FEDERAL REGISTER

Vol. 80 Tuesday,
No. 197 October 13, 2015

Part II

Department of the Interior

Fish and Wildlife Service

50 CFR Part 17

Endangered and Threatened Wildlife and Plants; Proposed Endangered Status for Five Species From American Samoa; Proposed Rule

DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

[Docket No. FWS–R1–ES–2015–0128; 4500030113]

RIN 1018–AZ97

Endangered and Threatened Wildlife and Plants; Proposed Endangered Status for Five Species From American Samoa

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Proposed rule.

SUMMARY: We, the U.S. Fish and Wildlife Service (Service), propose to list as endangered species two endemic American Samoan land snails, the American Samoa distinct population segment of the friendly ground-dove, the Pacific sheath-tailed bat, (South Pacific subspecies), and the mao, under the Endangered Species Act (Act). If we finalize this rule as proposed, it would extend the Act's protections to these species. The effect of this regulation will be to add these species to the List of Endangered and Threatened Wildlife.

DATES: We will accept comments received or postmarked on or before December 14, 2015. Comments submitted electronically using the Federal eRulemaking Portal (see **ADDRESSES** below) must be received by 11:59 p.m. Eastern Time on the closing date. We must receive requests for public hearings, in writing, at the address shown in **FOR FURTHER INFORMATION CONTACT** by November 27, 2015.

ADDRESSES: You may submit comments by one of the following methods:

(1) *Electronically:* Go to the Federal eRulemaking Portal: *http://www.regulations.gov.* In the Search box, enter FWS–R1–ES–2015–0128, which is the docket number for this rulemaking. Then, in the Search panel on the left side of the screen, under the Document Type heading, click on the Proposed Rules link to locate this document. You may submit a comment by clicking on ''Comment Now!''

(2) *By hard copy:* Submit by U.S. mail or hand-delivery to: Public Comments Processing, Attn: FWS–R1–ES–2015–0128; Division of Policy, Performance, and Management Programs; U.S. Fish and Wildlife Service; 5275 Leesburg Pike, MS: BPHC; Falls Church, VA 22041.

We request that you send comments only by the methods described above. We will post all comments on *http://www.regulations.gov.* This generally means that we will post any personal information you provide us (see *Public Comments* below for more information).

FOR FURTHER INFORMATION CONTACT: Mary Abrams, Field Supervisor, Pacific Islands Fish and Wildlife Office, 300 Ala Moana Boulevard, Honolulu, HI 96850, by telephone 808–792–9400 or by facsimile 808–792–9581. Persons who use a telecommunications device for the deaf (TDD) may call the Federal Information Relay Service (FIRS) at 800–877–8339.

SUPPLEMENTARY INFORMATION:

Executive Summary

Why we need to publish a rule. Under the Act, if a species is determined to be an endangered or threatened species throughout all or a significant portion of its range, we are required to promptly publish a proposal in the **Federal Register** and make a determination on our proposal within 1 year. Critical habitat shall be designated, to the maximum extent prudent and determinable, for any species determined to be an endangered or threatened species under the Act. Listing a species as an endangered or threatened species and designations and revisions of critical habitat can only be completed by issuing a rule. We intend to publish a separate rule addressing designation of critical habitat for the five species in American Samoa.

This rule proposes the listing of the two American Samoa land snails, *Eua zebrina* (no common name) and *Ostodes strigatus* (no common name), the American Samoa distinct population segment (DPS) of the friendly ground-dove (*Gallicolumba stairi*), and two species from American Samoa (extirpated), Western Polynesia, and Melanesia, the Pacific sheath-tailed bat (South Pacific subspecies) (*Emballonura semicaudata semicaudata*) and the mao (*Gymnomyza samoensis*) as endangered species. These five species are candidate species for which we have on file sufficient information on biological vulnerability and threats to support preparation of a listing proposal, but for which development of a listing regulation has been precluded by other higher priority listing activities. This rule reassesses all available information regarding status of and threats to these five species.

The basis for our action. Under the Act, we can determine that a species is an endangered or threatened species based on any of five factors: (A) The present or threatened destruction, modification, or curtailment of its habitat or range; (B) Overutilization for commercial, recreational, scientific, or educational purposes; (C) Disease or predation; (D) The inadequacy of existing regulatory mechanisms; or (E) Other natural or manmade factors affecting its continued existence. One or more of the five candidate species face one or more of the following threats:

- Habitat loss and fragmentation or degradation due to agriculture and urban development, nonnative ungulates, and nonnative plants.
- Collection for commercial purposes (snails only).
- Predation by feral cats, rats, nonnative snails, and nonnative flatworms.
- Inadequate existing regulatory mechanisms.
- Small numbers of individuals and populations.

Environmental effects from climate change are likely to exacerbate these threats, and may become a threat to all five species in the future.

We will seek peer review. We will seek comments from independent specialists to ensure that our designation is based on scientifically sound data, assumptions, and analyses in accordance with our joint policy on peer review published in the **Federal Register** on July 1, 1994 (59 FR 34270). We will invite these peer reviewers to comment on our listing proposal. Because we will consider all comments and information received during the comment period, our final determinations may differ from this proposal.

Information Requested

Public Comments

We intend that any final action resulting from this proposed rule will be based on the best scientific and commercial data available and be as accurate and as effective as possible. Therefore, we request comments or information from the public, other concerned governmental agencies, the American Samoa Government (ASG), the scientific community, industry, or any other interested parties concerning this proposed rule. For the Pacific sheath-tailed bat and the mao, we also request comments or information from the CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora) management and scientific authorities or authority competent to issue comparable documentation in the countries of Samoa, Fiji, Tonga, and Vanuatu. We particularly seek comments concerning:

(1) The species' biology, range, and population trends, including:

(a) Biological or ecological requirements of the species, including habitat requirements for feeding, breeding, and sheltering;

(b) Genetics and taxonomy;

(c) Historical and current range including distribution patterns;

(d) Historical and current population levels, and current and projected trends; and

(e) Past and ongoing conservation measures for these species, their habitats, or both.

(2) Factors that that may affect the continued existence of these species, which may include habitat modification or destruction, overutilization, disease, predation, the inadequacy of existing regulatory mechanisms, or other natural or manmade factors.

(3) Biological, commercial trade, or other relevant data concerning any threats (or lack thereof) to these species and existing regulations that may be addressing those threats.

(4) Empirical data or other scientific information describing the specific impacts of climate change on the habitat, life history, and/or ecology of these species, for example, the species' biological response, or likely response, to changes in habitat resulting from climate-change related changes in ambient temperature, precipitation, drought, or storm severity.

(5) Additional information concerning the historical and current status, ranges, distributions, and population sizes of these species, including the locations of any additional populations of these species.

(6) Although we are not proposing to designate critical habitat at this time, we request information about the quality and extent of areas within U.S. jurisdiction (*i.e.,* in American Samoa) that may qualify as critical habitat for the proposed species. Specifically, we are soliciting the identification of particular areas within the geographical area occupied by these species in American Samoa that include physical or biological features that are essential to the conservation of these species and that may require special management considerations or protection (16 U.S.C. 1532(5)(A)(i)). Essential features may include, but are not limited to, features specific to individual species' ranges, habitats, and life history characteristics within the following general categories of habitat features: (1) Space for individual growth and for normal behavior; (2) food, water, air, light, minerals, or other nutritional or physiological requirements; (3) cover or shelter; (4) sites for breeding, reproduction and development of offspring; and (5) habitats that are protected from disturbance or are representative of the historical, geographical, and ecological distributions of the species (50 CFR 424.12(b)). Areas outside the geographical area occupied by the species at the time of listing should also be identified, if such areas are essential for the conservation of the species (16 U.S.C. 1532(5)(A)(ii)). Unlike for occupied habitat, such areas are not required to contain physical or biological features essential to the conservation of the species. ESA implementing regulations at 50 CFR 424.12(h) specify that critical habitat shall not be designated within foreign countries or in other areas outside of U.S. jurisdiction. Therefore, we request information only on potential areas of critical habitat within locations under U.S. jurisdiction.

Please include sufficient information with your submission (such as scientific journal articles or other publications) to allow us to verify any scientific or commercial information you include.

Please note that submissions merely stating support for or opposition to the action under consideration without providing supporting information, although noted, will not be considered in making a determination, as section 4(b)(1)(A) of the Act directs that determinations as to whether any species is a threatened or endangered species must be made ''solely on the basis of the best scientific and commercial data available.''

You may submit your comments and materials concerning this proposed rule by one of the methods listed in the **ADDRESSES** section. We request that you send comments only by the methods described in the **ADDRESSES** section.

If you submit information via *http://www.regulations.gov,* your entire submission—including any personal identifying information—will be posted on the Web site. If your submission is made via a hardcopy that includes personal identifying information, you may request at the top of your document that we withhold this information from public review. However, we cannot guarantee that we will be able to do so. We will post all hardcopy submissions on *http://www.regulations.gov*. Please include sufficient information with your comments to allow us to verify any scientific or commercial information you include.

Comments and materials we receive, as well as supporting documentation we used in preparing this proposed rule, will be available for public inspection on *http://www.regulations.gov,* or by appointment, during normal business hours, at the U.S. Fish and Wildlife Service, Pacific Islands Fish and Wildlife Office (see **FOR FURTHER INFORMATION CONTACT**).

Public Hearing

Section 4(b)(5) of the Act provides for one or more public hearings on this proposal, if requested. Requests must be received within 45 days after the date of publication of this proposed rule in the **Federal Register**. Such requests must be sent to the address shown in **FOR FURTHER INFORMATION CONTACT**. We will schedule public hearings on this proposal, if any are requested, and announce the dates, times, and places of those hearings, as well as how to obtain reasonable accommodations, in the **Federal Register** and local newspapers at least 15 days before the hearing.

Previous Federal Action

All five species proposed for listing are candidate species. Candidate species are those taxa for which the Service has sufficient information on their biological status and threats to propose them for listing under the Act, but for which the development of a listing regulation has been precluded to date by other higher priority listing activities. The species addressed in this proposed rule are the Pacific sheath-tailed bat, the mao, the American Samoa DPS of the friendly ground-dove, and two American Samoa land snails, *Eua zebrina* and *Ostodes strigatus*. The candidate status of all of these species was most recently assessed and reaffirmed in the December 4, 2014, Review of Native Species That Are Candidates for Listing as Endangered or Threatened (CNOR) (79 FR 72450).

On May 4, 2004, the Center for Biological Diversity petitioned the Secretary of the Interior to list 225 species of plants and animals, including four of the five candidate species listed above, as endangered or threatened under the provisions of the Act. Since then, we have published our annual findings on the May 4, 2004, petition (including our findings on the candidate species listed above) in the CNORs dated May 11, 2005 (70 FR 24870), September 12, 2006 (71 FR 53756), December 6, 2007 (72 FR 69034), December 10, 2008 (73 FR 75176), November 9, 2009 (74 FR 57804), November 10, 2010 (75 FR 69222), October 26, 2011 (76 FR 66370), November 21, 2012 (77 FR 69994), November 22, 2013 (78 FR 70104), and December 4, 2014 (79 FR 72450). This proposed rule constitutes a further response to the 2004 petition.

In 2014, the Service evaluated the status and threats for the fifth candidate species, the mao. We determined that this species warranted listing as an endangered or threatened species under the Act and assigned a Listing Priority Number of 2 for this species (79 FR 72450, December 4, 2014).

Background

Species Addressed in This Proposed Rule

The table below (Table 1) provides the common name, scientific name, listing priority, and range for the species that are the subjects of this proposed rule.

TABLE 1—SPECIES ADDRESSED IN THIS PROPOSED RULE

Common name Samoan name or other local name	Scientific name	Listing priority number	Range evaluated for listing
MAMMALS			
Pacific sheath-tailed bat (South Pacific subspecies), Beka beka, Peapea vai, Tagiti.	*Emballonura, semicaudata, semicaudata*.	3	American Samoa, Fiji, Samoa, Tonga, Vanuatu.
BIRDS			
Mao	*Gymnomyza samoensis*	2	American Samoa, Samoa.
Friendly (shy) ground-dove, Tuaimeo	*Gallicolumba stairi*	9	American Samoa DPS.
SNAILS			
No common name	*Eua zebrina*	2	American Samoa.
No common name	*Ostodes strigatus*	2	American Samoa.

The Samoan Archipelago

The Samoan Archipelago consists of a remote chain of 13 islands and 2 atolls in the Pacific Ocean south of the equator. These islands extend more than 298 miles (mi) (480 kilometers (km)) in an east-west orientation between 13 and 15 degrees south latitude, and 168 to 172 degrees west longitude (Goldin 2002, p. 4). The islands date to the early Pleistocene and were formed as hot-spot shield volcanoes, with the older islands located on the western end of the chain (Thornberry-Ehrlich 2008, pp. 16, 28). The archipelago is divided into two political entities, American Samoa, an unincorporated territory of the United States, and the independent nation of Samoa (Craig 2009, p. 5). American Samoa consists of five high islands and two atolls: Tutuila (the largest island; 54 square (sq) mi (140 sq km)); Aunuu (1 sq mi (2 sq km)) off the southeast end of Tutuila; Ofu and Olosega (3.5 sq mi (9 sq km)) separated by a narrow channel now spanned by a bridge; Tau (15 sq mi (39 sq km)); Rose Atoll (1.5 sq mi (4 sq km)), a National Wildlife Refuge) with two uninhabited islands, Rose and Sand; and Swains Island (0.6 sq mi (1.5 sq km)), which is politically part of American Samoa, but geologically and biologically part of the Tokelau archipelago (Goldin 2002, pp. 5–6). These islands and atolls range in elevation from the high peak of Mt. Lata on Tau at 3,170 ft (966 meters (m)) to 4 to 6 ft (1 to 2 m) above sea level (asl) at Rose Atoll.

American Samoa lies within the tropics, where it is hot, humid, and rainy year-round. The wet season is from October to May, with a slightly cooler and drier season from June through September. Temperatures average about 81.5 degrees Fahrenheit (F) (27 degrees Celsius (C)). Rainfall averages 125 inches (in) (318 centimeters (cm)) annually at lower elevations, but can vary greatly depending upon topography, reaching 300 in (750 cm) or greater annually in the mountain areas. Hurricanes are a common natural disturbance in the Samoan Archipelago, and occur at intervals of 1 to 13 years (Goldin 2002, p. 7).

In 2010, the population of American Samoa totaled 55,519 individuals (U.S. Census 2011, in litt.). Because of the steep topography, most areas of the northern coastline of Tutuila are uninhabited, and most people live on the narrow coastal plain on the southern shore, within several hundred yards of the shoreline. The islanders practice extensive small-scale agriculture on plots inland of villages and in lowland rainforest on slopes that sometimes exceed 45 degrees (Atkinson and Medeiros 2006, p. 4). Before the arrival of Polynesians approximately 3,000 years ago, the whole archipelago, except for recent lava flows or poorly drained areas, was likely covered by rain forest or cloud forest (Mueller-Dombois and Fosberg 1998, p. 360).

Samoa

The independent nation of Samoa (Samoa) is located less than 100 mi (160 km) west of Tutuila Island, American Samoa, and consists of two large inhabited islands, Upolu (424 sq mi (1,100 sq km)) and Savaii (703 sq mi (1,820 sq km)), and 8 small offshore islets, several of which are inhabited. Samoa lies between 13 to 14 degrees south latitude and 170 to 173 degrees west longitude and has a total land area of approximately 1,133 sq mi (2,934 sq km)) (Watling 2001, p. 26). The highest point in Samoa is Mt. Silisili on Savaii at 6,093 ft (1,857 m) asl. As discussed above, the Samoan archipelago is volcanic in origin with the islands sequentially formed in a generally eastern direction by a series of ''hot spot'' eruptions, starting with Savaii approximately at 2 million years of age (Keating 1992, p. 131).

Kingdom of Tonga

The Kingdom of Tonga (Tonga) is located in the western South Pacific Ocean, approximately 560 mi (900 km) southwest of the Tutuila Island, American Samoa. The archipelago is spread over 500 mi (800 km) in a north-south direction between 15 to 23.5 degrees south latitude and 173 to 177 west degrees longitude (Australian Bureau of Meteorology (BOM) and Commonwealth Scientific and Industrial Research Organization (CSIRO) Australian BOM and CSIRO 2011, Vol. 2, p. 217). Tonga consists of four groups of islands: Tongatapu and Eua in the south, Haapai in the middle, Vavau in the north, and Niaufoou and Niua Toputapu in the far north. The 172 named islands have an area of 289 sq mi (748 sq km). The islands include high volcanic islands (maximum elevation 3,389 ft (1,033 m) asl), elevated limestone islands and low-lying coralline islands (Australian BOM and CSIRO 2011, Vol. 2, p. 217).

Republic of Fiji

The Republic of Fiji (Fiji) is located in the western South Pacific Ocean approximately 777 mi (1250 km) west of Tutuila Island, American Samoa, between 16 to 20 degrees south latitude and 177 degrees east to 178 degrees west longitude. Fiji consists of 322 islands (105 inhabited) and a total land area of 7,078 sq mi (18,333 sq km) (Watling 2001, p. 22). The two largest islands, Viti Levu (4,026 sq mi (10,429 sq km)) and Vanua Levu (2,145 sq mi (5,556 sq km)), account for 87 percent of the total land area and are mountainous and of volcanic origin with peaks up to 4,265 ft (1,300 m) asl (Australian BOM and CSIRO 2011, Vol. 2, p. 77). The other islands consist of small volcanic islands, low-lying atolls, and elevated reefs in the Northern and Southern Lau groups in the east, the centrally located Lomaiviti group, and the Yasawa group in the northwest (Watling 2001, p. 23).

Republic of Vanuatu

The Republic of Vanuatu (Vanuatu) is an archipelago located in the western South Pacific Ocean, approximately 1,500 mi (2,400 km) west of Tutuila Island, American Samoa. Vanuatu lies between 13 to 21 south degrees latitude and 166 to 171 degrees east longitude and includes over 80 islands (about 65 of which are inhabited) with a total land area of 4,707 sq mi (12,190 sq km) (Central Intelligence Agency (CIA) 2013). Larger islands in general are characterized by rugged volcanic peaks and tropical rainforests. The largest island is Espiritu Santo (1,527 sq mi (3,955 sq km)), which also contains the highest peak, Mount Tabwemasana (6,158 ft (1,877 m) asl) (Australia BOM and CSIRO 2011, Vol. 2, p. 245).

Territory of the Wallis and Futuna Islands

The Territory of the Wallis and Futuna Islands (Wallis and Futuna) is an overseas territory of France located approximately 496 mi (799 km) west of Tutuila Island, American Samoa. Wallis and Futuna consists of three main islands (Wallis or Uvea, Futuna, and Alofi) and more than 20 smaller islands, which lie between 13 to 14 south degrees latitude and 176 to 178 west degrees longitude (Watling 2001, pp. 36–37). The land area totals approximately 98 sq mi (255 sq km). Uvea is a low volcanic island with gentle relief, while Futuna and Alofi (uninhabited) are rugged mountainous islands with uplifted coral tiers (Dupon and Beaudou 1986, p. 1; Watling 2001, p. 36). The islands have experienced extensive deforestation due to the continued use of wood as the main fuel source (CIA 2009).

Pacific Sheath-Tailed Bat (South Pacific Subspecies), *Emballonura semicaudata* ssp. *semicaudata,* Peapea Vai (American Samoa), Tagiti (Samoa), Beka Beka (Fiji)

The Pacific sheath-tailed bat is a member of the Emballonuridae, an Old World bat family that has an extensive distribution primarily in the tropics (Nowak 1994, pp. 90–91). A Samoan specimen was first described by Peale in 1848 as *Vespertilio semicaudatus* (Lyon and Osgood 1909, p. 259). The species was later included in the genus *Emballonura* (Temminck 1838; cited in the Integrated Taxonomic Information System (ITIS) 2014) and is now known as *Emballonura semicaudata* (Smithsonian Institution 1909; Tate and Archbold 1939, p. 8). This species is a small bat. Males have a forearm length of about 1.8 in (45 millimeters (mm)), and weigh approximately 0.2 ounces (oz) (5.5 grams (g)), and females are slightly larger in size and weight (Lemke 1986, p. 744; Nowak 1994, p. 91; Flannery 1995, p. 326; Uyehara and Wiles 2009, p. 5). The Pacific sheath-tailed bat was once common and widespread in Polynesia, eastern Melanesia, and Micronesia and is the only insectivorous bat recorded from a large part of this area (Hutson *et al.* 2001, p. 138). Sheath-tailed bats are rich brown to dark brown above and paler below (Walker and Paradiso 1983, p. 211). The common name ''sheath-tailed bat'' refers to the nature of the tail attachment: The tail pierces the tail membrane, and its tip appears completely free on the upper surface of the membrane (Walker and Paradiso 1983, p. 209). The Pacific sheath-tailed bat (all subspecies) is listed as Endangered in the 2015 IUCN (International Union for Conservation of Nature) Red List (Bonaccorso and Allison 2008). Endangered is IUCN's second most severe category of extinction assessment, which equates to a very high risk of extinction in the wild. IUCN criteria include the rate of decline, population size, area of geographic distribution, and degree of population and distribution fragmentation; however, IUCN rankings do not confer any actual protection or management.

Four subspecies of Pacific sheath-tailed bats are currently recognized: *E. s. rotensis,* endemic to the Mariana Islands (Guam and the Commonwealth of the Northern Mariana Islands; proposed for listing as endangered in 2014 (79 FR 59363, October 1, 2014)), and referred to here as the Mariana subspecies); *E. s. sulcata* in Chuuk and Pohnpei; *E. s. palauensis* in Palau; and *E. s. semicaudata* in American Samoa, Samoa, Tonga, Fiji, and Vanuatu (Koopman 1997, pp. 358–360; Oyler-McCance *et al.* 2013, pp. 1,030–1,036), referred to here as the South Pacific subspecies. Recent analysis found notable genetic differences between *E. s. rotensis, E. s. palauensis,* and *E. s. semicaudata,* indeed greater differences than typically reported between mammalian subspecies (Oyler-McCance *et al.* 2013, p. 1,030). Hereafter, ''bat'' or ''Pacific sheath-tailed bat'' refers to the South Pacific subspecies unless otherwise noted.

All subspecies of the Pacific sheath-tailed bat appear to be cave-dependent, roosting during the day in a wide range of cave types, including overhanging cliffs, crevices, lava tubes, and limestone caves (Grant 1993, p. 51; Grant *et al.* 1994, pp. 134–135; Hutson *et al.* 2001, p. 139; Palmeirim *et al.* 2005, p. 28). Large roosting colonies appear fairly common in the Palau subspecies, but smaller aggregations may be more typical of at least the Mariana subspecies and perhaps other species of *Emballonura* (Wiles *et al.* 1997, pp. 221–222; Wiles and Worthington 2002, pp. 15, 17). The Mariana subspecies, which persists only on the island of Aguiguan (Commonwealth of the Northern Mariana Islands (CNMI)), appears to prefer relatively large caves (Wiles *et al.* 2009, p. 15 in O'Shea and Valdez 2009). The limestone cave ecosystem of the Mariana subspecies on Aguiguan is characterized by constant temperature, high relative humidity, and no major air movement (O'Shea and Valdez 2009, pp. 77–78). Such basic habitat data are lacking for the South Pacific subspecies of Pacific sheath-tailed bat, but may be important because the alteration of climate conditions has been implicated in the abandonment of roost caves by other bat species (Hutson *et al.* 2001, p. 101). All subspecies of the Pacific sheath-tailed bat are nocturnal and typically emerge around dusk to forage on flying insects (Hutson *et al.* 2001, p. 138; Craig *et al.* 1993, p. 51). The Mariana Islands subspecies forages almost entirely in forests (native and nonnative) near their roosting caves (Esselstyn *et al.* 2004, p. 307). Other subspecies in Micronesia have been observed foraging beneath the canopy of dense native forest (on Pohnpei) and over town streets (Palau and Chuuk) (Bruner and Pratt 1979, p. 3). Bats and swiftlets (*Aerodramus* spp.) are commonly found sharing caves (Lemke 1986, p. 744; Hutson *et al.* 2001, p. 139; Tarburton 2002, p. 106; Wiles and Worthington 2002, p. 7, Palmeirim *et al.* 2005, p. 28).

In American Samoa, Amerson *et al.* (1982, p. 74) estimated a total population of approximately 11,000 Pacific sheath-tailed bats in 1975 and 1976. A precipitous decline of the bat on the island of Tutuila has been documented since 1990 (Grant *et al.* 1994, p. 134; Koopman and Steadman 1995, pp. 9–10; Helgen and Flannery 2002, pp. 4–5). Knowles (1988, p. 65) recorded about 200 in 1988, and in 1993, observers caught one bat and saw only three more (Grant *et al.* 1994, p. 134). A single bat was also observed on two occasions in a small cave north of Alao (Grant *et al.* 1994, pp. 134–135). Additional small caves and lava tubes have been checked for bats and swiftlets, however, Tutuila is entirely volcanic and does not have the extensive limestone cave systems that provide bat roosting habitat in the Mariana Islands and other Pacific island groups (Grant *et al.* 1994, p. 135). Two individuals were last observed in the cave at Anapeapea Cove on the north shore of Tutuila in 1998 (Hutson *et al.* 2001, p. 138). Surveys conducted by the DMWR in 2006 failed to detect the presence of this species (DMWR 2006, p. 53). In an attempt to ascertain whether the species is still extant, DMWR conducted surveys consisting of acoustic sweeps and cave checks on all main islands in 2008 and 2012, and no bats were detected (Fraser *et al.* 2009, p. 9; U.R. Tulafono 2011, in litt.; DMWR 2013, in litt.). Based on its decline and the lack of detections since it was last seen in 1998, this species is thought to be nearly extirpated (if not already extirpated) in American Samoa (DMWR 2006, p. 54; Uyehara and Wiles 2009, p. 5). DMWR continues to conduct acoustic surveys in search of the Pacific sheath-tailed bat in American Samoa (Miles 2015a, in litt.).

In Samoa, the Pacific sheath-tailed bat is known from the two main islands of Upolu and Savaii, but the species has experienced a severe decline over the last several decades, and has been observed only rarely since Cyclones Ofa (1990) and Val (1991) (Lovegrove *et al.* 1992, p. 30; Park *et al.* 1992, p. 47; Tarburton 2002, pp. 105–108). This species was previously abundant on Upolu with an individual cave estimated to support several thousand individuals (Ollier *et al.* 1979, pp. 22, 39). A survey of 41 lava tube caves and other locations on Upolu and Savaii conducted from 1994 to 1997 detected a total of 5 individuals at two sites, which had declined to 2 individuals total by the end of the survey (Hutson 2001, p. 139; Tarburton 2002, pp. 105–108, Tarburton 2011, p. 38). In Samoa, the Pacific sheath-tailed bat occupies sea caves and lava tubes located from the coast up to elevations of 2,500 ft (762 m) that range from 49 ft (15 m) to over 2,130 ft (650 m) in length; vary in height and width, number of openings, and degree of branching; and may be subject to rockfalls and flooding during high rain events (Tarburton 2011, pp. 40–49).

In Tonga, the distribution of the Pacific sheath-tailed bat is not well known. It has been recorded on the island of Eua and Niaufoou (Rinke 1991, p. 134; Koopman and Steadman 1995, p. 7), and is probably absent from Ata and Late (Rinke 1991, pp. 132–133). In 2007, ten nights of acoustic surveys on Tongatapu and Eua failed to record any detections of this species (M. Pennay pers. comm. in Scanlon *et al.* 2013, p. 456). Pennay describes Eua as the place most likely to support the Pacific sheath-tailed bat because of the island's large tracts of primary forest and many rocky outcrops and caves, but he considers the bat to be extremely rare or extirpated from both islands (M. Pennay pers. comm. in Scanlon *et al.* 2013, p. 456).

