication of the exact locations of individual caves. Since publication of the proposed listing rule for these animals in 1997 (62 FR 64340), we have found evidence of increased entry and vandalism in these caves (D. Hopper, *in litt.* 1998b, 2000b). While direct and intentional threats to these species from human take and collection are not documented, the sensitive nature of these animals and their habitat to increased human presence makes increased human awareness of these caves a potential direct threat to the Kauai cave wolf spider and Kauai cave amphipod.

Previous Federal Action

On June 16, 1978, we published in the **Federal Register** a proposal to list the Kauai cave wolf spider as an endangered species and the Kauai cave amphipod as threatened (43 FR 26084). That proposal was withdrawn on September 2, 1980 (45 FR 58171) as a result of a provision in the 1978 Amendments to the Endangered Species Act of 1973 that required withdrawal of all pending proposals that were not made final within 2 years of the proposal or within one year after passage of the Amendments, which ever period was longer. An initial comprehensive Notice of Review for invertebrate animals was published on May 22, 1984 (49 FR 21664), in which the Kauai cave wolf spider and Kauai cave amphipod were treated as category 2 candidates for Federal listing. Category 2 taxa were those for which conclusive data on biological vulnerability and threats were not currently available to support proposed rules to list the species as threatened or endangered.

We published an updated Notice of Review for animals on January 6, 1989 (54 FR 554). In this notice, the Kauai cave wolf spider and Kauai cave amphipod were treated as category 1 candidates for Federal listing. Category 1 taxa were those for which we had on file substantial information on biological vulnerability and threats to support preparation of listing proposals. However, in the Notice of Review for all animal taxa published on November 21, 1991 (56 FR 58804), the two Kauai cave arthropods were listed as category 2 candidates. In the November 15, 1994, Notice of Review for all animal taxa (59 FR 58982), the two Kauai cave arthropods were again elevated to category 1 candidates. Upon publication of the February 28, 1996, Notice of Review (61 FR 7596), we ceased using candidate category designations and included the two cave arthropods as candidate species. Candidate species are those for which we have on file sufficient information on biological vulnerability and threats to support proposals to list the species as threatened or endangered. The two cave arthropods were included as candidate species in the September 19, 1997 (62 FR 49398), Notice of Review.

A proposed rule to list these two species as endangered was published on December 5, 1997 (62 FR 64340), and the final rule to list them was published on January 14, 2000 (65 FR 2348). Since that time, we have conducted conservation efforts for the Kauai cave wolf spider and Kauai cave amphipod through voluntary partnerships with two private landowners in the Koloa area.

In the proposed listing rule, we indicated that designation of critical habitat for the Kauai cave wolf spider and Kauai cave amphipod was not prudent. Our concern was that publication of precise maps and descriptions of critical habitat in the **Federal Register** could increase human visitation to these highly sensitive cave habitats, which could lead to incidents of vandalism, destruction of habitat, and unintentional cases of take. Also, we believed that critical habitat designation would not provide any additional benefit to these species beyond that provided through listing as endangered.

However, in the final listing rule, we determined that critical habitat designation was prudent as we did not find specific evidence of taking, vandalism, collection, or trade of these species or any other similarly situated species. Also, we found that there may also be some educational or informational benefit to designating critical habitat. Therefore, we found that the benefits of designating critical habitat for these two species outweighed the benefits of not designating critical habitat.

On June 2, 2000, we were ordered by the U.S. District Court for the District of Hawaii (in *Center for Biological Diversity* v. *Babbitt and Clark,* Civ. No. 99–00603 (D. Haw.)) to publish the final critical habitat designation for both cave animals by February 1, 2002. The plaintiffs and the Service entered into a consent decree in a separate action agreeing to jointly seek an extension of this deadline (*Center for Biological Diversity* v. *Norton,* Civ. No. 01–2063 (D.D.C. October 2, 2001)).

On February 14, 2001, we contacted landowners on the island of Kauai, notifying them of our requirement to designate critical habitat for the Kauai cave wolf spider and Kauai cave amphipod. We included a copy of a fact sheet describing the two species and their habitat, and a map showing the presumed historic and current range (based on occupied habitat and the distribution of similar geology and soils) of one or both of these species.

On January 30, 2002, the U.S. District Court in Hawaii approved a joint stipulation to modify the terms of the June 2 order to extend the deadline to August 10, 2002. Subsequently, the Service determined that an additional extension of time was needed to complete this designation process. On August 21, 2002, the U.S. District Court in Hawaii approved another joint stipulation extending the date for the final rule designating critical habitat for both cave animals to March 31, 2003.

The proposed rule published March 27, 2002, proposed to designate four critical habitat units which collectively

amounted to approximately 1,697 ha (4,193 ac) (67 FR 14671). The public comment period closed on May 28, 2002. On November 15, 2002, we announced the availability of the draft economic analysis and reopened the comment period until December 16, 2002 (67 FR 69177).

Summary of Comments and Recommendations

In the proposed rule published on March 27, 2002 (67 FR 14671), we requested that all interested parties submit written comments on the proposal. We also contacted all appropriate Federal, State, and local agencies, scientific organizations, and other interested parties and invited them to comment. We received no requests for a public hearing.

We received individually written letters from 43 parties, including five designated peer reviewers. Approximately 417 additional letters were submitted as part of a mailing campaign that supported designation. Of the 43 commenters who were not part of the mailing campaign, 16 supported the proposed designation, 26 were opposed, and 1 expressed neither support nor opposition. Of the 26 commenters who opposed the proposal, 17 commenters specifically opposed designation of critical habitat on lands they own or manage, and requested that these areas be excluded from critical habitat designation.

We reviewed all comments received for substantive issues and new information regarding critical habitat for both cave animals. Similar comments were grouped into general issues and are addressed in the following summary.

Peer Review

In accordance with our policy published on July 1, 1994 (59 FR 34270), we solicited, in writing, the review of the proposed critical habitat designation from nine independent experts affiliated with academic and research organizations or natural resource conservation agencies. We also put in a request to Sustainable Ecosystems Institute. All of the individuals contacted are recognized leaders in the field of cave ecology and conservation, as demonstrated by a record of published peer reviewed results of past and current research in this field. Four parties responded with written reviews of the proposal, one provided a letter citing his inability to participate due to the lack of applicability to his state agency position, and the remaining four parties either verbally declined to participate due to workload or other constraints or simply did not respond.

The four scientific review responses were generally positive and in support of the proposed designation on the basis of its technical merits. Reviewers generally recognized the limitations on the extent of specific knowledge regarding the cave species in terms of population sizes, population dynamics, and distribution of occupied habitat. However, a lack of knowledge is not unusual for troglobitic organisms that only occur in areas where humans rarely go and that may primarily inhabit mesocavern areas where humans are unable to enter at all. The reviewers were in agreement that the primary constituent elements were identified adequately. Three of the reviewers commented that additional information, particularly detailed mapping, was needed regarding human activities that may have eliminated one or more primary constituent elements from the landscape, information which presumably would allow some areas to be eliminated from consideration as critical habitat. Comments received from the peer reviewers are summarized in the following section and were considered in developing the final rule.

Issue 1: Biological Justification and Methodology

(1) *Comment:* One scientific reviewer commented that it was difficult to justify inclusion of Units 2 and 3 on geological grounds alone, considering that evidence of historical or current occupation by the organisms was lacking. However, another reviewer stated that the proposed designation on the basis of geology alone was indeed adequate, and pointed out the ''plastic'' nature of the underlaying calcareous substrates of Unit 2 and 3 over geologic time. Another scientific reviewer did not feel that enough information was available to evaluate the adequacy of the large size of Unit 1a without more detailed maps of geology, cave locations, and past, present and future land use. Another commenter noted that the proposed designation does not provide enough connectivity between units, and recommended that there should be continuity between Unit 1a and Unit 1b and to accomplish this, all of Makahuena Point should be designated.

Our Response: Unit 2 has not been included in the designation on geology alone. This unit lies only a short distance from a known occupied site and as mentioned by another reviewer was likely connected at an earlier time. Information provided during the comment period shows that the large size of appropriate habitat is likely to sustain the cave animals and is expected to provide the best type of habitat. In determining adequacy of size of critical habitat, we have reviewed the best scientific and commercial data available in making our final designation. Units 1b and 3 have not been included in the designation. A considerable amount of new information was provided to the Service regarding site-specific conditions on lands that had previously never been surveyed or had been incompletely surveyed. This includes new information regarding occupied and unoccupied caves, and technical information (*e.g.,* drilling logs that include cross-section/stratigraphy data of geologic core samples) regarding subsurface geology of surrounding areas. The total number of known occupied caves and caves with appropriate habitat has increased substantially, and some of the intervening areas between caves has been shown not to contain the primary constituent elements required to support adequate habitat for the species. The new information has resulted in a reformulation of the number of caves (and amount of above-ground area) considered to be essential to the conservation of the species. The new information has reduced, but not eliminated, the need for establishing critical habitat boundaries on the basis of the underlying geology of a given unit. Critical habitat boundaries have been modified to encompass surface areas above known caves and mesocave-bearing geologic features. These modifications and the rationale for the changes are described in detail in the section ''Summary of Changes from the Proposed Rule.''

(2) *Comment:* One scientific reviewer stressed the importance of environmental requirements of obligate cave-dwelling species, noting that appropriate conditions (100 percent relative humidity) only occurs in larger, longer caves, and may be most commonly found in mesocavern spaces. Mesocavern areas may be limited in Koloa because of the geologic age of the lava flow series; however, where they occur they are important.

Our Response: As the reviewer points out, a variety of data supports the existence and occupation of mesocavern habitats. This includes the typically low, but variable, numbers of organisms observed in cave surveys. Survey events that detect few individuals probably occur during conditions of reduced humidity whereby the organisms retreat into mesocaverns with suitable environmental conditions. Also, two known occupied caves that tend to exhibit drier conditions have been

surveyed numerous times with the wolf spider observed on only a few occasions. This indicates that, despite careful searches by trained observers, the organisms are able to move into areas of suitable habitat that are too small for humans to enter. We note that the ''type locality'' from where the initial specimens of the cave amphipod were collected for scientific description (the ''sand chamber'' of the Mahaulepu Sinkhole cave) appears to have a drier environmental regime than during initial biological surveys there in the 1970s. No amphipods have been seen in that chamber in recent years, likely due to this alteration of conditions. The Service agrees with the scientific reviewer that maintenance (and possibly enhancement) of suitable environmental conditions of caves and voids is an important consideration in conservation of the caves species.

(3) *Comment:* Two scientific reviewers recommended that the size of the critical habitat areas should be sufficient to protect adequate population numbers such that, in the event of local extirpations of the species due to natural disaster or disease, recolonization of these areas can occur.

Our Response: We agree, and we consider the issue of population dynamics central to the concept of conservation of the species. The cave species have characteristics that make estimates of population sizes and dispersal capabilities difficult. In addition, the species have naturally low reproductive potential. These characteristics highlight the importance of ensuring that the populations do not slip towards extinction due to demographic stochasticity (natural disaster, disease, invasive species interactions) or suffer from the effects of loss of genetic variability (inbreeding, genetic drift). We feel that our revised critical habitat boundaries, based upon the incorporation of new information regarding the number and locations of known occupied sites and sites highly likely to be occupied, encompass a wide distribution across the Koloa Basin, which will provide adequate refugia despite the possibility that unforeseen events may eliminate the entire population of a single cave or cave complex. These modified critical habitat boundaries are described in detail in the section ''Summary of Changes from the Proposed Rule.''

(4) *Comment:* The proposed critical habitat designation is based upon little specific data regarding the distribution of the cave invertebrates and the caves they inhabit; this has resulted in an overly broad ''blanket'' approach to the proposed critical habitat boundaries. A more reasonable approach would be to designate critical habitat around known population centers and known likely habitat.

Our Response: The proposed critical habitat designation was developed using the best technical information available to the Service at the time of preparation of the proposed rule. The majority of the lands where these species are found is privately owned, which severely limits and may prohibit the ability of the Service to survey caves and analyze landforms exhibiting potential habitat in short timeframes. Through ongoing outreach efforts and development of a series of cooperative conservation programs with certain landowners, a reasonable amount of scientific information had accumulated over time, and it was this available information that was used in the development of the proposed critical habitat designation. In response to Service requests for additional relevant information, several parties, including landowners and land managers, undertook surveys of their lands to obtain and share new information with the Service. This information has increased the level of specific knowledge about the species in terms of distribution of occupied and unoccupied caves, locations of additional areas with geologic features likely to contain habitat, and areas that, because of natural processes or human-caused changes, do not contain the primary constituent elements adequate for support of the species. In particular, the number of individual caves where one or both of the species are found has increased from six to nine. This has greatly influenced the technical analysis leading to the ultimate conclusion of which areas are necessary for the conservation of the species. As described elsewhere, the identification of additional known occupied habitat has resulted in refocusing critical habitat boundaries in consideration of our better understanding of the cave species populations, their distribution, the effects of habitat fragmentation, protection of isolated populations, and potential for retaining areas of habitat connectivity.

(5) *Comment:* A sand mining operation is located in Unit 2. Significant portions of this unit have been disturbed and should be excluded from designation.

Our Response: The sand mining operation is not included in the designation of critical habitat. As described above, new information regarding the geology and modification of potential habitat due to human activities such as the sand-pit operation, agriculture, and past and current land use patterns, have resulted in modification of the boundaries of the proposed critical habitat. These modified critical habitat boundaries are described in detail in the section ''Summary of Changes from the Proposed Rule.''

(6) *Comment:* One scientific reviewer noted that the concern regarding diseases and alien species invasions is warranted, but the reference to *Bacillus thuringinensis* (Bt) toxin as a potential threat is weak.

Our Response: The threat of profound ecological disturbance, including species extinctions, due directly or indirectly to alien species introduction is a common theme in the conservation of virtually every native Hawaiian ecosystem. In addition to calling attention to this immediate threat, our use of the Bt example was to demonstrate: (1) That some disease and alien species threats are intentional ''biocontrol'' introductions that could have unintended effects upon native ecosystems (this has occurred and continues to occur in Hawaii and elsewhere); and (2) the rationale behind protecting multiple, isolated portions of suitable occupied and unoccupied habitat in the event of a catastrophic event, such as a pesticide spill or other surface disturbance.

(7) *Comment:* Based upon existing and new information, there appear to be four distinct populations of the cave invertebrates. They occur at: Kukuiula, Kiahuna, Bypass Road/Civil Defense caves, and the sinkhole area. Based upon other cave conservation efforts (including a proposed critical habitat designation for cave organisms in Texas by the Service), recovery goals can be achieved by protecting in perpetuity three discrete populations of organisms. Considering the cooperative conservation efforts of landowners at Kukuiula, Kiuahuna (for caves), and at the sinkhole (presently for archeological preservation), the requisite three faunal areas for each species has been identified, which is sufficient for species protection.

Our Response: While the cave animals in Hawaii share some similarities with cave animals in Texas, it is inappropriate to assume recovery standards would be the same just because both occur in caves. Caves in Texas and caves in Hawaii are formed through different processes, have different food resources, and face different specific threats. Recovery standards need to be determined by evaluating individual species and their threats. Although there is no final recovery plan for either the Kauai cave amphipod or the Kauai cave wolf

spider, we do not at this time believe the three areas mentioned above adequately provide protection against catastrophic events. Therefore, a designation limited to these three areas would not adequately provide for the conservation of either species.

Issue 2: Legal and Regulatory Issues

(8) *Comment:* The Service has misinterpreted the intent of the Act with exclusion of areas under 3(5)(A)(i) of the Act. If a specific area of cave invertebrate habitat is recognized to be critical to the extent that management is already taking place, the notion that such management renders designation unnecessary does not make sense. In fact, designation of these areas would seem more urgent.

Our Response: While we have not excluded any areas from this rule because they are already sufficiently managed, we still believe this interpretation of the definition is reasonable. Pursuant to the definition of critical habitat in section 3 of the Act, the primary constituent elements as found in any area so designated must also require ''special management considerations or protections.''

(9) *Comment:* Areas that are merely capable of supporting the species are proposed for designation, as opposed to areas that are essential for the conservation of the species.

Our Response: Based on new information received during the public comment period we have refined the proposed designation. All areas designated as critical habitat are deemed essential to the conservation of the species. Areas designated provide for areas known to be occupied by the animals or provide for protection against catastrophic events by contributing to a wide distribution throughout the Koloa Basin.

(10) *Comment:* The Service failed to consider the cascading impacts resulting from the State-led regulatory activities that must, by law, be implemented as a result of critical habitat designation. These include the broad interpretation of ''take'' under Hawaii's Endangered Species Act (HRS Ch. 195D); mandatory ''downzoning'' of private lands under Hawaii's Land Use Law (HRS Ch. 205); unreasonably frequent requirements for full environmental impact statements for minor actions under Hawaii's Environmental Impact Statement Law (HRS Ch. 343); unreasonable permit delays for county-regulated Special Management Area permits under Hawaii's Coastal Zone Management Law (HRS Ch. 205A); uncertainty of interpretation of the reach and extent of State regulatory authority under Hawaii's State Water Code (HRS Ch. 174C); and implications for water quality standards under Hawaii Administrative Rules Ch. 11–54, Water Quality Standards.

Our Response: Possible costs resulting from interplay of the Federal Endangered Species Act and Hawaii State laws were discussed in sections 3 and 4 of the November 2002 Draft Economic Analysis of Proposed Critical Habitat Designation for the Kauai Cave Wolf Spider and the Kauai Cave Amphipod Island of Kauai, Hawaii (DEA) under direct and indirect costs as modified by the Addendum. They consider the economic impacts of section 7 consultations related to critical habitat even if they are attributable co-extensively to the listing status of the species. In addition, they examine any indirect costs of critical habitat designation, such as where critical habitat triggers the applicability of a State or local statute. The addendum to the DEA also fully considered this issue.

(11) *Comment:* The proposal violates the ''commerce clause'' because the spider and the amphipod are not related to interstate commerce.

Our Response: The Federal government has the authority under the Commerce Clause of the U.S. Constitution to protect these species, for the reasons given in Judge Wald's opinion and Judge Henderson's concurring opinion in *Nat'l Ass'n of Home Builders* v. *Babbitt,* 130 F.3d 1041 (D.C. Cir. 1997), cert. denied, 1185 S. Ct. 2340 (1998). *See also Gibbs* v. *Babbitt,* No.99–1218 (4th Cir. 2000). The *Home Builders* case involved a challenge to application of ESA prohibitions to protect the listed Delhi Sands flower-loving fly. As with the species at issue here, the Delhi Sands flower-loving fly is endemic to only one State. Judge Wald held that application of the ESA to this fly was a proper exercise of Commerce Clause power because it prevented loss of biodiversity and destructive interstate competition.

(12) *Comment:* The Service must take into consideration the completed economic analysis prior to designation of critical habitat. Currently, the proposed critical habitat boundaries are proposed prior to the completion of the economic analysis. This runs counter to the requirement for determination of prudency under the ESA.

Our Response: We did not designate critical habitat before conducting an economic analysis. The DEA was published and made available for review on November 15, 2002 (67 FR 69177). The comment period on the proposed rule to designate critical habitat for these two species was extended until December 16, 2002, to allow interested and affected parties the opportunity to review the DEA in conjunction with the proposed critical habitat rule.

The Service determines whether critical habitat designation is prudent according to regulations found at 50 CFR 424.12(a). In accordance with these regulations, critical habitat designation is not prudent only when one or both of the following two 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 such threat to the species; or, (2) such designation would not be beneficial to the species. The economic analysis is generally conducted after critical habitat has been proposed in a given area, as set forth in regulations found at 50 CFR 424.19. If we find that economic or other impacts outweigh the benefit of designating critical habitat in a given area, that area will be excluded under section 4(b)(2) of the Act.

(13) *Comment:* Existing protections are adequate to conserve the species. The additional action of designating critical habitat is unnecessary.

Our Response: We are required to designate critical habitat to the maximum extent prudent. Designation is not prudent only when the species is threatened by taking or other human activity and designation would increase that threat or designation would not be beneficial.

(14) *Comment:* Because the DEA indicates that there will be substantial adverse impacts on small landowners, such as KG Kauai Development, LLC, there should be a Regulatory Flexibility Analysis performed on the designation of critical habitat.

Our Response: Small landowners and other entities potentially impacted by the designation of critical habitat for the Kauai cave arthropods were identified and discussed in section 5 of the November 2002 DEA and February 2003 addendum. As summarized in the addendum, there are no small entities, as defined under the Regulatory Flexibility Act (as amended by the Small Business Regulatory Enforcement Fairness Act) (RFA/SBREFA) that may be impacted by implementation of the section 7 provisions of the Act for the cave animals. Therefore, we concluded that the designation of critical habitat for the cave species is not likely to significantly impact a substantial number of small entities. The final determination is much smaller than that which was initially proposed, and the addendum discusses impacts to

landowners but also concludes that no small entities will be impacted.

(15) *Comment:* In the context of Hawaii law, the designation constitutes taking as it results in the loss of value to the property.

Our Response: To a property owner, the designation of critical habitat becomes important when viewed in the context of section 7 of the Act, which requires all Federal agencies to ensure, in consultation with the Service, that any action that these aagencies authorize, fund, or carry out is not likely to result in the destruction or adverse modification of designated critical habitat. If, after consultation, our biological opinion concludes that a proposed action is likely to result in the destruction or adverse modification of critical habitat, we are required to suggest reasonable and prudent alternatives to the action that would avoid the destruction or adverse modification of the critical habitat. If we cannot suggest acceptable reasonable and prudent alternatives, the agency (or the applicant) may apply for an exemption, in accordance with section 7(e) through (p) of the Act.

The mere promulgation of a regulation, like the enactment of a statute, does not take private property unless the regulation on its face denies the property owners all economically beneficial or productive use of their land (*Agins* v. *City of Tiburon,* 447 U.S. 255, 260–263 (1980); *Hodel* v. *Virginia Surface Mining and Reclamation Ass'n,* 452 U.S. 264, 195 (1981); *Lucas* v. *South Carolina Coastal Council,* 505 U.S. 1003, 1014 (1992)). The designation of critical habitat alone does not deny anyone economically viable use of their property. The Act does not automatically restrict all uses of critical habitat; it only imposes restrictions under section 7(a)(2) of the Act on Federal agency actions that may result in destruction or adverse modification of designated critical habitat. Furthermore, as discussed above, if a biological opinion concludes that a proposed action is likely to result in destruction or modification of critical habitat, we are required to suggest reasonable and prudent alternatives.

(16) *Comment:* Several commenters requested an extension of the public comment period to enable more time for preparing and submitting comments to the Service. This request was made in part to enable the completion of scientific surveys of certain lands within proposed critical habitat and to allow more time to develop voluntary conservation agreements on some of these lands that might obviate the need for critical habitat.

Our Response: The Service provided a total of 90 days of public comment following publication of the proposed critical habitat rule and draft economic analysis. The Service was unable to accomodate further requests for an extension of the public comment period due to the court-ordered deadline mandating completion of this final critical habitat rule. However, the Service would be happy to receive and review any new information, and if warranted will consider this information in possible future revisions of this rule (*see* 16 U.S.C. 1533(a)(3)(B)). In addition, interested parties may petition to revise a critical habitat designation based on new information (16 U.S.C. 1533(b)(3)(D).

(17) *Comment:* The DEA lists economic impacts; however, there is no indication that the Service has identified appropriate critical habitat boundaries or modified the critical habitat boundaries in consideration of these economic impacts.

Our Response: We considered the economic impacts that were analyzed and summarized in the DEA and final addendum, and no critical habitat units in the proposed rule were excluded or modified due to economic impacts (*see* section ''Analysis of Impacts Under Section 4(b)(2)''). However, several areas were excluded or modified because they lacked primary constituent elements, or were more degraded than other essential habitat areas, and therefore were not considered essential to the conservation of the species (*see* ''Summary of Changes from the Proposed Rule'' section).

(18) *Comment:* The incremental impact of designating critical habitat, over and above the original listing, is that it creates a presumption that modification of the land will ''take'' members of the species. The Service is obliged to calculate the impact of deterring landowners' use of their lands. If any economic use of the land is prevented, the Service is liable to compensate the private landowner for losses.

