

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 accommodating.

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