In Fiji, the Pacific sheath-tailed bat is distributed throughout the archipelago, on large islands such as Vanua Levu and Taveuni, medium-sized islands in the Lau group (Lakeba, Nayau, Cicia, Vanua Balavu), and small islets such as Yaqeta in the Yasawa group and Vatu Vara and Aiwa in the Lau group (Palmeirim *et al.* 2005, pp. 31–32). Pacific sheath-tailed bats in Fiji roost in lava tubes and limestone caves of varying length and width, beneath rock outcrops, and in cave-like areas formed by irregularly-shaped boulders located in areas along the coast and up to 6.2 mi (10 km) inland (Palmierim *et al.* 2007, pp. 1–13). Running water or pools of water are a common occurrence in inland caves with streams running through or coastal caves that are tidally influenced (Palmierim *et al.* 2007, pp. 1–13). Habitat surrounding roost sites includes undisturbed forest, secondary forest, cultivated areas, and forested cliffs (Palmierim *et al.* 2007, pp. 1–13). The species was reported as common some decades ago on the small, volcanic island of Rotuma, a Fijian dependency, approximately 372 mi (600 km) from the Fiji archipelago (Clunie 1985, pp. 154–155). Although widely distributed, the species clearly has suffered a serious decline since the 1950s as evidenced by a contraction of its range and a decline in density and abundance on the islands where it still occurs (Flannery 1995, p. 327; Palmeirim *et al.* 2005, p. 31). In 2000 to 2001 bats were absent or present in diminished numbers in many of the caves known previously to be occupied on 30 Fijian islands, and villagers reported that small bats, presumably Pacific sheath-tailed bats, were no longer commonly seen (Palmeirim *et al.* 2005, p. 31).

The species is predicted to be extirpated or nearly so on Kadavu, Vanua Levu, and Fiji's largest island, Viti Levu, where it was known to be widespread until the 1970s (Palmeirim *et al.* 2005, p. 31; Scanlon *et al.* 2013, p. 453). Field observations during the 2000 to 2001 surveys documented a single large colony of several hundred individuals on Yaqeta Island in the Yasawa group and a large colony on Vatu Vara Island in the Lau group, but otherwise only a few to dozens of individuals scattered among caves on small and remote islands in the Lau group (Palmeirim *et al.* 2005, pp. 55–62). Scanlon *et al.* 2013 (p. 453) revisited the large cave colony on Yaqeta between 2007 and 2011 and described it as without any evidence of any recent use by bats (*e.g.,* odor, fresh guano) and probably abandoned. The loss of the Yaqeta colony and the species' overall declining trend across the archipelago led Scanlon *et al.* 2013 (p. 456) to infer a reduction in population size of greater than 80 percent over the last 10 years. The most important remaining sites for the protection of this species are likely those on small and mid-sized islands in Lau where bats still occur (Palmeirim *et al.* 2007, p. 512).

In Vanuatu, the Pacific sheath-tailed bat is known from two museum specimens, one collected in 1929 and one collected before 1878, both on the main island of Espiritu Santo (Helgen and Flannery 2002, pp. 210–211). No subsequent expeditions have recorded sheath-tailed bats, suggesting that this species was either extirpated or perhaps never actually occurred in Vanuatu (Medway and Marshall 1975, pp. 32–33; Hill 1983, pp. 140–142; Flannery 1995, p. 326; Helgen and Flannery 2002, pp. 210–211; Palmeirim *et al.* 2007, p. 517). For example, Medway and Marshall (1975, p. 453) detected seven other small, insectivorous bats (family Microchiroptera) in Vanuatu, but failed to observe the Pacific sheath-tailed bat, possibly as a result of survey sites and methods. However, the Vanuatu provenance of the two specimens is not in question (Helgen and Flannery 2002, p. 211). The current disjunct distribution of the Pacific sheath-tailed bat (all subspecies) is suggestive of extinctions (Flannery 1995, p. 45), and the possible extirpation of the South Pacific subspecies from Vanuatu could be an example of this (Helgen and Flannery 2002, p. 211). The bat's status in Vanuatu is unknown, and a basic inventory of Vanuatu's bat fauna is lacking (Helgen and Flannery 2002, p. 211).

In summary, the Pacific sheath-tailed bat, once widely distributed across the southwest Pacific islands of American Samoa, Samoa, Tonga, and Fiji, has undergone a significant decline in numbers and contraction of its range. Reports of possible extirpation or extremely low numbers in American Samoa and Samoa, steep population declines in Fiji, and the lack of detections in Tonga and Vanuatu, suggest that the Pacific sheath-tailed bat is vulnerable to extinction throughout its range. The remaining populations of the Pacific sheath-tailed bat continue to experience habitat loss from deforestation and development, predation by introduced mammals, and human disturbance of roosting caves, all of which are likely to be exacerbated in the future by the effects of climate change (see Summary of Factors Affecting the Species discussion below). In addition, low population numbers and the breakdown of the metapopulation equilibrium across its range render the remaining populations of Pacific sheath-tailed bat more vulnerable to chance occurrences such as hurricanes.

Summary of Factors Affecting the Pacific Sheath-Tailed Bat

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

Habitat Destruction and Modification by Deforestation

Deforestation can cause the destruction and modification of foraging habitat of the Pacific sheath-tailed bat as a result of the loss of cover and reduction of available insect prey. The loss of native plant diversity associated with the conversion of native forests to agriculture and other uses can result in a corresponding reduction in the diversity and number of flying insects (Hespenheide 1975, pp. 84, 96; Waugh and Hails 1983, p. 212; Tarburton 2002, p. 107). Deforestation results from logging, agriculture, and development (Government of Samoa 2001, p. 59; Wiles and Worthington 2002, p. 18) and from hurricanes. Based on the preference of the Mariana subspecies for foraging in forested habitats near their roost caves, Wiles *et al.* (2011, p. 307) predict that past deforestation in the Mariana archipelago may be a principal factor in limiting their current population to the island of Aguiguan, which has healthy native forest. Similarly, in Fiji, most sheath-tailed bat colonies are found roosting in caves in or near good forest (*e.g.,* closed canopy, native forest) (Palmeirim *et al.* 2005, pp. 36, 44); however, much of it has been lost on the large Fijian islands (Palmeirim *et al.* 2007, p. 515).

Deforestation has been extensive and is ongoing across the range of the Pacific sheath-tailed bat. On the island of Tutuila, American Samoa, agriculture and development cover approximately 24 percent of the island and are concentrated in the coastal plain and low-elevation areas where loss of forest is likely to have modified foraging habitat for sheath-tailed bats (American Samoa Community College (ASCC) 2010, p. 13). In Samoa, the amount of forested area declined from 74 to 46 percent of total land area between 1954 and 1990 (Food and Agricultural Organization (FAO) 2005 in litt.). Between 1978 and 1990, 20 percent of all forest losses in Samoa were attributable to logging, with 97 percent of the logging having occurred on Savaii (Government of Samoa 1998 in Whistler 2002, p. 132). Forested land area in Samoa continued to decline at a rate of roughly 2.1 percent or 7,400 ac (3,000 ha) annually from 1990 to 2000 (FAO 2005 in litt.). As a result, there is very little undisturbed, mature forest left in Samoa (Watling 2001, p. 175; FAO 2005 in litt.). Today, only 360 ac (146 ha) of native lowland rainforests (below 2,000 ft or 600 m) remain on Savaii and Upolu as a result of logging, agricultural clearing, residential clearing (including relocation due to tsunami), and natural causes such as rising sea level and hurricanes (Ministry of Natural Resources and Environment (MNRE) 2013, p. 47). On Upolu, direct or indirect human influence has caused extensive damage to native forest habitat (above 2,000 ft or 600 m) (MNRE 2013, p. 13). Although forested, almost all upland forests on Upolu are largely dominated by introduced species today. Savaii still has extensive upland forests, which are for the most part undisturbed and composed of native species (MNRE 2013, p. 40). Although the large Fijian islands still have some areas of native forest, much of it has been lost (*e.g.,* 17 percent between 1990 and 2000; FAO 2005 in litt.), and commercial logging continues (Palmeirim *et al.* 2007, p. 515). The best available information does not provide the current status of native forests and rates of forest loss in Tonga or Vanuatu. Native forests are preferred foraging habitat of the Pacific sheath-tailed bat, and deforestation is occurring in Fiji (where the last relatively large population occurs), and in Samoa, and has occurred in American Samoa. Therefore we conclude that habitat destruction and modification by deforestation is a current threat to the species in at least Fiji and Samoa, which comprise roughly 62 percent of the land area, and occupy the center, of the bat's range.

Habitat Destruction and Modification by the Effects of Climate Change

Climate change may have impacts to the habitat of the Pacific sheath-tailed bat. Discussion of these impacts is included in our complete discussion of climate change in the section ''E. Other Natural or Manmade Factors Affecting Their Continued Existence,'' below.

Conservation Efforts To Reduce Habitat Destruction, Modification, or Curtailment of Its Range

American Samoa

The National Park of American Samoa (NPSA) was established to preserve and protect the tropical forest and archaeological and cultural resources, to maintain the habitat of flying foxes, to preserve the ecological balance of the Samoan tropical forest, and, consistent with the preservation of these resources, to provide for the enjoyment of the unique resources of the Samoan tropical forest by visitors from around the world (Pub. L. 100–571, Pub. L. 100–336). Under a 50-year lease agreement between local villages, the American Samoa Government, and the Federal Government, approximately 8,000 ac (3,240 ha) of forested habitat on the islands of Tutuila, Tau, and Ofu are protected and managed, including suitable foraging habitat for the Pacific sheath-tailed bat (NPSA Lease Agreement 1993).

Samoa

As of 2014, a total of approximately 58,176 ac (23,543 ha), roughly 8 percent of the total land area of Samoa (285,000 ha) was enlisted in terrestrial protected areas, with the majority located in five national parks covering a total of 50,629 ac (20,489 ha), overlapping several sites known to be previously occupied by the bat (Tarburton 2002, pp. 105–107; Tarburton 2011, pp. 43–46).

Fiji

Fiji currently has 23 terrestrial protected areas covering 188 sq mi (488 sq km) or 2.7 percent of the nation's land area (Fiji Department of Environment 2014, pp. 20–21). Most notably, on Taveuni Island, the Bouma

National Heritage Park (3,500 ac (1,417 ha)), Taveuni Forest Reserve (27,577 ac (11,160 ha)), and Ravilevu Reserve (9.934 ac (4,020 ha)) may contain caves and could provide important foraging habitat for the Pacific sheath-tailed bat (Fiji Department of Environment 2011; Naikatini 2015, in litt.; Scanlon 2015a, in litt.). Additional areas of remnant forest and important bat habitat are also managed informally under traditional custodial management systems (Scanlon 2015a, in litt.).

Summary of Factor A

Based on our review of the best available scientific and commercial information, habitat destruction and degradation by deforestation, as a result of logging and land-clearing for agriculture and other land-uses, is occurring throughout the range of the Pacific sheath-tailed bat. Habitat destruction and modification and range curtailment are current threats to the Pacific sheath-tailed bat that are likely to persist in the future.

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

The best available information does not indicate that the Pacific sheath-tailed bat is used for any commercial, recreational, scientific, or educational purpose. As a result, we do not find overutilization for commercial, recreational, scientific, or educational purposes to be a threat to the Pacific sheath-tailed bat.

C. Disease or Predation

Predation by Nonnative Mammals

Predation by nonnative mammals (mammals that occur as a result of introduction by humans) is a factor in the decline of the Pacific sheath-tailed bat throughout its range. Terrestrial predators may be able to take the bat directly from its roosts, which are often in exposed sites such as shallow caves, rock overhangs or cave entrances. Domestic and feral cats (*Felis catus*) can capture low-flying bats; cats have been documented to wait for bats as they emerge from caves and capture them in flight (Tuttle 1977 in Palmeirim *et al.* 2005, p. 33; Ransome 1990 in Palmeirim *et al.* 2005, p. 33; Woods *et al.* 2003, pp. 178, 188). Consequently, even a few cats can have a major impact on a population of cave-dwelling bats (Palmeirim *et al.* 2005, p. 34).

Of the predators introduced to Fiji, cats are the most likely to prey on bats (Palmeirim *et al.* 2005, pp. 33–34). On Cicia Island in the Lau group in Fiji, Palmeirim *et al.* (2005, p. 34) observed a cat next to the entrance of a cave where Pacific sheath-tailed bats roosted, far from any human settlement. On Lakeba (Lau), a cave that once harbored a large colony of Pacific sheath-tailed bats is now empty and called Qara ni Pusi (cave of the cat; (Palmeirim *et al.* 2005, p. 34)). Feral cats are also present on Tutuila and on the Manua Islands in American Samoa, (Freifeld 2007, pers. comm.; Arcilla 2015, in litt.). Feral cats have also been documented in Samoa, Tonga, and are likely present in Vanuatu (Atkinson and Atkinson 2000, p. 32; Freifeld 2007, pers. comm.; Arcilla 2015, in litt.).

Rats may also prey on the Pacific sheath-tailed bat. Rats are omnivores and opportunistic feeders and have a widely varied diet consisting of nuts, seeds, grains, vegetables, fruits, insects, worms, snails, eggs, frogs, fish, reptiles, birds, and mammals (Fellers 2000, p. 525; Global Invasive Species Database (GISD) 2011). Rats are known to prey on non-volant (young that have not developed the ability to fly) bats at roosting sites and can be a major threat to bat colonies (Wiles *et al.* 2011, p. 306). Of several nonnative rats (*Rattus* spp.) found on islands in the Pacific, black rats (*R. rattus*) likely pose the greatest threat to Pacific sheath-tailed bats because of their excellent climbing abilities (Palmeirim 2015, in litt.). Although we lack direct evidence of black rats preying on Pacific sheath-tailed bats, this rat species has had documented, adverse impacts to other colonial species of small bats, such as Townsend's big-eared bat (*Corynorhinus townsendii*) in California (Fellers 2000, pp. 524–525), and several species (*Mystacina* spp.) in New Zealand (Daniel and Williams 1984, p. 20). Based on observations of swiftlets, cave-nesting birds that often share bats' roosting caves, smooth rock overhangs in tall caverns can provide nesting surfaces safe from rats, cats, and other predators (Tarburton 2011, p. 38). However, bats roosting in caves with low ledges or those that are filled with debris as a result of rockfalls or severe weather events are likely to either abandon such caves or become more accessible to predators such as rats. Rats have been postulated as a problem for the Mariana subspecies of the Pacific sheath-tailed bat (Wiles *et al.* 2011, p. 306); their remaining roost sites on Aguiguan appear to be those that are inaccessible to rodents (Wiles and Worthington 2002, p. 18; Berger *et al.* 2005, p. 144). Nonnative rats are present throughout the range of Pacific sheath-tailed bats (Atkinson and Atkinson 2000, p. 32), and although we lack information about the impact of rats on this species, based on information from other bat species, we consider rats to be predators of this species.

In summary, nonnative mammalian predators such as rats and feral cats are present throughout the range of the Pacific sheath-tailed bat. Predation of related subspecies and other cave-roosting bats by rats and feral cats strongly suggests a high probability of predation of the Pacific sheath-tailed bat. Based on the above information, we conclude that predation by rats and feral cats is a current and future threat to the Pacific sheath-tailed bat throughout its range.

Disease

Disease may contribute to the decline of the Pacific sheath-tailed bat, especially because of the bat's communal roosting habit (Wiles and Worthington 2002, p. 13). Microchiropterans have been severely affected by certain diseases, such as white nose syndrome in North America; therefore, the possibility exists that an undetected disease has led or contributed to the extirpation of this species on several islands (Malotaux 2012a in litt.). However, disease has not been observed either in the Mariana or South Pacific subspecies of Pacific sheath-tailed bat (Palmeirim *et al.* 2007, p. 517; Wiles *et al.* 2011, p. 306). The best available information does not indicate that disease is a threat to this species; therefore, we conclude that disease is not a current threat the Pacific sheath-tailed bat or likely to become a threat in the future.

Conservation Efforts To Reduce Disease or Predation

We are unaware of any conservation actions planned or implemented at this time to abate the threats of predation by feral cats or rats to the Pacific sheath-tailed bat.

Summary of Factor C

In summary, based on the best available scientific and commercial information, we consider predation by nonnative mammals to be an ongoing threat to the Pacific sheath-tailed bat that will continue into the future. We do not find that disease is a threat to the Pacific sheath-tailed bat, or that it is likely to become one in the future.

D. The Inadequacy of Existing Regulatory Mechanisms

The Act requires that the Secretary assess available regulatory mechanisms in order to determine whether existing regulatory mechanisms may be inadequate as designed to address threats to the species being evaluated (Factor D). Under this factor, we examine whether existing regulatory mechanisms are inadequate to address the potential threats to the Pacific sheath-tailed bat discussed under other factors. In determining whether the inadequacy of regulatory mechanisms constitutes a threat to the Pacific sheath-tailed bat, we analyzed the existing Federal, Territorial, and international laws and regulations that may address the threats to this species or contain relevant protective measures. Regulatory mechanisms, if they exist, may preclude the need for listing if we determine that such mechanisms adequately address the threats to the species such that listing is not warranted.

American Samoa

In American Samoa no existing Federal laws, treaties, or regulations specify protection of the Pacific sheath-tailed bat's foraging habitat from the threats of agriculture and development, protect its known roosting caves from disturbance, or address the threat of predation by nonnative mammals such as rats and feral cats. However, some existing Territorial laws and regulations have the potential to afford the species some protection but their implementation does not achieve that result. The DMWR is given statutory authority to ''manage, protect, preserve, and perpetuate marine and wildlife resources'' and to promulgate rules and regulations to this end (American Samoa Code Annotated (ASCA), title 24, chapter 3). This agency conducts monitoring surveys, conservation activities, and community outreach and education about conservation concerns. However, to our knowledge, DMWR has not used this authority to undertake conservation efforts for the Pacific sheath-tailed bat such as habitat protection and control of nonnative predators (DMWR 2006, pp. 79–80).

The Territorial Endangered Species Act provides for appointment of a Commission with the authority to nominate species as either endangered or threatened (ASCA, title 24, chapter 7). Regulations adopted under the Coastal Management Act (ASCA § 24.0501 *et seq.*) also prohibit the taking of threatened or endangered species listed as threatened or endangered by the American Samoa Government (ASG) (American Samoa Administrative Code (ASAC) § 26.0220.I.c). However, the ASG has not listed the bat as threatened or endangered so these regulatory mechanisms do not provide protection for this species.

Commercial hunting and exportation of the Pacific sheath-tailed bat is prohibited under ASCA, title 24, chapter 23, ''Conservation of Flying Foxes),'' which also authorizes and directs the ASG DMWR to monitor flying fox populations, protect roosting areas from disturbance, and conduct other activities to manage and protect the species. This law identifies the Pacific sheath-tailed bat as a ''flying fox species'' (ASCA § 24.2302), but it has not led to measures implemented to protect the Pacific sheath-tailed bat or its habitat from known threats. The sale and purchase of all native bats is prohibited, and the take, attempt to take, and hunting of all native bats are prohibited unless explicitly allowed during an officially proclaimed hunting season (ASAC § 24.1106); take is defined as harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or to attempt to engage in such conduct (ASAC § 24.1101 (f)). However, we do not consider hunting or other forms of utilization to be a threat to the Pacific sheath-tailed bat.

Under a 50-year lease agreement between local villages, the American Samoa Government, and the Federal Government, approximately 8,000 ac (3,240 ha) of forested habitat on the islands of Tutuila, Tau, and Ofu are protected and managed in the National Park of American Samoa (NPSA Lease Agreement 1993). There is the potential for development surrounding park in-holdings, but such forest clearing would be isolated and small in scale compared to the large tracts of forested areas protected.

Under ASCA, title 24, chapter 08 (Noxious Weeds), the Territorial DOA has the authority to ban, confiscate, and destroy species of plants harmful to the agricultural economy. This authority was expanded by executive regulation so that the governor can ban the use or importation of any plant (ASCA § 24.0801). A permit from the director of the DOA is likewise required before plants may be imported to American Samoa (ASAC § 24.0328). These regulations are promulgated without consultation with the DMWR (DMWR 2006, p. 80). Although these regulations provide some protection against the introduction of nonnative plant species, some imports permitted by the DOA, or that escape detection, could prove harmful to native species and their habitats in American Samoa. These regulations do not require any measures to control invasive nonnative plants that already are established and proving harmful to native species and their habitats.

Similarly, under ASCA, title 24, chapter 06 (Quarantine), the director of DOA has the authority to promulgate agriculture quarantine restrictions concerning animals. Using this authority, the DOA has restricted the importation of insects, farm animals, and ''domestic pets,'' including exotic animals, to entry by permit only (See ASAC § 24.0305 *et. seq.*). Yet these restrictions do not expressly extend to all non-domesticated animals, nor does the DMWR have any consultative role in restricting entry of animals (or plants) harmful to wildlife or native flora. Accordingly, existing statutes and regulations leave a great deal of discretion to the DOA, which may not block the entry of animals harmful to native species or their habitats (DMWR 2006, p. 80). These regulations do not require any measures to control nonnative animals, such as mammalian predators, that already are established and proving harmful to native species and their habitats.

The Territorial Coastal Management Act establishes a land use permit (LUP) system for development projects and a Project Notification Review System (PNRS) for multi-agency review and approval of LUP applications (ASAC § 26.0206). The standards and criteria for review of LUP applications includes requirements to protect Special Management Areas (SMA), Unique Areas, and ''critical habitats'' where ''sustaining the natural characteristics is important or essential to the productivity of plant and animal species, especially those that are threatened or endangered'' on all lands and in coastal waters in the territory not under federal management authority (ASCA § 24.0501 *et. seq.*). To date, three SMAs have been designated (Pago Pago Harbor, Leone Pala, and Nuuuli Pala; ASAC § 26.0221), and all are in coastal and mangrove habitats on the south shore of Tutuila that likely provide little foraging habitat and no roosting habitat for the Pacific sheath-tailed bat. The only Unique Area designated to date is the Ottoville Rainforest (American Samoa Coastal Management Program 2011, p. 52), also on Tutuila's south shore, which hypothetically may provide some foraging habitat for Pacific sheath-tailed bats, but it is a relatively small island of native forest in the middle of the heavily developed Tafuna Plain (Trail 1993, p. 4), far from the last known roost sites of this species. To the best of our knowledge, no critical habitats, as defined in the ASCA, have been designated. Nonetheless, these laws and regulations are designed to ensure that ''environmental concerns are given appropriate consideration,'' and include provisions and requirements that could address to some degree threats to native forests and other habitats important to the Pacific sheath-tailed bat, even though individual species are not named (ASAC § 26.0202 *et seq.*). Because the implementation of these regulations has been minimal, and because review of permits is not rigorous and does not reliably include the members of the PNRS Board responsible for management of wildlife and natural resources (ASCA § 26.026.C), issuance of permits may not provide the habitat protection necessary for the conservation of the species and instead may result in loss of native habitat important to the Pacific sheath-tailed bat and other species as a result of land clearing for agriculture and development (DMWR 2006, p. 71). We conclude that the implementation of the Coastal Management Act and its PNRS is inadequate to address the threat of habitat destruction and degradation to the Pacific sheath-tailed bat.

In summary, some existing Territorial laws and regulatory mechanisms have the potential to offer some level of protection for the Pacific sheath-tailed bat and its habitat but are not currently implemented in a manner that would do so. The DMWR has not has not exercised its statutory authority to address threats to the bat such has nonnative species. The bat is not listed pursuant to the Territorial Endangered Species Act. The Coastal Management Act and its implementing regulations have the potential to address this threat more substantively, but are inadequately implemented. Therefore, we conclude that regulatory mechanisms in American Samoa do not address threats to the Pacific sheath-tailed bat.

Samoa

In Samoa, the Animals Ordinance 1960 and the Protection of Wildlife Regulations 2004 regulate the protection, conservation, and utilization of terrestrial or land-dwelling species (MNRE and the Secretariat of the Pacific Regional Environment Programme (SPREP) 2012, p. 5). These laws and regulations prohibit, and establish penalties for committing, the following activities: (1) The take, keep, or kill of protected and partially protected animal species; (2) harm of flying species endemic to Samoa; and (3) the export of any bird from Samoa (MNRE and SPREP 2012, pp. 5–6). As described above, the Pacific sheath-tailed bat is neither endemic to the Samoan archipelago, nor is it listed as a ''flying species endemic to Samoa'' under the Protection of Wildlife Regulations 2004. Therefore, it is not protected by the current regulations.

The Planning and Urban Management Act 2004 (PUMA) and PUMA Environmental Impact Assessment (EIA) Regulation (2007) were enacted to ensure all development initiatives are properly evaluated for adverse environmental impacts (MNRE 2013, p. 93). The information required under PUMA for Sustainable Management Plans (Para. 18, Consultation) and Environmental Impact Assessments (Para. 46, Matters the Agency shall consider) does not include specific consideration for species or their habitat (PUMA 2004, as amended). Other similar approval frameworks mandated under other legislation address specific stressors and activities. These include the permit system under the Lands Surveys and Environment Act 1989 for sand mining and coastal reclamation, and ground water exploration and abstraction permits under the Water Resources Act 2008 (MNRE 2013, p. 93). The PUMA process has been gaining in acceptance and use; however, information is lacking on its effectiveness in preventing adverse impacts to species or their habitats (MNRE 2013, p. 93).

The Forestry Management Act 2011 aims to provide for the effective and sustainable management and utilization of forest resources. This law creates the requirement for a permit or license for commercial logging or harvesting of native, agro-forestry, or plantation forest resources (MNRE and SPREP 2012, p. 18). Permitted and licensed activities must follow approved Codes of Practice, forestry harvesting plans, and other requirements set by the Ministry of Natural Resources and Environment. Certain restrictions apply to actions on protected lands such as national parks and reserves. Permits or licenses may designate certain areas for the protection of the biodiversity, endangered species, implementation of international conventions, water resources, or area determined to be of significance on which no forestry activities may be undertaken (Forestry Management Act 2011, Para. 57). Although this law includes these general considerations for managing forest resources, it does not specifically provide protection to habitat for the Pacific sheath-tailed bat.

Fiji

In Fiji, the Endangered and Protected Species Act (2002) regulates the international trade, domestic trade, possession, and transportation of species protected under CITES and other species identified as threatened or endangered under this act. Under the law, the Pacific sheath-tailed bat is recognized as an ''indigenous species not listed under CITES.'' Its recognition under the law can garner public recognition of the importance of conserving the bat and its habitat (Tuiwawa 2015, in litt.); however, because the focus of the legislation is the regulation of foreign and domestic trade, and the bat is not a species in trade, this law is not intended to provide protection for the bat or its habitat within Fiji. The best available information does not identify any laws or regulations protecting the habitat of the Pacific sheath-tailed bat in Fiji.

Tonga

In Tonga, the Birds and Fish Preservation (Amendment) Act 1989, is a law to ''make provision for the preservation of wild birds and fish.'' The law protects birds and fish, and provides for the establishment of protected areas, but it does not specifically protect the Pacific sheath-tailed bat or its habitat (Kingdom of Tonga 1988, 1989).

Vanuatu

In Vanuatu, the Environment Management and Conservation Act (2002) provides for conservation, sustainable development, and management of the environment of Vanuatu. Areas of the law that may apply to species protection are the Environmental Impact Assessment process, which includes an assessment of protected, rare, threatened, or endangered species or their habitats in project areas, laws on bioprospecting, and the creation of Community Conservation Areas for the management of unique genetic, cultural, geological, or biological resources (Environmental Management and Conservation Act, Part 3, Environmental Impact Assessment). The Wild Bird Protection law (Republic of Vanuatu 2006) is limited to birds and does not offer protection to the Pacific sheath-tailed bat or its habitat.

Summary of Factor D

Based on the best available information, some existing regulatory mechanisms have the potential to offer protection, but their implementation does not reduce or remove threats to the Pacific sheath-tailed bat. In American Samoa the DMWR has not exercised its statutory authority to address threats to the bat such as predation by nonnative species, the bat is not listed pursuant to the Territorial Endangered Species Act, and the Coastal Management Act's land use permitting process is implemented inadequately to reduce or remove the threat of habitat destruction or modification to the Pacific sheath-tailed bat. Therefore, we conclude that existing regulatory mechanisms do not address the threats to the Pacific sheath-tailed bat.

E. Other Natural or Manmade Factors Affecting Its Continued Existence

Roost Disturbance

Disturbance of roosting caves has contributed to the decline of the Pacific sheath-tailed bat throughout its range. Disturbance of roost caves by humans is likely to have occurred as a result of recreation, harvesting of co-occurring bat species, and, more commonly, guano mining (Grant *et al.* 1994, p. 135; Tarburton 2002, p. 106; Wiles and Worthington 2002, p. 17; Palmeirim *et al.* 2005, pp. 63, 66; Malotaux 2012a in litt.; Malotaux 2012b in litt.). Roost disturbance is a well-known problem for many cave-dwelling species (Palmeirim *et al.* 2005, p. 3). Roosts are important sites for bats for mating, rearing young, and hibernating (in mid- and high-latitude species). Roosts often facilitate complex social interactions, offer protection from inclement weather, help bats conserve energy, and minimize some predation risk (Kunz and Lumsden 2003, p. 3); therefore, disturbance at caves and being repeatedly flushed from their roosts may cause bats to incur elevated energetic costs and other physiological stress and potentially increased risk of predation while in flight. Roost disturbance thus would negatively affect the survival and reproduction of the Pacific sheath-tailed bat.