Our Response: Under federal law, while critical habitat may provide information to help a landowner identify where take through habitat modification may occur, the take prohibition applies whether or not critical habitat has actually been designated. The Act defines ''take'' to include ''harm.'' 16 U.S.C. 1532 (19). ''Harm is defined by regulation to include significant habitat modification or degradation where it actually kills or injures wildlife. 50 CFR 17.3. However, just because an action occurs in critical habitat would not demonstrate a take violation; the action must actually kill or injure the species. Take of a listed wildlife species may occur inside or outside of critical habitat if it causes death or injury to the species.

(19) *Comment:* A cost benefit and economic analysis pursuant to Executive Order 12866 is required because the DEA indicates that there may be an annual effect on the economy of over $100 million per year.

Our Response: While the DEA estimated potential costs greater than $100 million, this was based on the proposed critical habitat acreage of approximately 1,697 ha (4,193 ac). The final economic analysis evaluated the revised acreage of 110 ha (272 ac) and concluded that costs did not exceed $100 million.

(20) *Comment:* Portions of Unit 2 and the eastern portion of Unit 1 are planned but not permitted for major resort development; the southern portion of Unit 1 is planned but not permitted for subdivision into over 50 ''upscale'' houselots; a portion of Unit 3 is planned and permitted for a future limestone and basalt quarry; the area surrounding the old Koloa sugar mill will be expanded into an industrial area; several water wells are located in Unit 1 and additional water wells are expected. This development will create residential and employment opportunities for over a thousand island residents. In view of their economic importance, these areas should be excluded from consideration.

Our Response: As indicated in the ''Summary of Changes from the Proposed Rule'' section, large portions of the proposed critical habitat Units 1 and 2 have been excluded in the final designation of critical habitat due to biological, rather than economic, considerations. Unit 3 has been completely removed from critical habitat designation for biological reasons, as well.

(21) *Comment:* The Eric A. Knudsen Trust is seeking to subdivide or otherwise participate in the development of at least 741 lots/resorts units on 202 acres of trust-controlled lands [Tax Map Keys (TMKs): (4) 2–8–015:082; (4) 2–8–013:01; (4) 2–8–014:01, 02, 03, 04, 19, 30 {in part}; (4) 2–8–09:09; (4) 2–8–011:01, 18, 20, 35]. Because critical habitat designation may impact these plans, the trust asks that the lands be excluded from designation. Certain Eric A. Knudsen Trust lands may not be suitable as critical habitat because of prior urban and resort development [TMKs: (4) 2–8–01421, 26], and the trust asks that these lands be excluded from designation.

Our Response: With the revised critical habitat boundaries, only two critical habitat units fall within the TMKs listed. Both units (unit 6 and 8) fall within TMK (4) 2–8–014:01. All other proposed areas were excluded from final critical habitat designation for biological reasons, as described in the ''Summary of Changes from the Proposed Rule'' section.

(22) *Comment:* The DEA acknowledges that the proposed critical habitat boundaries will change with the final designation; however, the process by which final boundary determinations are made is not clear. The lack of definitive boundaries under consideration makes it impossible for anyone commenting on the economic impacts to be precise.

Our Response: The proposed critical habitat units were described and depicted in the proposed rule (67 FR 14671), as were the methods and criteria used in determining the proposed areas. We have described our methods and criteria for designating final critical habitat boundaries within this final rule.

(23) *Comment:* The DEA fails to distinguish potential costs due to designation from costs due to listing the cave animals as endangered. Nowhere does the draft provide any analysis of what impacts, if any, designating critical habitat for the cave animals would impose above and beyond those associated with the species' listing. Because the draft economic analysis does not distinguish between these costs, it cannot exclude proposed critical habitat from a final critical habitat designation pursuant to section 4(b)(2).

Our Response: The court, as per *New Mexico Cattlegrowers Association* v. *U.S. Fish and Wildlife Service,* requires us to look at co-extensive costs (consideration of the impact of all section 7 effects that could be a result of the designation, even if they are the same as those that arise from the listing). This is the approach the economic analysis and addendum take. The Service recognizes that if an area is excluded under 4(b)(2), not all of the economic impacts may be avoided.

Issue 3: Economic Issues

(24) *Comment:* Elements of the economic analysis are based upon unsubstantiated and speculative development scenarios that greatly exceed foreseeable, sustainable growth for the Koloa/Po'ipu region as set by existing county zoning and State land use designations, as well as other legally-binding planning guidelines such as the Kaua'i County General Plan.

Our Response: The resort/residential development planned in Units 2 and 4 and the residential development planned in Unit 10 is consistent with the 2000 Kaua'i General Plan (General Plan), current State land use districts, and current county zoning. The resort/residential development planned in Units 6 and 8 requires minor modifications in the State land use districts and county zoning, but it is consistent with the General Plan. All of this development is likely to occur within the proposed critical habitat between 2003 and 2020 if no consideration is given to the indirect impacts of the intended designation.

The commercial development planned in Unit 10 is not in the General Plan and is not included in the State Urban District. As mentioned in the Indirect Costs section of the Addendum, this development may not occur for reasons unrelated to the intended designation. However, since the General Plan is updated every 10 years or so, the commercial development may be added to the General Plan before 2020. The property values used in the Addendum reflect the fact that the development is not fully entitled, but that the land has development potential.

Barring a hurricane or a major recession that disrupts tourism and resort/residential property sales, it is expected that, without the intended designation, all or nearly all of the planned development in the intended designation would occur by 2020.

(25) *Comment:* Most development can proceed with reasonable project modifications that will reduce or eliminate damage to the cave ecosystems, therefore the economic impacts are greatly overstated. The economic analysis indicates that $1.9 billion of development may occur in the region and that project modifications would cost $61.6 million. This represents 3.2 percent of the cost of development, not an unreasonable amount considering these species and their habitats are highly endangered. Another commenter stated that direct costs of consultation must actually be divided by the profits from the sales, rentals, jobs, *etc.,* produced by all the units of resort, residential, commercial and light industrial development which are likely to be built. Figured per saleable and rental unit and calculated over time, the cost is not likely to be as staggering as portrayed.

Our Response: The estimates of direct and indirect costs in the *Draft Economic Analysis of Proposed Critical Habitat Deisgnation for the Kaua'i Cave Wolf Spider and the Kaua'i Cave Amphipod, Island of Kaua'i, Hawai'i* (DEA) were revised based on new information from the Service, resulting in a reduction in these estimates. For the larger projects affected by the intended designation, the revised figures represent a small percentage of the total development costs and profits.

(26) *Comment:* Direct costs are summed with indirect costs to derive a total impact estimate. Yet, direct costs are associated with development put in place, while indirect costs are associated with development foregone. The benefits of the former should be offset against the costs of the latter, not summed. Also, direct cost estimates do not include multiplier effects of these expenditures, yet indirect costs do include multiplier effects. So we see the full impact of development foregone, but only partial impacts of development actually implemented.

Our Response: Since the DEA was published, the direct costs and indirect costs have been modified to reflect new information gained since the publication of the DEA and based on the intended critical habitat designation. Direct costs include expenditures, on section 7 consultations and project modifications for assumed development. Indirect costs include additional expenditures as well as lost income benefits associated with lost development. The direct and indirect costs are no longer summed; also, the direct costs are not benefits—they do not offset indirect costs.

Indirect costs that reflect the multiplier effects of lost development are no longer included in the analysis because they would be generated in any case; to the extent that development is displaced from the intended designation due to the implementation of section 7 for the cave animals, that development would still be expected to occur but in another location of Koloa outside the critical habitat. This is now expected because of the smaller area intended for designation.

(27) *Comment:* Total impact is based on a guess that between 25 percent (low) and 50 percent (high) of all proposed development will not proceed due to habitat restrictions. [Sec 4.c] Also, Table VI–3 indicates that the ''Low Projection'' actually assumes a 33 percent loss, not 25 percent as claimed in the text (pg. VI–57). Thus, the ''Low'' impact should be 25 percent lower than reported, or about $330 million in Net Present Value terms.

Our Response: Due to the Service's intended modifications to the critical habitat designation, the cost estimates presented have been revised. In particular, the indirect impacts on remaining parcels are considered on a

parcel-by-parcel basis whereby the change in the likelihood of development, if any, associated with the intended designation is identified. The costs associated with these impacts are presented in the Indirect Costs section of the Addendum.

(28) *Comment:* The State of Hawaii Department of Business, Economic Development and Tourism (DBEDT) population and tourism growth projections were used for this study. These estimates are higher than the 2000 Kaua'i's General Plan projections. DBEDT's projections are controversial and contested.

Our Response: The DBEDT projections are presented in Table II–1 of the DEA, although both the DBEDT and General Plan projections are discussed in Chapter II of the DEA. The General Plan projections and information from developers are used to determine the amount of development that is planned in the intended critical habitat designation.

While the DBEDT projections are used in comparisons of lost economic activity to projected island-wide economic activity in the DEA, neither the DBEDT projections nor the General Plan projections are directly used in the calculation of updated cost estimates presented in the Addendum.

(29) *Comment:* It is erroneous to assume hotel and resort development displaced at Po'ipu is not likely to be replaced by equivalent projects elsewhere on Kauai. (V–57). In fact, there is island-wide competition for the resort market, and new areas such as Kapalawai have received Kauais General Plan resort designation. Also, visitor accommodations on Kauai are diversified with significant uncounted numbers of people staying in vacation rental homes, bed and breakfasts and camping outside of planned visitor destination areas. According to the Kauai General Plan analysis, the total number of resort and residential units already permitted, as opposed to those desired, is 5,836. (Appendices, Tables C and D). If the density allotted to Kukui'ula is cut in half, that total number is 4,036. Taking the HIGH number of baseline development (2,253, which includes not permitted units desired by Grove Farm), it appears that there must be 1,783 permitted units *outside* of the proposed critical habitat area. Future growth opportunities in Koloa, not requiring cave species mitigation construction, do exist in both the resort and residential categories. Growth opportunities in the Koloa area are not foreclosed by habitat designation.

Our Response: As a result of the Service's intended modifications to critical habitat, the DEA's estimates of loss of resort/residential development in the Po'ipu area and reduction in the amount of islandwide development no longer reflect the impacts associated with the intended designation. As discussed in the Indirect Costs section of the Addendum, even if some of the development planned in critical habitat does not take place, it is assumed that other development projects in the Koloa/Po'ipu area will be able to be increased in density or area to satisfy unmet demand for residential or resort/residential development.

(30) *Comment:* The costs of public support of residential and tourism development is not adequately identified or calculated. These costs should be considered avoided costs for reductions in growth. Among the missing estimates for the taxpayers ''growth subsidies'' are the following: (1) Public expenditures for more schools or expansion of existing schools, including teachers, staff and administrators; for police, fire, ambulance, lifeguard personnel and equipment; solid waste; recycling; governmental administrative services; etc. Public subsidies of each unit of residential and of tourism development are substantial; (2) Most of these costs, as well as those for water, sewage, and roads (which the study states will not be affected by habitat designation and do require consultations etc.), are increased when development is sprawling rather than contiguous. Development of Maha'ulepu and the Sugar Mill area would leap beyond current developed areas; (3) Another avoided cost would be the cost to attain permits for projects and project design costs, *etc.* To get permits needed to develop, Grove Farm has previously estimated costs of over $5 million, higher than numbers in the study.

Our Response: As discussed in the Indirect Costs section of the Addendum, a reduction in islandwide development attributable to the intended designation is no longer anticipated. Similarly, it is assumed there will be no impacts to the Maha'ulepu development since the areas planned for development are no longer in critical habitat. As such, any avoided public-support costs for reductions in development are not anticipated.

(31) *Comment:* Table ES–1 appears to present both the low and high ends of the economic impacts estimated, implying that the low-end value reflects the likely least cost that critical habitat designation would impose. In fact, review of the DEA reveals that the ''low'' value represents the low end of the possible worst-case scenario, not the low end of all likely scenarios.

Our Response: The impact estimates have been revised in the Addendum to include expected impacts for a number of possible scenarios and the Service's intended modifications to critical habitat. As such, the high and low estimates in Table Add-3 represent the range of reasonably foreseeable direct costs associated with section 7 implementation for the cave animals and the indirect costs associated with the intended designation.

(32) *Comment:* The DEA fails to recognize that the costs to investigate the implications of critical habitat are sunk costs associated with the designation process, not additional costs that final designations would impose. Any concerned party investigating the proposed designation of critical habitat on their lands have already hired their lawyers and consultants, and incurred the costs associated with figuring out the implications of designation on their lands. Even were the private landowners' lands ultimately excluded from the final critical habitat designation, the landowners would still not recoup those costs; the money has already been spent. These costs should not be included in the analysis of future potential costs from designation since they have already been incurred and were incurred regardless of the final designation decision.

Our Response: For completeness, estimated expenditures by landowners to investigate the implications of the proposed critical habitat were included in the DEA and Addendum, even if the funds have already been expended and are not recoverable. In estimating costs, a distinction is not made between the designation process and the final designation.

(33) *Comment:* Project modification costs are underestimated, particularly the cascading effect of project realignment with the purpose of avoiding critical habitat. Also, the costs of avoiding subsurface impacts to sewer lines, buried cables, *etc.,* in addition to roads, is underestimated.

Our Response: The project modification cost estimates take into account a variety of projects, locations, and contingencies, and are based on (1) discussions with the Service and construction contractors, and (2) an examination of the historical record of project modifications regarding the cave animals. The one historical case of a road realignment due to the cave animals involved the Koloa Bypass Road. In this case, the realignment was minor and was completed quickly at

relatively low cost. The Service indicates that if a realignment is too costly for a particular project, other alternatives are possible. These include using post-tension concrete to bridge caves and mesocaverns, or placing sewer lines and cables above ground. If none of these options is economically or technically feasible, the Service indicates that a portion of a cave could be sealed off and filled in, as long as precautions are taken to minimize the impact to any cave animals that may be present. The costs associated with these various scenarios are considered in the project modification cost calculations in the Addendum.

In situations where development is displaced because of critical habitat, the cascading effect of project realignment is taken into account (*e.g.*, a school planned for a location in critical habitat would be relocated to an area planned for residential development, thereby resulting in a loss of planned housing).

(34) *Comment:* The DEA only partially considers the ''indirect impacts'' of critical habitat designation, and instead focuses on ''direct impacts'' due primarily to consultations under section 7 of the Act. Due to precedent set by *New Mexico Cattle Growers,* the Service must fully consider both types of impacts, and the DEA must present a thorough analysis of these economic effects. Another commenter stated that the DEA overemphasizes the direct costs attributable to critical habitat designation, which are relatively minor, and ignores or omits many indirect impacts, such as: Impacts to housing supply, especially affordable housing required by State and local governments as permit conditions associated with development of ''market-priced'' housing, upscale housing, and resort development; impacts to public infrastructure such as schools, parks, and roads, and decreases in public revenues as a result of reduced economic activity; disproportionate impacts to specific ethnic groups, and other social impacts.

Our Response: Both direct and indirect impacts are analyzed in Chapter VI and in the Addendum, and both are summarized in Table Add-2.

Regarding affordable housing, schools, parks and roads, the developers are obligated to provide them regardless of critical habitat. But if they cannot build them in critical habitat, then they could be moved elsewhere within a project site, displacing market housing or other project components. This displacement was assumed in analyzing the economic impacts of the section 7 implementation for the cave animals.

As discussed in the Indirect Costs section of the Addendum and in responses to other comments, a reduction in islandwide development attributable to the intended designation is no longer anticipated. As such, any changes in the public revenues associated with reduced economic activity are expected to be minimal.

No disproportionate economic or social impacts on specific ethnic groups were identified.

(35) *Comment:* The DEA acknowledges that some or all lands designated as critical habitat may be redistricted/rezoned at the State or county level to preclude further development, and the actual economic costs of redistricting could be very high ($1.54 billion to $3.1 billion). These estimates are mentioned in the text but not in the summaries of the economic impacts.

Our Response: Due to the Service's intended modifications to critical habitat, economic impacts on the order of $1.54 billion to $3.1 billion are no longer anticipated. The Indirect Costs section of the Addendum considers the potential indirect impact of the intended designation on each parcel in the intended designation to determine an estimate of development impacts (including any associated with potential redistricting, as applicable).

(36) *Comment:* The DEA does not account for investments and other expenditures already made on lands with the expectation that rezoning and redistricting will allow future development and hence a return on investment, nor does it account for the potential lost recapture of investment yields that may be foregone due to lost development potential for lands that have successfully been rezoned and permitted for development at a very high cost.

Our Response: The Indirect Costs section of the Addendum presents an estimate of the loss in property values due to the cave animals listing and critical habitat designation. The property values used in the analysis reflect the current market value of the land, which consists of real returns from existing uses and improvements as well as any anticipated improvements or uses.

(37) *Comment:* The DEA fails to consider the more restrictive Habitat Conservation Plan (HCP) guidelines under the Hawaii Endangered Species Law (HRS 195D–4, HRS 195D–21) which require that the State HCP permittee show a net benefit to the species. The DEA fails to analyze impacts due to the circumstance in which a landowner qualifies for a Federal HCP but is unable to obtain a State HCP.

Our Response: None of the landowners and developers remaining in the intended designation are anticipated to seek an HCP as a result of critical habitat designation. Section 4 of the Addendum discusses the indirect impacts of the intended designation in greater detail.

(38) *Comment:* The narrative exclusion of areas underlying currently developed areas such as buildings and driveways (''unmapped holes'') is too vague considering the cryptic nature of the organisms and their habitats. The DEA fails to fully consider the economic impacts of landowners costs to properly demarcate ''unmapped holes'' in the process of obtaining necessary permits for development projects.

Our Response: The intended critical habitat designation contains few unmapped holes or developed areas. The costs to landowners to demarcate these sites is expected to be minimal.

(39) *Comment:* The DEA does not take into account the loss of income by Jas W. Glover Ltd., the operators of the quarry. The DEA should use a figure of $31–35/ton for shipping of limestone to Kauai, not the $13 to $16 per ton due to costs of wharfage fees loading and unloading costs, trucking, insurance, and other costs. In addition, the loss of quarry materials will have impacts throughout the construction industry on Kauai. Another commenter stated the siting of an additional quarry in the area is no longer necessary because market conditions have changed and products produced by the expanded quarry are not needed by the local economy. Another commenter stated that the operator of the quarry on Grove Farm lands (Jas W. Glover Ltd.) is a small entity, and it is woman-owned and Native Hawiian-owned. Because this firm is one of only two aggregate producers on the island the impacts to this economic sector should be considered under ''Impacts to Small Entities.''

Our Response: The site planned for the future expansion of the limestone quarry is no longer included in the intended critical habitat designation, so the associated direct costs, indirect costs, and impacts to small entities attributable to the intended designation are zero.

(40) *Comment:* The DEA incorrectly lists Kobayashi Group LLC as the owner of Kiahuna Golf Course and surrounding lands. The golf course (225.063 acres) is owned by Kiahuna Golf Club, LLC; the adjacent lands (95.412 acres) are owned by KG Kauai Development, LLC. These are distinct entities and not subsidiaries

of Kobayashi Group LLC, although there are common elements of ownership between various individuals. Kiahuna Golf Club, LLC, and KG Kau'i Development, LLC believe they qualify as small businesses. Because the DEA indicates that there will be substantial adverse impacts on small landowners such as KG Kaua'i Development, LLC and Kiahuna Golf Club, LLC there should be a Regulatory Flexibility Analysis performed on the designation of critical habitat.

Our Response: The Addendum lists KG Kaua'i Development, LLC (KGKD) as the owner of the land that is planned for the Kiahuna Golf Village Expansion and the Kiahuna Golf Course Expansion. No impacts are anticipated for the continued operation of the existing Kiahuna Golf Course by Kiahuna Golf Club, LLC.

RFA/SBREFA regulations state that the Small Business Administration (SBA) counts the receipts or employees of the business whose size is at issue and those of all its affiliates in determining the business' size. Businesses are affiliates of each other when one concern controls or has the power to control the other, or a third party or parties controls or has the power to control both. The SBA considers factors such as ownership, management, previous relationships with or ties to another business, and contractual relationships, in determining whether affiliation exists. Finally, RFA/SBREFA regulations state that a firm will not be treated as a separate business concern if a substantial portion of its assets and/or liabilities are the same as those of a predecessor entity. In such a case, the annual receipts and employees of the predecessor will be taken into account in determining size (13 CFR part 121).

KGKD states that it is affiliated with Kobayashi Group LLC through common ownership by certain individuals. In addition, KGKD was recently established by the Kobayashi Group LLC for the purpose of acquiring the properties surrounding the golf course. As such, Kobayashi may be considered a predecessor entity of KGKD. Due to its affiliation with Kobayashi Group LLC, KGKD is not considered separately in the RFA/SBREFA analysis in the Addendum.

(41) *Comment:* The level of effort to document and analyze the potential economic impacts resulting from critical habitat designation greatly exceeded the level of effort to document and analyze potential economic benefits due to designation, resulting in an unbalanced overestimation of detrimental economic impacts, and an unfair underestimation of economic benefits due to designation of critical habitat.

Our Response: See response to comment 42 below.

(42) *Comment:* The benefits of species protection are overstated and speculative. The DEA does not present the expected circumstances or timeline for delisting the species, nor is there a quantifiable estimate of the economic benefits of delisting. In addition, one commenter states the species themselves have no economic value; any estimate of economic benefit derived from not fully developing lands proposed for critical habitat are speculative and unquantifiable.

Our Response: This responds to comments 41 and 42 above: Even though the material presented in the DEA and in the Addendum regarding benefits is not as extensive as the material on costs, this does not result in overestimated costs and underestimated benefits. The less extensive analysis of the benefits is due to (1) a lack of scientific studies on environmental and biological changes that would be attributable to the section 7 implementation for the cave animals, and (2) the lack of existing economic studies on the economic value of these changes. However, the Addendum presents an expanded discussion of benefits, including the estimated value of retaining land in open space due to critical habitat.

The expected circumstances and the potential timeline of delisting the cave animals will be presented in the Service's final recovery plan for the cave animals. The DEA does discuss the reduced costs due to successful preservation and the existence value of the cave animals in the Benefits section of Chapter VI; however, these benefits are not quantified given the lack of information as described above.

(43) *Comment:* Based on 6,000 acres of undeveloped land bounded by Haupu ridge, and using pro rata estimates of ecological values from a University of Hawaii study of the value of the Koolau Range on Oahu (*http://www2.hawaii.edu/~uhero/workingpaper/HawaiiEnviroEvaluation.pdf* Environmental Valuation and the Hawaiian Economy, by Brooks Kaiser, Nancy Krause, and Jim Roumasset), the Koloa/Poipu viewscape is worth $29 million per year (at $0.23 per acre per household for Kauai's 21,000 households). Over 18 years (comparable to FWS estimates), this sums to $521 million. The annual stream of benefits from the conservation district is $10.1 million annually (at $1,690 per acre), summing to another $182.5 million on a comparable basis. The net present value of the undeveloped land is $456.9 million (at the UH lower estimate of $76,146 per acre). Degradation scenarios combining urban creep, invasive species, and human/animal disruption resulting in recharge loss could cost another $3.6 million annually (at $600 per acre), or a total of $65 million. That is only a start at estimating the ecological benefits and savings associated with preserving this undeveloped land, and we are at $1.225 billion already.

Our Response: The suggested benefits analysis would yield inaccurate results for several reasons. First, the proposed critical habitat for the cave animals as described in the proposed rule covers 4,193 acres. Since the publication of the proposed rule, the Service has identified several areas of the proposed critical habitat that it intends to remove for biological reasons, which would reduce the critical habitat to 272 acres. Basing the benefits analysis on 6,000 acres would overstate the economic benefits attributable to the implementation of section 7 for the cave animals.

Second, the commenter uses an incorrect value of open space. As stated in the University of Hawaii study, a recent survey found that Oahu residents are willing to pay $0.0023 per acre (0.23 cent per acre) for the preservation of open agricultural land on O'ahu. The commenter's use of $0.23 (23 cents) per acre overstates the benefits associated with open space by a factor of 100. The Benefits section of the Addendum uses the 0.23 cent per acre figure, corrected for (1) inflation; (2) the income levels on Kauai; and (3) the amount of existing open space on Kauai compared to Oahu. To calculate the value of additional open space, the corrected figure is then applied to the amount of land that may no longer be developed due to critical habitat.

Third, the University of Hawa'i (UH) study on the Koolau Range on Oahu focuses on the economic benefits provided by a mountainous region covered by dense forests and many native Hawaiian plants. The proposed critical habitat is in a gradually sloping and relatively dry area that contains many nonnative plant species. Since the ecosystems of these two areas are vastly different, the ecosystem services provided by these areas will also be different. As such, the economic valuation of the ecosystem services provided by the Koolau Mountains is generally not transferrable to the proposed or intended critical habitat. For example, the value of water recharge in the UH study reflects projected water supply and demand conditions on Oahu—an island which is nine percent

larger than Kauai but has a population of more than twelve times that of Kauai. Furthermore, neither the proposed nor the intended designation is in an area of high rainfall. Also, the UH benefit analysis of reducing soil runoff is unique to three valleys that drain through partially channelized streams in urban areas into the manmade Ala Wai Canal. Since this canal was designed with inadequate flushing from stream or ocean currents, it functions as an unintended settling basin so must be dredged periodically. The proposed critical habitat drains into a portion of the ocean that has strong currents and adequate flushing. And unlike the Koolaus, none of the proposed critical habitat contains streams and aquatic life, and none of the units are suitable for hunting wild pigs.

Finally, the commenter's summation of benefits to $1.225 billion is flawed due to double-counting. For example, the $1,690 per acre figure in the UH study includes the benefits of open space. So adding the estimated open space benefit of $521 million to the ecosystem services estimate of $182.5 million double-counts the benefits of open space. Similarly, the two per-acre figures taken from the UH study ($1,690 per acre and $76,146 per acre) are two different measures of the same ecosystem benefits. The first figure refers to the annual stream of benefits, while the second figure refers to the net present value. Multiplying both of these figures by 6,000 acres and adding them together clearly double-counts the ecosystem benefits.

(44) *Comment:* Assigning an economic value to preservation of ecosystem functions that may result from the designation of critical habitat (such as groundwater recharge, protection of coastal marine waters and fisheries, and other ecosystem services) is now an acceptable method of economic analysis. The dollar value of these services is high. However, this analysis was done in a qualitative, narrative manner in the draft economic analysis. Why was it not done quantitatively?

Our Response: Quantitative estimates of the economic benefits of the listed ecosystem services provided by critical habitat are not presented in the DEA or in the Addendum because studies estimating the change in the ecosystem associated with critical habitat designation and the value of that change are not available.

However, such benefits are likely to be small. For example, the proposed critical habitat is near the coast in an area of low rainfall, and thus contributes little to groundwater recharge.

The reduction of development and grazing in critical habitat could reduce soil runoff thereby protecting the coastal marine waters and fisheries off the south shore of Kauai. However, as mentioned in the DEA, this benefit is likely to be small because the affected marine ecosystem has already been altered by over 150 years of sugarcane cultivation in the area. Also, Koloa has an open coastline that is exposed to surf and strong ocean currents that continually flush the near-shore environment. Finally, any displaced development is likely to occur elsewhere in Koloa. Thus, the net environmental benefit to Kauai is likely to be small.

Additional environmental benefits, such as the preservation of open space, changes to traffic congestion, and the promotion of native plants, are discussed in the Benefits section of Chapter VI in the DEA and in the Addendum.

(45) *Comment:* There was no attempt to quantify the value of open space (parks, preserves, even golf courses) surrounding real estate. Such increased property values are acknowledged, but there was no attempt to estimate the corresponding increases in property values. Understanding of this principle is a large driver in the DMB Development Company's decision to halve the density of their joint project with A&B at Kukuiula.

Our Response: The Indirect Costs section of the Addendum discusses the possibility that the land planned for development in certain critical habitat units will remain open as a result of the intended designation. If this land is managed as a park or preserve, it could increase the selling values of the home lots that are directly adjacent to critical habitat. An estimate of the number of homes or lots adjacent to the critical habitat units, as well as the potential increase in selling values, is discussed for critical habitat Units 2, 6, and 8.

(46) *Comment:* Development in the Koloa/Poipu area is already progressing at unsustainable levels, and future traffic, emergency services, and possibly water supply are sources of uncertainty. It is good that the critical habitat designation places additional mechanisms to undertake reasonable slow-growth planning for the region. Also, some tourists prefer less developed areas. The potential loss of revenues due to people seeking less overbuilt resort area would be conjectural, but no more so than the assumption that critical habitat designation for cave species will reduce the number of visitors to Kauai.

Our Response: With the intended reduction in critical habitat, it is now assumed that any loss in development due to the intended designation will be replaced by development elsewhere in Koloa (see the Indirect Costs section of the Addendum). Thus, critical habitat designation for the cave animals, as intended by the Service, is expected to result in little or no change to future traffic, emergency services, water requirements, etc.

(47) *Comment:* Portions of Unit 2 and the eastern portion of Unit 1 are planned but not permitted for major resort development; the southern portion of Unit 1 is planned but not permitted for subdivision into over 50 ''upscale'' houselots; a portion of Unit 3 is planned and permitted for a future limestone and basalt quarry; the area surrounding the old Koloa sugar mill will be expanded into an industrial area; several water wells are located in Unit 1 and additional water wells are expected. This development will create residential and employment opportunities for over a thousand island residents.

Our Response: Most of the development projects and associated water well projects mentioned by the commenter are no longer in the intended critical habitat designation.

Summary of Changes From the Proposed Rule

Based on a review of public comments received on critical habitat, we have reevaluated our proposed designations and included several changes to the final designations of critical habitat. No specific information on habitat conditions or species occurrence was provided. At the time of the publication of the proposed rule, we were aware of only six known cave locations where the animals occurred and did not know the precise locations of other caves with suitable habitat. In addition, in the proposed rule, we acknowledged two theories with regard to intercave dispersal corridors (67 FR 14673 and 67 FR 14674). One theory is that very limited, if any dispersal was occurring between the cave systems, and the other that dispersal corridors needed to be protected if these species are to be conserved. Because of the limited verified occupied areas and the absence of other known suitable cave locations, we believed it necessary to include areas in the proposal that would provide for intercave dispersal corridors. In the absence of more specific data, we proposed those areas that were most likely to contain the primary constituent elements based on the best available information at the

time. In our request for peer review and public comments on the proposed rule, we asked for specific information on the number and/or distribution of both animals and what areas were essential for the conservation of the species.

During the comment periods on the proposed rule, a significant amount of specific information was received on the presence or absence of primary constituent elements, verified occupied cave locations, and other locations of suitable caves. No additional information was provided on either the location or importance of intercave dispersal corridors. Although our peer review confirmed the importance of protecting caves and surrounding mesocaverns for local dispersal, there was no consensus or scientific clarity provided on intercave dispersal corridors.

We only designate areas as final critical habitat if they contain the physical and biological features essential to the conservation of the species, and if unoccupied, they are essential to the conservation of the species. In the case of the intercave dispersal corridors, we suspect connectivity may be important, but we do not know where they are, to what degree they are used, or how to map these corridors to be consistent with the legal requirements in designating critical habitat. Therefore, we have not included such areas in the final rule.

Based on a review of the public comments received on the proposed critical habitat, we have reevaluated our proposed designations and included several changes to the final designations of critical habitat. These changes include the following:

(1) The final designation went from three proposed units encompassing an area of approximately 1,697 ha (4,193 ac) to 14 units encompassing a total of 110 ha (272 ac).

(2) We received new information on the presence of the Kauai cave wolf spider in two caves in the Koloa region and updated their verified occurrence from four caves to six caves.

(3) We received information indicating we missed a cave from which the Kauai cave amphipod was previously recorded and updated their verified occurrence from six caves to seven caves.

(4) We received information from a survey conducted by Dr. Frank Howarth which identified areas required to maintain the persistence of both animals on Alexander and Baldwin property. The information contained numbers of caves discovered and the amount of areas surrounding them to incorporate sufficient protection and inclusion of mesocaverns connected to the caves. Areas not identified in Dr. Howarth's survey were excluded from the designation. This information also assisted us in refining the amount of needed habitat surrounding other caves.

(5) We received substantial data from various parties such as drilling records, photographs, archeological surveys, and biological surveys indicating the lack of primary constituent elements in certain portions of proposed critical habitat. These data provided information as to the current depths of dirt, clay, and other soils. Soil deposits greater than a foot deep begin to degrade and fill the meoscaverns and caves necessary for the cave animals' survival and indicate a lack of the primary constituent elements, or at a minimum the primary constituent elements are likely to be severely degraded (Dr. F. Howarth, pers. comm., 2002). These areas have been removed from the designation.

(6) We received additional information from Dr. Frank Howarth on areas of higher quality habitat with a high likelihood of containing occupied caves on Grove Farm property and a Civil Defense map indicating a large cave previously used as a fall-out shelter. These areas have been mapped and retained in the designation.

(7) We received information from various parties on surveys done on their properties indicating the likelihood of suitable cave habitat. Areas found to have a low likelihood of suitability have been removed from the designation.

(8) We made revisions to the unit boundaries based on information supplied by commenters, as well as information gained from field visits to some of the sites, that indicated that the primary constituent elements were not present in certain portions of the proposed unit, that certain changes in land use had occurred on lands within the proposed critical habitat that would preclude those areas from supporting the primary constituent elements, or that the areas may not be essential to the conservation of the species in question.

This final critical habitat designation addresses the conservation of the species by protecting a number of discrete cave systems (*i.e.*, eight caves occupied by one or both species and associated mesocaverns, six caves where occupancy status is unknown with associated mesocaverns, and three areas containing higher quality habitat likely to be occupied by one or both species) that represent a widely distributed pattern throughout the highest quality habitat in the Koloa Basin. Designating only the known occupied caves themselves would only provide extremely small areas with several of the caves in close proximity to one another. A designation such as this would leave the species vulnerable to extinction due to a single catastrophic event and therefore not provide for the conservation of the species. As previously discussed in this rule under ''Adaptations of troglobitic animals,'' given the great vulnerability of these species to desiccation, adjacent mesocavern habitats that contain appropriate microclimate conditions will provide habitat or serve as refugia for both animals when conditions in the main cave passages become drier or otherwise less accommodating. It is within these mesocaverns where it is likely that the majority of their time is spent. Therefore, designating surrounding mesocaverns incorporates the area where the majority of the animals are likely to occur and provides for refugia from fluctuating conditions in caves which makes them essential to the conservation of the species. The remaining areas designated where occupancy by either species has not been verified are essential to the conservation of the species for the following reasons. The areas chosen, are known to contain caves or mesocaverns where the animals are most likely to occur. The designated spatter cones are the type of volcanic formations that produce rock with mesocaverns and likely produce cave structures as well. If animals do no currently occupy these areas, if dispersal is occurring, it can allow for areas for the species to disperse into, and if dispersal is not occurring, it can allow for reintroduction. These areas are deemed essential to the conservation of the species because they provide for a widely distributed pattern throughout the highest quality habitat available in the Koloa Basin. This wide distribution will protect the species from extinction from a single catastrophic event and therefore is essential to the conservation of the species. If new and additional scientific information shows that these areas are not essential, the critical habitat designation can then be revised.

Intervening areas between identified units of critical habitat may still be important to the recovery of the species although at this time we do not have information to identify them as essential to the conservation of the species. However, because either animal may be present at any given time in these intervening areas with suitable habitat, section 7 consultation requirements to ensure Federal actions are not likely to jeopardize the species and section 9 prohibitions, which preclude the

unauthorized taking of listed animals, may apply.

Absent any scientific data on the issue of intercave dispersal corridors, we applied a basic conservation strategy that protects all of the known cave locations and surrounding mesocaverns and identified high quality habitat where the animals are most likely to be found in a pattern that maximizes distribution across the basin. This wide distribution of cave systems should provide for the long term conservation of these two species if they are adequately protected and managed by reducing the vulnerability to diseases and other catastrophic events.

We are currently working on a draft recovery plan for the cave animals which will identify the need for genetic studies to determine the relationships between animals in verified occupied caves and continued study into ways to determine the importance and location of intercave dispersal corridors. In the event that new information is made available and indicates the necessity, we will consider amending the critical habitat designation.

A brief summary of the modifications made to each unit is given below.

Former Unit 1 Waikomo—subunit 1a

This unit has been redesignated into 13 separate units. All of Alexander and Baldwin property has been surveyed by Dr. Frank Howarth, the recognized expert on Hawaiian caves. Along with data that a significant portion of their land has been dynamited and therefore highly unlikely to contain the primary constituent elements, Dr. Howarth has indicated where the primary cave habitats are and the surrounding buffer area (61 m) (200 ft) necessary to maintain the species in this area. Units 1, 2, and 3 represent the areas identified by Dr. Howarth. All other areas surveyed either do not contain the primary constituent elements or are not believed to be necessary to the conservation of the species because they were not identified by Dr. Howarth as necessary to maintain the species in the area and have been removed from the designation.

Areas above the Old Railroad Grade have been surveyed and the caves found to contain these animal species have been retained in the designation. Service biologists have mapped these caves.

The southern cave found in this area is one of the caves where the spider's occurrence has been verified. This cave and a 61 m (200 ft) buffer area to capture the surrounding mesocaverns to provide for a protective area from the development that may occur outside the buffer area comprise Unit 4.

The northern cave which occurs on the Kiahuna golf course has been gated, informational signs have been posted, and the area above the cave has been planted with native vegetation that is likely to provide food for the Kauai cave amphipod. This cave was mapped and a 30 m (100 ft) buffer placed around to capture the mesocaverns surrounding the cave. The golf course has been fully developed, therefore an additional buffer to protect against additional development is not believed to be necessary. The cave located within the golf course and the buffer area comprise Unit 5.

Additional information was provided indicating large soil deposits on the southern end of the property owned by Kiahuna Golf Club, LLC and KG Kauai Development LLC. In addition, archaeological information was provided indicating a large portion of the property was once used as fish ponds and terraced agricultural fields that were routinely left flooded. The use of land in this manner is likely to have caused a buildup of silt and other deposits that would either eliminate any primary constituent elements or degrade them. Therefore, these areas have been removed from the designation.

Drilling information obtained near areas proposed on the south side of Poipu Road near Koloa Landing and Poipu Beach Park indicate large deposits of sand and therefore no appropriate primary constituent elements. It is unlikely that the three small areas proposed south of Poipu Road, which likely contain similar deposits, contain the primary constituent elements. In addition, drilling information provided just north of Poipu Road, next to Poipu Village Shopping Center indicate a settling basin where large deposits of silt, clay, and soil have accumulated, indicating a lack of primary constituent elements. These areas have been removed from the designation.

Information obtained on the area north of the private road above Alexander and Baldwin property and east of Waikomo Stream indicates that far more homes and other structures have been built than previously believed. It is unlikely that primary constituent elements will be found in this area, and therefore it has been removed from the designation.

Additional information provided by the Eric Knudsen Trust shows two caves located within their property. These caves were identified during an archeological survey. Because the caves have not been surveyed by anyone familiar with the Kauai cave animals, we do not know whether they are occupied by either species. However, given that many of the caves found in the same area contain the animals, if all the primary constituent elements are present, it is highly likely that the animals will be present in these caves. Therefore, the area mapped for these caves including a 61 m (200 ft) buffer around them to include surrounding mesocaverns and protection from potential development are included in this designation as Units 6 and 8. Other archaeological finds indicate an extensive irrigation system, and it is likely that the rest of Eric Knudsen Trust property was used as terraced agricultural land that would have been routinely flooded. The use of land in this manner is likely to have caused a buildup of silt and other deposits that would either eliminate any primary constituent elements or degrade them. These areas have been deemed not essential to the conservation of the species and removed from the designation.

Unit 7 comprises an area that has not been surveyed recently, but the cave located on the property had a verified occurrence of the Kauai cave amphipod. The property is owned by the Roman Catholic Church, and no new information was provided on it. Since we did not have information on the exact location of the cave, we viewed satellite imagery and designated the area where the cave is most likely located. If new information on the exact location of the cave is gathered in the future, we will consider it in possible future revisions of this rule.

The Koloa bypass cave which is now a park and has a verified occurrence of the Kauai cave amphipod has been retained in the designation as Unit 9. This cave is completely surrounded by previously disturbed areas. The area above the cave was planted with plants to provide food for the Kauai cave amphipod and the entrance sealed over to prevent human intrusion. This unit comprises the open field of the park, which incorporates the cave and mesocaverns surrounding the cave.

Unit 10 includes the area containing the cave indicated on the civil defense map. The civil defense map does not outline the extent of the cave, but gives a general location. The entrance to the cave has also been sealed making it difficult to locate its exact location. This unit also includes the surrounding areas containing mesocaverns. In addition, further refinement was made by reviewing drilling records provided during the comment period. These records showed large deposits of clay

north of Mahaulepu Road, along Kaluahono Road, and below Waita Reservoir. These areas are unlikely to contain the primary constituent elements and have been removed from the designation.

Site visits by Service biologists and Dr. Frank Howarth were made in the remaining areas of proposed Unit 1a. Units 11 and 12 represent Puu Wanawana and Puu Hunihuni, areas that are most likely to contain suitable cave habitat where animals are likely to be present. Both are spatter cones which are volcanic formations that are comprised of exposed barren rock that contain mesocaverns, limited soil deposits, and limited prior disturbance, and are likely to contain larger voids or caves. Information was provided by consultants hired by Grove Farm who were able to further investigate the area and have indicated it is the place most likely to be occupied by either species. Since we do not know of an exact cave location, the entire area of barren rock has been included in the designation. Areas surrounding the barren rock are less likely to contain the primary constituent elements and were deemed not essential to the conservation of either species. Puu Hi Reservoir is less likely to contain suitable habitat since these areas have a greater build up of soil and water does not seem to percolate through the rock, suggesting a lack of unfilled mesocaverns and caves (Dr. F. Howarth, pers. comm., 2002).

Unit 13 incorporates the limestone cave with verified occurrences of the Kauai cave amphipod. A recent visit to the cave by Service biologist Gordon Smith, Dr. Frank Howarth, and Grove Farm consultants Dr. Steven Carothers and Kemble White verified the presence of the Kauai cave wolf spider in the cave (G. Smith *in litt.,* 2002). This record is the first of the Kauai cave wolf spider occurring in limestone caves. Although the cave has been extensively surveyed, the remaining limestone bearing rock has not been surveyed. Dr. Howarth did look at the area near Makawehi and indicated that the area north of the limestone bench, outside of the conservation zoned area, was not likely to contain the primary constituent elements as little barren rock was seen and the soil layer appeared to be significant. Unit 13 incorporates the limestone cave with verified occurrences of both the Kauai cave wolf spider and the Kauai cave amphipod as well as adjoining limestone bench area that is most likely to contain suitable habitat. All other surrounding areas were deemed not essential to the conservation of either species.

Former Unit 1 Waikomo—subunit 1b

No new information specific to proposed Unit 1b was provided during the comment period. However, when this was evaluated in light of the information provided on the proposed rule, this unit was found to be of lower quality habitat due to its small size and greater isolation from occupied areas, and because of the identification of suitable caves and likely higher quality habitat in other areas, this unit was deemed not essential to the conservation of either species.

Former Unit 2—Haula

Additional information was provided in and adjacent to Unit 2 in the form of survey information indicating a lack of primary constituent elements in parts of the unit. Areas less likely to contain the appropriate habitat were excluded and the remaining area is included in the designation. This unit lies only a short distance (approximately 350 m (1,100 ft)) from Unit 13 which is occupied, and it was likely once connected to that unit in the geologic past (Pleistocene Era) by deposits that have since eroded away or have been covered by unconsolidated sediments. The large size of appropriate habitat in this area is most likely to be able to sustain a population of either the Kauai cave amphipod or the Kauai cave spider. Information provided by Grove Farm confirms a large drainage system that empties into the limestone formation expected to provide the best type of habitat for the cave animals. Inclusion of this area with Units 1 through 13 provides a diverse geographic distribution that will increase the likelihood the species will survive stochastic or catastrophic impacts. This unit has been renamed Unit 14 of the designation and includes all the limestone bench area most likely to contain the primary constituent elements and therefore the animals themselves.

Former Unit 3—Puu Keke

Drilling logs were provided around and in the proposed Unit 3 which showed a mixture of limestone, rock, dirt, and mud. Based on the number of areas elsewhere verified to be occupied or found to be highly likely to contain the animals, this area was deemed not essential to the conservation of either species.

Critical Habitat

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

Critical habitat receives protection under section 7 of the Act through the prohibition against destruction or adverse modification of critical habitat with regard to actions carried out, funded, or authorized by a Federal agency. Section 7 also requires conferences on Federal actions that are likely to result in the destruction or adverse modification of proposed critical habitat. In our regulations at 50 CFR 402.02, we define destruction or adverse modification as ''* * * the direct or indirect alteration that appreciably diminishes the value of critical habitat for both the survival and recovery of a listed species. Such alterations include, but are not limited to, alterations adversely modifying any of those physical or biological features that were the basis for determining the habitat to be critical.'' The relationship between a speciessurvival and its recovery has been a source of confusion to some in the past. We believe that a species' ability to recover depends on its ability to survive into the future when its recovery can be achieved; thus, the concepts of long-term survival and recovery are intricately linked. However, in the March 15, 2001, decision of the United States Court of Appeals for the Fifth Circuit (*Sierra Club* v. *U.S. Fish and Wildlife Service et al.*, 245 F.3d 434) regarding a not prudent finding, the Court found our definition of destruction or adverse modification as currently contained in 50 CFR 402.02 to be invalid. In response to this decision, we are reviewing the regulatory definition of adverse modification in relation to the conservation of the species.

In order to be included in a critical habitat designation, the habitat or its physical or biological features must first be ''essential to the conservation of the species.'' Critical habitat designations identify, to the extent known, using the best scientific and commercial data available, habitat areas that provide essential life cycle needs of the species (*i.e.*, areas on which are found the primary constituent elements, as defined at 50 CFR 424.12(b)).

Section 4 requires that we designate critical habitat for a species, to the extent such habitat is determinable, at the time of listing. When we designate critical habitat at the time of listing or under short court-ordered deadlines, we may not have sufficient information to identify all the areas essential for the conservation of the species or, alternatively, we may inadvertently include areas that later will be shown to be nonessential. Nevertheless, we are required to designate those areas we determine to be critical habitat, using the best information available to us.

Our regulations state that ''The Secretary shall designate critical habitat outside the geographic areas presently occupied by the species only when a designation limited to its present range would be inadequate to ensure the conservation of the species'' (50 CFR 424.12(e)). Accordingly, when the best available scientific and commercial data do not demonstrate that the conservation needs of the species require designation of critical habitat outside of occupied areas, we will not designate critical habitat in areas outside the geographic area occupied by the species.

Our Policy on Information Standards Under the Endangered Species Act, published in the **Federal Register** on July 1, 1994 (59 FR 34271), provides criteria, establishes procedures, and provides guidance to ensure that our decisions represent the best scientific and commercial data available. It requires our biologists, to the extent consistent with the Act and with the use of the best scientific and commercial data available, to use primary and original sources of information as the basis for recommendations to designate critical habitat. When determining which areas are critical habitat, a primary source of information should be the listing package for the species. Additional information may be obtained from recovery plans, articles in peer-reviewed journals, conservation plans developed by States and counties, scientific status surveys and studies, and biological assessments or other unpublished materials.

It is important to clearly understand that critical habitat designations do not signal that habitat outside the designation is unimportant or may not be required for recovery. Areas outside the critical habitat designation will continue to be subject to conservation actions that may be implemented under section 7(a)(1) and to the regulatory protections afforded by the Act's 7(a)(2) jeopardy standard and section 9 prohibitions, as determined on the basis of the best available information at the time of the action. We specifically anticipate that federally funded or assisted 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 to these planning efforts calls for a different outcome. Furthermore, we recognize that designation of critical habitat may not include all of the habitat areas that may eventually be determined to be necessary for the recovery of the species.

Methods

As required by the Act and regulations (section 4(b)(2) and 50 CFR 424.12), we used the best scientific information available to determine areas that contain the physical and biological features that are essential for the conservation of the Kauai cave wolf spider and the Kauai cave amphipod. This information included: peer-reviewed scientific publications, the final listing rule for the Kauai cave wolf spider and Kauai cave amphipod (65 FR 2348), the Hawaii Natural Heritage Program database, unpublished field data collected by Service biologists, and unpublished field notes and communications with other qualified biologists or experts, archeological surveys, drilling records, photographs, and published descriptions of the regional geology and soils (MacDonald *et. al.* 1960; Foote *et. al.* 1972), and the Recovery Outline for Two Cave Arthropods from Kauai, Hawaii (Service, 2000).