In American Samoa, human disturbance at the two caves known to be historical roost sites for the bat is likely to be minimal. Guano mining occurred in the Anapeapea caves in the 1960s (Amerson *et al.* 1982, p. 74), but ceased due to the high salt content as a result of flooding with seawater during cyclones (Grant *et al.* 1994, p. 135). On Taveuni, Fiji, a cave known to be used as a roosting cave for the Pacific sheath-tailed bat is under more immediate threat by humans, as the cave is situated close to farmland, and is often used by locals (Malotaux 2012a, p. 3). On Upolu, Samoa, caves previously known to support bats are well-known and often visited by tourists; one within O le Pupu Pue National Park and others on village land (Tarburton 2011, pp. 40, 44). Swiftlets (*Aerodramus* spp.) are still observed in significant numbers in these caves (Tarburton 2011, p. 40), but these birds may be more tolerant than bats of human disturbance. We do not have information on human disturbance of roosts in Tonga or Vanuatu.

Goats are certain to enter caves for shelter from the sun and consequently can disturb roosting bats, although the extent of this disturbance is unknown (Scanlon 2015b, in litt.). Feral goats have been observed entering caves on Aguiguan Island for shelter, which disrupts colonies of the endangered swiftlet and is believed to disturb the Mariana subspecies of the Pacific sheath-tailed bat (Wiles and Worthington 2002, p. 17; Cruz *et al.* 2008, p. 243; Scanlon 2015b, in litt.). Researchers found that if caves that were otherwise suitable for bats were occupied by goats, there were no bats present in the caves (Guam Division of Aquatic and Wildlife Resources 1995, p. 95). On Yaqeta Island, Fiji, a cave once known to support several hundred Pacific sheath-tailed bats but now abandoned, is located within a small forest fragment frequented by goats (Scanlon *et al.* 2013, p. 453).

Populations of the Pacific sheath-tailed bat are concentrated in the caves where they roost, and chronic disturbance of these sites can result in the loss of populations, as described above. Because so few populations of this bat remain, loss of additional populations to roost disturbance further erodes its diminished abundance and distribution. Based on the above information, roost disturbance at caves accessible to humans and animals such as feral goats is a current threat and will likely continue to be a threat into the future.

Pesticides

The use of pesticides may negatively affect the Pacific sheath-tailed bat as a result of direct toxicity and a reduction in the availability of insect prey. Pesticides are known to adversely affect bat populations, either by secondary poisoning when bats consume contaminated insects or by reducing the availability of insect prey (Hutson *et al.,* 2001, p. 138; Mickleburgh *et al.* 2002, p. 19). Pesticides may have contributed to declines and loss of the Mariana subspecies of Pacific sheath-tailed bat on islands where pesticides were once applied in great quantities (Guam, Saipan, and Tinian) (Wiles and Worthington 2002, p. 17).

In American Samoa and Samoa, current levels of pesticide use are likely lower than several decades ago when their use, particularly during the years in which taro was grown on large scales for export (1975–1985), coincided with the decline of bats in both places and has been implicated as the cause (Tarburton 2002, p. 107). However, Grant *et al.* (1994, pp. 135–136) dismissed the role of insecticides in the decline of the bat in American Samoa based on the absence of a similar population crash in the insectivorous white-rumped swiftlet (*Aerodramus spodiopygius*) and the limited use of agricultural and mosquito-control pesticides. On the island of Taveuni in Fiji, where bat populations have persisted at low levels over the last 10 years (Palmeirim *et al.* 2005, p. 62, Malotaux 2012, in litt.), several locals reported that pesticide use was quite widespread, and their use may be similar on other Fijian islands (Malotaux 2012, in litt.). We do not have information about pesticide use in Tonga or Vanuatu. The best available information does not lead us to conclude that the use of pesticides is a current threat to the Pacific sheath-tailed bat or that it is likely to become one in the future.

Hurricanes

Although severe storms are a natural disturbance with which the Pacific sheath-tailed bat has coexisted for millennia, such storms exacerbate other threats to the species by adversely affecting habitat and food resources and pose a particular threat to its small and isolated remaining populations. American Samoa, Samoa, Fiji, Tonga, and Vanuatu are irregularly affected by hurricanes (Australian BOM and CSIRO 2011 Vol. 1, p. 41). Located in the Southern Hemisphere, these countries experience most hurricanes during the November to April wet season, with the maximum occurrence between January and March (Australian BOM and CSIRO 2011 Vol. 1, p. 47). In the 41-year period ending in 2010, more than 280 hurricanes passed within 250 mi (400 km) of Samoa (52 storms), Tonga (71), Fiji (70), and Vanuatu (94) (Australian BOM and CSIRO 2011, pp. 76, 186, 216, 244). In recent decades, several major (named) storms have hit American Samoa and Samoa (Tusi in 1987, Ofa in 1990, Val in 1991, Heta in 2004, and Olaf in 2005 (MNRE 2013, pp. 31–32; Federal Emergency Management Agency 2015, in litt.)); Tonga (Waka in 2001 and Ian in 2014 (Tonga Meteorological Service 2006, in litt.; World Bank 2014, in litt.)); Fiji (Tomas in 2010 (Digital Journal 2010, in litt.)); and, most recently, Vanuatu (Pam in 2015 (BBC 2015, in litt.)).

The high winds, waves, strong storm surges, high rainfall, and flooding associated with hurricanes, particularly severe hurricanes (with sustained winds of at least 150 mi per hour or 65 m per second) cause direct mortality of the Pacific sheath-tailed bat. Cyclones Ofa (1990) and Val (1991) removed the dense vegetation that had obscured the entrance to the larger cave at Anapeapea Cove, inundated the cave with water, filled it with coral and fallen trees, and washed the cave walls clean (Craig *et al.* 1993, p. 52; Grant *et al.* 1994, p. 135). The majority of sheath-tailed bats in the cave likely were killed when the hurricane hit (Grant *et al.* 1994, p. 135).

Hurricanes also cause direct mortality of the Pacific sheath-tailed bat as a result of the bats' inability to forage during extended periods of high wind or rain, during which they may starve. Cyclone Val (December 1991) remained stationary over the Samoan archipelago for four days, and Pacific sheath-tailed bats likely were unable to feed during this time (Grant *et al.* 1994, p. 135). Despite the ability of Pacific sheath-tailed bats to enter torpor to survive episodes of inclement weather, the high ambient temperatures in Samoa may preclude the energy savings necessary to sustain a small (4–7-g) torpid bat for an extended period (Grant *et al.* 1994, p. 135).

Hurricanes may also cause modification of the roosting habitat of the Pacific sheath-tailed bat by modifying vegetation in and around cave entrances and altering climate conditions within roosting caves as a result. Microchiropterans, such as the Pacific sheath-tailed bat, can spend over half their lives in their roosts; consequently, the microclimate of these habitats can exert a strong influence over their heat-energy balance (Campbell *et al.* 2011, p. 174). The presence of nearby forest cover and a well-developed tree canopy at cave entrances is likely to be important in maintaining temperature and relative humidity, and minimizing air movement in bat roosts, while allowing for passage. O'Shea and Valdez (2009, pp. 77–78) characterized the limestone cave ecosystem of the Mariana subspecies on Aguiguan as having constant temperature, high relative humidity, and no major air movement. Although such data are lacking for the Pacific sheath-tailed bat, alteration of climate conditions has been implicated in the abandonment of roost caves by other bat species (Hutson *et al.* 2001, p. 101).

Loss of forest cover and associated insect prey for bats as a result of hurricanes can reduce foraging opportunities. Following Cyclones Ofa (1990) and Val (1991), about 90 percent of the forests on Upolu and Savaii were blown over or defoliated (Park *et al.* 1992, p. 4; Elmqvist *et al.* 2002, pp. 385, 388). Tarburton (2002, p. 107) noted that the abundance of flying insects remained low for weeks after cyclones had defoliated trees. Although the Pacific sheath-tailed bat has the capacity to forage in a variety of habitats, a study of habitat use by the Mariana subspecies showed a clear preference for forested habitats (Esselstyn *et al.* 2004, p. 307). Finally, the Pacific sheath-tailed bat's severely diminished abundance and distribution increase the likelihood that mortality events will cause population-level impacts and increase the vulnerability of populations and of the species to environmental catastrophes. Based on the information described above, we consider hurricanes to be a factor that exacerbates other threats to the Pacific sheath-tailed bat.

Low Numbers of Individuals and Populations

The low numbers of individuals and populations of this subspecies place the Pacific sheath-tailed bat at great risk of extinction from inbreeding and stochastic events such as storms. The threat is significant for cave-dwelling species whose populations are often highly localized with few numbers of animals that can easily be lost in a severe storm, disease outbreak, or disturbance to the roost caves (Wiles and Worthington 2002, p. 20).

Species that undergo significant habitat loss and degradation and face other threats resulting in decline in numbers and range reduction are inherently highly vulnerable to extinction resulting from localized catastrophes such as severe storms or disease outbreaks, climate change effects, and demographic stochasticity (Shaffer 1981, p. 131; Gilpin and Soulé 1986, pp. 24–34; Pimm *et al.* 1988, p. 757; Mangel and Tier 1994, p. 607). Conditions leading to this level of vulnerability are easily reached by island species that face numerous threats such as those described above. Small populations persisting in fragmented habitat face increased risk from environmental catastrophes, such as hurricanes, which could immediately extinguish some or all of the remaining populations; demographic stochasticity that could leave the species without sufficient males or females to be viable; or inbreeding depression or loss of adaptive potential that can be associated with loss of genetic diversity and result in eventual extinction (Shaffer 1981, p. 131; Lacy 2000, pp. 40, 44–46). The problems associated with small population size and vulnerability to natural catastrophes or random demographic or genetic fluctuations are further magnified by synergistic interactions with ongoing threats such as those discussed above under Factors A and C (Lacy 2000, pp. 45–47).

Breakdown of the Metapopulation Equilibrium

The Pacific sheath-tailed bat is thought to have a metapopulation structure (Palmeirim *et al.* 2005, p. 29), and will only persist in an archipelago if the island colonization rate is sufficiently high to compensate for the rate of extirpation caused by stochastic factors on individual islands (Palmeirim *et al.* 2005, p. 36). However, the colonization rate is obviously proportional to the availability of source populations; immigration of bats to recolonize sites or islands where the species was extirpated is dependent on sufficient numbers of animals existing in multiple other sites or islands within dispersal distance (Hanski and Gilpin 1991, pp. 4–14). Consequently, the extirpation of the Pacific sheath-tailed bat from some islands, particularly from the largest islands, may in the long term result in the permanent regional extinction of the species, even if suitable environmental conditions persist on some islands (Palmeirim *et al.* 2005, p. 36). For example, the continued decline of the only significant source population of Pacific sheath-tailed bat in the Fijian archipelago greatly diminishes the probability of recolonization and persistence throughout the remainder of its range in Fiji, where it is currently considered to be extirpated or nearly extirpated. The loss of a functioning metapopulation is a current threat and will continue to be a threat in the future.

Climate Change

Our analyses under the Act include consideration of ongoing and projected changes in climate. The terms ''climate'' and ''climate change'' are defined by the Intergovernmental Panel on Climate Change (IPCC). ''Climate'' refers to the mean and variability of different types of weather conditions over time, with 30 years being a typical period for such measurements, although shorter or longer periods also may be used (IPCC 2013, p. 1,450). The term ''climate change'' thus refers to a change in the mean or variability of one or more measures of climate (*e.g.,* temperature or precipitation) that persists for an extended period, typically decades or longer, whether the change is due to natural variability, human activity, or both (IPCC 2013, p. 1,450). Various types of changes in climate can have direct or indirect effects on species. These effects may be positive, neutral, or negative and they may change over time, depending on the species and other relevant considerations, such as the effects of interactions of climate with other variables (*e.g.,* habitat fragmentation) (IPCC 2007, pp. 8–14, 18). Climate change will be a particular challenge for the conservation of biodiversity because the introduction and interaction of additional stressors may push species beyond their ability to survive (Lovejoy 2005, pp. 325–326). The synergistic effects of climate change and habitat fragmentation are the most menacing facet of climate change for biodiversity (Hannah *et al.* 2005, p. 4). Currently, there are no climate change studies that address impacts to the specific habitat of the Pacific sheath-tailed bat. There are, however, climate change studies that address potential changes in the tropical Pacific on a broader scale.

In our analyses, we reference the scientific assessment and climate change predictions for the western Pacific region prepared by the Pacific Climate Change Science Program (PCCSP), a collaborative research partnership between the Australian Government and 14 Pacific Island countries, including Samoa, Tonga, Fiji, and Vanuatu (Australian BOM and CSIRO 2011 Vol. 1, p. 15). The assessment builds on the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC), and presents regional predictions for the area roughly between 25° S. to 20° N. and 120° E. to 150° W. (excluding the Australian region south of 10° S. and west of 155° E.) (Australian BOM and CSIRO 2011 Vol. 1, pp. 14, 20). The findings for Samoa (13° S. and 171° E.) may be used as a proxy for American Samoa (14° S. and 170° W.).

The annual average air temperatures and sea surface temperatures are projected to increase in American Samoa, Samoa, Fiji, Tonga, and Vanuatu, as well as throughout the western Pacific region (Australian BOM and CSIRO 2011 Vol. 2, pp. 91, 198, 228, 258). The projected regional warming is around 0.5–1.0 °C by 2030, regardless of the emissions scenario. By 2055, the warming is generally 1.0–1.5 °C with regional differences depending on the emissions scenario. Projected changes associated with increases in temperature include, but are not limited to, changes in mean precipitation with unpredictable effects on local environments (including ecosystem processes such as nutrient cycling), increased occurrence of drought cycles, increases in the intensity and number of severe storms, sea-level rise, a shift in vegetation zones upslope, and shifts in in the ranges and lifecycles of individual species (Loope and Giambelluca 1998, pp. 514–515; Pounds *et al.* 1999, pp. 611–612; IPCC AR4 2007, p. 48; Emanuel *et al.* 2008, p. 365; U.S. Global Change Research Program (US–GCRP) 2009, pp. 145–149, 153; Keener *et al.* 2010, pp. 25–28; Sturrock *et al.* 2011, p. 144; Townsend *et al.* 2011, pp. 14–15; Warren 2011, pp. 221–226; Finucane *et al.* 2012, pp. 23–26; Keener *et al.* 2012, pp. 47–51).

In the western Pacific region, increased ambient temperatures is projected to lead to increases in annual mean rainfall, the number of heavy rain days (20–50 mm), and extreme rainfall events in American Samoa, Samoa Fiji, Tonga, and Vanuatu (Australian BOM and CSIRO 2011 Vol. 1, p. 178; Australian BOM and CSIRO 2011 Vol. 2, pp. 87–88, 194–195, 224–225, 254–255). Impacts of increased precipitation on the Pacific sheath-tailed bat are unknown.

Hurricanes are projected to decrease in frequency in this part of the Pacific but increase in severity as a result of global warming (Australian BOM and CSIRO 2011 Vol. 2, pp. 88, 195, 225, 255). The high winds, waves, strong storm surges, high rainfall, and flooding associated with hurricanes, particularly severe hurricanes (with sustained winds of 150 mi (240 km) per hour), have periodically caused great damage to roosting habitat of Pacific sheath-tailed bats and to native forests that provide their foraging habitat (Craig *et al.* 1993, p. 52; Grant *et al.* 1994, p. 135; Tarburton 2002, pp. 105–108; Palmeirim *et al.* 2005, p. 35), as described in the ''Hurricanes'' section, above.

In the western Pacific region, sea level is projected to rise 1.18 to 6.3 in (30 to 160 mm) by 2030, 2.6 to 12.2 in (70 to 310 mm) by 2055, and 8.3 in to 2 ft (210 to 620 mm) by 2090 under the high-emissions scenario (Australian BOM and CSIRO 2011 Vol. 2, pp. 91, 198, 228, 258). The Pacific sheath-tailed bat is known to roost in areas close to the coast and forage in the adjacent forested areas at or near sea-level, as well as inland and at elevations up to 2,500 ft (762 m). The impacts of projected sea-level rise on low-elevation and coastal roosting and foraging habitat are likely to reduce and fragment the bat's habitat on individual high islands.

In summary, although we lack information about the specific effects of projected climate change on the Pacific sheath-tailed bat, we anticipate that increased ambient temperature, precipitation, hurricane intensity, and sea-level rise and inundation would create additional stresses on the bat and on its roosting and foraging habitat because it is vulnerable to these disturbances. The risk of extinction as a result of the effects of climate change increases when a species' range and habitat requirements are restricted, its habitat decreases, and its numbers and number of populations decline (IPCC 2007, pp. 8–11). In addition, the fragmented range, diminished number of populations, and low total number of individuals have caused the Pacific sheath-tailed bat to lose redundancy and resilience rangewide. Therefore, we would expect the Pacific sheath-tailed bat to be particularly vulnerable to the habitat impacts of projected environmental effects of climate change (Loope and Giambelluca 1998, pp. 504–505; Pounds *et al.* 1999, pp. 611–612; Still *et al.* 1999, p. 610; Benning *et al.* 2002, pp. 14,246–14,248; Giambelluca and Luke 2007, pp. 13–15). Based on the above information, we conclude that habitat impacts resulting from the effects of climate change are not a current threat but are likely to become a threat to the Pacific sheath-tailed bat in the future.

Conservation Efforts To Reduce Other Natural or Manmade Factors Affecting Its Continued Existence

We are unaware of any conservation actions planned or implemented at this time to abate the threats of roost disturbance, low numbers, hurricanes, or breakdown of the metapopulation equilibrium that negatively impact the Pacific sheath-tailed bat.

Summary of Factor E

In summary, based on the best scientific and commercial information available, we consider other natural and manmade factors to be current and ongoing threats to the Pacific sheath-tailed bat. Roost disturbance, small population size, and breakdown of the metapopulation dynamic are threats to the Pacific sheath-tailed bat and are likely to continue in the future. The bat's small and isolated remaining populations are vulnerable to natural environmental catastrophes such as hurricanes, and the threats of small population size and hurricanes are likely to continue into the future. Due to reduced levels of pesticide use and the uncertainty regarding impacts to this species, we do not consider the use of pesticides to be a threat to the Pacific sheath-tailed bat. Although we do not consider climate change to be a current threat to the Pacific sheath-tailed bat, we anticipate that climate change is likely to exacerbate other threats to the species and to become a threat in the future.

Synergistic Effects

In our analysis of the five factors, we found that the Pacific sheath-tailed bat is likely to be affected by loss of forest habitat, predation by nonnative mammals, roost disturbance, and small population size. We also identify several potential sources of risk to the species (*e.g.,* disease, pesticides, climate change) that we do not currently consider to be significantly affecting the Pacific sheath-tailed bat because of their low occurrence today or apparently minimal overall impact on the species. Multiple stressors acting in combination have greater potential to affect the Pacific sheath-tailed bat than each factor alone. The combined effects of environmental, demographic, and catastrophic-event stressors, especially on a small population can lead to a decline that is unrecoverable and results in extinction (Brook *et al.* 2008, pp. 457–458). The impacts of the stressors described above, which might be sustained by a larger, more resilient population, have the potential in combination to rapidly affect the size, growth rate, and genetic integrity of a species that persists as small, disjunct populations. Thus, factors that, by themselves, may not have a significant effect on the Pacific sheath-tailed bat, may affect the subspecies when considered in combination.

Proposed Determination for the Pacific Sheath-Tailed Bat

Section 4 of the Act (16 U.S.C. 1533), and its implementing regulations at 50 CFR part 424, set forth the procedures for adding species to the Federal Lists of Endangered and Threatened Wildlife and Plants. Under section 4(a)(1) of the Act, we may list a species based on (A) The present or threatened destruction, modification, or curtailment of its habitat or range; (B) Overutilization for commercial, recreational, scientific, or educational purposes; (C) Disease or predation; (D) The inadequacy of existing regulatory mechanisms; or (E) Other natural or manmade factors affecting its continued existence. Listing actions may be warranted based on any of the above threat factors, singly or in combination.

We have carefully assessed the best scientific and commercial information available regarding the past, present, and future threats to the Pacific sheath-tailed bat. We find that the Pacific sheath-tailed bat is presently in danger of extinction throughout its entire range based on the severity and immediacy of the ongoing and projected threats described above. Habitat loss and degradation due to deforestation, predation by nonnative mammals, human disturbance of roost caves, and stochastic events such as hurricanes, floods, or disease outbreaks, which all pose a particular threat to the small and isolated remaining populations and probable low total abundance throughout its range, render the Pacific sheath-tailed bat in its entirety highly susceptible to extinction as a consequence of these imminent threats. The vulnerability of the species and its cave habitat to the impacts of predation and human disturbance is exacerbated by hurricanes and likely to be further exacerbated in the future by the effects of climate change, such as sea level rise, extreme rain events, and increased storm severity. The breakdown of the Pacific sheath-tailed bat's metapopulation structure is expected to reduce opportunities for repopulation following local extirpations of dwindling populations due to stochastic events. In addition, the continued decline of the last relatively large population of this species in Fiji further diminishes the probability of persistence throughout the remainder of its range where it is currently considered to be extirpated or nearly extirpated. In addition, the continued decline of the last relatively large population of this species in Fiji further diminishes the probability of persistence throughout the remainder of its range where it is currently considered to be extirpated or nearly extirpated.

In summary, habitat destruction and modification from deforestation is a threat to the Pacific sheath-tailed bat that is occurring throughout its range (Factor A). The threat of predation by nonnative predators such as rats and feral cats is ongoing (Factor C). Existing regulatory mechanisms do not address the threats to the Pacific sheath-tailed bat (Factor D). Human disturbance of roost caves, low numbers of individuals and populations and their concomitant vulnerability to catastrophic events such as hurricanes, and the breakdown of the metapopulation structure all are current threats to the bat as well (Factor E). All of these factors pose threats to the Pacific sheath-tailed bat, whether we consider their effects individually or cumulatively, and all of these threats will continue in the future.

The Act defines an endangered species as any species that is ''in danger of extinction throughout all or a significant portion of its range'' and a threatened species as any species ''that is likely to become endangered throughout all or a significant portion of its range within the foreseeable future.'' We find that the Pacific sheath-tailed bat is presently in danger of extinction throughout its entire range based on the severity and immediacy of threats currently impacting the species. Therefore, On the basis of the best available scientific and commercial information, we propose listing Pacific sheath-tailed bat as endangered in accordance with sections 3(6) and 4(a)(1) of the Act.

Under the Act and our implementing regulations, a species may warrant listing if it is in danger of extinction or likely to become so throughout all or a significant portion of its range. Because we have determined that the Pacific sheath-tailed bat is endangered throughout all of its range, no portion of its range can be ''significant'' for purposes of the definitions of ''endangered species'' and ''threatened species.'' See the Final Policy on Interpretation of the Phrase ''Significant Portion of Its Range'' in the Endangered Species Act's Definitions of ''Endangered Species'' and ''Threatened Species'' (79 FR 37577, July 1, 2014).

Mao, Gymnomyza samoensis

The genus *Gymnomyza* refers to birds in the honeyeater family Meliphagidae, which are restricted to a few islands in the southwestern Pacific Ocean. The mao (*Gymnomyza samoensis*), also called maomao, is one of three honeyeater species in the genus (Mayr 1945, p. 100). We have carefully reviewed the available taxonomic information (Watling 2001, p. 174; BirdLife International 2013; Gill and Donsker 2015; ITIS 2015a) and have concluded the species is a valid taxon.

The mao is a large (approximately 11 in (28 cm)), ''very dark-looking honeyeater . . . uniformly olive-black with a brown suffusion, except for an olive stripe beneath the eye. The ''slender, down-curved bill and feet are black'' (Watling 2001, p. 174). Butler and Stirnemann (2013, p. 25) report that male mao have blue eyes and are larger, while females are smaller with brown eyes. Juveniles have a shorter bill than adults, and eye color changes 2 months post-fledging (Butler and Stirnemann 2013, p. 25). The mao is a very vocal species and makes a variety of loud distinctive calls with bouts of calling lasting up to a minute (Watling 2001, p. 174). Calls differ between sexes (Butler and Stirnemann 2013, p. 25).

The mao is endemic to the Samoan archipelago. The species was thought to be primarily restricted to mature, well-developed, moist, mossy forests at upper elevations (Watling 2001, p. 175; Engbring and Ramsey 1989, p. 68), but has recently been observed at elevations ranging from 932 to 5,075 ft (284 to 1,547 m) and in ecosystems including lowland rainforest, disturbed secondary forest, and montane rainforest (MNRE 2006, pp. 9–10). The birds use the mid- to upper-canopy levels of the forest and will also forage along forest edges and brushy forest openings (Engbring and Ramsey 1989, p. 68). The mao has also been recorded visiting coconut trees near the coast (Watling 2001, p. 175).

Butler and Stirnemann (2013, p. 30) provide the following information about the mao's habitat use. The birds only occur in forested areas with a canopy layer, including modified habitat such as plantations where large trees also are present. They do not occur in logged areas with no large trees or canopy. Mao are primarily found in the high canopy layer, but also spend considerable time foraging on the trunks of trees and feeding on nectar sources near the ground (such as ginger (family Zingiberaceae)) and in low bushes (such as *Heliconia* spp.). The mao selects territories with high tree species diversity and with appropriate nectar sources and a large tree from which the male sings. Trees near a commonly used singing tree are selected for nesting. No particular tree species is used for nesting, but all nests are built more than 5 meters above the ground.

Butler and Stirnemann (2013, pp. 19–32) provide the following information about mao life history and breeding behavior. Based on a study of 15 nests, the mao nests once a year, between June and October, and produces one egg per clutch (Butler and Stirnemann 2013, pp. 19–32). The nest consists of young branches of various trees and contains little lining (Butler and Stirnemann 2013, p. 25). Incubation lasts 19 days, and chicks fledge 21–22 days after hatching. Juveniles are dependent on adults for approximately 8 to 10 weeks post-fledging. The female is almost exclusively responsible for incubation and feeding the chick, and both adults defend the nest. The mao will re-nest if the first nest fails, but not if the first nesting attempt produces a chick. Pairs are highly territorial with high site fidelity.

The mao's diet consists primarily of nectar, and also includes some invertebrates and fruit (MNRE 2006, p. 11). Nectar is an especially important food source during the breeding season, and the mao will defend nectar patches (Butler and Stirnemann 2013, p. 30). The mao eats invertebrates by probing dead material and moss, and by gleaning from emerging leaves (Butler and Stirnemann 2013, p. 30). Females forage for invertebrates under dead leaves on the forest floor to feed their fledglings (Butler and Stirnemann 2013, p. 30). Fledglings solicit food from the female by begging continually from the forest floor (Butler and Stirnemann 2013, p. 28).

The mao was once found throughout Savaii and Upolu (Samoa) likely in forests ranging from the coast to mountain tops (MNRE 2006, p. 2). It is endemic to the islands of Savaii and Upolu, Samoa, and Tutuila Island, American Samoa (Engbring and Ramsey 1989, p. 68; Watling 2001, p. 174). The mao was observed during an 1839 expedition on Tutuila (Amerson *et al.* 1982, p. 72), two male specimens were collected there in 1924, and an unconfirmed observation of the mao on Tutuila was reported in 1977 (Engbring and Ramsey 1989, p. 68; Watling 2001, p. 174).

The mao is currently found only on the islands of Savaii and Upolu in Samoa (Amerson *et al.* 1982, p. 72; Engbring and Ramsey 1989, p. 68; Watling 2001, p. 74; MNRE 2006, p. 2). In 1984, the mao was reported as common in undisturbed upland forests (foothill, montane, and cloud forests above 1,970 ft (600 m)) of Upolu and Savaii (Bellingham and Davis 1988, p. 124). A decline in distribution was observed in the 1990s following a period in which several powerful hurricanes hit Samoa: Tusi (1987), Ofa (1990), and Val (1991) (Lovegrove 1992, p. 26; MNRE 2006, pp. 2, 4). Otherwise, no detailed surveys of the mao were conducted before 2005, and little information exists regarding changes in abundance and distribution (MNRE 2006, p. 2). Surveys conducted in 2005–2006 found mao at seven sites on Upolu and Savaii in upland forested habitat, yielded a rough estimate of 500 individuals and indicated that numbers are declining (MNRE 2006, p. 4; Tipamaa 2007, in litt., cited in Birdlife International 2012). The Rapid Biodiversity Assessment of Upland Savaii, Samoa conducted in 2012 detected small numbers of the mao at two sites on the island (Atherton and Jefferies 2012, p. 14), and it is possible that the species has particular habitat requirements that have become limited in Samoa (MNRE 2013, p. 12). Neither the 2012 surveys nor a study of the species' biology and movements (Butler and Stirnemann 2013) yielded an updated population estimate. However, researchers observed that the species is rarer than previously thought and recommended that comprehensive surveys be conducted to generate a new population estimate (Stirnemann 2015, in litt).