Section 3(5)(A)(ii) of the Act provides that areas outside the geographical area currently occupied by the species may meet the definition of critical habitat upon determination that they are essential for the conservation of these species. Although we do not know whether the entire area is currently occupied, to date all caves that have been surveyed within the Koloa basin that contain all of the primary constituent elements have contained the Kauai cave amphipod and/or cave wolf spider. Hence, where appropriate habitat occurs within the Koloa basin, we fully expect it will be occupied by one or both of these species. Surrounding areas of the known occupied caves that are comprised of cave-bearing rock also will likely contain occupied habitat.

The final rule listing the Kauai cave wolf spider and Kauai cave amphipod stressed that these animals were at increasing risk from ''predation and competition for space, water, and nutrients by introduced, alien animals; biological and chemical pesticide control activities associated with residential and golf course development; and an increased likelihood of extinction from naturally occurring events due to the small number of remaining individuals and populations and their limited distribution'' (65 FR 2348). Recovery may require augmentation or enhancement of suitable cave habitat and the surrounding mesocaverns.

The primary goal of this critical habitat designation effort is to identify and designate a sufficient amount of suitable habitat to provide for the conservation of these two species. The Service has been challenged in this effort by the lack of scientific information on the distribution of the species and their suitable cave habitat within the Koloa basin, and a lack of understanding of the physical and genetic relationship between populations located in the various cave systems that are scattered throughout the basin.

To address these questions, the Service requested and received information in response to the publication of the proposed critical habitat designation. This information, which is detailed in the Summary of Changes from the Proposed Rule, provided new data on the location of occupied cave systems and also indicated areas of relatively higher quality habitat that are more likely to be occupied by these species. This new information allowed us to refine an original proposal by more precisely identifying areas essential to the conservation of these species.

However, there are still significant gaps in our current understanding of these species and their habitat needs, especially concerning the degree to which individual cave systems are or are not connected to one another. We did not receive any additional information as to the extent of the importance of intercave dispersal corridors or any information that would allow us to identify where these corridors are specifically located. Absent this information, we are unable to designate as critical habitat any areas that may provide connectivity between cave systems. First of all, we do not have data to show that such connectivity is occurring and if it is, to what extent and what importance does it play in the continued existence of the

species. Second, we are not able to precisely identify, map, and designate the underground corridors that would provide this connectivity.

Therefore, this final critical habitat designation is based on what we are at this time able to identify as essential to the conservation of these two species: multiple cave systems (*i.e.,* eight caves occupied by one or both species, six unknown occupied caves, their associated mesocaverns, and three areas containing higher quality habitat likely to contain one or more occupied caves) known to be occupied or that have relatively higher quality habitat and most likely to be occupied, and that are located in a wide distributional pattern within the basin. As discussed below, this approach of multiple populations that are distributed throughout the basin provides the best protections against extinction of the species due to catastrophic events as well as the highest likelihood of long-term conservation of these species.

In determining critical habitat for these species, we started with lands within the region containing geologic and soil characters similar or identical to those of known, occupied, accessible caves. This area includes the Waikomo-Kalihi-Koloa soil association (Foote *et al.* 1972) where it overlays the Koloa Volcanic Series flows (MacDonald *et al.* 1960). In addition, karst outcrops of calcified marine deposits are part of the same geologic deposits that contain the cave at Mahulepu that is occupied by the Kauai cave amphipod. Solution pockets and voids are abundant in this rock type and, like the cave at Mahulepu, lay on top of old, lava-tube-bearing pahoehoe flows.

Within these areas, we designated sites where either the Kauai cave amphipod or the Kauai cave wolf spider have been verified as occurring. We set out the following buffers to capture the adjacent mesocaverns where the animals are likely to spend the majority of their time as previously discussed in this rule. In cases where development was not complete, whenever possible, a 61 meter (200 ft) buffer was included around caves. Information provided during the comment period showed that a previous archeological and biological cave survey was done (Hammatt *et.al.,* 1978) that recommended a 30 meter (100 ft) buffer be placed around known caves. We believe that these buffers are essential to the conservation of the species because they reduce the vulnerability of the species to diseases and other catastrophic events by providing habitat that is most likely occupied, area for local intracave dispersal, as well as refugia from effects from disturbance that may take place in and around identified caves. We did not feel that with the additional known activities that may be occurring in the Koloa Basin, a 100 ft. buffer would be adequate to protect against impacts from adjacent development. Dr. Howarth's information on what he believed was a necessary buffer to maintain the existence of the species in a given area assisted us in refining what we believe to be an adequate buffer. In cases where development around the cave has been completed, a 30 meter (100 ft) buffer around caves was included. A smaller buffer zone was used for these areas which include habitat most likely occupied and allow for local intracave dispersal. Because all development and ground disturbance has already occurred in these areas, less refugia is needed and therefore a smaller buffer area was needed.

For those areas where surveys showed they were highly likely to contain suitable habitat and the animals were likely to occur, we designated the entire area to be sure we would capture any caves and the surrounding mesocaverns. The addition of these areas is essential to the conservation of the species because they create a widely distributed pattern of protected areas across the best habitat throughout the Koloa basin. This wide distribution protects the species from a single catastrophic event and therefore is essential to the conservation of both species.

Because a recovery plan has not been completed for either of these species, in making this determination, we looked to areas where the Kauai cave wolf spider and the Kauai cave amphipod have been verified and also included those areas that are highly likely to contain these animals. We looked for a distribution across geologically suitable habitat and conferred with the recognized expert on the necessary distribution of caves within the Koloa area to maintain both species (Dr. F. Howarth, pers. comm., 2002). This approach is consistent with the recovery outline for the Kauai cave wolf spider and the Kauai cave amphipod. If, after critical habitat for the Kauai cave wolf spider and the Kauai cave amphipod is designated, a final approved recovery plan for these animals calls for a different approach to the conservation of the Kauai cave wolf spider and the Kauai cave amphipod, we will consider amending the critical habitat designation.

Primary Constituent Elements

In accordance with section 3(5)(A)(i) of the Act and regulations at 50 CFR 424.12 in determining which areas to propose as critical habitat, we are required to consider those physical and biological features essential to the species' conservation that may require special management considerations and protection. Such features are termed primary constituent elements, and include but are not limited to: Space for individual and population growth and for normal behavior; food, water, air, minerals and other nutritional or physiological requirements; cover or shelter; and habitats that are protected from disturbance and represent the historic geographical and ecological distributions of the species.

The habitat requirements of the Kauai cave wolf spider and Kauai cave amphipod may differ slightly, as the wolf spider can feed on other arthropods that become trapped in caves or reside in caves facultatively. However, as observed elsewhere in Hawaii, the presence of a healthy, intact cave ecosystem, which includes roots or other sources of naturally occurring detritus and an associated detritivore or herbivore fauna, contains larger numbers of healthy troglobitic predators (A. Asquith, pers. comm., 2001). While native, troglobitic predators, detritivores, and herbivores may be present in caves lacking naturally occurring plant biomass, this situation represents an unhealthy cave ecosystem. Native troglobitic assemblages occurring in ''sterile'' caves (those lacking roots or other sources of active nutrient input) probably represent declining populations that will be extirpated as the existing plant biomass is consumed unless efforts are made to enhance condititions.

As with most troglobites, both the Kauai cave wolf spider and Kauai cave amphipod require dark or stagnant air zone habitats in caves. These zones typically have atmospheres with humidity at saturation levels (greater or equal to 100 percent), which is necessary to prevent desiccation and death of the troglobites.

A sustainable food base, such as the roots of living perennial plants or other sources of detritus, is necessary to support a breeding population and for the long-term survival of the Kauai cave amphipod and other herbivorous or detritivorous troglobites. In turn, healthy populations of herbivores or detritivores will help ensure that co-evolved predators, such as the Kauai cave wolf spider, will also persist as viable populations.

There is little information on what, if any, species of food plants are preferred by the Kauai cave amphipod. Since the amphipod is regarded as a detritivore, there may be little or no food specialization by these animals.

However, plant species containing naturally occurring toxic compounds, such as tannins or alkaloids, might be of low food value, inhibit feeding, or result in the direct mortality of cave organisms. For this reason, plant species and their potential toxicity must be considered as well. Likely candidates for suitable plants would be native species like ohia (*Metrosideros polymorpha*), maiapilo (*Capparis sandwichiana*), and aalii (*Dodonea viscosa*).

The primary constituent elements required by the Kauai cave wolf spider and the Kauai cave amphipod consist of the presence of subterranean spaces from 5 to 25 cm (0.2 in to 10 in) at the narrowest dimension (collectively termed ''mesocaverns''), or caves or passages (spaces greater than 25 cm (10 in)), dark and/or stagnant air zones that maintain microclimates with humidity at saturation levels, and the presence of roots from living, non-toxic plants such as, but not limited to, ohia (*Metrosideros polymorpha*), maiapilo (*Capparis sandwichiana*), and aalii (*Dodonea viscosa*) in these types of mesocaverns or caves.

The areas designated as critical habitat for the Kauai cave wolf spider and the Kauai cave amphipod are designed to incorporate what is essential for their conservation. Habitat components that are essential for these two species include the primary biological needs of foraging, reproduction, intraspecific communication, intracave dispersal and intracave genetic exchange, or nonrestricted movement to appropriate microclimates in mesocaverns, and refugia from human-induced or other environmental threats. Caves and mesocaverns containing actively growing tree roots or other sources of detritus provide a food source for herbivorous or detritivorous troglobites, which in turn provide food for predators. Such caves will be necessary for the long-term persistence of viable populations of the endangered troglobites by providing areas for foraging and reproduction. Caves and or mesocaverns lacking food resources but containing appropriate microclimates may provide intracave corridors which facilitate movement and genetic exchange within populations. In addition, these areas may also provide refugia from areas impacted by human-induced or other environmental threats, such as when main cave passages become temporarily drier or otherwise less accomodating.

Criteria Used To Identify Critical Habitat

We used several criteria to identify and select lands for designation as critical habitat. First, we selected critical habitat areas based on the verified distributions of the Kauai cave wolf spider and the Kauai cave amphipod (known occupied habitat). Then we included additional areas containing mesocaverns surrounding the known occupied caves to capture habitat likely to be occupied and to allow for refugia.

The known occupied cave distribution is not sufficient to expect a reasonable probability of conservation of either species by protecting against threats including but not limited to, human intrusion, fluctuating humidity levels in caves, and loss through catastrophic events (*e.g.,* hurricanes, oil spills and nonnative species introductions). Therefore, we looked to those areas where suitable habitat had been identified through survey work. This included both biological surveys and archeological surveys. The suitable caves identified, and their surrounding appropriate mesocavern areas, were included in this final designation.

The inclusion of these identified caves, some of which were newly discovered, and their surrounding areas still did not provide for a wide enough distribution to protect against catastrophic events. Therefore, we looked to those areas within the Koloa basin where site visits indicated the presence of suitable habitat and therefore a high likelihood of the presence of the animals. We looked for areas with exposed barren basalt, proximity to the areas that were known to contain animals, soils less than a foot deep, native vegetation, and areas that had received the least known surface disturbance. These areas represent habitat likely to be occupied by one or both species and contain the greatest amount of intact mesocaverns with the required humidity levels necessary for the cave animals. These types of areas have been identified by Dr. Howarth as the ones most likely to be occupied by the Kauai cave amphipod and the Kauai cave wolf spider (Dr. F. Howarth, pers. comm., 2002).

To provide for the conservation of both species, a sufficient amount of limestone habitat needs to be present to provide refugia in case of a catastrophic event for those animals known to be existing in limestone habitat. We looked to areas closest to the known occupied limestone cave, with exposed limestone bench and native vegetation, with little or no prior surface disturbance, and with soils less than a foot deep. These places are where intact mesocaverns and caves with appropriate humidity levels necessary exist therefore, these areas are the places most likely to be occupied.

Areas within the appropriate geologic formations that have had long term or extensive surface disturbance, soil deposits greater than a foot deep, lack of native vegetation, or lack exposed barren basalt or limestone benches may still provide suitable habitat and animals may still occur there. However, it is more likely that the habitat will be relatively degraded, and thus the probability is lower that animals will be found there. However, if new information shows the discovery of additional caves and animals in the areas, and if warranted, we will consider this information in possible future revisions of this rule as time and available resources allow.

For the purpose of this determination, critical habitat units have been described using Universal Transverse Mercator (UTM) North American Datum of 1983 (NAD83) coordinates using a scale of 1:85,000. Soil series was determined using information and maps from soil surveys (Foote *et al.* 1972). Geologic and soil features that appear to limit the distribution of cave and mesocavern habitats were determined using information and maps from MacDonald *et al.* (1960) and Foote *et al.* (1972).

We were unable to map the critical habitat unit boundaries in sufficient detail to exclude all existing developed lands that do not contain the primary constituent elements. However, as specified in the final rule language, existing features and structures within the boundaries of the mapped units that have resulted in below-surface modification or alteration are excluded from critical habitat designation. Existing human-constructed structures and features, such as large buildings, homes, major roads, and other activities or projects that involve trenching, filling, and/or excavation, which likely resulted in loss or degradation of the primary constituent elements, are therefore not included within this critical habitat designation. Such human-constructed structures and features would include homes and buildings for which the underlying bedrock has been altered for their construction through incorporation of or connection to buried structural foundations, septic tanks, city sewage and drainage systems, or water and underground electrical supply corridors and conduits. Additional areas that are also excluded from critical habitat

include existing paved roads, quarries, and sewage treatment facilities. Included in critical habitat are areas that have been modified on the surface, but for which below-surface modifications have not altered the underlying bedrock and subterranean habitat. These land uses include but are not limited to agriculture (*e.g.,* sugar cane, corn, coffee), range land, golf courses, county and city parks, unimproved roads, and undeveloped lands. These areas may lie adjacent to areas that have undergone extensive below-surface modification.

Critical Habitat Designation

Lands designated as critical habitat provide at least one of the primary constituent elements needed by the Kauai cave wolf spider and Kauai cave amphipod, including, but not limited to, the presence of subterranean spaces from 5 to 25 cm (0.2 in to 10 in) at the narrowest dimension (collectively termed ''mesocaverns''), or caves or passages (spaces greater than 25 cm (10 in)), dark and/or stagnant air zones that maintain microclimates with humidity at saturation levels, and the presence of roots from living, non-toxic plants such as, but not limited to, ohia (*Metrosideros polymorpha*), maiapilo (*Capparis sandwichiana*), and aalii (*Dodonea viscosa*) in these types of mesocaverns or caves. As discussed previously in this rule under ''Primary Constituent Elements,'' the presence of a healthy, intact cave ecosystem, includes roots or other sources of naturally occurring detritus. While native, troglobitic predators, detritivores, and herbivores may be present in caves lacking naturally occurring plant biomass, this situation represents an unhealthy cave ecosystem. Native troglobitic assemblages occurring in ''sterile'' caves (those lacking roots or other sources of active nutrient input) probably represent declining populations that will be extirpated as the existing plant biomass is consumed unless efforts are made to enhance condititions.

Lands designated as critical habitat for the Kauai cave wolf spider and Kauai cave amphipod occur in 14 separate units. The approximate area encompassing the designation of critical habitat by land ownership is shown in Table 1.

TABLE 1.—APPROXIMATE DESIGNATED CRITICAL HABITAT IN HECTARES (HA) (ACRES (AC)) BY LAND OWNERSHIP.

[Area estimates reflect critical habitat unit boundaries, not the primary constituent elements within.]

Unit	State/local	Private	Total
New Unit 01	0 ha	<1 ha	<1 ha
	0 ac	1 ac	1 ac
New Unit 02	0 ha	7 ha	7 ha
	0 ac	16 ac	16 ac
New Unit 03	0 ha	6 ha	6 ha
	0 ac	16 ac	16 ac
New Unit 04	0 ha	2 ha	2 ha
	0 ac	6 ac	6 ac
New Unit 05	0 ha	<1 ha	<1 ha
	0 ac	2 ac	2 ac
New Unit 06	0 ha	2 ha	2 ha
	0 ac	4 ac	4 ac
New Unit 07	0 ha	3 ha	3 ha
	0 ac	9 ac	9 ac
New Unit 08	<1 ha	2 ha	2 ha
	1 ac	6 ac	7 ac
New Unit 09	1 ha	<1 ha	1 ha
	3 ac	<1 ac	4 ac
New Unit 10	0 ha	14 ha	14 ha
	0 ac	35 ac	35 ac
New Unit 11	0 ha	4 ha	4 ha
	0 ac	10 ac	10 ac
New Unit 12	0 ha	6 ha	6 ha
	0 ac	16 ac	16 ac
New Unit 13	0 ha	21 ha	21 ha
	0 ac	51 ac	51 ac
New Unit 14	0 ha	39 ha	39 ha
	0 ac	96 ac	96 ac
Total	1 ha	109 ha	110 ha
	4 ac	268 ac	272 ac

Designated critical habitat includes land under private, county, and State ownership. Designated lands include areas known to be occupied by the Kauai cave wolf spider and the Kauai cave amphipod and include habitat with similar distribution of geologic and soil characteristics of known occupied habitat and that contain the most probable distribution of appropriate caves and mesocaverns. A brief description of each unit and reasons for including it as critical habitat are presented below.

Unit 1: Unit 1 incorporates a newly found cave and associated mesocaverns with the verified occurrence of the Kauai cave wolf spider. It is one of only six caves with a verified occurrence of the spider. It is highly likely that given the spider's presence, the amphipod is likely to be found there when conditions are appropriate. This unit contains a minimum of two of the primary constituent elements essential to these species and which may require protection.

Unit 2: Unit 2 incorporates four caves and surrounding mesocaverns with two of the caves having verified occurrences of both the Kauai cave wolf spider and the Kauai cave amphipod. This unit contains three of the primary constituent elements essential to these species and which may require protection.

Unit 3: Unit 3 consists of a cave and surrounding mesocaverns with suitable habitat for both cave animals. It was identified by Dr. Frank Howarth, an expert in this field, as important to maintaining the presence of these animals in this area. This unit contains at minimum two of the primary constituent elements and is one of only three sites west of Waikomo Stream. This unit adds to a wide distribution across the Koloa Basin which will protect the species from extinction from a single catastrophic event and therefore is essential to the conservation of the species.

Unit 4: Unit 4 consists of a cave with verified occurrences of both the amphipod and the spider and the surrounding mesocaverns. It is one of only six caves with a verified occurrence of the spider, and one of only seven verified occurrence of the amphipod. It contains at minimum two of the primary constituent elements, essential to the these species and which may require protection.

Unit 5: Unit 5 consists of a cave with verified occurrences of both the amphipod and the spider mapped by the Service and the surrounding mesocaverns. It is one of only seven verified occurrences of the amphipod, and one of only six verified occurrences for the spider. This unit contains three of the primary constituent elements essential to these species and which may require protection.

Unit 6: Unit 6 consists of a cave and surrounding mesocaverns identified in an archaeological survey and is likely to be occupied by one or both of the species. At this time, its occupancy status is unknown. This unit adds to the wide distribution across the Koloa Basin that will protect the species from extinction from a single catastrophic event and therefore is essential to the conservation of the species.

Unit 7: Unit 7 consists of a cave with a verified occurrence of the amphipod and surrounding available mesocaverns. It is one of only seven verified occurrences of the amphipod. This unit contains at minimum two of the primary constituent elements essential to the conservation of the species.

Unit 8: Unit 8 contains a lava tube identified through an archaelogical survey and the surrounding mesocaverns associated with the tube. It is an area that is most likely to harbor the animals and contains at least two of the primary constituent elements. This unit adds to the wide distribution across the Koloa Basin that will protect the species from extinction from a single catastrophic event and therefore is essential to the conservation of the species.

Unit 9: Unit 9 consists of a cave with the verified occurrence of the cave amphipod and surrounding available mesocaverns. It is only one of seven verified occurrences of the amphipod. It contains three of the primary constituent elements considered essential to the conservation of both species.

Unit 10: Unit 10 is located in the Koloa district, an area with cave-bearing rock containing an abundance of mesocaverns (small voids, cracks and passages). As previously discussed in the Background section of the rule, the Hawaiian basalt, found in this area, shrinks and cracks upon cooling creating the mesocaverns. In addition, this unit contains a cave that was used as a Civil Defense shelter. The entrance to the cave was sealed and has not been subsequently relocated. Therefore, the current occupancy status for these species is unknown. Although human use can detrimentally impact cave systems (see discussion under threats), they do not necessarily make the cave permanently unsuitable. For example, one of the cave systems included in critical habitat on Alexander and Baldwin (A&B) property (Unit 2) was also previously used as a civil defense shelter and is currently occupied by these species. Since the cave in Unit 10 was so large and long, it is unlikely that it has been completely filled in and the sealing of the entrance likely increased the humidity levels available in the cave. As discussed in the Cave Habitat section of the rule, cave systems for these species include one or more caves comprised of five zones (entrance, twilight, transition, dark and stagnant) and mesocaverns. While these mesocaverns can possess characteristics of each of the five zones, they frequently represent conditions of the stagnant zone. These mesocaverns are believed to provide refugia for these species when impacts make the caves uninhabitable for them. Unit 10 is believed to contain at least three PCEs (cave, mesocaverns, and appropriate microclimate [*i.e.*, high levels of humidity]). Information provided during the comment period (drilling records) show that the other areas surrounding Unit 10 have large deposits of clay or housing and other structures have been built in the area. The presence of clay and housing developments make it unlikely that additional areas adjacent to Unit 10 contain any remaining PCEs. Unit 10 is necessary to maintain continuity of the distribution of areas throughout the Koloa Basin making it essential to the conservation of the species.

Unit 11: Unit 11 consists of habitat that has been identified as an area most likely to be occupied by one or both of the species. The area within Unit 11 contains barren exposed rock, minimal prior surface disturbance, and minimal soil deposits, all of which provide higher quality caves and mesocaverns. This unit adds to the wide distribution across the Koloa Basin that will protect the species from extinction from a single catastrophic event and therefore is essential to the conservation of the species.

Unit 12: Unit 12 consists of habitat that has been identified as an area most likely to be occupied by one or both of the species. The area within Unit 12 contains barren exposed rock, minimal prior surface disturbance, and minimal soil deposits, all of which provide higher quality caves and mesocaverns. This unit adds to the wide distribution across the Koloa Basin that will protect the species from extinction from a single catastrophic event and therefore is essential to the conservation of the species.

Unit 13: Unit 13 consists of the only known occupied limestone cave and surrounding mesocaverns. The cave is occupied by both arthropods and is one of only seven verified locations of the amphipod, and one of six verified locations of the spider. This unit contains three of the primary constituent elements considered essential to the conservation of both species.

Unit 14: Unit 14 is composed of uplifted coral and algal reefs and consolidated calcareous deposits (MacDonald *et al.* 1960). Exposed basaltic flows are not believed to be present within this unit. This unit lies only a short distance (approximately 350 m (1,100 ft)) from Unit 13, which is occupied, and was likely once connected to that unit in the geologic past (Pleistocene Era) by deposits that have since eroded away or have been covered by unconsolidated sediments. It is not known if this unit is currently occupied by the Kauai cave wolf spider, Kauai cave amphipod, or other endemic troglobites.

Recent visits to this unit have found that the area is composed of exposed calcareous deposits containing cracks and solution pockets, which are indicative of the presence of underlying cave and mesocavern habitats. While accessible caves have not been located, air-passages, holes, and fissures visible above ground strongly suggest the presence of underlying caves or mesocaverns. Critical habitat is designated in this unit because of the cave-bearing nature of the geology, and

because of the occurrence of occupied habitat in adjacent areas with similar geologic features. Because the types of voids that occur in these calcareous formations continuously reform, thereby providing suitable habitat for very long time spans, this area is essential to provide for population expansion and refuge from human and catastrophic environmental threats. This unit currently has minimal human presence in the area, and there are no known current plans for development. Inclusion of this area with Units 1 through 13 provides a diverse geographic distribution that will increase the likelihood the species will survive stochastic or catastrophic impacts and is therefore considered essential to the conservation of both species.

Effects of Critical Habitat Designation

Section 7 Consultation

Section 7(a)(2) of the Act requires Federal agencies, including the Service, to ensure that actions they fund, authorize, or carry out are not likely to destroy or adversely modify critical habitat. Destruction or adverse modification occurs when a Federal action directly or indirectly alters critical habitat to the extent it appreciably diminishes the value of the critical habitat for the conservation of the species. Individuals, organizations, States, local governments, and other non-Federal entities are affected by the designation of critical habitat when their actions occur on Federal lands, require a Federal permit, license, or other authorization, or involve Federal funding.

Section 7(a)(1) of the Act requires Federal agencies, including the Service, to use their authorities to carry out programs for the conservation of any species that is proposed or listed as endangered or threatened. Section 7(a)(4) of the Act requires Federal agencies (action agency) to confer with us on any action that is likely to jeopardize the continued existence of a species proposed for listing or result in destruction or adverse modification of proposed critical habitat. Regulations implementing this interagency cooperation provision of the Act are codified at 50 CFR part 402.

If a species is listed or critical habitat is designated, section 7(a)(2) of the Act requires Federal agencies to ensure that actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of such a 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 (action agency) must enter into consultation with us. Through this consultation, the Federal agency would ensure that the permitted actions do not destroy or adversely modify critical habitat.

Regulations at 50 CFR 402.16 require Federal agencies to reinitiate formal consultation on previously reviewed actions in instances where critical habitat is subsequently designated and the Federal agency has retained discretionary involvement or control over the action or such discretionary involvement or control is authorized by law. Consequently, some Federal agencies may request reinitiation of consultation with us on actions for which formal consultation has been completed if those actions may affect designated critical habitat or adversely modify or destroy proposed critical habitat.

If we issue a biological opinion concluding that a project is likely to result in the destruction or adverse modification of critical habitat, we also provide ''reasonable and prudent alternatives'' to the project, if any are identifiable. Reasonable and prudent alternatives are defined at 50 CFR 402.02 as alternative actions identified during formal consultation that can be implemented in a manner consistent with the intended purpose of the action, that are consistent with the scope of the Federal agency's legal authority and jurisdiction, that are economically and technologically feasible, and that the Director believes would avoid the likelihood of the destruction or adverse modification of critical habitat. Reasonable and prudent alternatives can vary from slight project modifications to extensive redesign or relocation of the project.

Activities on Federal lands that may affect the Kauai cave wolf spider or Kauai cave amphipod or their critical habitat will require section 7 consultation. Activities on private or State lands that may affect the species or their critical habitat and that require a permit from a Federal agency, such as a permit from the U.S. Army Corps of Engineers (ACOE) under section 404 of the Clean Water Act, or some other Federal action, including funding (*e.g.,* from the Federal Highway Administration, Federal Aviation Administration, Federal Emergency Management Agency (FEMA), or Natural Resources Conservation Service (NRCS)) will also continue to be subject to the section 7 consultation process. Federal actions not affecting listed species or critical habitat and actions on non-Federal lands that are not federally funded or permitted do not require section 7 consultation.

Section 4(b)(8) of the Act requires us to evaluate briefly in any proposed or final regulation that designates critical habitat those activities involving a Federal action that may adversely modify such habitat or that may be affected by such designation. Activities that may result in the destruction or adverse modification of critical habitat include those that alter the primary constituent elements to an extent that the value of critical habitat for the conservation of the Kauai cave wolf spider and Kauai cave amphipod is appreciably reduced. We note that such activities also may jeopardize the continued existence of the species. Activities that may directly or indirectly adversely affect critical habitat for these cave animals include, but are not limited to:

(1) Removing, thinning, or destroying perennial surface vegetation occurring directly above or adjacent to the cave or within the cave (roots) or mesocaverns (as defined in the primary constituent elements discussion), whether by burning, or by mechanical, chemical, or other means (*e.g.,* wood cutting, grading, overgrazing, construction, road building, mining, herbicide application, etc.);

(2) Activities within or outside of the cave or other mesocavern (*i.e.,* all cave-bearing rock) that promotes prolonged soil-disturbance, resulting in the filling of caves, voids, and mesocaverns, with sediments or other materials, or alters airflow, and/or light penetration such that habitat microclimates are exposed to conditions of desiccation. These activities include, but are not limited to: Utilizing caves for the disposal of wastes or unwanted soil or rock, elevated and prolonged soil disturbance above or adjacent to cave-bearing rock, closing existing cave openings, breeching existing caves (*i.e.,* creating new openings), modifying the natural geomorphology of a cave interior, passage, or opening;

(3) Appreciably decreasing habitat value or quality through indirect effects (*e.g.,* introduction or promotion of potential predators, parasitoids, diseases, or disease vectors (*e.g.,* nonnative arthropods), vertebrate or invertebrate food competitors, or invasive plant species), habitat fragmentation, overgrazing, water diversion or impoundment, groundwater pumping, inappropriately planned ground water disposal (*e.g.,* diversion into potential habitat or prevention of natural water recharge into soils and rock above and adjacent to caves), or other activities that could

potentially alter water quality or quantity to an extent that vegetation structure is affected, cave humidity levels are reduced, habitat is flooded, or toxic materials (*e.g.,* pesticides, fuel, solvents, or other household or industrial chemicals) are transported into habitat, and activities that increase the risk of fire within or outside habitats above the cave;

(4) Application of pesticides, herbicides, insecticides, fungicides, or other such chemicals within, above, or adjacent to known habitat, that may directly or indirectly affect troglobitic organisms; and

(5) Release of certain biological control organisms within or outside of the critical habitat area. Biological organisms include, but are not limited to: Predaceous or parasitoid vertebrates or invertebrates, fungi, bacteria, or other natural or bioengineered biocontrol organisms.

Federal agencies already consult with us on activities in areas where the species may be affected by their projects to ensure that their actions do not jeopardize the continued existence of the species. These actions include, but are not limited to:

(1) Regulation of activities affecting waters of the United States by the ACOE under section 404 of the Clean Water Act;

(2) Regulation of water flows, damming, diversion, and channelization by Federal agencies;

(3) Development on private or State lands requiring permits from other Federal agencies, such as the Department of Housing and Urban Development;

(4) Construction of communication sites licensed by the Federal Communications Commission;

(5) Road construction and maintenance, right-of-way designation, and regulation of agricultural activities by Federal agencies;

(6) Hazard mitigation and post-disaster repairs funded by the FEMA; and.

(7) Activities not previously mentioned that are funded or authorized by the U.S. Department of Agriculture (Forest Service, NRCS), Department of Defense, Department of Transportation, Department of Energy, Department of the Interior (U.S. Fish and Wildlife Service, U.S. Geological Survey, National Park Service), Department of Commerce (National Oceanic and Atmospheric Administration), ACOE, FEMA, Environmental Protection Agency, or any other Federal agency.

If you have questions regarding whether specific activities would constitute adverse modification of critical habitat, contact the Field Supervisor, Pacific Islands Ecological Service's Field Office (*see* **ADDRESSES** section). Requests for copies of the regulations on listed wildlife and plants, and inquiries about prohibitions and permits, should be directed to the Field Supervisor, Pacific Islands Ecological Service's Field Office.

Analysis of Impacts Under Section 4(b)(2)

Section 4(b)(2) of the Act requires us to designate critical habitat on the basis of the best scientific and commercial information available, and to consider the economic and other relevant impacts of designating a particular area as critical habitat. We may exclude areas from critical habitat upon a determination that the benefits of such exclusions outweigh the benefits of specifying such areas as critical habitat. We cannot exclude an area from critical habitat when that exclusion will result in the extinction of the species concerned.

Economic Impacts

Following the publication of the proposed critical habitat designation on March 27, 2002, a draft economic analysis was prepared to estimate the potential economic impact of the designation, in accordance with recent decisions in the *N.M. Cattlegrowers Ass'n* v. *U.S. Fish and Wildlife Serv.,* 248 F.3d 1277 (10th Cir. 2001). The DEA was made available for review on November 15, 2002 (67 FR 69177). We accepted comments on the DEA until the comment period closed on December 16, 2002.

Following the close of the comment period on the draft economic analysis, a final addendum was completed, which incorporated public comments on the draft analysis and made other changes in the draft as necessary. In particular, the addendum focuses on the 272 acres and associated impacts that will be associated with the designation. The addendum to the draft economic analysis estimates that, over the next 18 years, the designation may result in potential direct economic effects ranging from approximately $260,000 to $429,000. The reduction ranging from approximately $56.2 million to $61.8 million from the costs estimated in the original draft economic analysis is primarily due to the significant reduction of acreage in proposed Units 1a and 2, and the removal of proposed Units 1b and 3 in the final critical habitat designation for the cave animals. These changes reduce the total critical habitat acreage from approximately 4,193 acres to 272 acres, a reduction of 3,921 acres or 94 percent. As described in the analysis, direct costs result from section 7 consultation, surveys, and project modifications associated with activities such as a county road (Koloa Bypass) widening project, and expansion of Kiahuna golf course.

Our final economic analysis includes an evaluation of potential indirect costs associated with designation of critical habitat for the Kauai cave wolf spider and Kauai cave amphipod. Based on the final economic analysis, the indirect costs are associated with actual or perceived loss of development potential and are expressed in terms of a loss in property value. These values reflect: Landowner's development plans (if any); existing entitlements; the probability of obtaining remaining development approvals (State redistricting, General Plan designation by the county, county zoning, *etc.*); and existing infrastructure improvements. In some cases, the loss in property value is estimated directly based on adjustments to the appraised or assessed value of comparable land. In other cases, the loss is based on the discounted present value of future profits based on specific development plans. Since the property value of undeveloped land reflects the discounted value of future profits, the two approaches are equivalent in concept. The analysis of lost property values focuses only on the land in or around the critical habitat units, and anticipates no islandwide impacts on economic and population growth. The analysis anticipates that while development will not occur within some areas designated as critical habitat, other developments in the Koloa/Poipu area will increase in density or area to largely offset this loss, thereby resulting in a negligible change in island wide development. For affected properties, however, the total potential loss in property values that could be indirectly associated with the designation ranges from $4.5 million to $6.1 million. This range represents the high estimate of the potential loss in property values indirectly associated with the critical habitat designation, and may be offset by adjusting the project (*e.g.,* density) to offset the loss of development within the critical habitat, or it may not be realized if the development within the critical habitat proceeds as proposed. Additional potential indirect costs are associated with the following: Contesting redistricting, State and county environmental review, and investigating the implications of the final designation. Other indirect costs identified in the draft economic analysis are no longer anticipated for the

designation of critical habitat because the affected areas have been excluded or reduced.

A more detailed discussion of our economic analysis is contained in the addendum. It is available for inspection at the Pacific Islands Fish and Wildlife Office (*see* **ADDRESSES** section).

No critical habitat units in the proposed rule were excluded or modified due to economic impacts because the expected cost of the designation (*i.e.* direct cost) is not significant. The indirect costs are speculative and represent a worst case scenario.

As described above, section 4(b)(2) of the Act also requires us to consider other relevant impacts, in addition to economic impacts, of designating critical habitat. No critical habitat units were excluded or modified due to non-economic impacts.

Required Determinations

Regulatory Planning and Review

In accordance with Executive Order 12866, the Office of Management and Budget (OMB) has determined that this critical habitat designation is not a significant regulatory action. This rule will not have an annual economic effect of $100 million or more or adversely affect any economic sector, productivity, competition, jobs, the environment, or other units of government. This designation will not create inconsistencies with other agencies' actions or otherwise interfere with an action taken or planned by another agency. It will not materially affect entitlements, grants, user fees, loan programs, or the rights and obligations of their recipients. Finally, this designation will not raise novel legal or policy issues. Accordingly, OMB has not reviewed this final critical habitat designation.

Regulatory Flexibility Act (5 U.S.C. 601 et seq.)

Under the Regulatory Flexibility Act (RFA), as amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA) of 1996, whenever an agency is required to publish a notice of rulemaking for any proposed or final rule, it must prepare and make available for public comment a regulatory flexibility analysis that describes the effects of the rule on small entities (*i.e.,* small businesses, small organizations, and small government jurisdictions). However, no regulatory flexibility analysis is required if the head of the agency certifies that the rule will not have a significant economic impact on a substantial number of small entities. SBREFA amended the RFA to require Federal agencies to provide a statement of the factual basis for certifying that a rule will not have a significant economic impact on a substantial number of small entities.

Federal courts and Congress have indicated that an RFA/SBREFA analysis should be limited to all impacts to entities directly subject to the requirements of the regulation (Service 2002). Directly regulated entities may laso be indirectly impacted and these indirect impacts should be considered. Therefore, entities not directly regulated by the listing or critical habitat designation are not considered in this section of the analysis.

In today's rule, we are certifying that the designation of critical habitat for the Kauai cave amphipod and the Kauai cave wolf spider will not have a significant effect on a substantial number of small entities. The following discussion explains our rationale.

Small entities include small organizations, such as independent non-profit organizations, and small governmental jurisdictions, including school boards and city and town governments that serve fewer than 50,000 residents, as well as small businesses. Small businesses include manufacturing and mining concerns with fewer than 500 employees, wholesale trade entities with fewer than 100 employees, retail and service businesses with less than $5 million in annual sales, general and heavy construction businesses with less than $27.5 million in annual business, special trade contractors doing less than $11.5 million in annual business, and agricultural businesses with annual sales less than $750,000. The RFA/SBREFA defines ''small governmental jurisdiction'' as the government of a city, county, town, school district with a population of less than 50,000. By this definition, Federal government agencies are not small business under SBA guidelines and State agencies are not considered small governments under RFA. Kauai County is also not a small governmental jurisdiction because it has a population greater than 50,000. To determine if potential economic impacts to these small entities are significant, we consider the types of activities that might trigger regulatory impacts under this rule as well as the types of project modifications that may result. In general, the term ''significant economic impact'' is meant to apply to a typical small business firm's business operations.

To determine if the rule would affect a substantial number of small entities, we consider the number of small entities affected within particular types of economic activities (*e.g.,* housing development, grazing, oil and gas production, timber harvesting, *etc.*). We apply the ''substantial number'' test individually to each industry to determine if certification is appropriate. In estimating the numbers of small entities potentially affected, we also consider whether their activities have any Federal involvement; some kinds of activities are unlikely to have any Federal involvement and so will not be affected by critical habitat designation.

Based on our final economic analysis, the primary projects and activities that could be affected by the critical habitat designation include Service conservation agreements, NRCS conservation programs, FHWA funding road projects, ACOE section 404 permits, Kauai County Department of Public Works (DPW) road project, and two private entities—Grove Farm partial funding of a survey for a conservation project and KG Kauai Development (KGKD)/Kobayashi Group LLC planned golf courses. For the purposes of the RFA/SBREFA, Federal agencies are not considered small governments. Accordingly, the Service, NRCS, FHWA, and ACOE are not considered small entities. As mentioned above, county agencies such as the DPW are not considered small entities. The primary business activity of Grove Farm is real estate asset management. The SBA defines a business in the real estate asset management industry as small if its annual sales are less than $1.5 million. According to this definition and 2000 sales information, Grove Farm is not a small business. KGKD is affiliated with Kobayashi Group, LLC (Kobayashi). Kobayashi's primary business activity is real estate asset management. The SBA defines a business in the real estate asset-management industry as small if its annual sales are less than $1.5 million. Kobayashi is a private business, and its annual sales figures are not listed in the Dun & Bradstreet database. However, the Kobayashi Group owns the following properties: two hotels in Waikiki, the Ocean Resort Hotel Waikiki (450 rooms), and the Queen Kapiolani Hotel (314 rooms); three golf courses; developable land in Koloa; and possibly other property. Rough estimates of the revenues generated from these properties suggest that annual revenues for the Kobayashi Group are at least $24 million [(764 rooms × 70 percent occupancy × $100 per room × 365 days) + (3 golf courses × 30,000 rounds of golf per year × $50 per round) = $24 million per year]. According to the RFA/SBREFA regulations, the SBA counts

the receipts of the business whose size is at issue and those of all its affiliates in determining the size of the business. Therefore, KGKD and Kobayashi are not small businesses.

The Kauai cave wolf spider and the Kauai cave amphipod have only been listed since January 2000 and no consultations have occurred involving these species. As a result, the requirement to reinitiate consultations for ongoing projects will not affect a substantial number of small entities on Kauai.

None of the designation is on Federal lands. On non-Federal lands, activities that lack Federal involvement would not be affected by the critical habitat designations. However, activities of an economic nature that are likely to occur on non-Federal lands in the area encompassed by these designations consist of housing or resort development that may require permits from the Department of Housing and Urban Development, small farms that may receive funding or require authorizations from the Department of Agriculture, or restoration projects sponsored by NRCS. In addition, consultation with the ACOE may occur if a permit is required for a project in Waikomo Stream that may negatively impact adjacent cave systems. Waikomo Stream runs between two known occupied cave systems and consultation may be required if the activities on the stream may affect the cave systems and the Kauai cave amphipod and Kauai cave wolf spider. However, we are not aware of a significant number of future activities that would require Federal funds, permits, or authorizations in the designated areas. Two to three small fruit and vegetable farmers may be impacted by the designation but these entities do not represent a substantial number of the total small entities in these industries. Therefore, we conclude that the rule would not affect a substantial number of small entities.

Even where the requirements of section 7 might apply due to critical habitat, based on our experience with section 7 consultations for all listed species, virtually all projects-including those that, in their initial proposed form, would result in jeopardy or adverse modification determinations in section 7 consultations-can be implemented successfully with, at most, the adoption of reasonable and prudent alternatives. These measures, by definition, must be economically feasible and within the scope of authority of the Federal agency involved in the consultation.

For these reasons, we are certifying that the designation of critical habitat for the Kauai cave wolf spider and the Kauai cave amphipod will not have a significant economic impact on a substantial number of small entities. Therefore, a regulatory flexibility analysis is not required.

Small Business Regulatory Enforcement Fairness Act (5 U.S.C. 804(2))

Under the Small Business Regulatory Enforcement Fairness Act (5 U.S.C. 801 *et seq.*), this rule is not a major rule. Our detailed assessment of the economic effects of this designation are described in the final addendum to the economic analysis. Based on the effects identified in this document, we believe that this rule will not have an effect on the economy of $100 million or more, will not cause a major increase in costs or prices for consumers, and will not have significant adverse effects on competition, employment, investment, productivity, innovation, or the ability of U.S.-based enterprises to compete with foreign-based enterprises. Refer to the final addendum to the economic analysis for a discussion of the effects of this determination.

Executive Order 13211

On May 18, 2001, the President issued Executive Order 13211 on regulations that significantly affect energy supply, distribution, and use. Executive Order 13211 requires agencies to prepare Statements of Energy Effects when undertaking certain actions. Although this rule is a significant regulatory action under Executive Order 12866, it is not expected to significantly affect energy production supply and distribution facilities because no significant energy production, supply, and distribution facilities are included within designated critical habitat. Further, for the reasons described in the economic analysis, we do not believe that designation of critical habitat for the Kauai cave amphipod and the Kauai cave wolf spider will affect future energy production. Therefore, this action is not a significant energy action, and no Statement of Energy Effects is required.

Unfunded Mandates Reform Act (2 U.S.C. 1501 et seq.)

In accordance with the Unfunded Mandates Reform Act (2 U.S.C. 1501 August 25, 2000 *et seq.*):

(a) For the reasons described in the final economic analysis, this rule will not produce a Federal mandate on State or local governments or the private sector of $100 million or greater in any year; that is, it is not a ''significant regulatory action'' under the Unfunded Mandates Reform Act. Further, the designation of critical habitat imposes no direct obligations on State or local governments.

(b) This rule will not ''significantly or uniquely'' affect small governments, so a Small Government Agency Plan is not required. Small governments will not be affected unless they propose an action requiring Federal funds, permits, or other authorizations. Any such activities will require that the Federal agency ensure that the action will not adversely modify or destroy designated critical habitat.

Takings

In accordance with Executive Order 12630 (''Government Actions and Interference with Constitutionally Protected Private Property Rights''), we have analyzed the potential takings implications of designating critical habitat for the Kauai cave wolf spider and the Kauai cave amphipod in a takings implication assessment. The takings implications assessment concludes that this final rule does not pose significant takings implications.

Federalism

In accordance with Executive Order 13132, this final rule does not have significant Federalism effects. A Federalism assessment is not required. In keeping with Department of Interior policy, we requested information from appropriate State agencies in Hawaii.

The designations may have some benefit to these governments, in that the areas essential to the conservation of these species are more clearly defined, and the primary constituent elements of the habitat necessary to the survival of the species are specifically identified. While this definition and identification does not alter where and what federally sponsored activities may occur, it may assist these local governments in long-range planning, rather than waiting for a case-by-case section 7 consultation to occur.

Civil Justice Reform

In accordance with Executive Order 12988, the Department of the Interior's Office of the Solicitor has determined that this does not unduly burden the judicial system and meets the requirements of sections 3(a) and 3(b)(2) of the Order. We have designated critical habitat in accordance with the provisions of the Act. The rule uses standard property descriptions and identifies the primary constituent elements within the designated areas to assist the public in understanding the habitat needs of the Kauai cave wolf spider and Kauai cave amphipod.

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

This rule does not contain any information collection requirements for which OMB approval under the Paperwork Reduction Act is required. An agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a valid OMB Control Number.

National Environmental Policy Act

We have determined that we do not need to prepare an Environmental Assessment or an Environmental Impact Statement as defined by the National Environmental Policy Act of 1969 in connection with regulations adopted pursuant to section 4(a) of the Endangered Species Act. We published a notice outlining our reason for this determination in the **Federal Register** on October 25, 1983 (48 FR 49244). This determination does not constitute a major Federal action significantly affecting the quality of the human environment.

Government-to-Government Relationship With Tribes

In accordance with the President's memorandum of April 29, 1994, ''Government-to-Government Relations with Native American Tribal Governments'' (59 FR 22951), Executive Order 13175, and 512 DM 2, we readily acknowledge our responsibility to communicate meaningfully with recognized Federal Tribes on a government-to-government basis. We have determined that there are no Tribal lands essential for the conservation of the Kauai cave wolf spider and Kauai cave amphipod. Therefore, designation of critical habitat for these species does not involve any Tribal lands.

References Cited

A complete list of all references cited in this final rule is available, upon request, from the Pacific Islands Fish and Wildlife Office (*see* **ADDRESSES** section).

Author

This rule was primarily prepared by the Pacific Islands Fish and Wildlife Office (*see* **ADDRESSES** section).

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 set forth below:

PART 17—[AMENDED]

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

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

■ 2. In § 17.11(h), revise the entries for ''spider, Kauai cave wolf'' under ''ARACHNIDS'' and ''amphipod, Kauai cave'' under ''CRUSTACEANS'' 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						
*	*	*	*	*	*		*
ARACHNIDS							
*	*	*	*	*	*		*
Spider, Kauai cave wolf	*Adelocosa anops*	U.S.A. (HI)	NA	E	676	17.95(g)	NA
*	*	*	*	*	*		*
CRUSTACEANS							
*	*	*	*	*	*		*
Amphipod, Kauai cave	*Spelaeorchestia koloana.*	U.S.A. (HI)	NA	E	676	17.95(h)	NA
*	*	*	*	*	*		*

■ 3. Amend § 17.95 by adding, in the same alphabetical order as these species occur in § 17.11(h):

■ a. In paragraph (g), critical habitat for the Kauai cave wolf spider (*Adelocosa anops*); and

■ b. In paragraph (h), critical habitat for the Kauai cave amphipod (*Spelaeorchestia koloana*), as set forth below.

§ 17.95 Critical habitat—fish and wildlife.

* * * * *

(g) *Arachnids.*

* * * * *

Kauai cave wolf spider (*Adelocosa anops*).

(1) Critical habitat units are depicted for the island of Kauai, Hawaii, on the maps below.