The mao is likely extirpated from Tutuila Island in American Samoa (Freifeld 1999, p. 1,208). Surveys conducted on Tutuila Island in 1982 and 1986 and from 1992 to 1996 did not detect the mao (Amerson *et al.* 1982, p. 72; Engbring and Ramsey 1989; p. 68; Freifeld 2015 in litt.). Given that the species is noisy and conspicuous, it is unlikely that a population on Tutuila was missed during the surveys (Engbring and Ramsey 1989; p. 68). More recent surveys conducted by DMWR in forested habitats likely to support mao failed to detect their presence, further indicating the likelihood that the species no longer occurs on Tutuila (MacDonald 2015 in litt.).

The mao is listed as Endangered in the 2014 IUCN Red List (Birdlife International 2012). Endangered is IUCN's second most severe category of extinction assessment, which equates to a very high risk of extinction in the wild. IUCN criteria include the rate of decline, population size, area of geographic distribution, and degree of population and distribution fragmentation; however, IUCN rankings do not confer any actual protection or management.

Summary of Factors Affecting the Mao

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

Habitat Destruction and Modification by Deforestation

Several thousand years of subsistence agriculture and more recent commercial agriculture has resulted in the alteration and great reduction in area of forests at lower elevations in the Samoan archipelago (Whistler 1994, p. 40; Mueller-Dombois and Fosberg 1998, p. 361; Whistler 2002, pp. 130–131). In American Samoa, forest clearing for agriculture has contributed to habitat loss and degradation of forests in the lowland areas on Tutuila, and has the potential to spread into higher elevations and previously undisturbed forest; however, owing to limits on the feasibility of land-clearing imposed by the island's extreme topography, large areas of mature native rainforest have persisted. Deforestation, therefore, is unlikely to have been a cause of the mao's extirpation on this island in American Samoa.

The loss of forested habitat in Samoa is a primary threat to the mao (MNRE 2006, p. 5). Between 1954 and 1990, the amount of forested area declined from 74 to 46 percent of total land area in Samoa (Food and Agricultural Organization (FAO) 2005 in litt.). Between 1978 and 1990, 20 percent of all forest losses in Samoa were attributable to logging, with 97 percent of the logging having occurred on Savaii (Government of Samoa 1998 in Whistler 2002, p. 132). Forested land area in Samoa continued to decline at a rate of roughly 2.1 percent or 7,400 ac (3,000 ha) annually from 1990 to 2000 (FAO 2005 in litt.). As a result, there is very little undisturbed, mature forest left in Samoa (Watling 2001, p. 175; FAO 2005 in litt.).

The clearing of land for commercial agriculture has been the leading cause of deforestation in Samoa—more so than plantations or logging (Whistler 2002, p. 131). The transition from subsistence agriculture to developing cash crops for export (*e.g.,* taro, bananas, cacao) coupled with rapid population growth and new technologies, led to increased forest clearing in Samoa (Paulson 1994, pp. 326–332; Whistler 2002, pp. 130–131). Today, only 360 ac (146 ha) of native lowland rainforests (below 2,000 ft or 600 m) remain on Savaii and Upolu as a result of logging, agricultural clearing, residential clearing (including relocation due to tsunami), and natural causes such as rising sea level and hurricanes (MNRE 2013, p. 47). On Upolu, direct or indirect human influence has caused extensive damage to native forest habitat above 2,000 ft (600 m) (MNRE 2013, p. 13). Although forested, almost all upland forests on Upolu are largely dominated by introduced species today (MNRE 2013, p. 12). Savaii still has extensive upland forests which are for the most part undisturbed and composed of native species (MNRE 2013, p. 40). However, forest clearance remains an ongoing threat to the mao (MNRE 2006, p. 5). Logging is slowing down because the most accessible forest has largely been removed, but is an ongoing problem on Savaii despite years of effort to phase it out (MNRE 2006, p. 5; Atherton and Jeffries 2012, p. 17). Shifting or slash-and-burn cultivation is an increasing concern in upland forest that provides important refuges for the mao because farmers use forestry roads from heavily logged lowland forests to gain access to formerly inaccessible land (MNRE 2006, p. 5). For example, there is much concern about potential forest loss because of road that has been bulldozed into the cloud forest (above 3,280 ft (1,000 m)) on Savaii, apparently illegally (Atherton and Jeffries 2012, p. 16). Such roads provide vectors for invasive nonnative plant and animal species as well, thus exacerbating those threats to the mao and its habitat (Atherton and Jeffries 2012, p. 108).

Habitat quality has also degraded with the loss of closed forest space (MNRE 2006, p. 5; Butler and Stirnemann 2013, p. 22). An analysis in 1999 identified 32 percent of the total forest cover as ''open'' forest (less than 40 percent tree cover) and less than 0.05 percent as ''closed'' forest, largely as a result of damage from Cyclones Ofa and Val (Butler and Stirnemann 2013, p. 22). An additional 24 percent of the forest cover is classified as secondary re-growth forest. As a result, the montane forest in Samoa is now extremely open and patchy with fewer food resources for birds, including the mao (Butler and Stirnemann 2013, p. 22). The montane forests are also increasingly vulnerable to invasion by nonnative trees and other plants (Butler and Stirnemann 2013, p. 22), which adversely affect native forests through competition for light, nutrients, and water; chemical inhibition; and prevention of reproduction. Loss of forest is likely to affect the mao by reducing breeding, nesting, and foraging habitat, increasing forest fragmentation, and increasing the abundance and diversity of invasive species (Butler and Stirnemann 2013, p. 22).

On the island of Tutuila, American Samoa, agriculture and urban development covers approximately 24 percent of the island, and up to 60 percent of the island contains slopes of less than 30 percent where additional land clearing is feasible (ASCC 2010, p. 13; DWMR 2006, p. 25). Farmers are increasingly encroaching into some of the steep forested areas as a result of suitable flat lands already being occupied with urban development and agriculture (ASCC 2010, p. 13). Consequently, agricultural plots have spread from low elevations up to middle and some high elevations on Tutuila.

In summary, deforestation by land-clearing for agriculture has been the major contributing factor in the loss and degradation of forested habitat for the mao throughout its range in Samoa and American Samoa, and logging has been an additional major factor in loss and degradation of forest habitat in Samoa. The majority of the lowland forests have either been lost or fragmented by land-clearing for agriculture. Upland areas in Samoa have suffered extensive deforestation from logging and are increasingly at risk as agriculture and development expand into these areas. Based on the above information, we conclude that the threat of habitat destruction and modification by agriculture and development is a current threat to the mao and will continue into the future.

Habitat Destruction and Modification by Nonnative Plants

Nonnative plant species can degrade the habitat of native species and their impacts to native forest often are facilitated or exacerbated by the impacts of other threats such as hurricanes, agriculture and development, and feral ungulates.

The native flora of the Samoan archipelago (plant species that were present before humans arrived) consisted of approximately 550 taxa, 30 percent of which were endemic (species that occur only in the American Samoa and Samoa) (Whistler 2002, p. 8). An additional 250 plant species have been intentionally or accidentally introduced and have become naturalized with 20 or more of these considered invasive or potentially invasive in American Samoa (Whistler 2002, p. 8; Space and Flynn 2000, pp. 23–24). Of these approximately 20 or more nonnative pest plant species, at least 10 have altered or have the potential to alter the habitat of the mao and the other four species proposed for listing (Atkinson and Medeiros 2006, p. 18; Craig 2009, pp. 94, 97–98; ASCC 2010, p. 15).

Nonnative plants can degrade native habitat in Pacific island environments by: (1) Modifying the availability of light through alterations of the canopy structure; (2) altering soil–water regimes; (3) modifying nutrient cycling; (4) ultimately converting native-dominated plant communities to nonnative plant communities; and (5) increasing the frequency of landslides and erosion (Smith 1985, pp. 217–218; Cuddihy and Stone, 1990, p. 74; Matson 1990, p. 245; D'Antonio and Vitousek 1992, p. 73; Vitousek *et al.* 1997, pp. 6–9; Atkinson and Medeiros 2006, p. 16). Nonnative plant species often exploit the disturbance caused by other factors such as hurricanes, agriculture and development, and feral ungulates, and thus, in combination reinforce or exacerbate their negative impacts to native habitats. Although the areas within the National Park of American Samoa (NPSA, on the islands of Tutuila, Ofu, and Tau) contain many areas that are relatively free of human disturbance and alien invasion and largely represent pre-contact vegetation, the threat of invasion and further spread by nonnative plant species poses immense cause for concern (Atkinson and Medeiros 2006, p. 17; ASCC 2010, p. 22).

The invasive vines *Merremia peltata* and *Mikania micrantha* have serious impacts in forested areas and prevent reforestation of former agriculture areas in Samoa and American Samoa; they are prolific invaders of forest gaps and disturbed sites, and can have a smothering effect on growing trees, blocking sunlight to sub-canopy and undergrowth vegetation (MNRE 2013, p. 29). Similarly, several invasive trees also negatively affect native forests in Samoa by outcompeting native species in forest gaps, getting established and moving further into old secondary regrowth and primary forests. A significant portion of Samoa's forest are now classified as secondary re-growth dominated by invasive tree species such as *Falcataria moluccana* (albizia, tamaligi), *Castilla elastica* (Mexican rubber tree, pulu mamoe), *Spathodea campanulata* (African tulip, faapasi), and *Funtumia elastica* (African rubber tree, pulu vao) (MNRE 2013, p. 29). In addition, the invasive shrub *Clidemia hirta* is found in remote areas of upland forests in Savaii (Atherton and Jeffries 2012, p. 103). Although the mao forage and occasionally nest in modified habitat such as plantation areas where nonnative trees that provide nectar and nesting habitat (*e.g., Falcataria moluccana*) may occur, these habitats lack the high tree-species diversity preferred by the mao and also place the species at a greater risk of predation by nonnative predators (see Factor C below) (Butler and Stirnemann 2013, p. 30). In summary, while the best available information does not provide the exact distribution of nonnative plant species, the habitat-modifying impacts of nonnative species are expected to continue and are not likely to be reduced in the future. Based on the above information, we conclude that the threat of habitat destruction and modification by nonnative plant species is a current threat to the mao and will continue into the future.

The following list provides a brief description of the nonnative plants that have the greatest negative impacts to the native forest habitat for the mao in American Samoa (Space and Flynn 2000, pp. 23–24; Craig 2009, pp. 94, 96–98; ASCC 2010, p. 15):

Adenanthera pavonina (red bean tree, coral bean tree, lopa), native to India and Malaysia, is a medium-sized tree up to 50 ft (15 m) high that invades intact forests as well as disturbed sites, and can quickly form large stands (GISD 2006). In American Samoa, it is invasive in secondary forests, but also has the ability to become more widely established on Tutuila and the Manua Islands (Space and Flynn 2000, p. 4). It is considered to have negative impacts on the native forests in American Samoa because the trees produce large quantities of seed, grow on a variety of soils, and can overtop many native trees and eventually form monotypic stands (Space and Flynn 2002, p. 5).

Castilla elastica (Mexican rubber tree, pulu mamoe), native to tropical America, is a medium-sized tree 15 to 30 ft (5 to 10 m) high that can invade intact forest where it reproduces prolifically and can crowd out native species (NPSA 2012, in litt.). It has displaced significant areas of lowland forest in Samoa, and is now considered to be an important threat to native forests in American Samoa (Atkinson and Medeiros 2006, p. 18).

Cinnamomum verum (cinnamon, tinamoni), native to south Asia, is a fast-growing, medium-sized tree up to 30 ft (9 m) high with aromatic bark and leaves. It forms dense root mats that inhibit establishment of other plants, and can shade out other tree species and thus create monotypic stands. On Tutuila, it is actively spreading in the ridge forests of Mt. Matafao, Matuu, and Maloata (Space and Flynn 2000, p. 4; NPSA 2012, in litt.).

The shrub *Clidemia hirta* (Koster's curse), native to the New World from Mexico to Argentina, grows to be 6.6 ft (2 m) in height, forms a dense understory, shades out native plants, and prevents their regeneration (Wagner *et al.* 1985, p. 41; Smith 1989, p. 64). On Tau, it has become a serious problem in the unique summit scrub community (Whistler 1992, p. 22).

Falcataria moluccana (albizia, tamaligi), native to Moluccas, New Guinea, New Britain, and the Solomon Islands, is a tree that can reach 131 ft (40 m) in height and has a wide-spreading canopy. It grows rapidly and outcompetes slow-growing native trees by reducing light availability, and its abundant, high-nutrient litter alters soil chemistry (GISD 2008). Its shallow root system may lead to soil instability and landslides (Atkinson and Medeiros 2006, p. 17).

Funtumia elastica (African rubber tree, pulu vao), is a medium-sized tree up to 100 ft (30 m) tall native to tropical Africa (U.S. Department of Agriculture—Agricultural Research Service (USDA) 2006). This tree is invasive because of its ''parachute seeds'' that can disperse long distances and germinate in sunny or shady conditions (Whistler 2002, p. 122). *Funtumia* has become a dominant subcanopy and understory tree in the western half of Upolu where it can form monotypic forests (Pearsall and Whistler 1991, p. 30). It is also established and becoming dominant on eastern Savaii (Whistler 2002, p. 122). This species has the potential to become a major problem in American Samoa due to its proximity and the volume of traffic with Samoa (Space and Flynn 2000, p. 12).

Leucaena leucocephala (wild tamarind, lusina, fua pepe), a shrub native to the neotropics, is a nitrogen-fixer and an aggressive competitor that often forms the dominant element of the vegetation (Geesink *et al.* 1999, pp. 679–680). It crowds out native species and resprouts vigorously after cutting, and seeds can remain viable for 10 to 20 years (Craig 2009, p. 98).

Merremia peltata (Merremia, fue lautetele), is an indigenous, sprawling, or high-climbing vine that can invade areas following disturbances such as land-clearing and hurricanes. This fast-growing vine can smother plantation and forest trees (Craig 2009, p. 98).

Mikania micrantha (mile-a-minute vine, fue saina), native to tropical America, is a scrambling or climbing herbaceous vine, that retards forest regeneration with its smothering growth (Whistler 1994, p. 42). This sun-loving, shade-intolerant vine is a major pest of plantations and forests on all major American Samoa islands (Space and Flynn 2000, p. 5; Craig 2009, p. 94).

Psidium cattleianum (strawberry guava, kuava) is a tall shrub or small tree that forms dense stands in which few other plants can grow, displacing native vegetation through competition. The fruit is eaten by feral pigs and birds that disperse the seeds throughout the forest (Smith 1985, p. 200; Wagner *et al.* 1985, p. 24). It is thought to have been cultivated in American Samoa for more than 40 years and has become naturalized in lowland rainforest on western Tutuila.

Spathodea campanulata (African tulip, faapasi), native to tropical Africa, is a large tree up to 80 ft (24 m) or more in height with showy red-orange tulip-like flowers and pods containing hundreds of wind-dispersed seeds (Pacific Islands Ecosystems at Risk (PIER) 2013). It is particularly invasive in low- to mid-elevation forests, and can spread in open agricultural land, waste areas, and intact native forest, forming dense stands that shade out other vegetation (GISD 2010).

Habitat Destruction and Modification by Nonnative Ungulates

Feral pigs (*Sus scrofa*) cause multiple negative impacts to island ecosystems including the destruction of vegetation, spread of invasive nonnative plant species, and increased soil erosion. In addition, feral cattle (*Bos taurus*) consume tree seedlings and browse saplings, and combined with undergrowth disturbance, prevent forest regeneration, subsequently opening the forest to invasion by nonnative species (Cuddihy 1984, p. 16).

Feral pigs are known to cause deleterious impacts to ecosystem processes and functions throughout their worldwide distribution (Aplet *et al.* 1991, p. 56; Anderson and Stone 1993, p. 201; Campbell and Long 2009, p. 2,319). Feral pigs are extremely destructive and have both direct and indirect impacts on native plant communities. Pigs are a major vector for the establishment and spread of invasive, nonnative plant species by dispersing plant seeds on their hooves and fur, and in their feces (Diong 1982, pp. 169–170, 196–197), which also serve to fertilize disturbed soil (Siemann *et al.* 2009, p. 547). In addition, pig rooting and wallowing contributes to erosion by clearing vegetation and creating large areas of disturbed soil, especially on slopes (Smith 1985, pp. 190, 192, 196, 200, 204, 230–231; Stone 1985, pp. 254–255, 262–264; Tomich 1986, pp. 120–126; Cuddihy and Stone 1990, pp. 64–65; Aplet et al. 1991, p. 56; Loope *et al.* 1991, pp. 18–19; Gagne and Cuddihy 1999, p. 52; Nogueira-Filho *et al.* 2009, p. 3,681; CNMI–Statewide Assessment and Resource Strategy (SWARS) 2010, p. 15; Dunkell *et al.* 2011, pp. 175–177; Kessler 2011, pp. 320, 323). Erosion resulting from rooting and trampling by pigs impacts native plant communities by contributing to watershed degradation and alteration of plant nutrient status, and increasing the likelihood of landslides (Vitousek *et al.* 2009, pp. 3,074–3,086; Chan-Halbrendt *et al.* 2010, p. 251; Kessler 2011, pp. 320 − 324). In the Hawaiian Islands, pigs have been described as the most pervasive and disruptive nonnative influence on the unique native forests, and are widely recognized as one of the greatest current threats to Hawaii's forest ecosystems (Aplet *et al.* 1991, p. 56; Anderson and Stone 1993, p. 195).

In American Samoa, feral pigs continue to negatively affect forested habitats. Feral pigs have been present in American Samoa since antiquity (American Samoa Historic Preservation Office 2015, in litt.). In the past, hunting pressure kept their numbers down, however, increasing urbanization and increasing availability of material goods has resulted in the decline in the practice of pig hunting to almost nothing (Whistler 1992, p. 21; 1994, p. 41). Feral pigs are moderately common to abundant in many forested areas, where they spread invasive plants, damage understory vegetation, and destroy riparian areas by their feeding and wallowing behavior (DMWR 2006, p. 23; ASCC 2010, p. 15). Feral pigs are a serious problem in the NPSA because of the damage they cause to native vegetation through their rooting and wallowing (Whistler 1992, p. 21; 1994, p. 41; Hoshide 1996, p. 2; Cowie and Cook 1999, p. 48; Togia pers. comm. in Loope *et al.* 2013, p. 321). Such damage to understory vegetation is likely to reduce foraging opportunities for the mao. Pig densities have been reduced in some areas by snaring and hunting, but remain high in other areas (ASCC 2010, p. 15).

In Samoa, feral pigs are present throughout lowland and upland areas on Savaii, and are considered to have a negative impact on the ecological integrity of upland forests of Savaii, an important conservation area for the mao and other rare species (Atherton and Jeffries 2012, p. 17). During recent surveys, feral pig activity was common at most sites in upland forests on Savaii, and was even detected at the upper range of the mao at an elevation of 4,921 ft (1,500 m) (Atherton and Jefferies 2012, pp. 103, 146). Significant numbers of feral cattle were present in an upland site where their trampling had kept open grassy areas within forested flats, and where mao had previously been observed (Atherton and Jeffries 2012, pp. 103–105). Trampling in forested areas damages understory vegetation and is likely to reduce foraging opportunities for mao as well as provide vectors for invasion by nonnative plants. In summary, the widespread disturbance caused by feral ungulates is likely to continue to negatively impact the habitat of the mao. Based on the above information, we conclude that habitat destruction and modification by feral ungulates is a threat to the mao.

Conservation Efforts To Reduce Habitat Destruction, Modification, or Curtailment of Its Range

American Samoa

The National Park of American Samoa (NPSA) was established to preserve and protect the tropical forest and archaeological and cultural resources, to maintain the habitat of flying foxes, to preserve the ecological balance of the Samoan tropical forest, and, consistent with the preservation of these resources, to provide for the enjoyment of the unique resources of the Samoan tropical forest by visitors from around the world (Public Law 100–571, Public Law 100–336). Under a 50-year lease agreement between local villages, the American Samoa Government, and the Federal Government, approximately 8,000 ac (3,240 ha) of forested habitat on the islands of Tutuila, Tau, and Ofu are protected and managed (NPSA Lease Agreement 1993).

Several programs and partnerships to address the threat of nonnative plant species have been established and are ongoing in American Samoa. Since 2000, the NPSA has implemented an invasive plant management program that has focused on monitoring and removal of nonnative plant threats. The nonnative plant species prioritized for removal include the following: *Adenanthera pavonina* or lopa, *Castilla elastica* or pulu mamoe, *Falcataria moluccana* or tamaligi, *Leucaena leucocephala* or lusina, and *Psidium cattleianum* or strawberry guava (Togia 2015, in litt.). In particular, efforts have been focused on the removal of the tamiligi from within the boundaries of the NPSA as well as in adjacent areas (Hughes *et al.* 2012).

The thrip *Liothrips urichi* is an insect that was introduced to American Samoa in the 1970s as a biocontrol for the weed *Clidemia hirta* (Tauiliili and Vargo 1993, p. 59). This thrip has been successful at controlling *Clidemia* on Tutuila. Though *Clidemia* is still common and widespread throughout Tutuila, thrips inhibit its growth and vigor, preventing it from achieving ecological dominance (Cook 2001, p. 143).

In 2004, the American Samoa Invasive Species Team (ASIST) was established as an inter-agency team of nine local government and Federal agencies. The mission of ASIST is to reduce the rate of invasion and impact of invasive species in American Samoa with the goals of promoting education and awareness on invasive species and preventing, controlling, and eradicating invasive species. In 2010, the U.S. Forest Service conducted an invasive plant management workshop for Territorial and Federal agencies, and local partners (Nagle 2010 in litt.). More recently, the NPSA produced a field guide of 15 invasive plants that the park and its partners target for early detection and response (NPSA 2012, in litt.).

In 1996, the NPSA initiated a feral pig control program that includes fencing and removal of pigs using snares in the Tutuila Island and Tau Island Units. Two fences have been constructed and several hundred pigs have been removed since 2007 (Togia 2015, in litt.). The program is ongoing and includes monitoring feral pig activity twice per year and additional removal actions as needed (Togia 2015, in litt.).

Samoa

In 2006, the Government of Samoa developed a recovery plan for the mao. The recovery plan identifies goals of securing the mao, maintaining its existing populations on Upolu and Savaii, and reestablishing populations at former sites (MNRE 2006). The plan has eight objectives: (1) Manage key forest areas on Upolu and Savaii where significant populations of the mao remain; (2) carry out detailed surveys to identify the numbers of pairs and establish monitoring; (3) increase understanding of the breeding and feeding ecology; (4) establish populations on rat-free islands or new mainland sites (including feasibility of reintroduction to American Samoa); (5) evaluate development of a captive-management program; (6) develop a public awareness and education program; (7) develop partnerships to assist in the mao recovery; and (8) establish a threatened bird recovery group to oversee the implementation and review of this plan and other priority bird species. In 2012, a detailed study provided information on the mao's diet, habitat use, reproductive success, and survival; important life-history requirements that can be used to implement recovery efforts (Butler and Stirnemann 2013).

The Mt. Vaea Ecological Restoration Project surveyed and mapped the presence of native bird and plant species and invasive plant species within lowland forest habitat of the 454-ac (183-ha) Mt. Vaea Scenic Reserve on Upolu, Samoa (Bonin 2008, pp. 2–5). The project was envisioned as the first demonstration project of invasive species management and forest restoration in Samoa. Phase I of the project resulted in the development of a restoration plan recommending removal of five priority invasive plant species and planting of native tree species (Bonin 2008, pp. viii, 24). Phase 2 of the project resulted in identifying techniques for treatment of two problematic rubber species (*Castilla elastica* or pulu mamoe and *Funtumia elastica* or pulu vao) and replanting areas with native tree species (Bonin 2010, pp. 20–21).

The Two Samoas Environmental Collaboration Initiative brings together government agencies, nongovernmental organizations and institutions from American Samoa and Samoa and provides a platform for a single concerted effort to manage threats to environmental resources such as the management of fisheries, land-based sources of pollution, climate change, invasive species, and key or endangered species (MNRE 2014, p. 67). In 2010, a Memorandum of Understanding establishing the collaborative effort between the two countries was signed by the two agencies responsible for conservation of species and their habitats, MNRE (Samoa) and DMWR (American Samoa). This initiative establishes a framework for efforts to recover the mao in American Samoa and Samoa.

Summary of Factor A

In summary, based on the best available scientific and commercial information, we conclude that the destruction, modification, and curtailment of the mao's habitat and range are ongoing threats and these threats will continue into the future. The destruction and modification of habitat for the mao is caused by agriculture, logging, feral ungulates, and nonnative plant species, the impacts of all of which are exacerbated by hurricanes (see Factor E). The most serious threat identified has been the loss of forested habitat caused by forest clearing for agriculture, and logging. All of the above threats are ongoing and interact to exacerbate the negative impacts and increase the vulnerability of extinction of the mao.

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

In Samoa, there is anecdotal information suggesting that the mao has been shot by people who were afraid of their calls (MNRE 2006, p. 8). In addition, one individual reported that mao are eaten, or were eaten in the past, but it seems more likely these birds were shot accidentally by hunters who were targeting pigeons (MNRE 2006, p. 8). The mao has been protected under regulations enacted by the Government of Samoa in 1993 and revised in 2004 (MNRE 2006, p. 8). The best available information does not indicate overutilization for commercial, recreation, scientific, or educational purposes in American Samoa. Based on the above information, we conclude that hunting of the mao is unintentional or accidental; therefore, we do not consider the overutilization for commercial, recreational, scientific, or educational purposes to be a threat to the mao.

C. Disease or Predation

Predation

Nest predation by rats has negative impacts on many island birds, including the mao (Atkinson 1977, p. 129; 1985, pp. 55–70; Butler and Stirnemann 2013, p. 29; O'Donnell *et al.* 2015, pp. 24–26). Rats have been identified as the main cause of decline in the closely related *Gymnomyza aubryana* in New Caledonia (MNRE 2006, p. 8). Juveniles spending time on the forest floor are also at risk from predation by feral cats (Butler and Stirnemann 2013, p. 31). Other potential predators include the native barn owl (*Tyto alba*) and wattled honeyeater (*Foulehaio carunculatus*); however, adults can potentially drive these species away from the nest (Butler and Stirnemann 2013, p. 31).

Butler and Stirnemann (2013, p. 29) captured footage of one nest depredation event by a black rat, which took a mao egg. The rat gained access to the egg by jumping on the incubating female's back from the branch above, driving the female off the nest. Combined with the disappearance of two females during the breeding season, this footage suggests that adult females are potentially vulnerable to predation on the nest at night, while they are incubating (Butler and Stirnemann 2013, p. 31), a phenomenon documented or suspected in other island bird species, which lack innate behavioral defenses against nonnative mammalian predators (see for example Robertson *et al.* 1994, p. 1,084; Armstrong *et al.* 2006, p. 1,034; VanderWerf 2009, p. 741). This potential bias toward predation of females has the potential to create a skewed sex ratio in mao populations (Robertson *et al.* pp. 1,083–1,084).

The location of mao nests affects their vulnerability to predation by rats; nests in close proximity to plantation habitats, where rats are most abundant, are particularly susceptible and experience low reproductive success (Butler and Stirnemann 2013, p. 31). Nests within 50 meters of a plantation are 40 percent more likely to be depredated than nests in forested areas farther from plantations (Butler and Stirnemann 2013, p. 31). Because good-quality, closed-canopy forest habitat remains in American Samoa, factors in addition to deforestation are likely responsible for the extirpation of the mao from American Samoa (MNRE 2006, p. 8), including predation by rats (Stirnemann 2015, in litt.). Habitat loss from clearing of native forest combined with an expansion of plantations in Samoa may lead to an increase in rat populations (which find ample food in plantation habitats) and a potential for an increase in the mao nest predation rate. In addition, the mao's low reproductive rate (one juvenile per year) and extended breeding season increase the likelihood of population-level effects of predation (Butler and Stirnemann 2013, p. 22).