(2) The primary constituent elements for the Kauai cave wolf spider are:

(i) The presence of subterranean spaces from 5 mm to 25 cm (0.2 in to 10 in) at their narrowest point (collectively termed ''mesocaverns'') and/or cave passages greater than 25 cm (>10 in);

(ii) Dark and/or stagnant air zones that maintain relative humidity at saturation levels (≥100 percent); and

(iii) The presence in these types of mesocaverns or caves of roots from living, nontoxic plants such as, but not limited to, ohia (*Metrosideros polymorpha*), maiapilo (*Capparis sandwichiana*), and aalii (*Dodonea viscosa*).

(3) All critical habitat areas contain one or more of the primary constituent elements for the Kauai cave wolf spider.

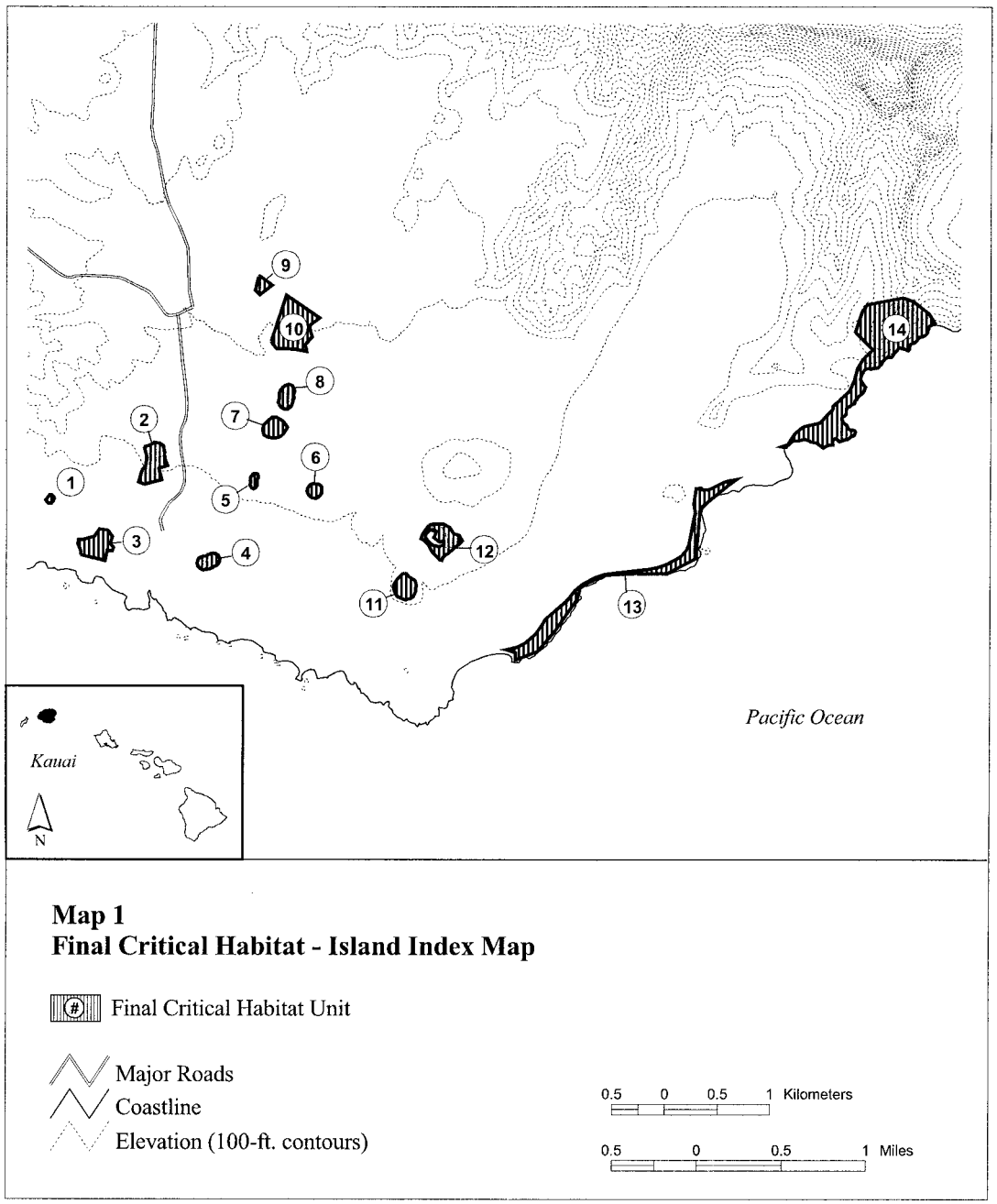
(4)(i) Existing human-constructed features and structures within the boundaries of mapped units that involved trenching, filling, or excavation resulting in below-surface modification or alteration would not contain either of the primary constituent elements and are excluded from critical habitat designation. Such features and structures include but are not limited to:

Homes and buildings for which the underlying bedrock has been altered for their construction or through incorporation of or connection to buried structural foundations, septic tanks, city sewage and drainage systems, or water or underground electrical supply corridors; paved roads; and areas previously or currently used as a quarry.

(ii) Areas that have been modified on the surface but without trenching, filling, or excavation resulting in below-surface modification or alteration are included in the critical habitat designation, even if they are adjacent to areas that have undergone below-surface modification.

(5) Critical habitat units are described below. Coordinates in UTM Zone 4 with units in meters using North American Datum of 1983 (NAD83). The following map shows the general locations of the 14 critical habitat units designated on the island of Kauai.

(i) **Note:** Map 1—Index map follows:



(6) Unit 1—(<1 ha (1 ac)):

(i) Unit 1 consists of the following 10 boundary points with the following coordinates in UTM Zone 4, with the units in meters, using North American Datum of 1983 (NAD83): Start at 450554, 2420457; 450546, 2420468; 450576, 2420510; 450586, 2420518; 450607, 2420516; 450624, 2420502; 450625, 2420480; 450618, 2420452; 450600, 2420437; 450574, 2420434; return to starting point.

(ii) **Note:** Unit 1 is depicted on Map 2—Units 1, 2, 3, and 4—below.

(7) Unit 2—(7 ha (16 ac)):

(i) Unit 2 consists of the following 16 boundary points with the following coordinates in UTM Zone 4, with the

units in meters, using North American Datum of 1983 (NAD83): Start at 451483, 2420974; 451539, 2420991; 451583, 2421015; 451622, 2421014; 451667, 2420984; 451677, 2420926; 451680, 2420869; 451705, 2420799; 451622, 2420769; 451650, 2420664; 451488, 2420620; 451468, 2420624; 451433, 2420642; 451470, 2420758; 451501, 2420801; 451510, 2420870; return to starting point.

(ii) **Note:** Unit 2 is depicted on Map 2—Units 1, 2, 3, and 4—below.

(8) Unit 3—(6 ha (16 ac)):

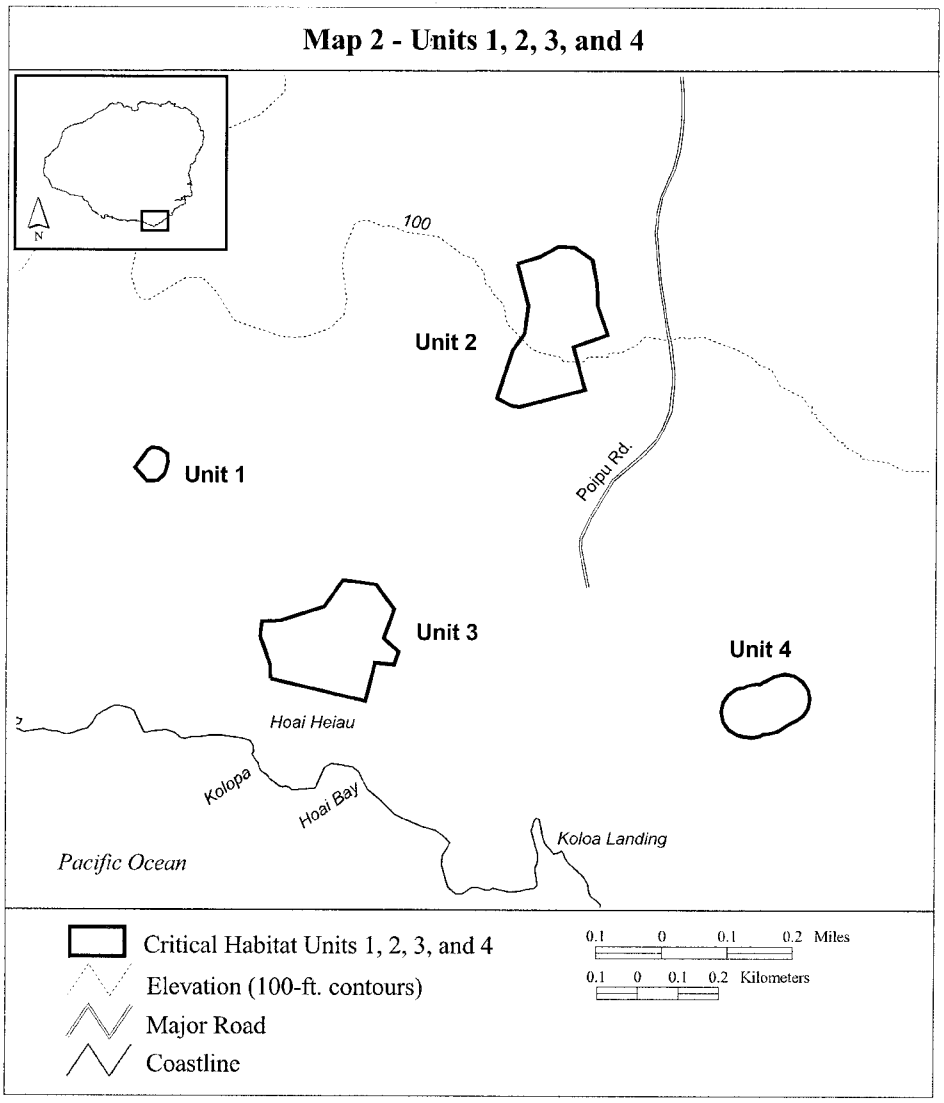
(i) Unit 3 consists of the following 14 boundary points with the following coordinates in UTM Zone 4, with the units in meters using North American Datum of 1983 (NAD83): Start at 450881, 2419947; 450879, 2419981; 450855, 2420053; 450859, 2420089; 450903, 2420089; 451012, 2420125; 451058, 2420191; 451138, 2420180; 451184, 2420119; 451159, 2420048; 451194, 2420014; 451183, 2419982; 451136, 2419987; 451114, 2419892; return to starting point.

(ii) **Note:** Unit 3 is depicted on Map 2—Units 1, 2, 3, and 4—below.

(9) Unit 4—(2 ha (6 ac)):

(i) Unit 4 consists of the following 33 boundary points with the following coordinates in UTM Zone 4, with the units in meters using North American Datum of 1983 (NAD83): Start at 452087, 2419809; 452063, 2419804; 452053, 2419805; 452040, 2419807; 452027, 2419811; 452007, 2419824; 451994, 2419844; 451989, 2419867; 451994, 2419890; 452007, 2419910; 452027, 2419923; 452045, 2419927; 452053, 2419932; 452076, 2419936; 452082, 2419936; 452084, 2419936; 452090, 2419939; 452095, 2419942; 452096, 2419943; 452118, 2419954; 452145, 2419960; 452168, 2419955; 452188, 2419942; 452201, 2419922; 452206, 2419899; 452201, 2419876; 452188, 2419856; 452172, 2419844; 452153, 2419835; 452132, 2419822; 452123, 2419817; 452099, 2419812; 452093, 2419812; return to starting point.

(ii) **Note:** Unit 4 is depicted on Map 2—Units 1, 2, 3, and 4—which follows:



(10) Unit 5—(1 ha (2 ac)):

(i) Unit 5 consists of the following 35 boundary points with the following coordinates in UTM Zone 4, with the units in meters using North American Datum of 1983 (NAD83): Start at 452493, 2420608; 452493, 2420613; 452493, 2420616; 452496, 2420639; 452492, 2420652; 452491, 2420660; 452492, 2420669; 452497, 2420683; 452498, 2420686; 452502, 2420694; 452516, 2420711; 452518, 2420713;

452528, 2420720; 452540, 2420722; 452552, 2420720; 452561, 2420713; 452568, 2420704; 452570, 2420692; 452568, 2420680; 452564, 2420673; 452553, 2420660; 452556, 2420649; 452557, 2420641; 452557, 2420637; 452554, 2420613; 452555, 2420611; 452555, 2420607; 452553, 2420595; 452546, 2420585; 452536, 2420579; 452525, 2420576; 452513, 2420579; 452503, 2420585; 452496, 2420595; 452494, 2420602; return to starting point.

(ii) Unit 5 is depicted on Map 3—Units 5, 6, 7, and 8—below.

(11) Unit 6—(2 ha (4 ac)):

(i) Unit 6 consists of the following 21 boundary points with the following coordinates in UTM Zone 4, with the units in meters using North American Datum of 1983 (NAD83): Start at 453052, 2420607; 453065, 2420616; 453078, 2420622; 453101, 2420626; 453126, 2420621; 453139, 2420616; 453154, 2420606; 453164, 2420591; 453167, 2420579; 453169, 2420551; 453165, 2420533; 453156, 2420517; 453141, 2420500; 453127, 2420490; 453109, 2420486; 453078, 2420490; 453053, 2420505; 453042, 2420522; 453034, 2420543; 453032, 2420559; 453036, 2420585; return to starting point.

(ii) Unit 6 is depicted on Map 3—Units 5, 6, 7, and 8—below.

(12) Unit 7—(3 ha (9 ac)):

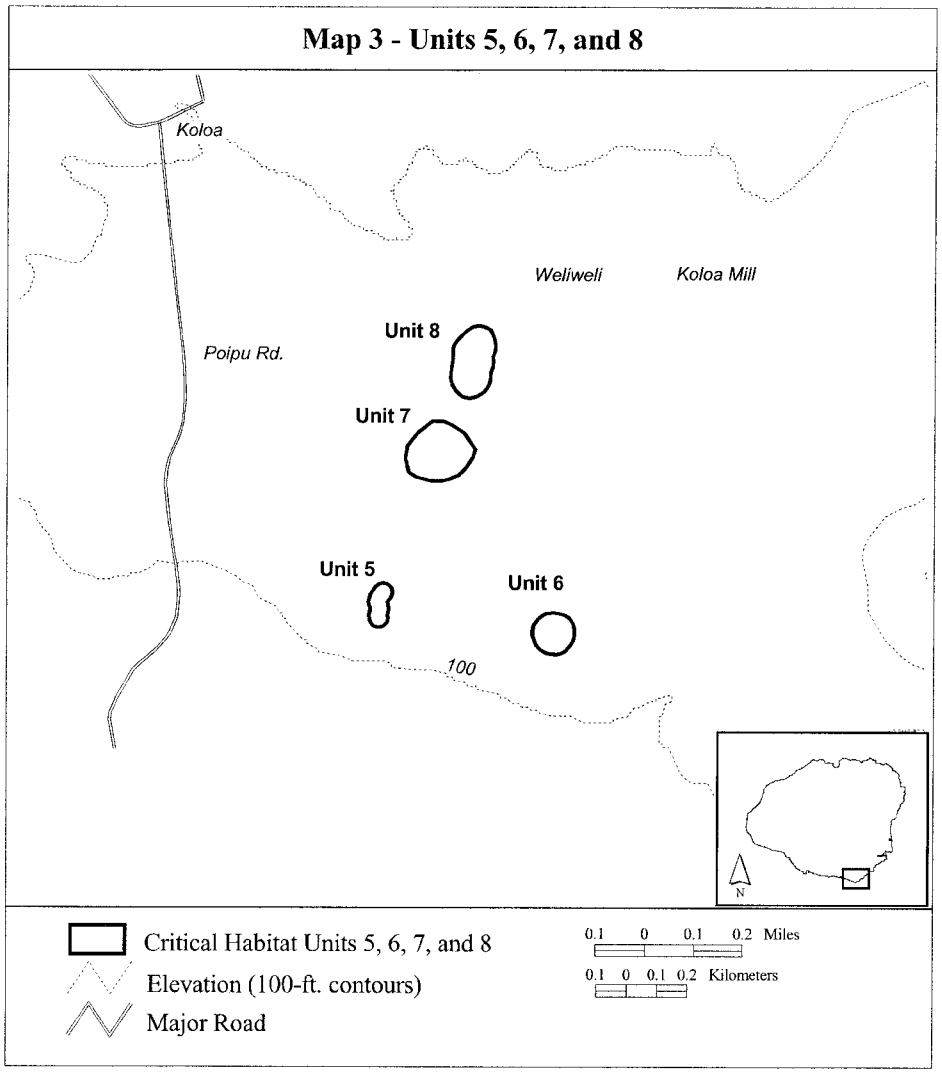
(i) Unit 7 consists of the following 7 boundary points with the following coordinates in UTM Zone 4, with the units in meters using North American Datum of 1983 (NAD83): Start at 452623, 2421100; 452812, 2421077; 452831, 2421041; 452816, 2421016; 452786, 2420896; 452590, 2420946; 452608, 2421015; return to starting point.

(ii) Unit 7 is depicted on Map 3—Units 5, 6, 7, and 8—below.

(13) Unit 8—(2 ha (7 ac)):

(i) Unit 8 consists of the following 33 boundary points with the following coordinates in UTM Zone 4, with the units in meters using North American Datum of 1983 (NAD83): Start at 452763, 2421383; 452759, 2421402; 452760, 2421421; 452767, 2421462; 452766, 2421477; 452768, 2421497; 452771, 2421510; 452780, 2421523; 452812, 2421556; 452824, 2421564; 452831, 2421567; 452848, 2421571; 452857, 2421571; 452875, 2421567; 452890, 2421557; 452899, 2421542; 452904, 2421531; 452907, 2421514; 452908, 2421497; 452904, 2421480; 452899, 2421471; 452902, 2421454; 452900, 2421439; 452894, 2421422; 452891, 2421412; 452891, 2421402; 452888, 2421385; 452880, 2421368; 452871, 2421355; 452844, 2421338; 452822, 2421335; 452799, 2421339; 452778, 2421357; return to starting point.

(ii) Unit 8 is depicted on Map 3—Units 5, 6, 7, and 8—which follows:



(14) Unit 9—(1 ha (4 ac)):

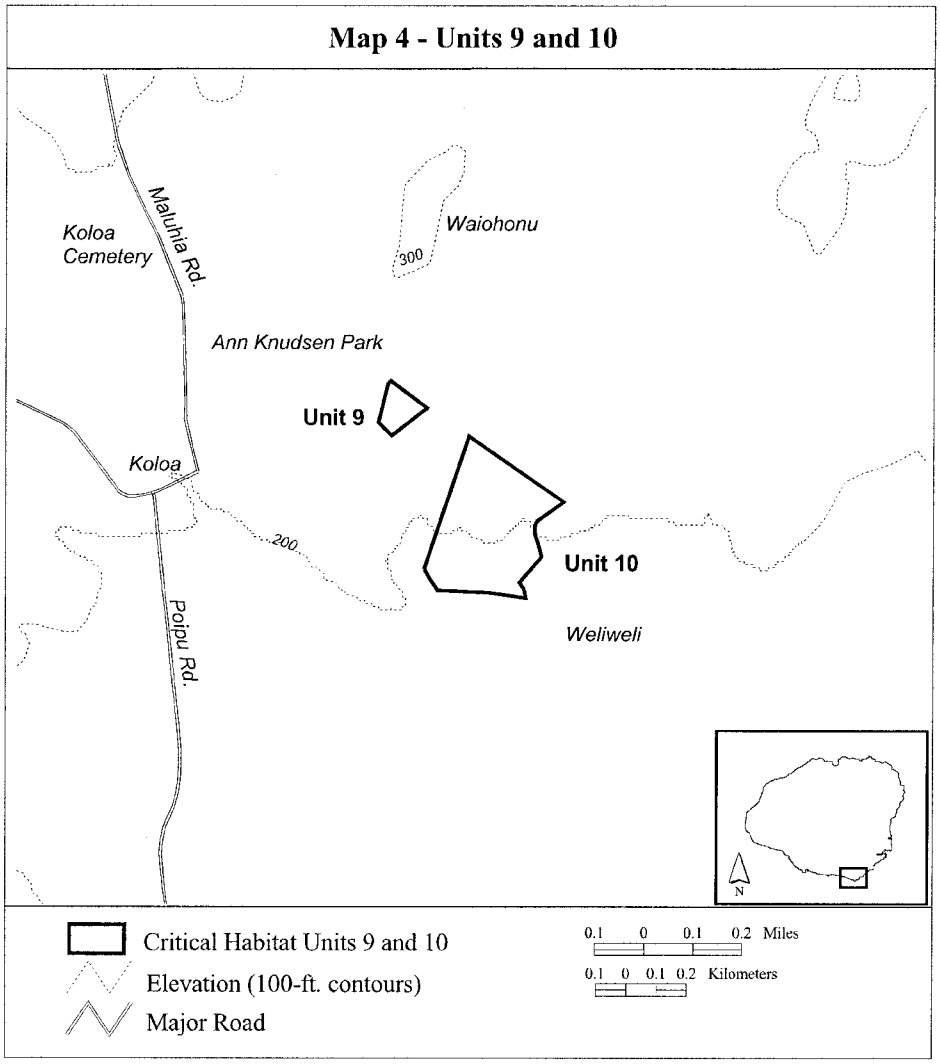
(i) Unit 9 consists of the following 5 boundary points with the following coordinates in UTM Zone 4, with the units in meters using North American Datum of 1983 (NAD83): Start at 452568, 2422604; 452577, 2422610; 452696, 2422521; 452580, 2422429; 452537, 2422471; return to starting point.

(ii) **Note:** Unit 9 is depicted on Map 4—Units 9 and 10—below.

(15) Unit 10—(14 ha (35 ac)):

(i) Unit 10 consists of the following 14 boundary points with the following coordinates in UTM Zone 4, with the units in meters using North American Datum of 1983 (NAD83): Start at 452688, 2421988; 452834, 2422427; 453145, 2422210; 453061, 2422147; 453053, 2422133; 453053, 2422102; 453061, 2422078; 453074, 2422029; 453002, 2421944; 453015, 2421922; 453022, 2421892; 452896, 2421910; 452733, 2421917; 452705, 2421959; return to starting point.

(ii) **Note:** Unit 10 is depicted on Map 4—Units 9 and 10—which follows:



(16) Unit 11—(4 ha (10 ac)):

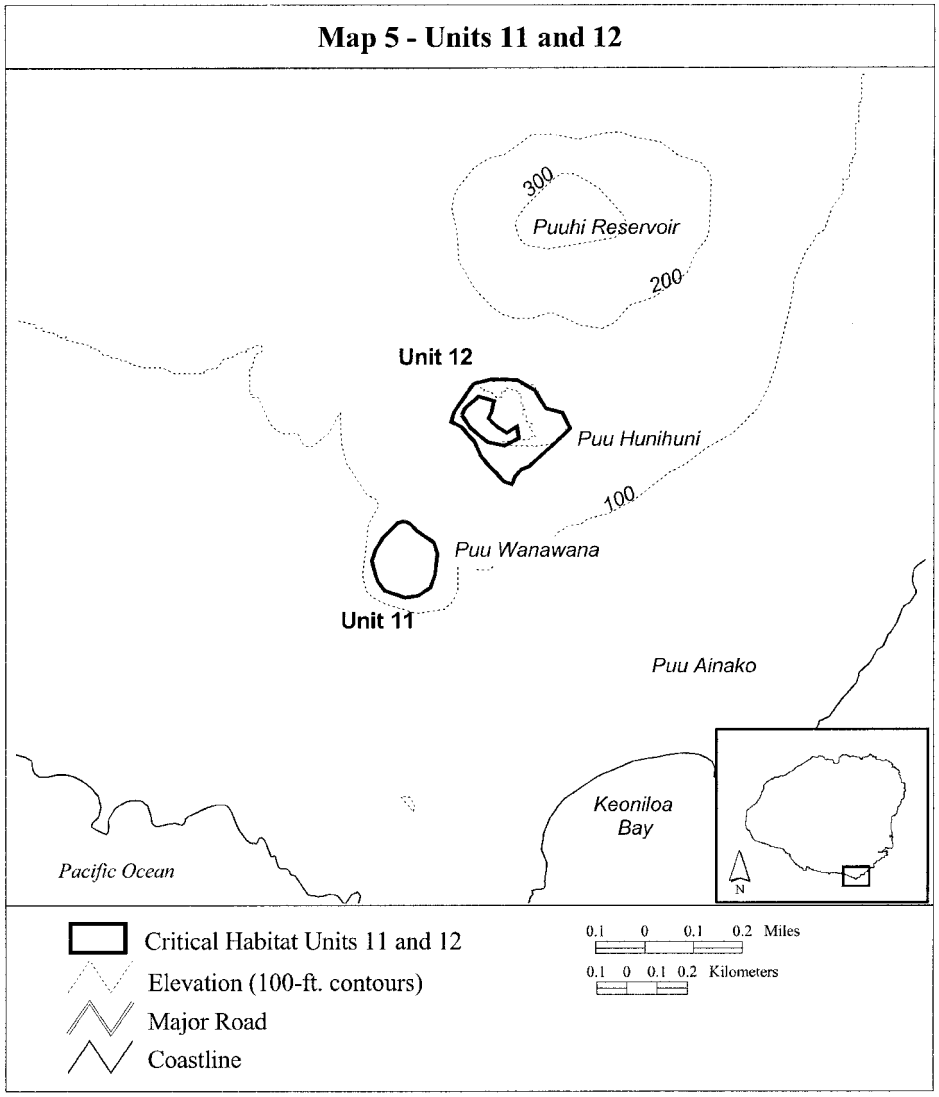
(i) Unit 11 consists of the following 17 boundary points with the following coordinates in UTM Zone 4, with the units in meters using North American Datum of 1983 (NAD83): Start at 453958, 2419773; 453976, 2419766; 453999, 2419741; 454054, 2419702; 454068, 2419667; 454060, 2419596; 454042, 2419553; 454005, 2419528; 453962, 2419521; 453894, 2419545; 453872, 2419573; 453862, 2419600; 453852, 2419642; 453862, 2419676; 453887, 2419718; 453912, 2419742; 453936, 2419768; return to starting point.

(ii) **Note:** Unit 11 is depicted on Map 5—Units 11 and 12—below.

(17) Unit 12 (6 ha (16 ac)):

(i) Unit 12 consists of the following 21 boundary points with the following coordinates in UTM Zone 4, with the units in meters using North American Datum of 1983 (NAD83): Start at 454185, 2420229; 454242, 2420243; 454326, 2420241; 454387, 2420207; 454420, 2420147; 454475, 2420133; 454502, 2420080; 454474, 2420055; 454366, 2419954; 454341, 2419944; 454321, 2419921; 454311, 2419895; 454286, 2419903; 454264, 2419927; 454229, 2419962; 454208, 2419993; 454186, 2420038; 454169, 2420058; 454145, 2420086; 454112, 2420103; 454120, 2420133; return to starting point.

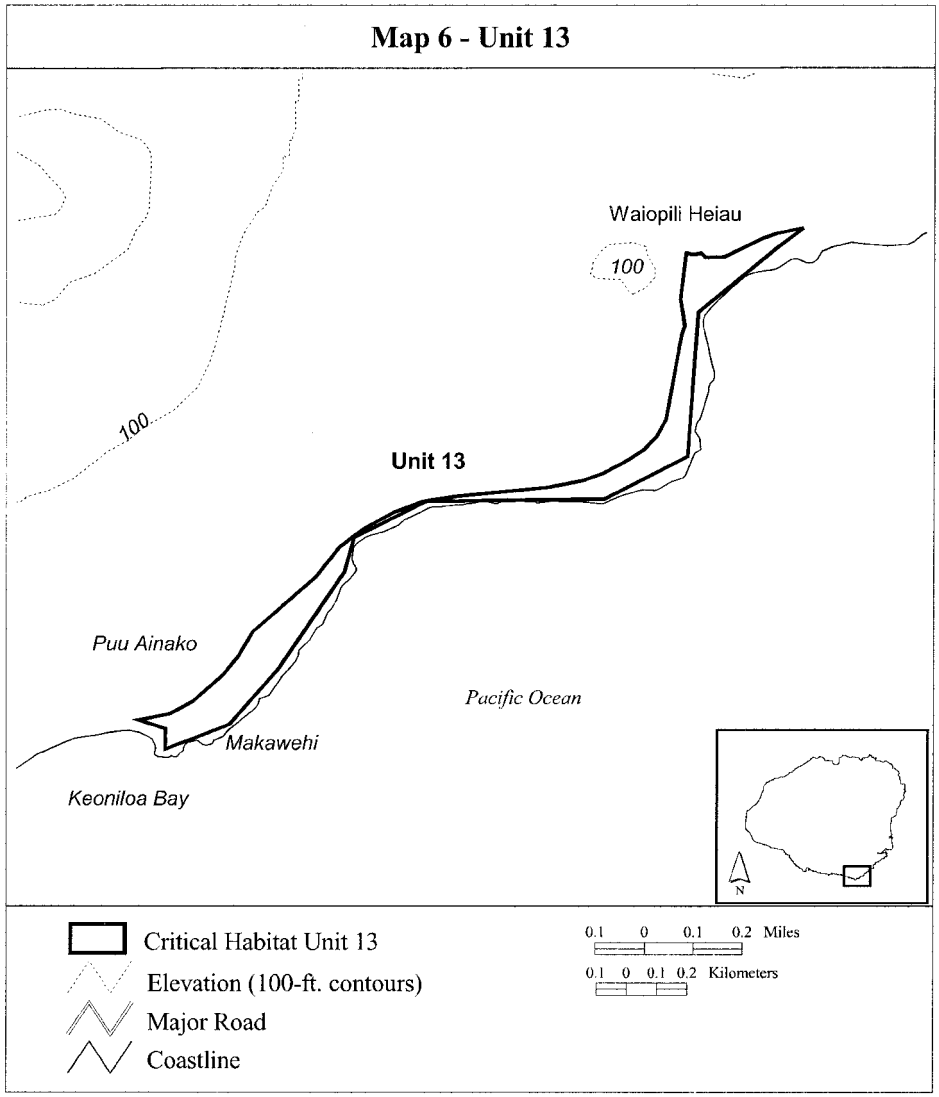
(ii) **Note:** Unit 12 is depicted on Map 5—Units 11 and 12—which follows:



(18) Unit 13—(21 ha (52 ac)):

(i) Unit 13 consists of the following 43 boundary points with the following coordinates in UTM Zone 4, with the units in meters using North American Datum of 1983 (NAD83): Start at 457108, 2420666; 457027, 2420606; 456763, 2420391; 456727, 2419912; 456456, 2419772; 455868, 2419764; 455633, 2419645; 455601, 2419531; 455389, 2419219; 455225, 2419029; 455014, 2418947; 455014, 2419015; 454926, 2419043; 455027, 2419064; 455102, 2419103; 455202, 2419192; 455255, 2419258; 455300, 2419334; 455508, 2419515; 455586, 2419614; 455664, 2419674; 455767, 2419730; 455859, 2419764; 455969, 2419780; 456212, 2419805; 456272, 2419811; 456376, 2419831; 456451, 2419859; 456531, 2419900; 456583, 2419935; 456627, 2419981; 456656, 2420036; 456682, 2420173; 456709, 2420316; 456718, 2420343; 456704, 2420433; 456723, 2420583; 456747, 2420580; 456771, 2420584; 456786, 2420569; 456848, 2420572; 456979, 2420634; 457022, 2420649; return to starting point.

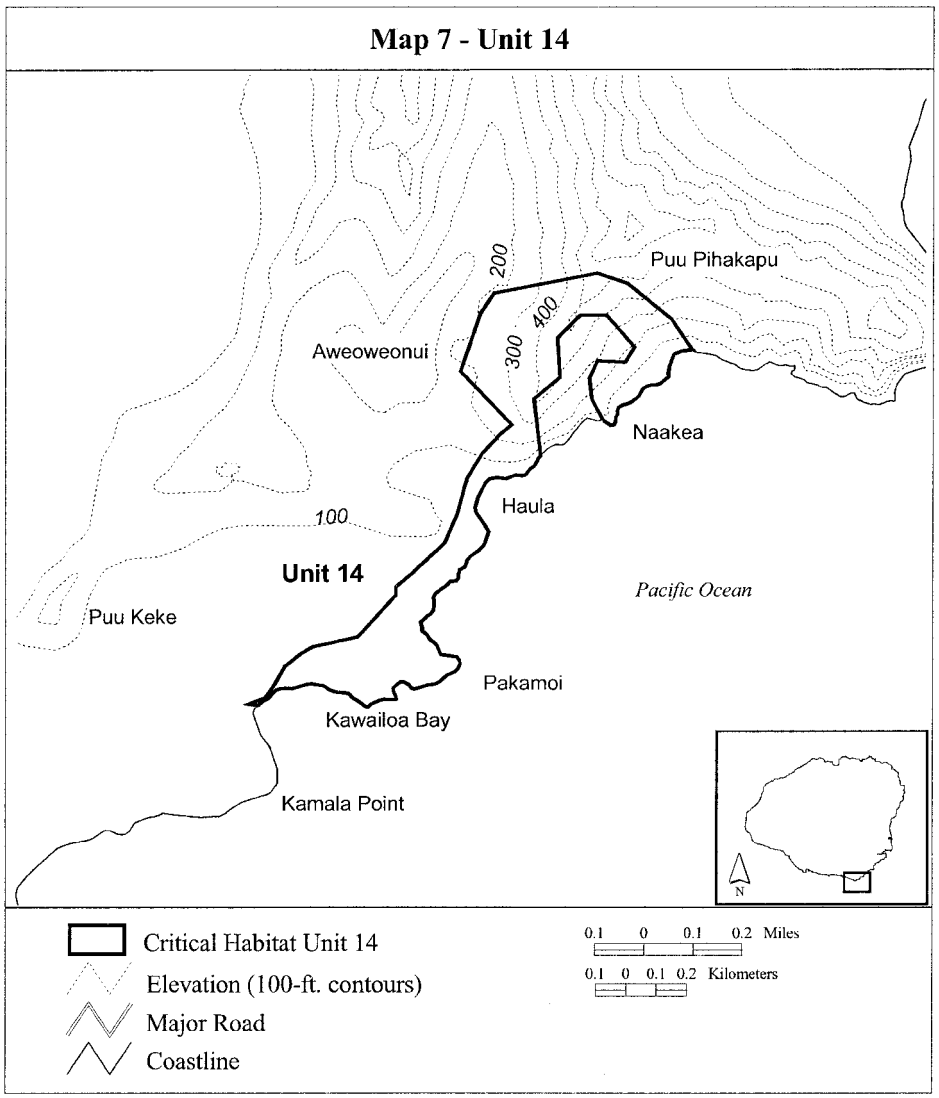
(ii) **Note:** Unit 13 is depicted on Map 6—Unit 13—which follows:



(19) Unit 14—(39 ha (96 ac)):

(i) Unit 14 consists of the following 47 boundary points with the following coordinates in UTM Zone 4, with the units in meters using North American Datum of 1983 (NAD83): Coastline. 457575, 2420977; 457548, 2420981; 457598, 2421002; 457624, 2421039; 457624, 2421039; 457624, 2421039; 457664, 2421105; 457715, 2421146; 457755, 2421170; 457901, 2421204; 458025, 2421342; 458025, 2421367; 458078, 2421412; 458078, 2421413; 458078, 2421413; 458184, 2421510; 458226, 2421607; 458226, 2421607; 458226, 2421607; 458259, 2421727; 458308, 2421809; 458371, 2421876; 458405, 2421905; 458237, 2422080; 458301, 2422271; 458346, 2422339; 458686, 2422403; 458785, 2422371; 458932, 2422252; 458997, 2422153; Coastline. 458706, 2421920; 458670, 2421988; 458662, 2422059; 458688, 2422116; 458778, 2422112; 458809, 2422160; 458719, 2422266; 458630, 2422266; 458556, 2422191; 458563, 2422061; 458479, 2421989; 458500, 2421803.

(ii) **Note:** Unit 14 is depicted on Map 7—Unit 14—which follows:



* * * * *

(h) Crustaceans.

* * * * *

Kauai cave amphipod (*Spelaeorchestia koloana*)

(1) Critical habitat units are depicted for the island of Kauai, Hawaii, on the maps below.

(2) The primary constituent elements for the Kauai cave amphipod are:

(i) The presence of subterranean spaces from 5 mm to 25 cm (0.2 in to 10 in) at their narrowest point (collectively termed ''mesocaverns'') and/or cave passages greater than 25 cm (>10 in);

(ii) Dark and/or stagnant air zones that maintain relative humidity at saturation levels (≥100 percent); and

(iii) The presence in these types of mesocaverns or caves of roots from living, nontoxic plants such as, but not limited to, ohia (*Metrosideros polymorpha*), maiapilo (*Capparis sandwichiana*), and aalii (*Dodonea viscosa*).

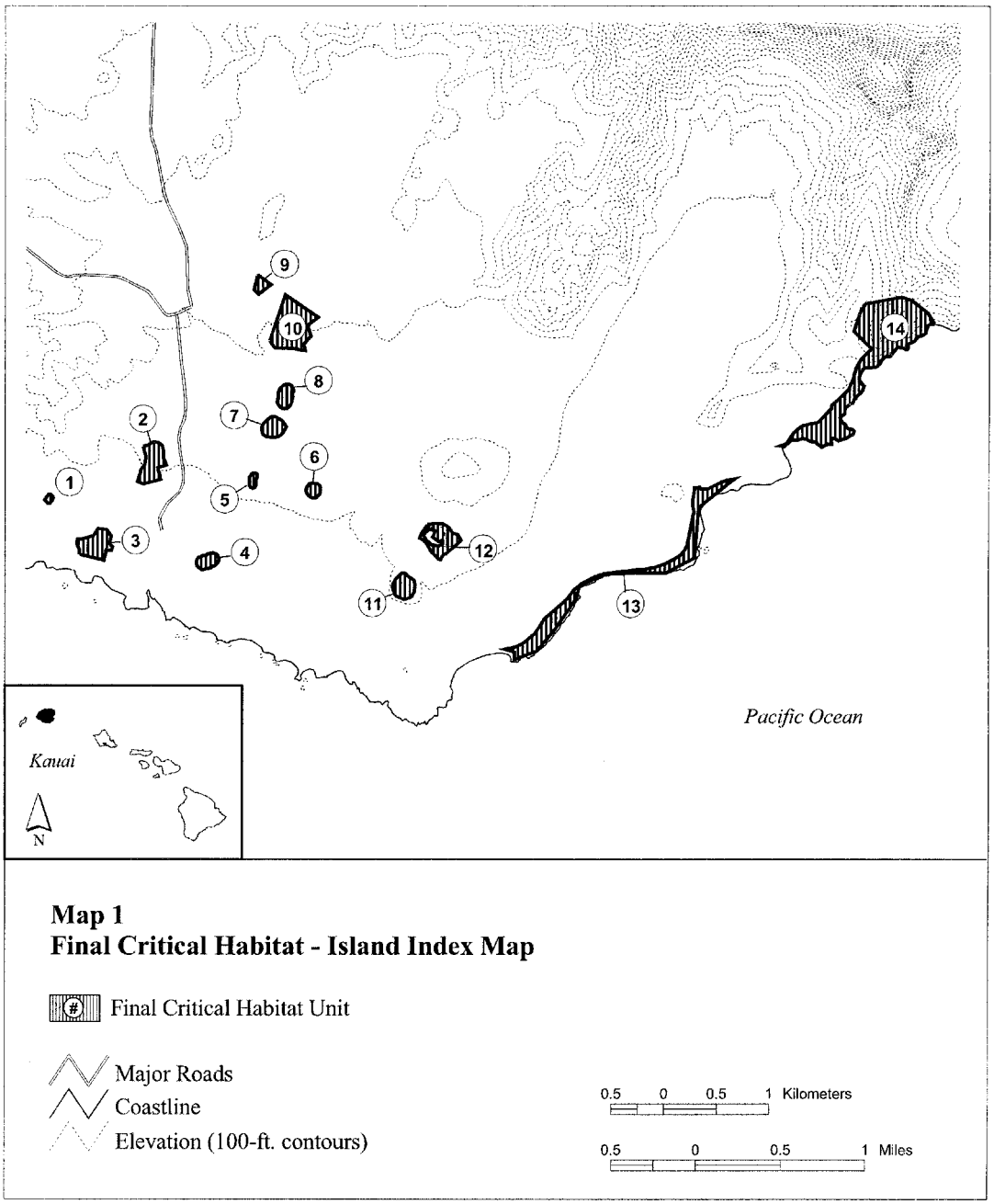
(3) All critical habitat areas contain one or more of the primary constituent elements for the Kauai cave amphipod.

(4)(i) Existing human-constructed features and structures within the boundaries of mapped units that involved trenching, filling, or excavation resulting in below-surface modification or alteration would not contain either of the primary constituent elements and are excluded from critical habitat designation. Such features and structures include but are not limited to: Homes and buildings for which the underlying bedrock has been altered for their construction or through incorporation of or connection to buried structural foundations, septic tanks, city sewage and drainage systems, or water or underground electrical supply corridors; paved roads; and areas previously or currently used as a quarry.

(ii) Areas that have been modified on the surface but without trenching, filling, or excavation resulting in below-surface modification or alteration are included in the critical habitat designation, even if they are adjacent to areas that have undergone below-surface modification.

(5) Critical habitat units are described below. Coordinates in UTM Zone 4 with units in meters using North American Datum of 1983 (NAD83). The following map shows the general locations of the 14 critical habitat units designated on the island of Kauai.

(i) **Note:** Map 1—Index map follows:



(6) Unit 1—(<1 ha (1 ac)):

(i) Unit 1 consists of the following 10 boundary points with the following coordinates in UTM Zone 4, with the units in meters, using North American Datum of 1983 (NAD83): Start at 450554, 2420457; 450546, 2420468; 450576, 2420510; 450586, 2420518; 450607, 2420516; 450624, 2420502; 450625, 2420480; 450618, 2420452; 450600, 2420437; 450574, 2420434; return to starting point.

(ii) **Note:** Unit 1 is depicted on Map 2—Units 1, 2, 3, and 4—below.

(7) Unit 2—(7 ha (16 ac)):

(i) Unit 2 consists of the following 16 boundary points with the following coordinates in UTM Zone 4, with the units in meters, using North American Datum of 1983 (NAD83): Start at 451483, 2420974; 451539, 2420991; 451583, 2421015; 451622, 2421014; 451667, 2420984; 451677, 2420926; 451680, 2420869; 451705, 2420799; 451622, 2420769; 451650, 2420664; 451488, 2420620; 451468, 2420624; 451433, 2420642; 451470, 2420758; 451501, 2420801; 451510, 2420870; return to starting point.

(ii) **Note:** Unit 2 is depicted on Map 2—Units 1, 2, 3, and 4—below.

(8) Unit 3—(6 ha (16 ac)):

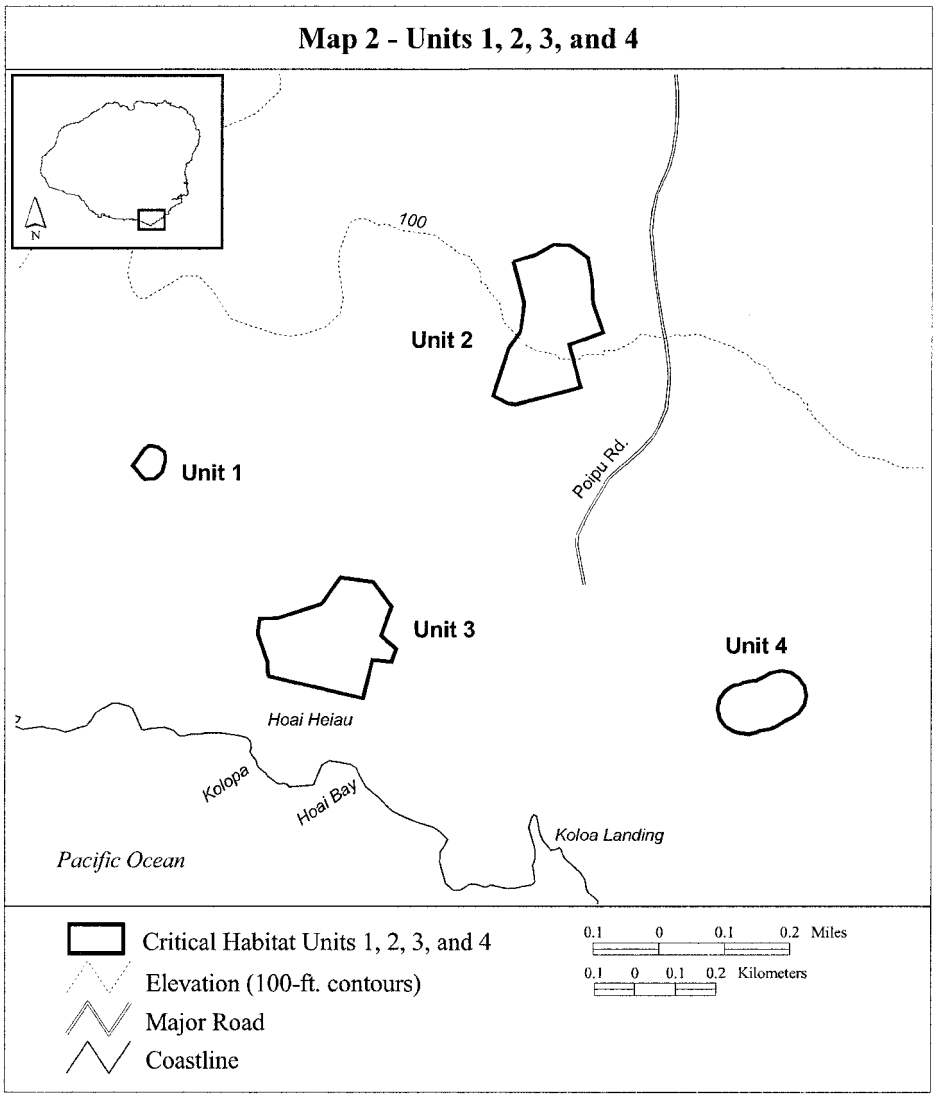
(i) Unit 3 consists of the following 14 boundary points with the following coordinates in UTM Zone 4, with the units in meters using North American Datum of 1983 (NAD83): Start at 450881, 2419947; 450879, 2419981; 450855, 2420053; 450859, 2420089; 450903, 2420089; 451012, 2420125; 451058, 2420191; 451138, 2420180; 451184, 2420119; 451159, 2420048; 451194, 2420014; 451183, 2419982; 451136, 2419987; 451114, 2419892; return to starting point.

(ii) **Note:** Unit 3 is depicted on Map 2—Units 1, 2, 3, and 4—below.

(9) Unit 4—(2 ha (6 ac)):

(i) Unit 4 consists of the following 33 boundary points with the following coordinates in UTM Zone 4, with the units in meters using North American Datum of 1983 (NAD83): Start at 452087, 2419809; 452063, 2419804; 452053, 2419805; 452040, 2419807; 452027, 2419811; 452007, 2419824; 451994, 2419844; 451989, 2419867; 451994, 2419890; 452007, 2419910; 452027, 2419923; 452045, 2419927; 452053, 2419932; 452076, 2419936; 452082, 2419936; 452084, 2419936; 452090, 2419939; 452095, 2419942; 452096, 2419943; 452118, 2419954; 452145, 2419960; 452168, 2419955; 452188, 2419942; 452201, 2419922; 452206, 2419899; 452201, 2419876; 452188, 2419856; 452172, 2419844; 452153, 2419835; 452132, 2419822; 452123, 2419817; 452099, 2419812; 452093, 2419812; return to starting point.

(ii) **Note:** Unit 4 is depicted on Map 2—Units 1, 2, 3, and 4—which follows:



(10) Unit 5—(1 ha (2 ac)):

(i) Unit 5 consists of the following 35 boundary points with the following coordinates in UTM Zone 4, with the units in meters using North American Datum of 1983 (NAD83): Start at 452493, 2420608; 452493, 2420613; 452493, 2420616; 452496, 2420639; 452492, 2420652; 452491, 2420660; 452492, 2420669; 452497, 2420683; 452498, 2420686; 452502, 2420694; 452516, 2420711; 452518, 2420713; 452528, 2420720; 452540, 2420722; 452552, 2420720; 452561, 2420713; 452568, 2420704; 452570, 2420692; 452568, 2420680; 452564, 2420673; 452553, 2420660; 452556, 2420649; 452557, 2420641; 452557, 2420637; 452554, 2420613; 452555, 2420611; 452555, 2420607; 452553, 2420595; 452546, 2420585; 452536, 2420579; 452525, 2420576; 452513, 2420579; 452503, 2420585; 452496, 2420595; 452494, 2420602; return to starting point.