Predation by feral cats has been directly responsible for the extinction of numerous birds on oceanic islands (Medina *et al.* 2011, p. 6). Native mammalian carnivores are absent from oceanic islands because of their low dispersal ability, but once introduced by humans, they become significant predators on native animals such as seabirds and landbirds that are not adapted to predation by terrestrial carnivores (Nogales *et al.* 2013, p. 804; Scott *et al.* 1986, p. 363; Ainley *et al.* 1997, p. 24; Hess and Banko 2006, in litt.). The considerable amount of time spent on the ground (up to 7 days) and poor flight ability of mao chicks post-fledging increases the risk of predation by feral cats (Butler and Stirnemann 2013, p. 28). Evidence of feral cat presence exists in montane forests and along an elevational gradient on Savaii, including numerous scats (feces) containing rodent hairs and bird bones and feathers (Atherton and Jeffries 2012, pp. 76, 103), and predation by feral cats has been posited as a contributing factor in the mao's extirpation from Tutuila (Stirnemann 2015 in litt.). Based on the above information, we conclude that predation by rats and cats is a threat to the mao that is likely to continue in the future.

Disease

Recent investigations suggest that avian malaria may be indigenous and non-pathogenic in American Samoa and, therefore, is unlikely to affect bird populations (Jarvi *et al.* 2003, p. 636; Seamon 2004a, in litt.). The best available information does not indicate there are other diseases affecting the mao populations in Samoa (MNRE 2006, p. 8).

Conservation Efforts To Reduce Disease or Predation

A project to restore habitat for the mao and other priority species by removing the threat of predation by the Polynesian rat (*R. exulans*) was attempted on the uninhabited islands of Nuutele (267 ac (108 ha)) and Nuulua (62 ac (25 ha)) off the eastern end of Upolu, Samoa (Tye 2012, in litt). The demonstration project aimed to eradicate the Polynesian rat from both islands through aerial delivery of baits. Post-project monitoring detected rats on Nuutele, suggesting that rats survived the initial eradication effort or were able to recolonize the island (Tye 2012, in litt.).

Summary of Factor C

In summary, based on the best available scientific and commercial information, we conclude that disease is not a current threat to the mao, nor is it likely to become a threat in the future. Because of its low reproductive rate (1 egg per clutch) and vulnerability to predation at multiple life-history stages (eggs, chicks, fledglings, and adults), we conclude that the threat of predation by rats and feral cats is an ongoing threat to the mao that will continue into the future.

D. The Inadequacy of Existing Regulatory Mechanisms

The Act requires that the Secretary assess available regulatory mechanisms in order to determine whether existing regulatory mechanisms may be inadequate as designed to address threats to the species being evaluated (Factor D). Under this factor, we examine whether existing regulatory mechanisms are inadequate to address the potential threats to the mao discussed under other factors. In determining whether the inadequacy of regulatory mechanisms constitutes a threat to the mao, we analyzed the existing Federal, Territorial, and international laws and regulations that may address the threats to this species or contain relevant protective measures. Regulatory mechanisms, if they exist, may preclude the need for listing if we determine that such mechanisms adequately address the threats to the species such that listing is not warranted.

Samoa

The Government of Samoa has enacted numerous laws and regulations and has signed on to various international agreements that address a wide range of activities such as land tenure and development, biodiversity, wildlife protection, forestry management, national parks, biosecurity, and the extraction of water resources (MNRE 2013, pp. 148–149; MNRE 2014, p. 57).

The Protection of Wildlife Regulations 2004 regulates the protection, conservation, and utilization of terrestrial or land-dwelling species (MNRE and SPREP 2012, p. 5). These regulations prohibit, and establish penalties for committing, the following activities: (1) The take, keep, or kill of protected and partially protected animal species; (2) harm of flying species endemic to Samoa; and (3) the export of any bird from Samoa (MNRE and SPREP 2012, pp. 5–6). The mao is endemic to the Samoan archipelago, but it is not listed as a ''flying species endemic to Samoa'' under these regulations.

The Planning and Urban Management Act 2004 (PUMA) and PUMA Environmental Impact Assessment (EIA) Regulation (2007) were enacted to ensure all development initiatives are properly evaluated for adverse environmental impacts (MNRE 2013, p. 93). The information required for Sustainable Management Plans and Environmental Impact Assessments does not include specific consideration for species or their habitat (Planning and Urban Management Act 2004, as amended). Other similar approval frameworks mandated under other legislation address specific threats and activities. These include the permit system under the Lands Surveys and Environment Act 1989 for sand mining and coastal reclamation, and ground water exploration and abstraction permits under the Water Resources Act 2008 (MNRE 2013, p. 93). The PUMA process has been gaining in acceptance and use, however, information on its effectiveness in preventing adverse impacts to species or their habitats is lacking (MNRE 2013, p. 93).

The Forestry Management Act 2011 regulates the effective and sustainable management and utilization of forest resources. This law creates the requirement for a permit or license for commercial logging or harvesting of native, agro-forestry, or plantation forest resources (MNRE and SPREP 2012, p. 18). Permitted and licensed activities must follow approved Codes of Practice, forestry harvesting plans, and other requirements set by the Ministry of Natural Resources and Environment. License or permit holders must also follow laws relating to national parks and reserves, and all provisions of management plans for any national park or reserve. Under this act, lands designated as protected areas for the purposes of the protection of biodiversity and endangered species prohibit any clearing for cultivation or removal of forest items from protected areas without prior consent of the MNRE (Forestry Management Act 2011, Para. 57). Although this law includes these general considerations for managing forest resources, it does not specifically provide protection to habitat for the mao.

The Quarantine (Biosecurity) Act 2005 forms part of the system to combat the introduction of invasive species and manage existing invasions. It is the main legal instrument to manage the deliberate or accidental importation of invasive species, pests, and pathogens and also to deal with such species should they be found in Samoa (MNRE and SPREP 2012, p. 38). This legislation also provides a risk assessment procedure for imported animals, plants and living modified organisms. Although this law provides for management of invasive species, including those that degrade or destroy native forest habitat for the mao, we do not have information indicating the degree to which it has been implemented or effectiveness of such efforts.

In Samoa, there are several regulatory and nonregulatory protected area systems currently in place that protect and manage terrestrial species and their habitats; these include national parks, nature reserves, conservation areas, and village agreements. The National Parks and Reserves Act (1974) created the statutory authority for the protection and management of national parks and nature reserves. Conservation areas, unlike national parks and nature reserves, emphasize the importance of conservation, but at the same time address the need for sustainable development activities within the conservation area. Village agreements are voluntary agreements or covenants developed and signed by local villages and conservation organizations that stipulate specific conservation measures or land use prohibitions in exchange for significant development aid. As of 2014, a total of approximately 58,176 ac (23,543 ha), roughly 8 percent of the total land area of Samoa (285,000 ha) were enlisted in terrestrial protected areas, with the majority located in five national parks covering a total of 50,629 ac (20,489 ha) overlapping several key conservation areas identified for the mao (MNRE 2006, p. 14; MNRE 2014, p. 57).

Conservation International (CI) and the Secretariat of the Pacific Regional Environment Programme (SPREP) in collaboration with the Ministry of Natural Resources Environment identified eight terrestrial Key Biodiversity Areas (KBAs) intended to ensure representative coverage of all native ecosystems with high biodiversity values, five of which are targeted to benefit the conservation of the mao (CI *et al.* 2010, p. 12): Eastern Upolu Craters, Uafato-Tiavea Coastal Forest, O le Pupu Pue National Park, Apia Catchments, and Central Savaii Rainforest. All five KBAs also overlap with Important Bird Areas designated by BirdLife International (Schuster 2010, pp. 16–43). Currently, these five KBAs, which are nonregulatory, are under various degrees of protection and conservation management including national parks, Community Conservation Areas, and areas with no official protective status (CI *et al.* 2010, p. 12). Many of the KBAs and protected areas mentioned above are still faced with increasing pressures in large part due to difficulties of their location on customary lands (traditional village system) and the ongoing threats of development, invasive species, and logging (MNRE 2009, p. 1; CI *et al.* 2010, p. 12). The decline of closed forest habitat has been a result of logging on Savaii and agricultural clearing on the edges of National Parks and Reserves (MNRE 2006, p. 5).

In 2006, the Government of Samoa developed a recovery plan for the mao. The recovery plan identifies goals of securing the mao, maintaining its existing populations on Upolu and Savaii, and reestablishing populations at former sites (MNRE 2006). This plan is nonregulatory in nature.

In summary, existing regulatory mechanisms have the potential to address the threat of habitat destruction and degradation to the mao in Samoa. However, these policies and legislation may not provide the protection necessary for the conservation of the mao in Samoa.

American Samoa

In American Samoa no existing Federal laws, treaties, or regulations specify protection of the mao's habitat from the threat of deforestation, or address the threat of predation by nonnative mammals such as rats and feral cats. However, some existing Territorial laws and regulations have the potential to afford the species some protection but their implementation does not achieve that result. The DMWR is given statutory authority to ''manage, protect, preserve, and perpetuate marine and wildlife resources'' and to promulgate rules and regulations to that end (American Samoa Code Annotated (ASCA), title 24, chapter 3). This agency conducts monitoring surveys, conservation activities, and community outreach and education about conservation concerns. However, to our knowledge, the DMWR has not used this authority to undertake conservation efforts for the mao such as habitat protection and control of nonnative predators such as rats and cats (DMWR 2006, pp. 79–80).

The Territorial Endangered Species Act provides for appointment of a Commission with the authority to nominate species as either endangered or threatened (ASCA, title 24, chapter 7). Regulations adopted under the Coastal Management Act (ASCA § 24.0501 *et seq.*) also prohibit the taking of threatened or endangered species (ASAC § 26.0220.I.c). However, the ASG has not listed the mao as threatened or endangered so these regulatory mechanisms do not provide protection for this species.

Under ASCA, title 24, chapter 08 (Noxious Weeds), the Territorial DOA has the authority to ban, confiscate, and destroy species of plants harmful to the agricultural economy. Similarly, under ASCA, title 24, chapter 06 (Quarantine), the director of DOA has the authority to promulgate agriculture quarantine restrictions concerning animals. These laws may provide some protection against the introduction of new nonnative species that may have negative effects on the mao's habitat or become predators of the mao, but these regulations do not require any measures to control invasive nonnative plants or animals that already are established and proving harmful to native species and their habitats (DMWR 2006, p. 80) (see Factor D for the Pacific sheath-tailed bat, above).

As described above, the Territorial Coastal Management Act establishes a land use permit (LUP) system for development projects and a Project Notification Review System (PNRS) for multi-agency review and approval of LUP applications (ASAC § 26.0206). The standards and criteria for review of LUP applications include requirements to protect Special Management Areas (SMA), Unique Areas, and ''critical habitats'' (ASCA § 24.0501 *et. seq.*). To date, the SMAs that have been designated (Pago Pago Harbor, Leone Pala, and Nuuuli Pala; ASAC § 26.0221), do not provide habitat for the mao. The only Unique Area designated to date, the Ottoville Rainforest (American Samoa Coastal Management Program 2011, p. 52), hypothetically may provide some foraging habitat for the mao, but it is a small (20-ac (8-ha)) island of native forest in the middle of the heavily developed Tafuna Plain (Trail 1993, pp. 1, 4), far from large areas of native forest. These laws and regulations are designed to ensure that ''environmental concerns are given appropriate consideration,'' and include provisions and requirements that could address to some degree threats to native forest habitat required by the mao, even though individual species are not named (ASAC § 26.0202 *et seq.*). Because the implementation of these regulations has been minimal and review of permits is not rigorous, issuance of permits may not provide the habitat protection necessary to provide for the conservation of the mao and instead result in loss of native forest habitat important to the mao and other species as a result of land clearing for agriculture and development (DMWR 2006, p. 71). We conclude that the implementation of the Coastal Management Act and its PNRS is inadequate to address the threat of habitat destruction and degradation to the mao (see Factor D for the Pacific sheath-tailed bat for further details).

Summary of Factor D

In summary, existing Territorial laws and regulatory mechanisms have the potential to offer some level of protection for the mao and its habitat if it were to be reintroduced to American Samoa but are not currently implemented in a manner that would do so. The DMWR has not exercised its statutory authority to address threats to the mao such as predation by nonnative predators, the mao is not listed pursuant to the Territorial Endangered Species Act, and the Coastal Management Act and its implementing regulations have the potential to address the threat of habitat loss to deforestation more substantively, but this law is inadequately implemented.

Based on the best available information, no existing Federal regulatory mechanisms address the threats to the mao. Some existing regulatory mechanisms in Samoa and American Samoa have the potential to offer some protection of the mao and its habitat, but their implementation does not reduce or remove threats to the species such as habitat destruction or modification or predation by nonnative species. For these reasons, we conclude that existing regulatory mechanisms do not address the threats to the mao.

E. Other Natural or Manmade Factors Affecting Its Continued Existence

Hurricanes

Hurricanes are a common natural disturbance in the tropical Pacific and have occurred in the Samoan archipelago with varying frequency and intensity (see Factor E discussion for the Pacific sheath-tailed bat). Catastrophic events such as hurricanes can be a major threat to the persistence of species already experiencing population-level impacts of other stressors (MNRE 2006, p. 8). Two storms in the 1990s, Cyclones Ofa (1990) and Val (1991), severely damaged much of the remaining forested habitat in Samoa, reducing forest canopy cover by 73 percent (MNRE 2006, pp. 5, 7). In addition, Cyclone Evan struck Samoa in 2012 causing severe and widespread forest damage, including defoliation and downed trees in 80 to 90 percent of the Reserves and National Parks on Upolu (Butler and Stirnemann 2013, p. 41). Secondary forests also were severely damaged by the storm, and most trees in the known mao locations were stripped of their leaves, fruits, and flowers (Butler and Stirnemann 2013, p. 41). Hurricanes thus exacerbate forest fragmentation and invasion of native forests by nonnative species, stressors that reduce breeding, nesting, and foraging habitat for the mao (see Factor A, above). Although severe storms are a natural disturbance with which the mao has coexisted for millennia, such storms exacerbate the threats to its remaining small, isolated populations by at least temporarily damaging or redistributing habitat and food resources for the birds and causing direct mortality of individuals (Wiley and Wunderle 1993, pp. 340–341; Wunderle and Wiley 1996, p. 261). If the mao was widely distributed, had ample habitat and sufficient numbers, and were not under chronic pressure from anthropogenic threats such as introduced predators, it might recover from hurricane-related mortality and the temporary loss or redistribution of resources in the wake of severe storms. However, this species' current status makes it highly vulnerable to catastrophic chance events, such as hurricanes, which occur frequently throughout its range in Samoa and American Samoa.

Low Numbers of Individuals and Populations

Species with low numbers of individuals, restricted distributions, and small, isolated populations are often more susceptible to extinction as a result of natural catastrophes such as hurricanes or disease outbreaks, demographic fluctuations, or inbreeding depression (Shaffer 1981, p. 131; see Factor E discussion for the Pacific sheath-tailed bat, above). These problems associated with small population size are further magnified by interactions with each other and with other threats, such as habitat loss and predation (Lacy 2000, pp. 45–47; see Factor A and Factor C, above).

We consider the mao to be vulnerable to extinction because of threats associated with its low number of individuals—perhaps not more than a few hundred birds—and low numbers of populations. These threats include environmental catastrophes, such as hurricanes, which could immediately extinguish some or all of the remaining populations; demographic stochasticity that could leave the species without sufficient males or females to be viable; and inbreeding depression or loss of adaptive potential that can be associated with loss of genetic diversity and result in eventual extinction (Shaffer 1981, p. 131; Lacy 2000, pp. 40, 44–46). Combined with ongoing habitat destruction and modification by logging, agriculture, development, nonnative plant species, and feral ungulates (Factor A) and predation by rats and feral cats (Factor C), the effects of these threats to small populations further increases the risk of extinction of the mao.

Climate Change

Our analyses under the Act include consideration of ongoing and projected changes in climate (see Factor E discussion for the Pacific sheath-tailed bat). The magnitude and intensity of the impacts of global climate change and increasing temperatures on western tropical Pacific island ecosystems currently are unknown. In addition, there are no climate change studies that address impacts to the specific habitats of the mao. The scientific assessment completed by the Pacific Science Climate Science Program provides general projections or trends for predicted changes in climate and associated changes in ambient temperature, precipitation, hurricanes, and sea level rise for countries in the western tropical Pacific region including Samoa (used also as a proxy for American Samoa) (Australian BOM and CSIRO 2011, Vol. 1 & Vol. 2; see Factor E discussion for the Pacific sheath-tailed bat for summary).

Although we do not have specific information on the impacts of the effects of climate change to the mao, increased ambient temperature and precipitation, and increased severity of hurricanes, would likely exacerbate other threats to this species as well as provide additional stresses on its habitat. The probability of species extinction as a result of climate change impacts increases when its range is restricted, habitat decreases, and numbers of populations decline (IPCC 2007, p. 48). The mao is limited by its restricted range and low numbers of individuals. Therefore, we expect this species to be particularly vulnerable to the environmental effects of climate change and subsequent impacts to its habitat, even though the specific and cumulative effects of climate change on the mao are presently unknown and we are not able to determine the magnitude of this future threat with confidence. Based on the above information, we conclude that habitat impacts resulting from the effects of climate change are not a current threat but are likely to become a threat to the mao in the future.

Conservation Efforts To Reduce Other Natural or Manmade Factors Affecting Its Continued Existence

We are unaware of any conservation actions planned or implemented at this time to abate the threats of hurricanes and low numbers of individuals that negatively impact the mao. However, the completion of a recovery plan, basic research on the mao's life-history requirements, population monitoring, and cooperation between the governments of American Samoa and Samoa contribute to the conservation of the mao.

Proposed Determination for the Mao

We have carefully assessed the best scientific and commercial information available regarding the past, present, and future threats to mao. This large honeyeater endemic to the Samoan archipelago is vulnerable to extinction because of the loss and degradation of its forested habitat, predation by nonnative mammals, and the impact of stochastic events to species that are reduced to small population size and limited distribution.

The threat of habitat destruction and modification from agriculture, logging, and development, nonnative plants, and nonnative ungulates is occurring throughout the range of the mao, and is not likely to be reduced in the future (Factor A). The threat of predation from nonnative predators such as rats and feral cats is ongoing and likely to continue in the future (Factor C). Existing regulatory mechanisms do not address the threats to this species (Factor D). Additionally, the low numbers of individuals and populations of the mao render the species vulnerable to environmental catastrophes such as hurricanes, demographic stochasticity, and inbreeding depression (Factor E). These factors pose threats to the mao whether we consider their effects individually or cumulatively. All of these threats are likely to continue in the future.

The Act defines an endangered species as any species that is ''in danger of extinction throughout all or a significant portion of its range'' and a threatened species as any species ''that is likely to become endangered throughout all or a significant portion of its range within the foreseeable future.'' We find that the mao is presently in danger of extinction throughout its entire range based on the severity and immediacy of threats currently impacting the species.

Therefore, on the basis of the best available scientific and commercial information, we propose listing mao as endangered in accordance with sections 3(6) and 4(a)(1) of the Act. We find that the mao is presently in danger of extinction throughout its entire range based on the severity and immediacy of the ongoing and projected threats described above. The loss and degradation of its forested habitat, predation by nonnative mammals, limited distribution, the effects of small population size, and stochastic events such as hurricanes render this species in its entirety highly susceptible to extinction as a consequence of these imminent threats; the species' low reproductive rate reduces its ability to recover from impacts of multiple threats and their cumulative effects.

Under the Act and our implementing regulations, a species may warrant listing if it is in danger of extinction or likely to become so throughout all or a significant portion of its range. Because we have determined that the mao is endangered throughout all of its range, no portion of its range can be ''significant'' for purposes of the definitions of ''endangered species'' and ''threatened species.'' See the Final Policy on Interpretation of the Phrase ''Significant Portion of Its Range'' in the Endangered Species Act's Definitions of ''Endangered Species'' and ''Threatened Species'' (79 FR 37577, July 1, 2014).

American Samoa Population of the Friendly Ground-Dove, *Gallicolumba stairi*, Tuaimeo

The genus *Gallicolumba* is distributed throughout the Pacific and Southeast Asia and is represented in the oceanic Pacific by six species. Three species are endemic to Micronesian islands or archipelagos, two are endemic to island groups in French Polynesia, and *Gallicolumba stairi* is endemic to Samoa, Tonga, and Fiji (Sibley and Monroe 1990, p. 206). The species name used here, the friendly ground-dove, was derived from ''Friendly Islands'' (*i.e.,* Tonga), where it is purported to have been first collected (Watling 2001, p. 118). Because of its shy and secretive habits, this species is also often referred to as the shy ground-dove (Pratt *et al.* 1997, pp. 194–195). Some authors recognize two subspecies of the friendly ground-dove: One, slightly smaller, in the Samoan archipelago (*G. s. stairi*), and the other in Tonga and Fiji (*G. s. vitiensis*) (Mayr 1945, pp. 131–132). However, morphological differences between the two are slight (Watling 2001, p. 117), and no genetic or other studies have validated the existence of separate subspecies.

We accept the current taxonomic treatment of the friendly ground-dove as *Gallicolumba stairi* as described in the IOC World Bird List Version 5.1 compiled by the International Ornithologists Union Committee on Nomenclature (Gill and Donsker 2015) and ITIS (2015b). However, recent molecular analyses suggest that the species ascribed to *Gallicolumba* are not monophyletic, and recommend reinstalling the name *Alopecoenas* for some *Gallicolumba* species, including *G. stairi,* thus including it in a monophyletic radiation of ten species distributed in New Guinea, the Lesser Sundas, and Oceania (Jonsson *et al.* 2011, pp. 541–542; Moyle *et al.* 2013, pp. 1,064–1,065). This recommendation also parallels the natural divide based on plumage patterns of birds distributed on either side of New Guinea: The ''bleeding hearts'' with a red-orange breast patch, which occur in the Philippines and are recommended to remain in *Gallicolumba,* and the other ground-doves with a white or gray breast and head, which occur on Pacific Islands and New Guinea and are recommended for placement in *Alopecoenas* (Jonsson *et al.* 2011, p. 538). Nevertheless, at this time, there is lack of consensus for the generic change from *Gallicolumba* to *Alopecoenas,* as well as the lack of evidence for validation of a subspecies, *G. s.stairi,* restricted to the Samoan archipelago. Therefore, we are evaluating the status of *G. stairi* in this proposed rule.

The friendly ground-dove is a medium-sized dove, approximately 10 in (26 cm) long. Males have rufous-brown upperparts with a bronze-green iridescence, the crown and nape are grey, the wings rufous with a purplish luster, and the tail is dark brown. The abdomen and belly are dark brown-olive, while the breast shield is dark pink with a white border. Immature birds are similar to adults but are uniformly brown. Females are dimorphic in Fiji and Tonga, where a brown phase (tawny underparts and no breast shield) and pale phase (similar to males but duller) occur. In Samoa and American Samoa, only the pale phase is known to occur (Watling 2001, p. 117).

In American Samoa, the friendly ground-dove is typically found on or near steep, forested slopes, particularly those with an open understory and fine scree or exposed soil (Tulafono 2006, in litt.). Elsewhere the species is known to inhabit brushy vegetation or native forest on offshore islands, native limestone forest (Tonga), and forest habitats on large, high islands (Steadman and Freifeld 1998, p. 617; Clunie 1999, pp. 42–43; Freifeld *et al.* 2001, p. 79; Watling 2001, p. 118). This bird spends most of its time on the ground, and feeds on seeds, fruit, buds, snails, and insects (Clunie 1999, p. 42; Craig 2009, p. 125). The friendly ground-dove typically builds a nest of twigs several feet from the ground or in a tree fern crown, and lays one or two white eggs (Clunie 1999, p. 43).

The friendly ground-dove is uncommon or rare throughout its range in Fiji, Tonga, Wallis and Futuna, Samoa, and American Samoa (Steadman and Freifeld 1998, p. 626; Schuster *et al.* 1999, pp. 13, 70; Freifeld *et al.* 2001, pp. 78–79; Watling 2001, p. 118; Steadman 1997, pp. 745, 747), except for on some small islands in Fiji (Watling 2001, p. 118). The status of the species as a whole is not monitored closely throughout its range, but based on available information, the friendly ground-dove persists in very small numbers in Samoa (Schuster *et al.* 1999, pp. 13, 70; Freifeld *et al.* 2001, pp. 78–79), and is considered to be among the most endangered of native Samoan bird species (Watling 2001, p. 118). In Tonga, the species occurs primarily on small, uninhabited islands and in one small area of a larger island (Steadman and Freifeld 1998, pp. 617–618; Watling 2001, p. 118). In Fiji, the friendly ground-dove is thought to be widely distributed but uncommon on large islands and relatively common on some small islands (Watling 2001, p. 118).

In American Samoa, the species was first reported on Ofu in 1976 (Amerson *et al.* 1982, p. 69), and has been recorded infrequently on Ofu and more commonly on Olosega since the mid-1990s (Amerson *et al.* 1982, p. 69; Seamon 2004a, in litt.; Tulafono 2006, in litt.). Amerson *et al.* (1982, p. 69) estimate a total population of about 100 birds on Ofu and possibly Olosega. Engbring and Ramsey (1989, p. 57) described the population on Ofu as ''very small,'' but did not attempt a population estimate. More than 10 ground-doves were caught on Olosega between 2001 and 2004, suggesting that numbers there are greater than on Ofu, but birds may move between the two islands (Seamon 2004a, in litt.), which once were a single land mass and are today connected by a causeway that is roughly 490 feet (ft) (150 meters (m)) long. No current population estimate is available; the secretive habits of this species make monitoring difficult. Monitoring surveys over the last 10 years do not, however, suggest any change in the relative abundance of the friendly ground-dove (Seamon 2004a, in litt.). The DMWR biologists regularly observe this species at several locations on Ofu and Olosega (DMWR 2013, in litt.), and have initiated a project to color band the population in order to better describe their distribution and status on the two islands (Miles 2015b, in litt.).

Distinct Population Segment (DPS) Analysis

Under the Act, we have the authority to consider for listing any species, subspecies, or for vertebrates, any distinct population segment (DPS) of these taxa if there is sufficient information to indicate that such action may be warranted. To guide the implementation of the DPS provisions of the Act, we and the National Marine Fisheries Service (National Oceanic and Atmospheric Administration—Fisheries), published the Policy Regarding the Recognition of Distinct Vertebrate Population Segments Under the Endangered Species Act (DPS Policy) in the **Federal Register** on February 7, 1996 (61 FR 4722). Under our DPS Policy, we use two elements to assess whether a population segment under consideration for listing may be recognized as a DPS: (1) The population segment's discreteness from the remainder of the species to which it belongs and (2) the significance of the population segment to the species to which it belongs. If we determine that a population segment being considered for listing is a DPS, then the population segment's conservation status is evaluated based on the five listing factors established by the Act to determine if listing it as either endangered or threatened is warranted. Below, we evaluate the American Samoa population of the friendly ground-dove to determine whether it meets the definition of a DPS under our Policy.

Discreteness

Under our DPS Policy, a population segment of a vertebrate taxon may be considered discrete if it satisfies either one of the following conditions: (1) It is markedly separated from other populations of the same taxon as a consequence of physical, physiological, ecological, or behavioral factors. Quantitative measures of genetic or morphological discontinuity may provide evidence of this separation; (2) It is delimited by international governmental boundaries within which differences in control of exploitation, management of habitat, conservation status, or regulatory mechanisms exist that are significant in light of section 4(a)(1)(D) of the Act.

The American Samoa population of the friendly ground-dove, a cryptic, understory-dwelling dove not noted for long-distance dispersal, is markedly separate from other populations of the species. The genus *Gallicolumba* is widely distributed in the Pacific, but populations of the friendly ground-dove are restricted to a subset of islands (often small, offshore islets) in any archipelago where they occur, or even to limited areas of single islands in Polynesia (Steadman and Freifeld 1998, pp. 617–618; Freifeld *et al.* 2001, p. 79; Watling 2001, p. 118). Unlike other Pacific Island columbids, this species does not fly high above the canopy; it is an understory species that forages largely on the ground and nests near the ground (Watling 2001, p. 118). Furthermore, members of the genus that are restricted to individual archipelagos, single islands, or offshore islets, are presumed to be relatively sedentary, weak, or reluctant fliers, with inter-island flights rarely observed (Baptista *et al.* 1997, pp. 95, 179–187, Freifeld *et al.* 2001, p. 79). Therefore, there is a low likelihood of frequent dispersal or immigration over the large distances that separate the American Samoa population on Ofu and Olosega islands from the other populations in Samoa (118 miles mi (190 km)), Tonga (430 mi (690 km)), and Fiji (more than 625 mi (1,000 km)). In addition, the American Samoan island of Tutuila lies between the American Samoa population and the nearest population in Samoa, and no Tutuila records of the friendly ground-dove exist. For these reasons, it is likely that populations of the friendly ground-dove, which occur in three archipelagos, are ecologically isolated from each other (*i.e.,* the likelihood is low that a population decimated or lost would be rebuilt by immigration from another population), although some level of exchange on an evolutionary timescale likely occurs.

Based on the our review of the available information, we have determined that the American Samoa population of the friendly ground-dove is markedly separate from other populations of the species due to geographic (physical) isolation from friendly ground-dove populations in Samoa, Tonga, and Fiji (Fig. 1). The geographic distance between the American Samoa population and other populations coupled with the low likelihood of frequent long-distance exchange between populations further separate the American Samoa population from other populations of this species throughout its range. Therefore, we have determined that the American Samoa population of friendly ground-dove meets a condition of our DPS policy for discreteness.

Significance

Under our DPS Policy, once we have determined that a population segment is discrete, we consider its biological and ecological significance to the larger taxon to which it belongs. This consideration may include, but is not limited to: (1) Evidence of the persistence of the discrete population segment in an ecological setting that is unusual or unique for the taxon, (2) evidence that loss of the population segment would result in a significant gap in the range of the taxon, (3) evidence that the population segment represents the only surviving natural occurrence of a taxon that may be more abundant elsewhere as an introduced population outside its historical range, or (4) evidence that the discrete population segment differs markedly from other populations of the species in its genetic characteristics. One of these criteria is met. We have found substantial evidence that loss of the American Samoa population of the friendly ground-dove would constitute a significant gap in the range of this species, and thus this population meets our criteria for significance under our Policy.

The American Samoa population of the friendly ground-dove represents the easternmost distribution of this species. The loss of this population would truncate the species' range by approximately 100 mi (161 km), or approximately 15 percent of the linear extent of its range, which trends southwest-to-northeast from Fiji to Tonga to Wallis and Futuna, Samoa, and American Samoa. Unlike other Pacific Island columbids, this species does not fly high above the canopy; it is an understory species that forages largely on the ground and nests near the ground (Watling 2001, p. 118). Because of its flight limitations, the friendly ground-dove is unlikely to disperse over the long distances between American Samoa and the nearest surrounding populations. Therefore, the loss of the American Samoa population coupled with the low likelihood of recolonization from the nearest source populations in Samoa, Fiji, and Tonga, would create a significant gap in the range of the friendly ground-dove.

Summary of DPS Analysis Regarding the American Samoa Population of the Friendly Ground-Dove

Given that both the discreteness and the significance elements of the DPS policy are met for the American Samoa population of the friendly ground-dove, we find that the American Samoa population of the friendly ground-dove is a valid DPS. Therefore, the American Samoa DPS of friendly ground-dove is a listable entity under the Act, and we now assess this DPS's conservation status in relation to the Act's standards for listing, (*i.e.,* whether this DPS meets the definition of an endangered or threatened species under the Act).

BILLING CODE 4333–15–C

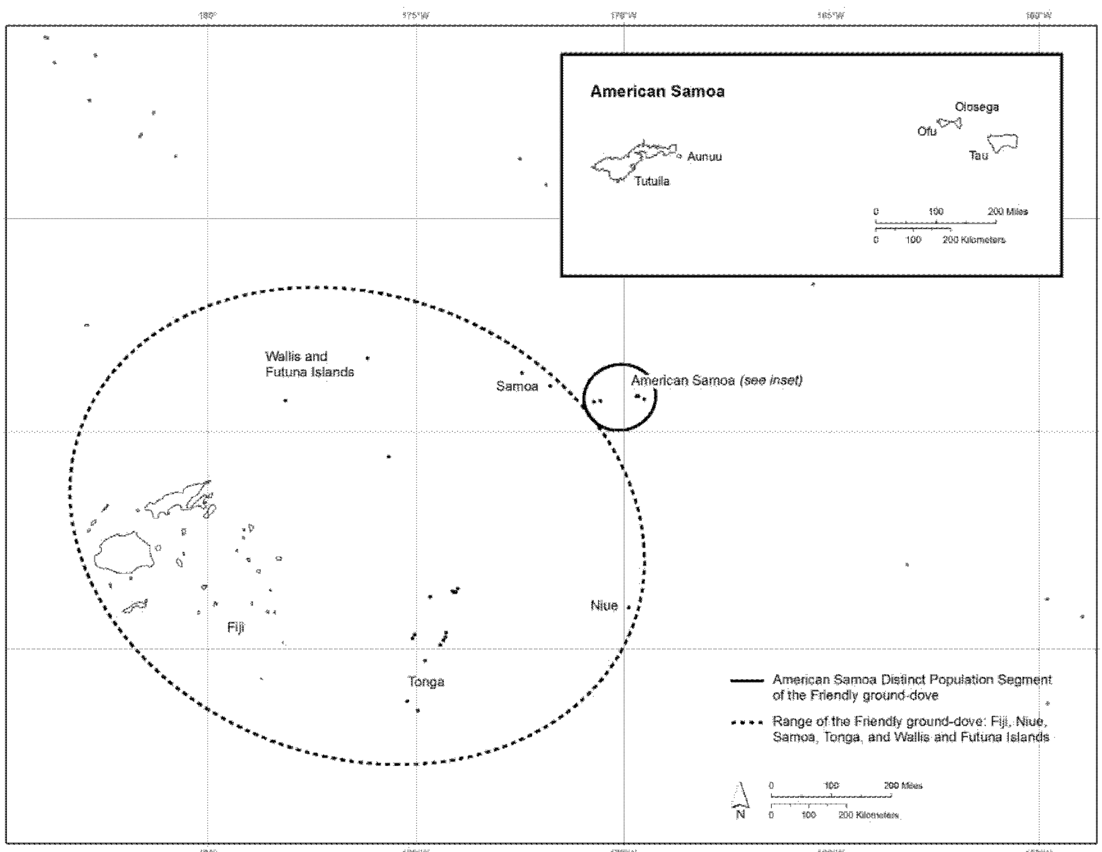

Figure 1. The South Pacific Ocean, indicating the location of the American Samoa DPS of the friendly ground-dove and the global range of the species.

Summary of Factors Affecting the American Samoa DPS of the Friendly Ground-Dove

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

Habitat Destruction and Modification by Agriculture and Development

The loss or modification of lowland and coastal forests has been implicated as a limiting factor for populations of the friendly ground-dove and has likely pushed this species into more disturbed areas or forested habitat at higher elevations (Watling 2001, p. 118). Several thousand years of subsistence agriculture and more recent, larger-scale agriculture has resulted in the alteration and great reduction in area of forests at lower elevations in American Samoa (see Factor A discussion for the mao). On Ofu, the coastal forest where the ground-dove has been recorded, and which may be the preferred habitat for this species range-wide (Watling 2001, p. 118), largely has been converted to villages, grasslands, or coconut plantations (Whistler 1994, p. 127). However, none of the land-clearing or development projects proposed for Ofu or Olosega in recent years has been approved or initiated in areas known to be frequented by friendly ground-doves (Tulafono 2006, in litt.; Stein *et al.* 2014, p. 25). Based on the above information, we find that agriculture and development have caused substantial destruction and modification of the habitat of the friendly ground-dove in American Samoa, potentially resulting in the curtailment of its range in American Samoa. Habitat destruction and modification by agriculture is expected to continue into the future, but probably at a low rate; the human population on Ofu and Olosega has been declining over recent decades and was estimated at 176 (Ofu) and 177 (Olosega) in 2010 (American Samoa Government 2013, p. 8). However, because any further loss of habitat to land-clearing will further isolate the remaining populations of this species in American Samoa, we conclude that habitat destruction and modification by agriculture is a current threat to the American Samoa DPS of the friendly ground-dove that will continue in the future.

Conservation Efforts To Reduce Habitat Destruction, Modification, or Curtailment of Its Range

The National Park of American Samoa (NPSA) was established to preserve and protect the tropical forest and archaeological and cultural resources, to maintain the habitat of flying foxes, to preserve the ecological balance of the Samoan tropical forest, and, consistent with the preservation of these resources, to provide for the enjoyment of the unique resources of the Samoan tropical forest by visitors from around the world (Public Law 100–571, Public Law 100–336). Under a 50-year lease agreement between local villages, the American Samoa Government, and the Federal Government, approximately 73 ac (30 ha) on Ofu Island are located within park boundaries (NPSA Lease Agreement 1993). While the majority of the park's land area on Ofu consists of coastal and beach habitat, approximately 30 ac (12 ha) in the vicinity of Sunuitao Peak may provide forested habitat for the friendly ground-dove.

Summary of Factor A

Past clearing for agriculture and development has resulted in the significant destruction and modification of coastal forest habitat for the American Samoa DPS of the friendly ground-dove. Land-clearing for agriculture is expected to continue in the future, but likely at a low rate. However, the degraded and fragmented status of the remaining habitat for the ground-dove is likely to be exacerbated by hurricanes. Therefore, we consider habitat destruction and modification to be a threat to this DPS.

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

Pigeon-catching was a traditional practice in ancient Samoan society (Craig 2009, p. 104). Hunting of terrestrial birds and bats in American Samoa primarily for subsistence purposes continued until the documented decline of wildlife populations led to the enactment of a hunting ban and formal hunting regulations (Craig *et al.* 1994, pp. 345–346). The bird species most commonly taken were the Pacific pigeon or lupe (*Ducula ducula*) and the purple-capped fruit-dove or manutagi (*Ptilinopus porphyraceus*). Although the many-colored fruit dove or manuma (*Ptilinopus perousii*) is too rare to be sought by hunters, a few may have been killed each year by hunters in search of the Pacific pigeon or purple-capped fruit-dove (Craig 2009, p. 106). The incidental shooting of the friendly ground-dove by hunters in pursuit of other bird species (during a sanctioned hunting season; see Factor D) has the potential to occur. Poaching is not considered a threat to the friendly ground-dove in American Samoa (Seamon 2004a, in litt.; 2004b, in litt.). In addition, the use of firearms on the islands of Ofu and Olosega has rarely, if ever, been observed (Caruso 2015a, in litt.). In summary, based on the best available scientific and commercial information, we do not consider overutilization for commercial, recreational, scientific, or educational purposes to be a threat to the American Samoa DPS of the friendly ground-dove.

C. Disease or Predation

Disease

Research suggests that avian malaria may be indigenous and non-pathogenic in American Samoa, and, therefore, is unlikely to limit populations of the friendly ground-dove (Jarvi *et al.* 2003, p. 636; Seamon 2004a, in litt.). Although other blood parasites are common in many bird species in American Samoa, none have been reported to date in friendly ground-dove samples (Atkinson *et al.* 2006, p. 232). The best available information does not show there are other avian diseases that may be affecting this species.

Predation

Depredation by introduced mammalian predators is the likely cause of widespread extirpation of the friendly ground-dove throughout portions of its range (Steadman and Freifeld 1998, p. 617; Watling 2001, p. 118). Three species of rats occur in American Samoa and are likely to be present on the islands of Ofu and Olosega: the Polynesian rat, Norway rat, and black rat (Atkinson 1985, p. 38; DMWR 2006, p. 22; Caruso 2015b, in litt.). Domestic cats are widespread on Ofu and have been observed in the proximity of areas where friendly ground-doves have been detected (Arcilla 2015, in litt.). Feral cats are likely to occur on Olosega because of its physical connection to Ofu.

Predation by rats is well known to have caused population decline and extirpation in many island bird species (Atkinson 1977, p. 129; 1985, pp. 55–70; O'Donnell *et al.* 2015, pp. 24–26), especially species that nest on or near the ground or in burrows (Bertram and Nagorsen 1995, pp. 6–10; Flint 1999, p. 200; Carlile *et al.* 2003, p. 186). For example, black rats were responsible for the near extirpation of the burrow-nesting Galapagos petrel on Floreana Island (Cruz and Cruz 1987, pp. 3–13), and for the extinction of the ground-nesting Laysan rail (*Porzana palmeri*), which had been translocated to Midway Atoll prior to the loss of the Laysan population (Fisher and Baldwin 1946, p. 8). The best available information is not specific to rat predation on the

American Samoa DPS of the friendly ground-dove, but the pervasive presence of rats throughout American Samoa makes it is likely that they play a role in limiting populations of this species.

Predation by cats has been directly responsible for the extinction of numerous birds on oceanic islands (Medina *et al.* 2011, p. 6). Native mammalian carnivores are absent from oceanic islands because of their low dispersal ability, but once introduced by humans, they become significant predators on native animals such as seabirds and landbirds that are not adapted to predation by terrestrial carnivores (Nogales *et al.* 2013, p. 804; Scott *et al.* 1986, p. 363; Ainley *et al.* 1997, p. 24; Hess and Banko 2006, in litt.). Domestic cats have been observed in remote areas known to be frequented by ground-doves and may prey on friendly ground-doves and other species that nest on or near the ground (Arcilla 2015, in litt.). Therefore, the threat of predation by feral cats could potentially have a significant influence on this species, particularly given that the American Samoa DPS of the friendly ground-dove population appears to be very small and limited to small areas on the islands of Ofu and Olosega.

In summary, based on the best available scientific and commercial information, we conclude that disease is not a factor in the continued existence of the friendly ground-dove. Because island birds such as the friendly ground-dove are extremely vulnerable to predation by nonnative predators, the threat of predation by rats and feral cats is likely to continue and is considered a threat to the continued existence of this DPS.

D. The Inadequacy of Existing Regulatory Mechanisms

The Act requires that the Secretary assess available regulatory mechanisms in order to determine whether existing regulatory mechanisms may be inadequate as designed to address threats to the species being evaluated (Factor D). Under this factor, we examine whether existing regulatory mechanisms are inadequate to address the potential threats to the American Samoa DPS of the friendly ground-dove discussed under other factors. In determining whether the inadequacy of regulatory mechanisms constitutes a threat to the friendly ground-dove, we analyzed the existing Federal and Territorial laws and regulations that may address the threats to this species or contain relevant protective measures. Regulatory mechanisms, if they exist, may preclude the need for listing if we determine that such mechanisms adequately address the threats to the species such that listing is not warranted.

In American Samoa no existing Federal laws, treaties, or regulations specify protection of the friendly ground-dove's habitat from the threat of deforestation, or address the threat of predation by nonnative mammals such as rats and feral cats. However, some existing Territorial laws and regulations have the potential to afford the species some protection but their implementation does not achieve that result. The DMWR is given statutory authority to ''manage, protect, preserve, and perpetuate marine and wildlife resources'' and to promulgate rules and regulations to that end (American Samoa Code Annotated (ASCA), title 24, chapter 3). This agency conducts monitoring surveys, conservation activities, and community outreach and education about conservation concerns. However, to our knowledge, the DMWR has not used this authority to undertake conservation efforts for the friendly ground-dove such as habitat protection and control of nonnative predators such as rats and cats (DMWR 2006, pp. 79–80).

The Territorial Endangered Species Act provides for appointment of a Commission with the authority to nominate species as either endangered or threatened (ASCA, title 24, chapter 7). Regulations adopted under the Coastal Management Act (ASCA § 24.0501 *et seq.*) also prohibit the taking of threatened or endangered species (ASAC § 26.0220.I.c). However, the ASG has not listed the friendly ground-dove as threatened or endangered so these regulatory mechanisms do not provide protection for this species.

Under ASCA, title 24, chapter 08 (Noxious Weeds), the Territorial DOA has the authority to ban, confiscate, and destroy species of plants harmful to the agricultural economy. Similarly, under ASCA, title 24, chapter 06 (Quarantine), the director of DOA has the authority to promulgate agriculture quarantine restrictions concerning animals. These laws may provide some protection against the introduction of new nonnative species that may have negative effects on the friendly ground-dove's habitat or become predators of the species, but these regulations do not require any measures to control invasive nonnative plants or animals that already are established and proving harmful to native species and their habitats (DMWR 2006, p. 80) (see Factor D for the Pacific sheath-tailed bat, above).

As described above, the Territorial Coastal Management Act establishes a land use permit (LUP) system for development projects and a Project Notification Review System (PNRS) for multi-agency review and approval of LUP applications (ASAC § 26.0206). The standards and criteria for review of LUP applications include requirements to protect Special Management Areas (SMA), Unique Areas, and ''critical habitats'' (ASCA § 24.0501 *et. seq.*). To date, the SMAs that have been designated (Pago Pago Harbor, Leone Pala, and Nuuuli Pala; ASAC § 26.0221), are all on Tutuila and do not provide habitat for the friendly ground-dove, which occurs only on the islands of Ofu and Olosega. The only Unique Area designated to date, the Ottoville Rainforest (American Samoa Coastal Management Program 2011, p. 52), also is on Tutuila and does not provide habitat for the friendly ground-dove. These laws and regulations are designed to ensure that ''environmental concerns are given appropriate consideration,'' and include provisions and requirements that could address to some degree threats to native forest habitat required by the friendly ground-dove, even though individual species are not named (ASAC § 26.0202 *et seq.*). Because the implementation of these regulations has been minimal and review of permits is not rigorous, issuance of permits may not provide the habitat protection necessary to provide for the conservation of the friendly ground-dove and instead result in loss of native habitat important to this and other species as a result of land clearing for agriculture and development (DMWR 2006, p. 71). We conclude that the implementation of the Coastal Management Act and its PNRS is inadequate to address the threat of habitat destruction and degradation to the friendly ground-dove (see Factor D for the Pacific sheath-tailed bat for further details).

Summary of Factor D

In summary, existing Territorial laws and regulatory mechanisms have the potential to offer some level of protection for the American Samoa DPS of the friendly ground-dove and its habitat but are not currently implemented in a manner that would do so. The DMWR has not exercised its statutory authority to address threats to the ground-dove such as predation by nonnative predators, the species is not listed pursuant to the Territorial Endangered Species Act, and the Coastal Management Act and its implementing regulations have the potential to address the threat of habitat loss to deforestation more substantively, but this law is inadequately implemented. Based on the best available information, some existing regulatory mechanisms have the potential to offer some protection of the friendly ground-dove and its habitat, but their implementation does not reduce or remove threats to the species such as habitat destruction or modification or predation by nonnative species. For these reasons, we conclude that existing regulatory mechanisms do not address the threats to the American Samoa DPS of the friendly ground-dove.

E. Other Natural or Manmade Factors Affecting Its Continued Existence

Hurricanes

Hurricanes may cause the direct and indirect mortality of the friendly ground-dove, as well as modify its already limited habitat (see Factor A above). This species has likely coexisted with hurricanes for millennia in American Samoa, and if the friendly ground-dove was widely distributed in American Samoa, had ample habitat and sufficient numbers, and was not under chronic pressure from anthropogenic threats such as habitat loss and introduced predators, it might recover from hurricane-related mortality and the temporary loss or redistribution of resources in the wake of severe storms. However, this species' current status in American Samoa makes it highly vulnerable to chance events, such as hurricanes.

Low Numbers of Individuals and Populations

Species with a low total number of individuals, restricted distributions, and small, isolated populations are often more susceptible to extinction as a result of natural catastrophes, demographic fluctuations, or inbreeding depression (Shaffer 1981, p. 131; see Factor E discussion for the Pacific sheath-tailed bat, above). The American Samoa DPS of the friendly ground-dove is at risk of extinction because of its probable low remaining number of individuals and distribution restricted to small areas on the islands of Ofu and Olosega, conditions that render this DPS vulnerable to the small-population stressors listed above. These stressors include environmental catastrophes, such as hurricanes, which could immediately extinguish some or all of the remaining populations; demographic stochasticity that could leave the species without sufficient males or females to be viable; and inbreeding depression or loss of adaptive potential that can be associated with loss of genetic diversity and result in eventual extinction. These small-population stressors are a threat to the American Samoa DPS of the friendly ground-dove, and this threat is exacerbated by habitat loss and degradation (Factor A) and predation by nonnative mammals (Factor C).

Climate Change

Our analyses under the Act include consideration of ongoing and projected changes in climate (see Factor E discussion for the Pacific sheath-tailed bat). The magnitude and intensity of the impacts of global climate change and increasing temperatures on western tropical Pacific island ecosystems are currently unknown. In addition, there are no climate change studies that address impacts to the specific habitats of the American Samoa DPS of the friendly ground-dove. The scientific assessment completed by the Pacific Science Climate Science Program provides general projections or trends for predicted changes in climate and associated changes in ambient temperature, precipitation, hurricanes, and sea level rise for countries in the western tropical Pacific region including Samoa (Australian BOM and CSIRO 2011, Vol. 1 and 2; used as a proxy for American Samoa) (see Factor E discussion for the Pacific sheath-tailed bat).

Although we do not have specific information on the impacts of climate change to the American Samoa DPS of the friendly ground-dove, increased ambient temperature and precipitation, increased severity of hurricanes, and sea level rise and inundation would likely exacerbate other threats to its habitat. Although hurricanes are part of the natural disturbance regime in the tropical Pacific, and the friendly ground-dove has evolved in presence of this disturbance, the projected increase in the severity of hurricanes resulting from climate change is expected to exacerbate the hurricane-related impacts such as habitat destruction and modification and availability of food resources of the friendly ground-dove, whose diet consists mainly of seeds, fruit, buds, and young leaves and shoots (Watling 2001, p. 118). For example, Hurricanes Heta (in January 2004) and Olaf (in February 2005) virtually destroyed suitable habitat for the friendly ground-dove at one of the areas on Olosega where this species was most frequently encountered; detections of ground-doves in other, less storm-damaged areas subsequently increased, suggesting they had moved from the area affected by the storms (Seamon 2005, in litt.; Tulafono 2006, in litt.). The probability of species extinction as a result of climate change impacts increases when a species' range is restricted, its habitat decreases, and its numbers are declining (IPCC 2007, p. 8). The friendly ground-dove is limited by its restricted range, diminished habitat, and small population size. Therefore, we expect the friendly ground-dove to be particularly vulnerable to the environmental impacts of projected changes in climate and subsequent impacts to its habitat. Based on the above information, we conclude that habitat impacts resulting from the effects of climate change are not a current threat but are likely to become a threat to the American Samoa DPS of the friendly ground-dove in the future.

Conservation Efforts To Reduce Other Natural or Manmade Factors Affecting Its Continued Existence

We are unaware of any conservation actions planned or implemented at this time to abate the threats of hurricanes and low numbers of individuals that negatively impact the American Samoa DPS of the friendly-ground-dove.

Proposed Determination for the American Samoa DPS of the Friendly Ground-Dove

We have carefully assessed the best scientific and commercial information available regarding the past, present, and future threats to the American Samoa DPS of the friendly ground-dove. The American Samoa DPS of the friendly ground-dove is vulnerable to extinction because of its reduced population size and distribution, habitat loss, and probable depredation by nonnative mammals.

The habitat of the American Samoa DPS of the friendly ground-dove remains degraded and destroyed by past land-clearing for agriculture, and hurricanes exacerbate the poor status of this habitat, a threat that is likely to continue in the future (Factor A) and worsen under the projected effects of climate change. The threat of predation by nonnative mammals such as rats and cats is likely to continue in the future (Factor C). Current Territorial wildlife laws and regulations do not address the threats to this DPS (Factor D). The DPS of the friendly ground-dove persists in low numbers of individuals and in few and disjunct populations (Factor E), a threat that interacts synergistically with other threats. These factors pose threats to the American Samoa DPS of the friendly ground-dove, whether we consider their effects individually or cumulatively. These threats will continue in the future.

The Act defines an endangered species as any species that is "in danger of extinction throughout all or a significant portion of its range'' and a threatened species as any species ''that is likely to become endangered throughout all or a significant portion of its range within the foreseeable future.'' We find that the friendly ground-dove is presently in danger of extinction throughout its entire range based on the severity and immediacy of threats currently impacting the species.

Therefore, on the basis of the best available scientific and commercial information, we propose listing the American Samoa DPS of the friendly ground-dove as endangered in accordance with sections 3(6) and 4(a)(1) of the Act. We find that the American Samoa DPS of the friendly ground-dove is presently in danger of extinction throughout its entire range based on the severity and immediacy of the ongoing and projected threats described above. The friendly ground-dove is restricted to the islands of Ofu and Olosega, where it exists in low numbers and is subject to predation by nonnative animals. The ground-dove's remaining habitat is limited and at risk from ongoing degradation by hurricanes. Habitat loss and degradation and the imminent threats of predation, the effects of small population size, and stochastic events such as hurricanes render the American Samoa DPS of the friendly ground-dove highly susceptible to extinction.

Under the Act and our implementing regulations, a species may warrant listing if it is in danger of extinction or likely to become so throughout all or a significant portion of its range. Because we have determined that the DPS of the friendly ground-dove is endangered throughout all of its range, no portion of its range can be ''significant'' for purposes of the definitions of ''endangered species'' and ''threatened species.'' See the Final Policy on Interpretation of the Phrase ''Significant Portion of Its Range'' in the Endangered Species Act's Definitions of ''Endangered Species'' and ''Threatened Species'' (79 FR 37577, July 1, 2014).

Snails

Eua zebrina

Eua zebrina, a tropical tree snail in the family Partulidae, occurs solely on the islands of Tutuila and Ofu in American Samoa. Snails in this family (which includes three genera: *Eua, Partula,* and *Samoana*) are widely distributed throughout the high islands of Polynesia, Melanesia, and Micronesia in the south- and west-Pacific basin (Johnson *et al.* 1986a, pp. 161–177; Goodacre and Wade 2001, p. 6; Lee *et al.* 2014, pp. 2, 6–8). Many of the roughly 120 or more partulid species, including *Eua zebrina,* are restricted to single islands or isolated groups of islands (Kondo 1968, pp. 75–77; Cowie 1992, p. 169). The Samoan partulid tree snails in the genera *Eua* and *Samoana* are a good example of this endemism. Cowie's (1998) taxonomic work is the most recent and accepted taxonomic treatment of this species.

Eua zebrina varies in color ranging from almost white to pale-brown, to dark brown or purplish; with or without a zebra-like pattern of flecks and lines (Cowie and Cooke 1999, pp. 29–30). Most *E. zebrina* shells have transverse patterning (distinct coloration perpendicular to whorls) with a more flared aperture (*i.e.,* tapered or wide-rimmed shell lip) than species of the related genus *Samoana* (Cowie *et al.* in prep.). Adult Tutuila snail shells usually fall between 0.7 and 0.8 in (18 to 21 mm) in height and between 0.4 and 0.5 in (11 to 13 mm) in width.

The biology of Samoan partulid snails has not been extensively studied, but there is considerable information on the partulid snails of the Mariana Islands (Crampton 1925a, pp. 1–113; Cowie 1992, pp. 167–191; Hopper and Smith 1992, pp. 77–85) and Society Islands (Crampton 1925b, pp. 5–35; Crampton 1932, pp. 1–194; Murray *et al.* 1982, pp. 316–325; Johnson *et al.* 1986a, pp. 167–177; Johnson *et al.* 1986b, pp. 319–327). Snails in the family Partulidae are predominantly nocturnal, arboreal herbivores that feed mainly on partially decayed and fresh plant material (Murray 1972 cited in Cowie 1992, p. 175; Murray *et al.* 1982, p. 324; Cowie 1992, pp. 167, 175; Miller 2014, pers. comm.). Partulids are slow growing and hermaphroditic (Cowie 1992, pp. 167, 174). Eggs develop within the maternal body and hatch within or immediately after extrusion; they may or may not receive nourishment directly from the parent prior to extrusion (Cowie 1992, p. 174). Some species in the family are known to be self-fertile, but most partulids rely predominantly on out-crossing (Cowie 1992, pp. 167, 174). Adult partulids generally live about 5 years and give birth about every 20 days, producing about 18 offspring per year (Cowie 1992, pp. 174, 179–180).