(ii) Unit 5 is depicted on Map 3—Units 5, 6, 7, and 8—below.

(11) Unit 6—(2 ha (4 ac)):

(i) Unit 6 consists of the following 21 boundary points with the following coordinates in UTM Zone 4, with the units in meters using North American Datum of 1983 (NAD83): Start at 453052, 2420607; 453065, 2420616; 453078, 2420622; 453101, 2420626; 453126, 2420621; 453139, 2420616; 453154, 2420606; 453164, 2420591; 453167, 2420579; 453169, 2420551; 453165, 2420533; 453156, 2420517; 453141, 2420500; 453127, 2420490; 453109, 2420486; 453078, 2420490; 453053, 2420505; 453042, 2420522;

453034, 2420543; 453032, 2420559; 453036, 2420585; return to starting point.

(ii) Unit 6 is depicted on Map 3—Units 5, 6, 7, and 8—below.

(12) Unit 7—(3 ha (9 ac)):

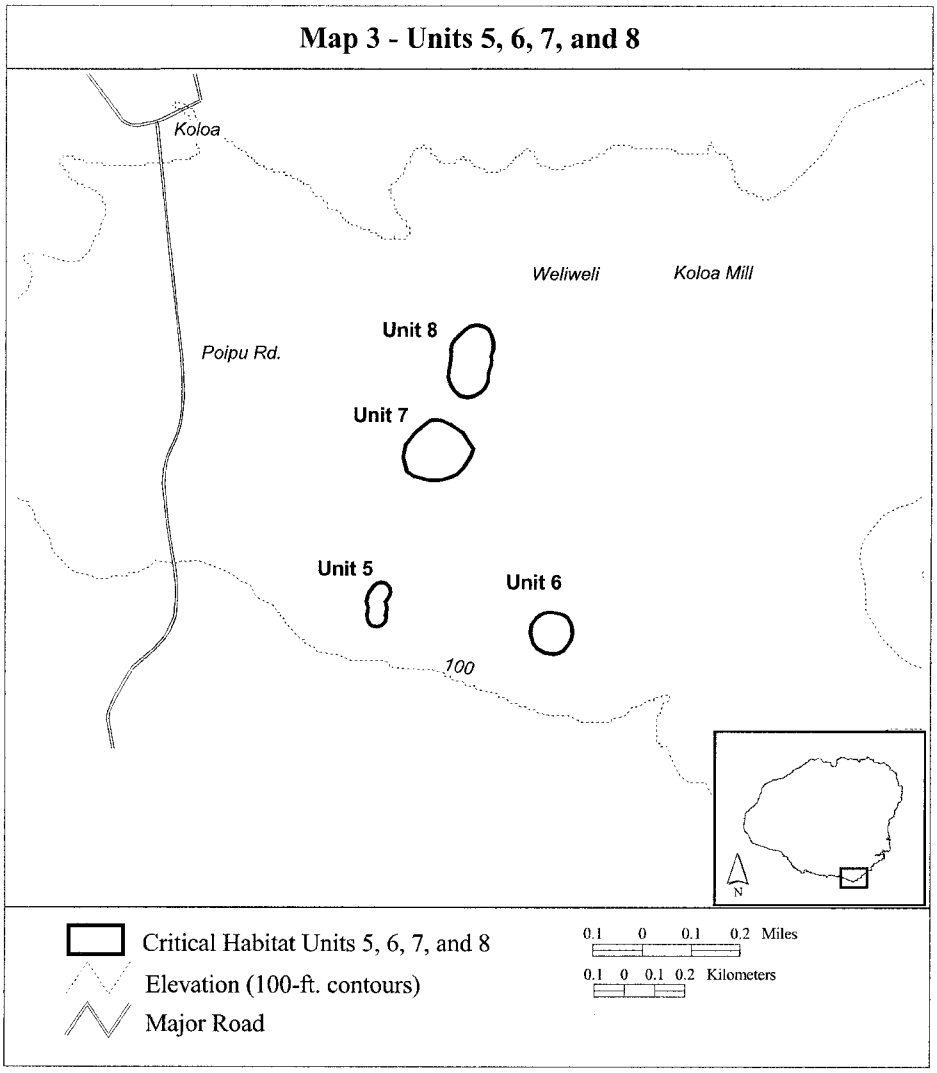
(i) Unit 7 consists of the following 7 boundary points with the following coordinates in UTM Zone 4, with the units in meters using North American Datum of 1983 (NAD83): Start at 452623, 2421100; 452812, 2421077; 452831, 2421041; 452816, 2421016; 452786, 2420896; 452590, 2420946; 452608, 2421015; return to starting point.

(ii) Unit 7 is depicted on Map 3—Units 5, 6, 7, and 8—below.

(13) Unit 8—(2 ha (7 ac)):

(i) Unit 8 consists of the following 33 boundary points with the following coordinates in UTM Zone 4, with the units in meters using North American Datum of 1983 (NAD83): Start at 452763, 2421383; 452759, 2421402; 452760, 2421421; 452767, 2421462; 452766, 2421477; 452768, 2421497; 452771, 2421510; 452780, 2421523; 452812, 2421556; 452824, 2421564; 452831, 2421567; 452848, 2421571; 452857, 2421571; 452875, 2421567; 452890, 2421557; 452899, 2421542; 452904, 2421531; 452907, 2421514; 452908, 2421497; 452904, 2421480; 452899, 2421471; 452902, 2421454; 452900, 2421439; 452894, 2421422; 452891, 2421412; 452891, 2421402; 452888, 2421385; 452880, 2421368; 452871, 2421355; 452844, 2421338; 452822, 2421335; 452799, 2421339; 452778, 2421357; return to starting point.

(ii) Unit 8 is depicted on Map 3—Units 5, 6, 7, and 8—which follows:



(14) Unit 9—(1 ha (4 ac)):

(i) Unit 9 consists of the following 5 boundary points with the following coordinates in UTM Zone 4, with the units in meters using North American Datum of 1983 (NAD83): Start at 452568, 2422604; 452577, 2422610; 452696, 2422521; 452580, 2422429; 452537, 2422471; return to starting point.

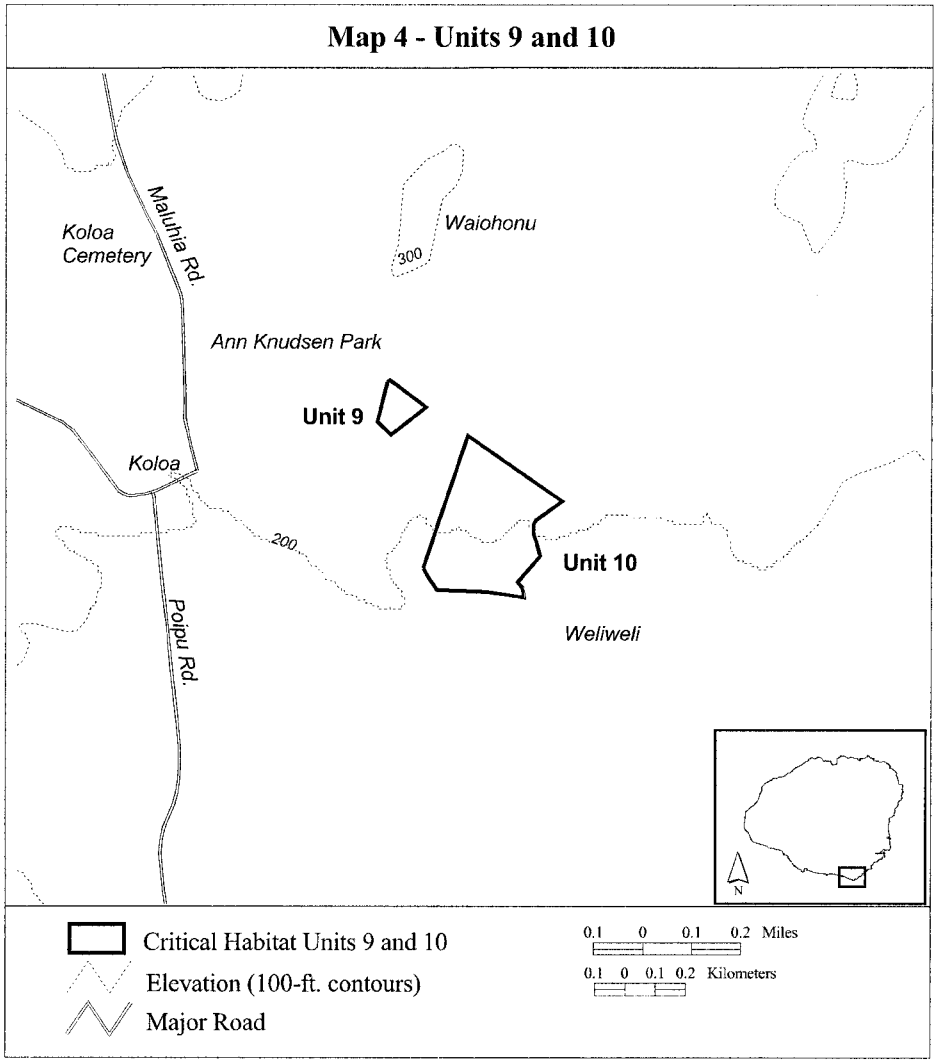
(ii) **Note:** Unit 9 is depicted on Map 4—Units 9 and 10—below.

(15) Unit 10—(14 ha (35 ac)):

(i) Unit 10 consists of the following 14 boundary points with the following coordinates in UTM Zone 4, with the units in meters using North American Datum of 1983 (NAD83): Start at 452688, 2421988; 452834, 2422427; 453145, 2422210; 453061, 2422147; 453053, 2422133; 453053, 2422102; 453061, 2422078; 453074, 2422029; 453002, 2421944; 453015, 2421922; 453022, 2421892; 452896, 2421910;

452733, 2421917; 452705, 2421959; return to starting point.

(ii) **Note:** Unit 10 is depicted on Map 4—Units 9 and 10—which follows:



(16) Unit 11—(4 ha (10 ac)):

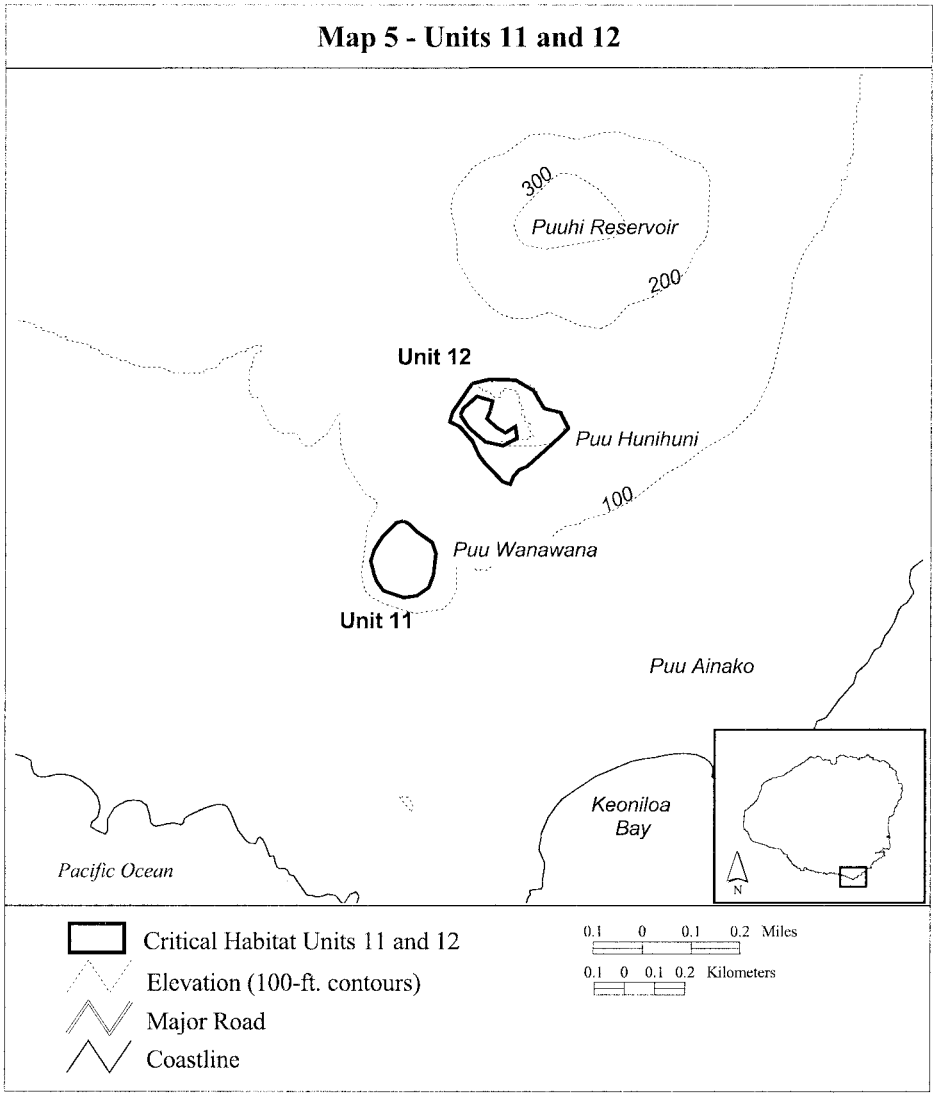
(i) Unit 11 consists of the following 17 boundary points with the following coordinates in UTM Zone 4, with the units in meters using North American Datum of 1983 (NAD83): Start at 453958, 2419773; 453976, 2419766; 453999, 2419741; 454054, 2419702; 454068, 2419667; 454060, 2419596; 454042, 2419553; 454005, 2419528; 453962, 2419521; 453894, 2419545; 453872, 2419573; 453862, 2419600; 453852, 2419642; 453862, 2419676; 453887, 2419718; 453912, 2419742; 453936, 2419768; return to starting point.

(ii) **Note:** Unit 11 is depicted on Map 5—Units 11 and 12—below.

(17) Unit 12 (6 ha (16 ac)):

(i) Unit 12 consists of the following 21 boundary points with the following coordinates in UTM Zone 4, with the units in meters using North American Datum of 1983 (NAD83): Start at 454185, 2420229; 454242, 2420243; 454326, 2420241; 454387, 2420207; 454420, 2420147; 454475, 2420133; 454502, 2420080; 454474, 2420055; 454366, 2419954; 454341, 2419944; 454321, 2419921; 454311, 2419895; 454286, 2419903; 454264, 2419927; 454229, 2419962; 454208, 2419993; 454186, 2420038; 454169, 2420058; 454145, 2420086; 454112, 2420103; 454120, 2420133; return to starting point.

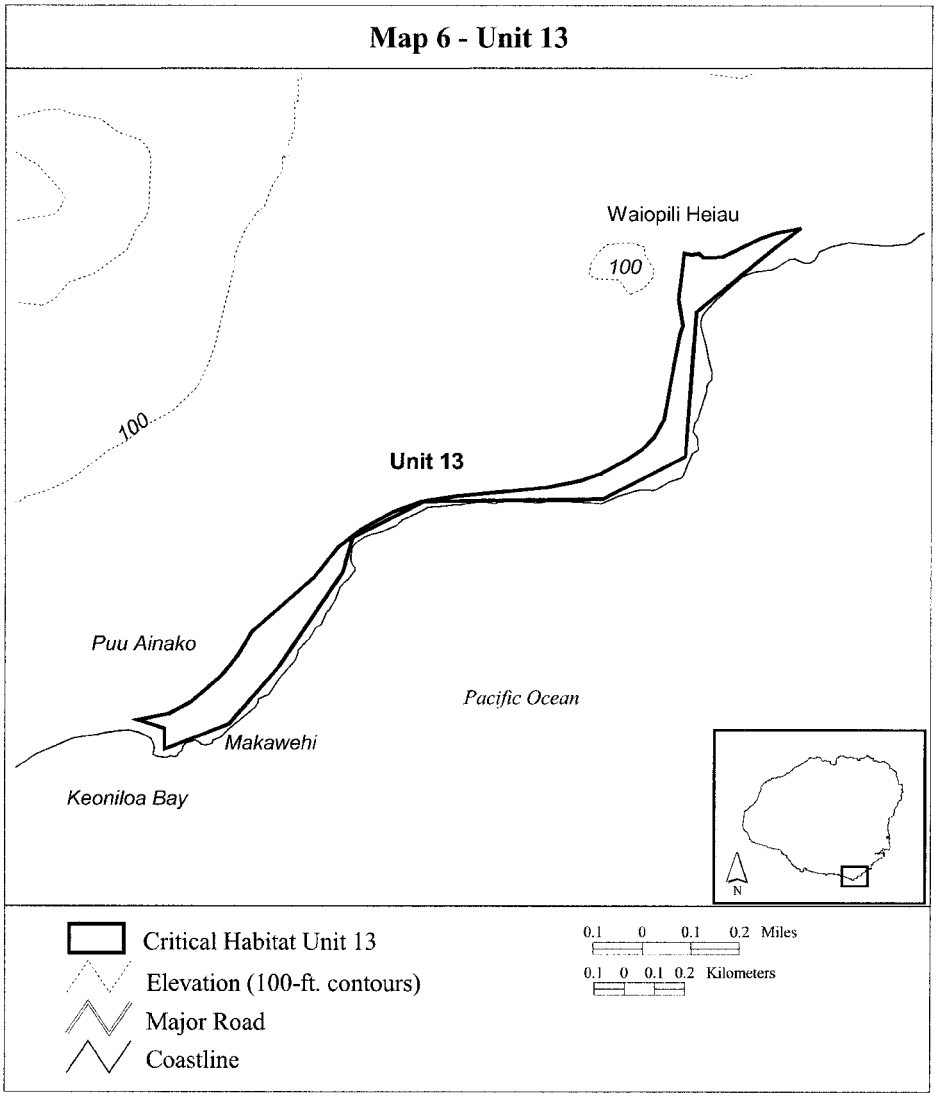
(ii) **Note:** Unit 12 is depicted on Map 5—Units 11 and 12—which follows:



(18) Unit 13—(21 ha (52 ac)):

(i) Unit 13 consists of the following 43 boundary points with the following coordinates in UTM Zone 4, with the units in meters using North American Datum of 1983 (NAD83): Start at 457108, 2420666; 457027, 2420606; 456763, 2420391; 456727, 2419912; 456456, 2419772; 455868, 2419764; 455633, 2419645; 455601, 2419531; 455389, 2419219; 455225, 2419029; 455014, 2418947; 455014, 2419015; 454926, 2419043; 455027, 2419064; 455102, 2419103; 455202, 2419192; 455255, 2419258; 455300, 2419334; 455508, 2419515; 455586, 2419614; 455664, 2419674; 455767, 2419730; 455859, 2419764; 455969, 2419780; 456212, 2419805; 456272, 2419811; 456376, 2419831; 456451, 2419859; 456531, 2419900; 456583, 2419935; 456627, 2419981; 456656, 2420036; 456682, 2420173; 456709, 2420316; 456718, 2420343; 456704, 2420433; 456723, 2420583; 456747, 2420580; 456771, 2420584; 456786, 2420569; 456848, 2420572; 456979, 2420634; 457022, 2420649; return to starting point.

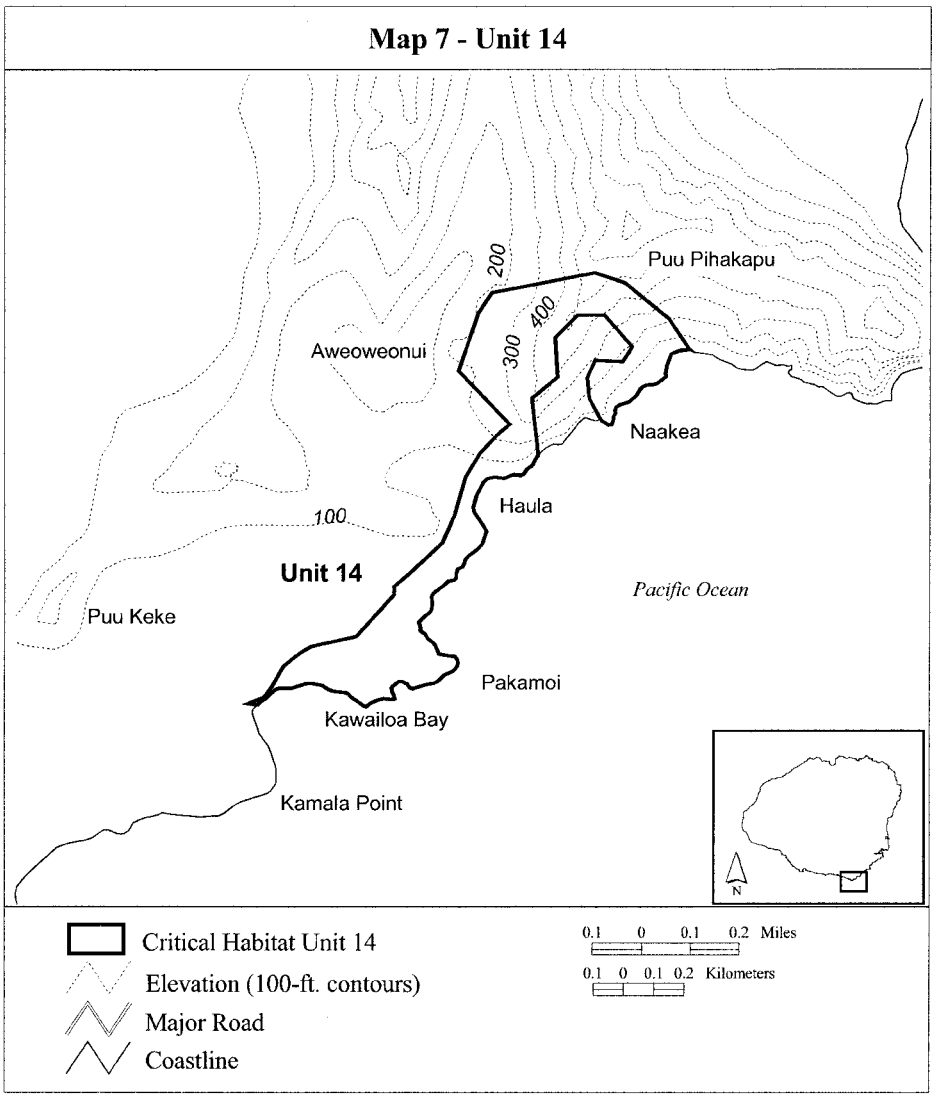
(ii) **Note:** Unit 13 is depicted on Map 6—Unit 13—which follows:



(19) Unit 14—(39 ha (96 ac)):

(i) Unit 14 consists of the following 47 boundary points with the following coordinates in UTM Zone 4, with the units in meters using North American Datum of 1983 (NAD83): Coastline. 457575, 2420977; 457548, 2420981; 457598, 2421002; 457624, 2421039; 457624, 2421039; 457624, 2421039; 457664, 2421105; 457715, 2421146; 457755, 2421170; 457901, 2421204; 458025, 2421342; 458025, 2421367; 458078, 2421412; 458078, 2421413; 458078, 2421413; 458184, 2421510; 458226, 2421607; 458226, 2421607; 458226, 2421607; 458259, 2421727; 458308, 2421809; 458371, 2421876; 458405, 2421905; 458237, 2422080; 458301, 2422271; 458346, 2422339; 458686, 2422403; 458785, 2422371; 458932, 2422252; 458997, 2422153; Coastline. 458706, 2421920; 458670, 2421988; 458662, 2422059; 458688, 2422116; 458778, 2422112; 458809, 2422160; 458719, 2422266; 458630, 2422266; 458556, 2422191; 458563, 2422061; 458479, 2421989; 458500, 2421803.

(ii) **Note:** Unit 14 is depicted on Map 7—Unit 14—which follows:



Dated: March 27, 2003.

Craig Manson,

Assistant Secretary for Fish and Wildlife and Parks.

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