Partulids can have a single preferred host plant or multiple host plants, in addition to having preference toward anatomical parts of the plant (*i.e.,* leaves, branch, or trunk). Habitat partitioning may occur among three partulids on Tutuila (Murray *et al.* 1982, pp. 317–318; Cooke 1928, p. 6). Cooke (1928, p. 6) observed that *Samoana conica* and *S. abbreviata* were commonly found on trunks and branches, and *Eua zebrina* was commonly found on leaves, but could also be found on trunks and branches, as well as on the ground in the leaf litter. A similar partitioning of habitat has been reported for the *Partula* of the Society Islands (Murray *et al.* 1982, p. 316). The snails are typically found scattered on understory vegetation in forest with intact canopy 33 to 66 ft (10 to 20 m) above the ground (Cowie and Cook 1999, pp. 47–49; Cowie 2001, p. 219). The importance of native forest canopy and understory for Samoan land snails cannot be underestimated; all live snails were found on understory vegetation beneath intact forest canopy (Miller 1993, p. 16).

Review of long-term changes in the American Samoa land snail fauna based on surveys from 1975 to 1998 and pre-1975 collections characterized 3 of 12 species as being stable in numbers, with the rest described as declining in numbers, including *E. zebrina* (Solem 1975, as cited in Cowie 2001, pp. 214–216; Christensen 1980, p. 1; Miller 1993, p. 13; Cowie 2001, p. 215). *Eua zebrina* was historically known only from the island of Tutuila (Cowie and Cook 2001, p. 49), and until 1975, it was considered widespread and common (Cowie 2001, p. 215). The large number of collections (927) of this species from Tutuila between the 1920s and 1960s indicate this species was clearly widely distributed and abundant; some collections included hundreds of specimens (Cowie and Cook 2001, p. 154). In addition, the enormous number of shells of this species used in hotel chandeliers also suggests its previous abundance (Cowie 1993, p. 1). Then, in 1993, only 34 live individuals of *E. zebrina* were found at 2 of 9 sites on Tutuila, with only shells found at 4 other sites (Miller 1993, pp. 11–13). In a 1998 survey, *E. zebrina* was seen alive at 30 of 87 sites surveyed for land snails on Tutuila, and at 1 of 58 sites surveyed in the Manua Islands (Ofu, Olosega, and Tau), where it was observed for the first time on Ofu (Cowie and Cook 1999, pp. 13, 22; Cowie 2001, p. 215). During the 1998 survey, 1,102 live *E. zebrina* were recorded on Tutuila, and 88 live *E. zebrina* were recorded on Ofu (Cowie and Cook 1999, p. 30). The uneven distribution of the 1,102 live snails on Tutuila suggest an overall decline in distribution and abundance; 479 live snails were recorded at 3 survey sites in one area, 165 live snails were recorded at 7 survey sites, and fewer than 10 snails were recorded at each of the remaining 20 sites (Cowie and Cook 1999, p. 30). On Tutuila, the survey sites with the highest numbers of *E. zebrina* (except one site, Amalau) are concentrated in the central area of the National Park of American Samoa: Toa Ridge, Faiga Ridge, and eastwards to the Vatia powerline trail and along Alava Ridge in these areas (Cowie and Cook 1999, p. 30). We are unaware of any systematic surveys conducted for *E. zebrina* since 1998; however, *E. zebrina* are still periodically observed by American Samoan field biologists (Miles 2015c, in litt.). Because the island of Ofu in the Manua Islands does not yet have the predatory snail, *Euglandina rosea* (see *Factor C. Disease or Predation*), the population of *Eua zebrina* on Ofu is of major conservation significance (Cowie 2001, p. 217).

Summary of Factors Affecting Eua zebrina

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

Habitat Destruction and Modification by Nonnative Plant Species

Nonnative plant species can seriously modify native habitat and render it unsuitable for native snail species (Hadfield 1986, p. 325). Although some Hawaiian tree snails have been recorded on nonnative vegetation, it is more generally the case that native snails throughout the Pacific are specialized to survive only on the native plants with which they have evolved (Cowie 2001, p. 219). Cowie (2001, p. 219) reported few observations of native snails, including *Eua zebrina,* in disturbed habitats on Tutuila.

The native flora of the Samoan archipelago (plant species that were present before humans arrived) consisted of approximately 550 taxa, 30 percent of which were endemic (species that occur only in the American Samoa and Samoa) (Whistler 2002, p. 8). An additional 250 plant species have been intentionally or accidentally introduced and have become naturalized with 20 or more of these considered invasive or potentially invasive in American Samoa (Whistler 2002, p. 8; Space and Flynn 2000, pp. 23–24). Of these approximately 20 or more nonnative pest plant species, at least 10 have altered or have the potential to alter the habitat of the species proposed for listing as endangered or threatened species (Atkinson and Medeiros 2006, p. 18; Craig 2009, pp. 94, 97–98; ASCC 2010, p. 15).

Nonnative plants can degrade native habitat in Pacific island environments by: (1) Modifying the availability of light through alterations of the canopy structure; (2) altering soil-water regimes; (3) modifying nutrient cycling; (4) ultimately converting native-dominated plant communities to nonnative plant communities; and (5) increasing the frequency of landslides and erosion (Smith 1985, pp. 217–218; Cuddihy and Stone, 1990, p. 74; Matson 1990, p. 245; D'Antonio and Vitousek 1992, p. 73; Vitousek *et al.* 1997, pp. 6–9; Atkinson and Medeiros 2006, p. 16). Nonnative plant species often exploit the disturbance caused by other factors such as hurricanes, agriculture and development, and feral ungulates, and thus, in combination reinforce or exacerbate their negative impacts to native habitats. Although the areas within the National Park of American Samoa (NPSA) on the islands of Tutuila, Ofu, and Tau contain many areas that are relatively free of human disturbance and alien invasion and largely represent pre-contact vegetation, the threat of invasion and further spread by nonnative plant species poses immense cause for concern (Atkinson and Medeiros 2006, p. 17; ASCC 2010, p. 22).

For brief descriptions of the nonnative plants that impose the greatest negative impacts to the native habitats in American Samoa, see the list provided in Habitat Destruction and Modification by Nonnative Plants for the mao, above.

In summary, based on the potential invasion and habitat-modifying impacts of nonnative plant species, habitat destruction and modification by nonnative plant species is and will continue to be a threat to *Eua zebrina.*

Habitat Destruction and Modification by Agriculture and Development

Several thousand years of subsistence agriculture and more recent plantation agriculture has resulted in the alteration and great reduction in area of forests at lower elevations (Whistler 1994, p. 40; Mueller-Dombois and Fosberg 1998, p. 361). The threat of land conversion to unsuitable habitat will accelerate if the human population continues to grow or if the changes in the economy shift toward commercial agriculture (DMWR 2006, p. 71). On the island of Tutuila, agriculture and urban development covers approximately 24 percent of the island, and up to 60 percent of the island contains slopes of less than 30 percent where additional land-clearing is feasible (ASCC 2010, p. 13; DWMR 2006, p. 25). Farmers are increasingly encroaching into some of the steep forested areas as a result of suitable flat lands already being occupied with urban development and agriculture (ASCC 2010, p. 13). Consequently, agricultural plots on Tutuila have spread from low elevations up to middle and some high elevations on Tutuila, significantly reducing the forest area and thus reducing the resilience of the native forest and populations of native snails. In addition, substantial housing increases are also projected to occur in some rural forests along the northern coastline of Tutuila, and in a few scattered areas near existing population bases with established roads (Stein *et al.* 2014, p. 24). These areas are outside of known snail locations within NPSA, but they do include forested habitat where snails may occur.

The development of roads, trails, and utility corridors has also caused habitat destruction and modification in or adjacent to existing populations of *Eua zebrina* on Tutuila (Cowie and Cook 1999, pp. 3, 30). Development and agriculture along the Alava Ridge road and in the areas surrounding the Amalau inholding within NPSA pose a threat to populations of *E. zebrina* in these areas (Whistler 1994, p. 41; Cowie and Cook 1999, pp. 48–49). In addition, construction activities, regular vehicular and foot trail access, and road maintenance activities cause erosion and the increased spread of nonnative plants resulting in further destruction or modification of habitat (Cowie and Cook 1999, pp. 3, 47–48). However, in spite of the incidence of encroachment by development and agriculture in certain areas, the NPSA provides approximately 2,533 ac (1,025 ha) of forested habitat on Tutuila that is largely protected from clearing for agriculture and development and managed under a 50-year lease agreement with the American Samoa Government and multiple villages (NPSA Lease Agreement 1993). In addition, areas of continuous, undisturbed native forest on northwestern Tutuila outside of the NPSA boundaries may support additional populations of *E. zebrina,* however, survey data for these areas are lacking. In summary, agriculture and development have contributed to habitat destruction and modification, and continue to be a threat to *E. zebrina* on Tutuila. The available information does not indicate that agriculture and development are a current threat to the single known population of *E. zebrina* on Ofu. However, because the vast majority of individuals and populations of this species occur on Tutuila, we consider agriculture and development to be a current and ongoing threat to *E. zebrina.*

Habitat Destruction or Modification by Feral Pigs

Feral pigs are known to cause deleterious impacts to ecosystem processes and functions throughout their worldwide distribution (Aplet *et* *al.* 1991, p. 56; Anderson and Stone 1993, p. 201; Campbell and Long 2009, p. 2,319). Feral pigs are extremely destructive and have both direct and indirect impacts on native plant communities. Pigs are a major vector for the establishment and spread of invasive, nonnative plant species by dispersing plant seeds on their hooves and fur, and in their feces (Diong 1982, pp. 169–170, 196–197), which also serve to fertilize disturbed soil (Siemann *et al.* 2009, p. 547). In addition, pig rooting and wallowing contributes to erosion by clearing vegetation and creating large areas of disturbed soil, especially on slopes (Smith 1985, pp. 190, 192, 196, 200, 204, 230–231; Stone 1985, pp. 254–255, 262–264; Tomich 1986, pp. 120–126; Cuddihy and Stone 1990, pp. 64–65; Aplet et al. 1991, p. 56; Loope *et al.* 1991, pp. 18–19; Gagne and Cuddihy 1999, p. 52; Nogueira-Filho *et al.* 2009, p. 3,681; CNMI–SWARS 2010, p. 15; Dunkell *et al.* 2011, pp. 175–177; Kessler 2011, pp. 320, 323). Erosion resulting from rooting and trampling by pigs impacts native plant communities by contributing to watershed degradation, alteration of plant nutrient status, and increasing the likelihood of landslides (Vitousek *et al.* 2009, pp. 3,074–3,086; Chan-Halbrendt *et al.* 2010, p. 251; Kessler 2011, pp. 320 − 324). In the Hawaiian Islands, pigs have been described as the most pervasive and disruptive nonnative influence on the unique native forests, and are widely recognized as one of the greatest current threats to Hawaii's forest ecosystems (Aplet *et al.* 1991, p. 56; Anderson and Stone 1993, p. 195).

Feral pigs have been present in American Samoa since antiquity (American Samoa Historic Preservation Office 2015, in litt.). In the past, hunting pressure kept their numbers down, however, increasing urbanization and increasing availability of material goods has resulted in the decline in the practice of pig hunting to almost nothing (Whistler 1992, p. 21; 1994, p. 41). Feral pigs are moderately common to abundant in many forested areas, where they spread invasive plants, damage understory vegetation, and destroy riparian areas by their feeding and wallowing behavior (DMWR 2006, p. 23; ASCC 2010, p. 15). Feral pigs are a serious problem in the NPSA because of the damage they cause to native vegetation through their rooting and wallowing (Whistler 1992, p. 21; 1994, p. 41; Hoshide 1996, p. 2; Cowie and Cook 1999, p. 48; Togia pers. comm. in Loope *et al.* 2013, p. 321). Pig densities have been reduced in some areas (Togia 2015, in litt.), but without control methods that effectively reduce feral pig populations, are likely to persist and remain high in areas that provide habitat for *E. zebrina* (Hess *et al.* 2006, p. 53; ASCC 2010, p. 15). Based on the reliance of *E. zebrina* on understory vegetation under native forest canopy, as well as its potential to feed on the ground in the leaf litter, rooting, wallowing, and trampling, the associated impacts to native vegetation and soil caused by feral pigs will negatively impact the habitat of *E. zebrina* and are a current threat to the species.

Conservation Efforts To Reduce Habitat Destruction, Modification, or Curtailment of Its Range

Several programs and partnerships to address the threat of habitat modification by nonnative plant species and feral pigs have been established and are ongoing within areas that provide habitat for *E. zebrina* (see Factor A discussion for the mao). In addition, approximately 2,533 ac (1,025 ha) of forested habitat within the Tutuila Unit of the NPSA are protected and managed under a 50-year lease agreement with the American Samoa Government and multiple villages contributing to the conservation of *E. zebrina* (NPSA Lease Agreement 1993).

Summary of Factor A

In summary, based on the best available scientific and commercial information, we consider the threats of destruction, modification, and curtailment of the species habitat and range to be ongoing threats to *Eua zebrina.* The decline of the native land snails in American Samoa has resulted, in part, from the loss of native habitat to agriculture and development, disturbance by feral pigs, and the establishment of nonnative plant species; these threats are ongoing and are of moderate influence, and are likely exacerbated by impacts to native forest structure from hurricanes. All of the above threats are ongoing and interact to exacerbate the negative impacts and increase the vulnerability of extinction of *E. zebrina.*

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

Tree snails can be found around the world in tropical and subtropical regions and have been valued as collectibles for centuries. For example, the endemic Hawaiian tree snails within the family Achatinellidae were extensively collected for scientific and recreational purposes by Europeans in the 18th to early 20th centuries (Hadfield 1986, p. 322). During the 1800s, collectors sometimes took more than 4,000 snails in several hours (Hadfield 1986, p. 322). Repeated collections of hundreds to thousands of individuals may have contributed to decline in these species by reduction of reproductive potential (removal of breeding adults) as well as by reduction of total numbers (Hadfield 1986, p. 327). In the Hawaiian genus *Achatinella,* noted for its colorful variations, 22 species are now extinct and the remaining 19 species endangered (Hadfield 1986, p. 320). In American Samoa, thousands of partulid tree snail shells (mostly *E. zebrina*) have been collected and used for decorative purposes (*e.g.,* chandeliers) (Cowie 1993, pp. 1, 9).

In general, the collection of tree snails persists to this day, and the market for rare tree snails serves as an incentive to collect them. A recent search of the Internet found a Web site advertising the sale of *E. zebrina* as well as three other Partulid species (Conchology, Inc. 2015, in litt.). Based on the history of collection of *E. zebrina,* the evidence of its sale on the Internet, and the vulnerability of the small remaining populations of this species, we consider over-collection to be a threat to the continued existence of *E. zebrina.*

C. Disease or Predation

Disease

We are not aware of any threats to *Eua zebrina* that would be attributable to disease.

Predation by Nonnative Snails

At present, the major existing threat to long-term survival of the native snail fauna in American Samoa is predation by the nonnative rosy wolf snail (*Euglandina rosea*), the most commonly recommended biological control agent of the giant African snail (*Achatina fulica*), which also is an invasive nonnative species in American Samoa. In 1980, the rosy wolf snail was released on Tutuila to control the giant African snail (Lai and Nakahara 1980 as cited in Miller 1993, p. 9). By 1984, the rosy wolf snail was considered to be well established on Tutuila, having reached the mountains (Eldredge 1988, pp. 122, 124–125), and by 2001 was reported as widespread within the National Park of American Samoa on Tutuila (Cowie and Cook 2001, pp. 156–157). While there are no records of introduction of the rosy wolf snail to the Manua Islands (Ofu, Olosega, and Tau), this species has been reported on Tau (Miller 1993, p. 10). The absence of the rosy wolf snail on the islands of Ofu and Olosega is significant because *E. zebrina* is present on Ofu (Miller 1993, p. 10, Cowie and Cook 2001, p. 143; Cowie *et al.* 2003, p. 39).

Numerous studies show that the rosy wolf snail feeds on endemic island snails and is a major agent in their declines and extinctions (Hadfield and Mountain 1981, p. 357; Howarth 1983, p. 240, 1985, p. 161, 1991, p. 489; Clarke *et al.* 1984, pp. 101–103; Hadfield 1986, p. 327; Murray *et al.* 1988, pp. 150–153; Hadfield *et al.* 1993, pp. 616–620; Cowie 2001, p. 219). Live individuals of the rosy wolf snail have been observed within meters of partulids on Tutuila, including *E. zebrina* and *Samoana conica* (Miller 1993, p. 10). Shells of *E. zebrina* and *S. conica* were found on the ground at several of the locations surveyed on Tutuila, along with numerous shells and an occasional live individual of the rosy wolf snail (Miller 1993, pp. 13, 23–28). The population of *E. zebrina* on Nuusetoga Island, a small islet off the north shore of Tutuila, was probably isolated from an ancestral parent population on Tutuila in prehistoric time (Miller 1993, p, 13). No live rosy wolf snails were found on this offshore islet in 1992, and *E. zebrina* on the islet were deemed safe from predatory snails at that time (Miller 1993, p. 13). Due to the widespread presence of the rosy wolf snail on Tutuila and the high probability of its unintentional introduction into additional areas within the range of *E. zebrina,* predation by the rosy wolf snail is a current threat to *E. zebrina* that will continue into the future.

Predation by several other nonnative carnivorous snails, *Gonaxis kibweziensis, Streptostele musaecola,* and *Gulella bicolor,* has been suggested as a potential threat to *Eua zebrina* and other native land snails. Species of *Gonaxis,* also widely introduced in the Pacific in attempts to control *Achatina fulica,* have been implicated, though less strongly, in contributing to the decline of native snail species in the region (Cowie and Cook 1999, p. 46). *Gonaxis kibweziensis* was introduced on Tutuila in American Samoa in 1977 (Eldredge 1988, p. 122). This species has only been reported from Tutuila (Miller 1993, p. 9, Cowie and Cook 1999, p. 36), and is not as common as the rosy wolf snail (Miller 1993, p. 11). However, the two other predatory snails have been recorded on the Manua Islands: *S. musaecola* from Tutuila, Tau, and Ofu; and *G. bicolor* on Ofu (Cowie and Cook 1999, pp. 36–37). The potential impacts of these two species on the native fauna are unknown; both are much smaller than the rosy wolf snail and *G. kibweziensis,* and were rarely observed during surveys (Cowie and Cook 1999, pp. 36–37, 46). However, Solem (1975 as cited in Miller 1993, p. 16) speculated that *S. musaecola* might have a role in the further decline of native species, and Miller (1993, p. 16) considered that it ''undoubtedly had a negative impact.'' Despite the lack of current information on the abundance of *G. kibweziensis,* but because of its predatory nature and the declining trend and small remaining populations of *E. zebrina,* we consider this species to be a threat to the continued existence *E. zebrina.* However, because of their previously observed low abundance and comparatively small size, and the lack of specific information regarding their impacts to *E. zebrina,* we do not consider predation by *G. bicolor* or *S. musaecola* to be threats to the continued existence of *E. zebrina.*

In summary, predation by nonnative snails, especially the rosy wolf snail, is a current threat to *E. zebrina* and will continue into the future.

Predation by the New Guinea or Snail-Eating Flatworm

Predation by the nonnative New Guinea or snail-eating flatworm (*Platydemus manokwari*) is a threat to *E. zebrina.* The extinction of native land snails on several Pacific Islands has been attributed to this terrestrial flatworm, native to western New Guinea (Ohbayashi *et al.* 2007, p. 483; Sugiura 2010, p. 1,499). The New Guinea flatworm was released in an unsanctioned effort to control the giant African snail (*Achatina fulica*) in Samoa in the 1990s (Cowie and Cook 1999, p. 47). In 2002, this species was likely present within the Samoan archipelago but was not yet introduced to American Samoa (Cowie 2002, p. 18). However, by 2004, this predatory flatworm had been found on the islands of Tutuila and Tau (Craig 2009, p. 84).

The New Guinea flatworm has contributed to the decline of native tree snails due to its ability to ascend into trees and bushes (Sugiura and Yamaura 2009, p. 741). Although mostly ground-dwelling, the New Guinea flatworm has also been observed to climb trees and feed on partulid tree snails (Hopper and Smith 1992, p. 82). Areas with populations of the flatworm usually lack partulid tree snails or have declining numbers of snails (Hopper and Smith 1992, p. 82). Because *E. zebrina* feeds on the ground as well as in shrubs and trees, it faces increased risk of predation by the New Guinea flatworm (Cooke 1928, p. 6). In summary, due to the presence of the New Guinea flatworm on Tutuila, and the high probability of its accidental introduction to the islands of Ofu and Olosega, predation by the New Guinea flatworm is a current threat to *E. zebrina* that will continue into the future.

Predation by Rats

Rats are likely responsible for the greatest number of animal extinctions on islands throughout the world, including extinctions of various snail species (Towns *et al.* 2006, p. 88). Rats are known to prey upon arboreal snails endemic to Pacific islands and can devastate populations (Hadfield *et al.* 1993, p. 621). Rat predation on tree snails has been observed on the Hawaiian Islands of Lanai (Hobdy 1993, p. 208; Hadfield 2005, in litt, p. 4), Molokai (Hadfield and Saufler 2009, p. 1,595), and Maui (Hadfield 2006, in litt.). Three species of rats are present in the American Samoa: The Polynesian rat, probably introduced by early Polynesian colonizers, and Norway and black rats, both introduced subsequent to western contact (Atkinson 1985, p. 38; Cowie and Cook 1999, p. 47; DMWR 2006, p. 22). Polynesian and Norway rats are considered abundant in American Samoa but insufficient data exist on the populations of black rats (DMWR 2006, p. 22).

Evidence of predation by rats on *E. zebrina* was observed at several locations on Tutuila (Miller 1993, pp. 13, 16). Shells of *E. zebrina* were damaged in a fashion that is typical of rat predation; the shell is missing a large piece of the body whorl or the apex (Miller 1993, p. 13). Old shells may be weathered in a similar fashion, except that the fracture lines are not sharp and angular. Frequent evidence of predation by rats was also observed on native land snails during subsequent surveys (Cowie and Cook 1999, p. 47). In summary, based on the presence of rats on Tutuila and Ofu, evidence of predation, and the effects on rats on native land snail populations, predation by rats is a threat to *E. zebrina* that is likely to continue in the future.

Conservation Efforts To Reduce Disease or Predation

We are unaware of any conservation actions planned or implemented at this time to abate the threats of predation by rats, nonnative snails or flatworms to *E. zebrina.*

Summary of Factor C

In summary, based on the best available scientific and commercial information, we consider predation by the rosy wolf snail, *Gonaxis kibweziensis,* New Guinea flatworm, and rats to be a threat to *E. zebrina* that will continue in the future.

D. The Inadequacy of Existing Regulatory Mechanisms

The Act requires that the Secretary assess available regulatory mechanisms in order to determine whether existing regulatory mechanisms may be inadequate as designed to address threats to the species being evaluated (Factor D). Under this factor, we examine whether existing regulatory mechanisms are inadequate to address the potential threats to *E. zebrina* discussed under other factors. In determining whether the inadequacy of regulatory mechanisms constitutes a threat to *E. zebrina,* we analyzed the existing Federal, Territorial, and international laws and regulations that may address the threats to this species or contain relevant protective measures. Regulatory mechanisms, if they exist, may preclude the need for listing if we determine that such mechanisms adequately address the threats to the species such that listing is not warranted.

No existing Federal laws, treaties, or regulations specify protection of *E. zebrina's* habitat from the threat of deforestation, or address the threat of predation by nonnative species such as rats, the rosy wolf snail, and the New Guinea flatworm. Some existing Territorial laws and regulations have the potential to afford *E. zebrina* some protection but their implementation does not achieve that result. The DMWR is given statutory authority to ''manage, protect, preserve, and perpetuate marine and wildlife resources'' and to promulgate rules and regulations to that end (American Samoa Code Annotated (ASCA), title 24, chapter 3). This agency conducts monitoring surveys, conservation activities, and community outreach and education about conservation concerns. However, to our knowledge, the DMWR has not used this authority to undertake conservation efforts for *E. zebrina* such as habitat protection and control of nonnative molluscs and rats (DMWR 2006, pp. 79–80).

The Territorial Endangered Species Act provides for appointment of a Commission with the authority to nominate species as either endangered or threatened (ASCA, title 24, chapter 7). Regulations adopted under the Coastal Management Act (ASCA § 24.0501 *et seq.*) also prohibit the taking of threatened or endangered species (ASAC § 26.0220.I.c). However, the ASG has not listed *E. zebrina* as threatened or endangered so these regulatory mechanisms do not provide protection for this species.

Under ASCA, title 24, chapter 08 (Noxious Weeds), the Territorial DOA has the authority to ban, confiscate, and destroy species of plants harmful to the agricultural economy. Similarly, under ASCA, title 24, chapter 06 (Quarantine), the director of DOA has the authority to promulgate agriculture quarantine restrictions concerning animals. These laws may provide some protection against the introduction of new nonnative species that may have negative effects on *E. zebrina's* habitat or become predators of the species, but these regulations do not require any measures to control invasive nonnative plants or animals that already are established and proving harmful to native species and their habitats (DMWR 2006, p. 80) (see Factor D for the Pacific sheath-tailed bat, above).

As described above, the Territorial Coastal Management Act establishes a land use permit (LUP) system for development projects and a Project Notification Review System (PNRS) for multi-agency review and approval of LUP applications (ASAC § 26.0206). The standards and criteria for review of LUP applications include requirements to protect Special Management Areas (SMA), Unique Areas, and ''critical habitats'' (ASCA § 24.0501 *et seq.*). To date, the SMAs that have been designated (Pago Pago Harbor, Leone Pala, and Nuuuli Pala; ASAC § 26.0221), all are in coastal and mangrove habitats on the south shore of Tutuila that don't provide habitat for *E. zebrina.* The only Unique Area designated to date is the Ottoville Rainforest (American Samoa Coastal Management Program 2011, p. 52), also on Tutuila's south shore, which hypothetically may provide habitat for *E. zebrina,* but it is a relatively small island of native forest in the middle of the heavily developed Tafuna Plain (Trail 1993, p. 4). These laws and regulations are designed to ensure that ''environmental concerns are given appropriate consideration,'' and include provisions and requirements that could address to some degree threats to native forest habitat required by *E. zebrina* on Tutuila and Ofu, even though individual species are not named (ASAC § 26.0202 *et seq.*). Because the implementation of these regulations has been minimal and review of permits is not rigorous, issuance of permits may not provide the habitat protection necessary to provide for the conservation of *E. zebrina* and instead result in loss of native habitat important to this and other species as a result of land clearing for agriculture and development (DMWR 2006, p. 71). We conclude that the implementation of the Coastal Management Act and its PNRS is inadequate to address the threat of habitat destruction and degradation to *E. zebrina* (see Factor D for the Pacific sheath-tailed bat for further details).

Summary of Factor D

In summary, existing Territorial laws and regulatory mechanisms have the potential to offer some level of protection for *E. zebrina* and its habitat but are not currently implemented in a manner that would do so. The DMWR has not exercised its statutory authority to address threats to the ground-dove such as predation by nonnative predators, the species is not listed pursuant to the Territorial Endangered Species Act, and the Coastal Management Act and its implementing regulations have the potential to address the threat of habitat loss to deforestation more substantively, but this law is inadequately implemented. Based on the best available information, some existing regulatory mechanisms have the potential to offer some protection of *E. zebrina* and its habitat, but their implementation does not reduce or remove threats to the species such as habitat destruction or modification or predation by nonnative species. For these reasons, we conclude that existing regulatory mechanisms do not address the threats to *E. zebrina.*

E. Other Natural or Manmade Factors Affecting Its Continued Existence

Hurricanes

Hurricanes are a common natural disturbance in the tropical Pacific and have occurred in American Samoa with varying frequency and intensity (see Factor E discussion for the Pacific sheath-tailed bat). Hurricanes may adversely impact the habitat of *E. zebrina* by destroying vegetation, opening the canopy, and thus modifying the availability of light and moisture, and creating disturbed areas conducive to invasion by nonnative plant species (Elmqvist *et al.* 1994, p. 387; Asner and Goldstein 1997, p. 148; Harrington *et al.* 1997, pp. 539–540; Lugo 2008, pp. 373–375, 386). Such impacts destroy or modify habitat elements (*e.g.,* stem, branch, and leaf surfaces, undisturbed ground, and leaf litter) required to meet the snails' basic life-history requirements. In addition, high winds and intense rains from hurricanes can also dislodge individual snails from the leaves and branches of their host plants and deposit them on the forest floor where they may be crushed by falling vegetation or exposed to predation by nonnative rats and snails (see ''Disease or Predation,'' above) (Hadfield 2011, pers. comm.).

The negative impact on *E. zebrina* caused by hurricanes was strongly suggested by surveys that failed to detect any snails in areas bordering agricultural plots or in forest areas that were severely damaged by three hurricanes (1987, 1990, and 1991) (Miller 1993, p. 16). Under natural conditions, loss of forest canopy to hurricanes did not pose a great threat to the long-term survival of these snails because there was enough intact forest with healthy populations of snails that would support dispersal back into newly regrown canopy forest. Similarly, forest damage may only be temporary and limited to defoliation or minor canopy damage, and vary depending on the aspect of forested areas in relation to the direction of approaching storms (Pierson *et al.* 1992, pp. 15–16). In general, forests in American Samoa, having evolved with the periodic disturbance regime of hurricanes, show remarkable abilities for regeneration and recovery, apart from catastrophic events (Webb *et al.* 2011, pp. 1,248–1,249).

Nevertheless, the destruction of native vegetation and forest canopy, and modification of light and moisture conditions both during and in the months and possibly years following hurricanes can negatively impact the populations of *E. zebrina.* In addition, today, the impacts of habitat loss and degradation caused by other factors such as nonnative plant species (see ''Habitat Destruction and Modification by Nonnative Plant Species'' above), agriculture and urban development (see ''Habitat Destruction and Modification by Agriculture and Development'' above) and feral pigs (see ''Habitat Destruction and Modification by Feral Pigs''), are exacerbated by hurricanes. As snail populations decline and become increasingly isolated, future hurricanes are more likely to lead to the loss of populations or the extinction of species such as this one that rely on the remaining canopy forest. Therefore, we consider the threat of hurricanes to be a factor in the continued existence of *E. zebrina.*

Low Numbers of Individuals and Populations

Species that undergo significant habitat loss and degradation and other threats resulting in decline and range reduction are inherently highly vulnerable to extinction resulting from localized catastrophes such as severe storms or disease outbreaks, climate change effects, and demographic stochasticity (Gilpin and Soulé 1986, pp. 24–34; Pimm *et al.* 1988, p. 757; Mangel and Tier 1994, p. 607). Conditions leading to this level of vulnerability are easily reached by island species that face numerous threats such as those described above for for *E. zebrina.* Small, isolated populations that are diminished by habitat loss, predation, and other threats can exhibit reduced levels of genetic variability, which can diminish the species' capacity to adapt to environmental changes, thereby increasing the risk of inbreeding depression and reducing the probability of long-term persistence (Shaffer 1981, p. 131; Gilpin and Soulé 1986, pp. 24–34; Pimm *et al.* 1988, p. 757). The problems associated with small occurrence size and vulnerability to random demographic fluctuations or natural catastrophes are further magnified by interactions with other threats, such as those discussed above (see Factor A, Factor B, and Factor C, above).

We consider *E. zebrina* vulnerable to extinction because of threats associated with low numbers of individuals and low numbers of populations. This species has suffered a serious decline and is limited by its slow reproduction and growth (Cowie and Cook 1999, p. 31). Threats to *E. zebrina* include: Habitat destruction and modification by hurricanes, agriculture and development, nonnative plant species and feral pigs; collection and overutilization; and predation by the rosy wolf snail, *Gonaxis kibweziensis,* and the New Guinea flatworm. The effects of these threats are compounded by the current low number of individuals and populations of *E. zebrina.*

Climate Change

Our analyses under the Act include consideration of ongoing and projected changes in climate (see Factor E discussion for the Pacific sheath-tailed bat). The magnitude and intensity of the impacts of global climate change and increasing temperatures on western tropical Pacific island ecosystems currently are unknown. In addition, there are no climate change studies that address impacts to the specific habitats of *E. zebrina.* The scientific assessment completed by the Pacific Science Climate Science Program (Australian BOM and CSIRO 2011, Vol. 1 and Vol. 2) provides general projections or trends for predicted changes in climate and associated changes in ambient temperature, precipitation, hurricanes, and sea level rise for countries in the western tropical Pacific region including Samoa (used as a proxy for American Samoa) (see Factor E discussion for the Pacific sheath-tailed bat for additional discussion).

Although we do not have specific information on the impacts of the effects of climate change to *E. zebrina,* increased ambient temperature and precipitation and increased severity of hurricanes would likely exacerbate other threats to this species as well as provide additional stresses on its habitat. The probability of species extinction as a result of climate change impacts increases when its range is restricted, habitat decreases, and numbers of populations decline (IPCC 2007, p. 48). *Eua zebrina* is limited by its restricted range in small areas on two islands and small total population size. Therefore, we expect this species to be particularly vulnerable to environmental impacts of climate change and subsequent impacts to its habitat. Based on the above information, we conclude that habitat impacts resulting from the effects of climate change are not a current threat but are likely to become a threat to *E. zebrina* in the future.

Conservation Efforts To Reduce Other Natural or Manmade Factors Affecting Its Continued Existence

We are unaware of any conservation actions planned or implemented at this time to abate the threats of hurricanes and low numbers of individuals that negatively impact *E. zebrina.*

Proposed Determination for *Eua zebrina*

We have carefully assessed the best scientific and commercial information available regarding the past, present, and future threats to *E. zebrina.* This endemic partulid tree snail restricted to the islands of Tutuila and Ofu in American Samoa has declined dramatically in abundance and is expected to continue along this declining trend in the future.

The threat of habitat destruction and modification from agriculture and development, nonnative plant species, and feral pigs is occurring throughout the range of *E. zebrina,* and is not likely to be reduced in the future (Factor A). The threat of overutilization for scientific and commercial purposes has likely contributed to the historical decline of *E. zebrina,* is a current threat to the species, and is likely to continue into the future (Factor B). The threat of predation from nonnative snails, a nonnative predatory flatworm, and rats is of the highest magnitude, and likely to continue in the future (Factor C). Current Territorial wildlife laws do not address the threats to the species (Factor D). Additionally, the low numbers of individuals and populations of *E.*

zebrina are likely to continue (Factor E), and these small isolated populations face increased risk of extinction from stochastic events such as hurricanes. Small population threats are compounded by the threats of habitat destruction and modification, overutilization, predation, and regulatory mechanisms that do not address the threats to the species. These factors pose threats to *E. zebrina* whether we consider their effects individually or cumulatively.

The Act defines an endangered species as any species that is ''in danger of extinction throughout all or a significant portion of its range'' and a threatened species as any species ''that is likely to become endangered throughout all or a significant portion of its range within the foreseeable future.'' We find that *Eua zebrina* is presently in danger of extinction throughout its entire range based on the severity and immediacy of the ongoing and projected threats described above. The loss and degradation of its habitat, predation by nonnative snails and flatworms, small number of individuals, limited distribution, the effects of small population size, and stochastic events such as hurricanes render this species in its entirety highly susceptible to extinction as a consequence of these imminent threats.

Therefore, on the basis of the best available scientific and commercial information, we propose listing *Eua zebrina* as endangered in accordance with sections 3(6) and 4(a)(1) of the Act. We find that a threatened species status is not appropriate for *Eua zebrina* because the threats are occurring rangewide and are not localized, and because the threats are ongoing and expected to continue into the future.

Under the Act and our implementing regulations, a species may warrant listing if it is in danger of extinction or likely to become so throughout all or a significant portion of its range. Because we have determined that the snail *E. zebrina* is endangered throughout all of its range, no portion of its range can be ''significant'' for purposes of the definitions of ''endangered species'' and ''threatened species.'' See the Final Policy on Interpretation of the Phrase ''Significant Portion of Its Range'' in the Endangered Species Act's Definitions of ''Endangered Species'' and ''Threatened Species'' (79 FR 37577, July 1, 2014).

Ostodes strigatus

Ostodes strigatus, a light tan- to cream-colored tropical ground-dwelling snail in the family Poteriidae, is endemic to the island of Tutuila in American Samoa (Girardi 1978, pp. 193, 214; Miller 1993, p. 7). *Ostodes strigatus* is a member of the superfamily Cyclophoroidea and the family Poteriidae (= Neocyclotidae) (Cowie 1998, p. 24; Girardi 1978, p. 192; Vaught 1989, p. 16; ITIS 2015c). The family Poteriidae consists of tropical land snails throughout Central America, the northern end of South America, and the South Pacific. The genus *Ostodes* is endemic to the Samoan archipelago (Girardi 1978, pp. 191, 242). The defining characteristics of species within the family Poteriidae include a pallium cavity (lung-like organ) and an operculum (a shell lid or ''trap door'' used to close the shell aperture when the snail withdraws inward, most commonly found in marine snails) (Girardi 1978, pp. 214, 222–;224; Vaught 1989, p. 16; Barker 2001, pp. 15, 25).

Ostodes strigatus has a white, turbinate (depressed conical) shell with 4 to 5 whorls and distinctive parallel ridges, reaching a size of 0.3 to 0.4 in (7 to 11 mm) in height, 0.4 to 0.5 in (9 to 12 mm) in diameter at maturity (Girardi 1978, pp. 222–223; Abbott 1989, p. 43). Its operculum is acutely concave to cone-shaped, with broad, irregular spirals from center to edge (Girardi 1978, pp. 198, 213, 222–224). True radial patterning is seldom found on the upper shell surface, and never on the ventral surface, which is usually entirely smooth (Girardi 1978, p. 223).

Ostodes strigatus is found on the ground in rocky areas under relatively closed canopy with sparse understory plant coverage at elevations below 1,280 ft (390 m) (Girardi 1978, p. 224; Miller 1993, pp. 13, 15, 23, 24, 27). Moisture supply is the principal environmental influence on *Ostodes* land snails (Girardi 1978, p. 245). The degree of moisture retention is controlled primarily by vegetation cover, with heavy forest retaining moisture at ground level longer than open forest or cleared areas (Girardi 1978, p. 245). *Ostodes* species were collected only in areas with heavy tree cover (Solem pers. comm. in Girardi 1978, p. 245), but the relative importance of rainfall and soil type in maintaining moisture supply was not assessed in these areas (Girardi 1978, p. 245). Nevertheless, relatively closed canopy or heavy tree cover and their roles in maintaining moisture supply appears to be an important habitat factor for *O. strigatus.*

Although the biology of the genus *Ostodes* is not well studied, and, therefore, the exact diet is unknown, it is highly probable that *O. strigatus* feeds at least in part on decaying leaf litter and fungus (Girardi 1978, p. 242; Miller 2014, pers. comm.). The approximate age at which these snails reach full sexual maturity is unknown (Girardi 1978, p. 194). Once they reach maturity and can successfully reproduce, it is likely adult snails deposit their eggs into leaf litter where they develop and hatch.

Ostodes strigatus is known only from the western portion of the island of Tutuila in American Samoa, including the center and southeast edge of the central plateau, and the extreme southern coast and mountain slope near Pago Pago, with an elevation range of 60 to 390 m (197 to 1,280 ft) (Girardi 1978, p. 224; B. P. Bishop Museum 2015, in litt.). Until 1975, *O. strigatus* was considered widespread and common, but has since declined significantly (Miller 1993, p. 15; Cowie 2001, p. 215). In 1992, a survey of nine sites on Tutuila reported several live individuals (and abundant empty shells) from a single site on the western end of the island (Maloata Valley) and only shells (no live individuals) at three sites in the central part of the island (Miller 1993, pp. 23–27). At each of the four sites where live *O. strigatus* or empty shells were found, the predatory rosy wolf snail was common or abundant (Miller 1993, p. 23). In 1998, surveys within the newly established National Park of American Samoa (NPAS) on northern Tutuila did not detect any live *O. strigatus* or shells (Cowie and Cook 2001, pp. 143–159); however, Cowie and Cook (1999, p. 24) note that these areas were likely outside the range of *O. strigatus.* We are unaware of any surveys conducted since 1998; however, local field biologists that frequent the forest above Maloata Valley for other biological field work report they have not seen *O. strigatus* (Miles 2015c, in litt.).

Summary of Factors Affecting *Ostodes strigatus*

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

The threats of nonnative plants, agriculture and development, and feral pigs negatively impact the habitat of *Ostodes strigatus* in a manner similar to that described for *Eua zebrina* (see Factor A discussion for *Eua zebrina* above). In summary, based on the best available, scientific and commercial information, we consider the threats of destruction, modification, and curtailment of the species habitat and range to be significant ongoing threats to *Ostodes strigatus.* The decline of the native land snails in American Samoa has resulted, in part, from the loss of native habitat to agriculture and development, impacts to native forest structure from hurricanes, the establishment of nonnative plant species, and disturbance by feral pigs; these threats are ongoing and moderate in magnitude. All of the above threats are ongoing and interact to exacerbate the negative impacts and increase the vulnerability of extinction of *O. strigatus.*

Conservation Efforts To Reduce Habitat Destruction, Modification, or Curtailment of Its Range

Several programs and partnerships to address the threat of habitat modification by nonnative plant species and feral pigs have been established and are ongoing within areas that provide habitat for *O. strigatus* (see Factor A discussion for the mao). In addition, approximately 2,533 ac (1,025 ha) of forested habitat within the Tutuila Unit of the NPSA are protected and managed under a 50-year lease agreement with the American Samoa Government and multiple villages within a portion of the range of *O. strigatus* (NPSA Lease Agreement 1993).

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

Collection of land snail shells for commercial, scientific, recreational, or educational purposes has had a moderate influence in the decline of *Ostodes strigatus* (see Factor B discussion for *Eua zebrina*). In the past, *O. strigatus* was collected for basic scientific purposes such as identification and classification (Girardi 1978, pp. 193–194; B. P. Bishop Museum 2015, in litt.). Currently, low numbers and awareness of its decline make collection for scientific or educational purposes unlikely, but the rarity of *O. strigatus* does not preclude collection for commercial purposes. In summary, based on the best available scientific and commercial information, we do not consider the overutilization for commercial, recreational, scientific, or educational purposes to be a current threat to *O. strigatus* because, although collection may occur, there is no evidence of commercial trade in the species at the present time.

C. Disease or Predation

Disease

We are not aware of any threats to *Ostodes strigatus* that would be attributable to disease.

Predation by Nonnative Snails

The nonnative rosy wolf snail is widespread on Tutuila and has been shown to contribute to the decline and extinction of native land snails (see Factor C discussion for *Eua zebrina*). Several live individuals and numerous shells of the rosy wolf snail were found in the same sites in which live individuals (one site) and numerous shells (three sites) of *O. strigatus* were found (Miller 1993, pp. 23–27). Due to its widespread presence on Tutuila, predation by the rosy wolf snail is considered a threat to *O. strigatus.*

Predation by several other nonnative carnivorous snails, *Gonaxis kibweziensis, Streptostele musaecola,* and *Gulella bicolor,* has been suggested as a potential threat to *O. strigatus* and other native land snails (see Factor C discussion for *Eua zebrina*). Despite the lack of current information on the abundance of *G. kibweziensis,* but because of its predatory nature and the declining trend and small remaining populations of *O. strigatus,* we consider the predation by *G. kibweziensis* to be a threat to *O. strigatus.* Because of their previously observed low abundance, comparatively small size, and lack of specific information regarding impacts to *O. strigatus,* we do not consider predation by *G. bicolor* or *S. musaecola* as threats to *O. strigatus* that will continue in the future. In summary, predation by nonnative snails, especially the rosy wolf snail, is a current threat to *O. strigatus* and will continue into the future.

Predation by New Guinea or Snail-Eating Flatworm

The nonnative New Guinea or snail-eating flatworm has been the cause of decline and extinction of native land snails (see Factor C discussion for *Eua zebrina*). This predatory flatworm is found on Tutuila. The ground-dwelling habit of *O. strigatus* and its occurrence in the leaf litter places *O. strigatus* at a greater risk of exposure to the threat of predation by this terrestrial predator. In summary, predation by *P. manokwari* is considered a threat to *O. strigatus* that will continue in the future.

Predation by Rats

Rats are known to prey upon endemic land snails and can devastate populations (see Factor C discussion for *Eua zebrina*). Three rat species are present in American Samoa and frequent evidence of predation by rats on the shells of native land snails was reported during surveys (Miller 1993, p. 16; Cowie and Cook 2001; p. 47). In summary, based on the presence of rats on Tutuila and evidence that they prey on native snails, the threat of predation by rats is likely to continue and is a significant factor in the continued existence of *Ostodes strigatus* that will continue in the future.

Conservation Efforts To Reduce Disease or Predation

We are unaware of any conservation actions planned or implemented at this time to abate the threats of predation by rats, nonnative snails, or flatworms to *O. strigatus.*

Summary of Factor C

In summary, based on the best available scientific and commercial information, we consider predation by the rosy wolf snail, the New Guinea flatworm, and rats to be a threat to of *O. strigatus* that will continue in the future.

D. The Inadequacy of Existing Regulatory Mechanisms

The Act requires that the Secretary assess available regulatory mechanisms in order to determine whether existing regulatory mechanisms may be inadequate as designed to address threats to the species being evaluated (Factor D). Under this factor, we examine whether existing regulatory mechanisms are inadequate to address the potential threats to *O. strigatus* discussed under other factors. In determining whether the inadequacy of regulatory mechanisms constitutes a threat to *O. strigatus,* we analyzed the existing Federal and Territorial laws and regulations that may address the threats to this species or contain relevant protective measures. Regulatory mechanisms, if they exist, may preclude the need for listing if we determine that such mechanisms adequately address the threats to the species such that listing is not warranted.

No existing Federal laws, treaties, or regulations specify protection of the habitat of *O. strigatus* from the threat of deforestation, or address the threat of predation by nonnative species such as rats, the rosy wolf snail, and the New Guinea flatworm. Some existing Territorial laws and regulations have the potential to afford *O. strigatus* some protection but their implementation does not achieve that result. The DMWR is given statutory authority to ''manage, protect, preserve, and perpetuate marine and wildlife resources'' and to promulgate rules and regulations to that end (American Samoa Code Annotated (ASCA), title 24, chapter 3). This agency conducts monitoring surveys, conservation activities, and community outreach and education about conservation concerns. However, to our knowledge, the DMWR has not used this authority to undertake conservation efforts for *O. strigatus* such as habitat protection and control of nonnative molluscs and rats (DMWR 2006, pp. 79–80).

The Territorial Endangered Species Act provides for appointment of a Commission with the authority to nominate species as either endangered or threatened (ASCA, title 24, chapter 7). Regulations adopted under the Coastal Management Act (ASCA § 24.0501 *et seq.*) also prohibit the taking of threatened or endangered species (ASAC § 26.0220.I.c). However, the ASG has not listed *O. strigatus* as threatened or endangered so these regulatory mechanisms do not provide protection for this species.

Under ASCA, title 24, chapter 08 (Noxious Weeds), the Territorial DOA has the authority to ban, confiscate, and destroy species of plants harmful to the agricultural economy. Similarly, under ASCA, title 24, chapter 06 (Quarantine), the director of DOA has the authority to promulgate agriculture quarantine restrictions concerning animals. These laws may provide some protection against the introduction of new nonnative species that may have negative effects on the habitat of *O. strigatus* or become predators of the species, but these regulations do not require any measures to control invasive nonnative plants or animals that already are established and proving harmful to native species and their habitats (DMWR 2006, p. 80) (see Factor D for the Pacific sheath-tailed bat, above).

As described above, The Territorial Coastal Management Act establishes a land use permit (LUP) system for development projects and a Project Notification Review System (PNRS) for multi-agency review and approval of LUP applications (ASAC § 26.0206). The standards and criteria for review of LUP applications include requirements to protect Special Management Areas (SMA), Unique Areas, and ''critical habitats'' (ASCA § 24.0501 *et. seq.*). To date, the SMAs that have been designated (Pago Pago Harbor, Leone Pala, and Nuuuli Pala; ASAC § 26.0221), all are in coastal and mangrove habitats on the south shore of Tutuila that don't provide habitat for *O. strigatus,* which is known only from the interior western portion of the island. The only Unique Area designated to date is the Ottoville Rainforest (American Samoa Coastal Management Program 2011, p. 52), also on Tutuila's south shore, which hypothetically may provide habitat for *O. strigatus,* but it is a relatively small island of native forest in the middle of the heavily developed Tafuna Plain (Trail 1993, p. 4), far from the areas where *O. strigatus* has been recorded. These laws and regulations are designed to ensure that ''environmental concerns are given appropriate consideration,'' and include provisions and requirements that could address to some degree threats to native forest habitat required by *O. strigatus,* even though individual species are not named (ASAC § 26.0202 *et seq.*). Because the implementation of these regulations has been minimal and review of permits is not rigorous, issuance of permits may not provide the habitat protection necessary to provide for the conservation of *O. strigatus* and instead result in loss of native habitat important to this and other species as a result of land clearing for agriculture and development (DMWR 2006, p. 71). We conclude that the implementation of the Coastal Management Act and its PNRS is inadequate to address the threat of habitat destruction and degradation to *O. strigatus* (see Factor D for the Pacific sheath-tailed bat for further details).

Summary of Factor D

In summary, existing Territorial laws and regulatory mechanisms have the potential to offer some level of protection for *O. strigatus* and its habitat but are not currently implemented in a manner that would do so. The DMWR has not exercised its statutory authority to address threats to the ground-dove such as predation by nonnative predators, the species is not listed pursuant to the Territorial Endangered Species Act, and the Coastal Management Act and its implementing regulations have the potential to address the threat of habitat loss to deforestation more substantively, but this law is inadequately implemented. Based on the best available information, some existing regulatory mechanisms have the potential to offer some protection of *O. strigatus* and its habitat, but their implementation does not reduce or remove threats to the species such as habitat destruction or modification or predation by nonnative species. For these reasons, we conclude that existing regulatory mechanisms do not address the threats to *O. strigatus.*

E. Other Natural or Manmade Factors Affecting Its Continued Existence

Low Numbers of Individuals and Populations

Species with low numbers of individuals, restricted distributions, and small, isolated populations are often more susceptible to extinction as a result of reduced levels of genetic variation, inbreeding depression, reproduced reproductive vigor, random demographic fluctuations, and natural catastrophes such as hurricanes (see Factor E discussion for *Eua zebrina,* above). The problems associated with small occurrence size and vulnerability to random demographic fluctuations or natural catastrophes such as severe storms or hurricanes are further magnified by interactions with other threats, such as those discussed above (see Factor A, Factor B, and Factor C, above).

We consider *O. strigatus* to be vulnerable to extinction due to impacts associated with low numbers of individuals and low numbers of populations because this species has suffered a serious decline in numbers and has not been observed in recent years (Miller 1993, pp. 23–27). Threats to *O. strigatus* include: Habitat destruction and modification by hurricanes, agriculture and development, nonnative plant species and feral pigs; and predation by the rosy wolf snail, *Gonaxis kibweziensis,* and the New Guinea flatworm. The effects of these threats are compounded by the current low number of individuals and populations of *O. strigatus.*

Climate Change

We do not have specific information on the impacts of the effects of climate change to *O. strigatus,* and our evaluation of the impacts of climate change to this species is the same as that for *E. zebrina,* above (and see Factor E discussion for the Pacific sheath-tailed bat). Increased ambient temperature and precipitation and increased severity of hurricanes would likely exacerbate other threats to this species as well as provide additional stresses on its habitat. The probability of species extinction as a result of climate change impacts increases when its range is restricted, habitat decreases, and numbers of populations decline (IPCC 2007, p. 48). *Ostodes strigatus* is limited by its restricted range in one portion of Tutuila and small population size. Therefore, we expect this species to be particularly vulnerable to environmental impacts of climate change and subsequent impacts to its habitat. We conclude that habitat impacts resulting from the effects of climate change are not a current threat but are likely to become a threat to *O. strigatus* in the future (see Factor E discussion for *E. zebrina,* above).

Conservation Efforts To Reduce Other Natural or Manmade Factors Affecting Its Continued Existence

We are unaware of any conservation actions planned or implemented at this time to abate the threats of hurricanes and low numbers of individuals that negatively impact *O. strigatus.*

Proposed Determination for *Ostodes strigatus*

We have carefully assessed the best scientific and commercial information available regarding the past, present, and future threats to *Ostodes strigatus.* Observations of live individuals at a single location on western Tutuila more than 20 years ago suggest that this species has undergone a significant reduction in its range and numbers.

The threat of habitat destruction and modification from agriculture and development, hurricanes, nonnative plant species, and feral pigs is occurring throughout the range of *O. strigatus* and is not likely to be reduced in the future. The impacts from these threats are cumulatively of high magnitude (Factor A). The threat of predation from nonnative snails, rats, and the nonnative predatory flatworm is of the highest magnitude, and likely to continue in the future (Factor C). Current Territorial wildlife laws do not address the threats to the species (Factor D). Additionally, the low numbers of individuals and populations of *O. strigatus, i.e.,* the possible occurrence of this species restricted to a single locality where it was observed more than 20 years ago, is likely to continue (Factor E) and is compounded by the threats of habitat destruction and modification and predation. These factors pose threats to *O. strigatus* whether we consider their effects individually or cumulatively. These threats will continue in the future.

The Act defines an endangered species as any species that is ''in danger of extinction throughout all or a significant portion of its range'' and a threatened species as any species ''that is likely to become endangered throughout all or a significant portion of its range within the foreseeable future.'' We find that *Ostodes strigatus* is presently in danger of extinction throughout its entire range based on the severity and immediacy of the ongoing and projected threats described above. The loss and degradation of its habitat, predation by nonnative snails and flatworms, small number of individuals, limited distribution, the effects of small population size, and stochastic events such as hurricanes render this species in its entirety highly susceptible to extinction as a consequence of these imminent threats.

Therefore, on the basis of the best available scientific and commercial information, we propose listing *Ostodes strigatus* as endangered in accordance with sections 3(6) and 4(a)(1) of the Act. We find that a threatened species status is not appropriate for *O. strigatus* because the threats are occurring rangewide and are not localized, and because the threats are ongoing and expected to continue into the future.

Under the Act and our implementing regulations, a species may warrant listing if it is endangered or threatened throughout all or a significant portion of its range. Because we have determined that the snail *O. strigatus* is endangered throughout all of its range, no portion of its range can be ''significant'' for purposes of the definitions of ''endangered species'' and ''threatened species.'' See the Final Policy on Interpretation of the Phrase ''Significant Portion of Its Range'' in the Endangered Species Act's Definitions of ''Endangered Species'' and ''Threatened Species'' (79 FR 37577, July 1, 2014).

Available Conservation Measures

Conservation measures provided to species listed as endangered or threatened under the Act include recognition, recovery actions, requirements for Federal protection, and prohibitions against certain practices. Recognition through listing results in public awareness and conservation by Federal, State, Territorial, and local agencies, private organizations, and individuals. The Act encourages cooperation with the States and requires that recovery actions be carried out for all listed species. The protection required by Federal agencies and the prohibitions against certain activities are discussed, in part, below.

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

Recovery planning includes the development of a recovery outline shortly after a species is listed and preparation of a draft and final recovery plan. The recovery outline guides the immediate implementation of urgent recovery actions and describes the process to be used to develop a recovery plan. Revisions of the plan may be done to address continuing or new threats to the species, as new substantive information becomes available. The recovery plan identifies site-specific management actions that set a trigger for review of the five factors that control whether a species remains endangered or may be downlisted or delisted, and methods for monitoring recovery progress. Recovery plans also establish a framework for agencies to coordinate their recovery efforts and provide estimates of the cost of implementing recovery tasks. Recovery teams (composed of species experts, Federal and State agencies, nongovernmental organizations, and stakeholders) are often established to develop recovery plans. When completed, the recovery outline, draft recovery plan, and the final recovery plan will be available on our Web site (*http://www.fws.gov/endangered*), or from our Pacific Islands Office (see **FOR FURTHER INFORMATION CONTACT**).

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

If these species are listed, funding for recovery actions will be available from a variety of sources, including Federal budgets, State programs, and cost share grants for non-Federal landowners, the academic community, and nongovernmental organizations. In addition, pursuant to section 6 of the Act, U.S. Territory of American Samoa would be eligible for Federal funds to implement management actions that promote the protection or recovery of these species. Information on our grant programs that are available to aid species recovery can be found at: *http://www.fws.gov/grants*.

Although these species are only proposed for listing under the Act at this time, please let us know if you are interested in participating in recovery efforts for these species. Additionally, we invite you to submit any new information on these species whenever it becomes available and any information you may have for recovery planning purposes (see **FOR FURTHER INFORMATION CONTACT**).

Regulatory Provisions

Section 7(a) of the Act requires Federal agencies to evaluate their actions with respect to any species that is proposed or listed as an endangered or threatened species and with respect to its critical habitat, if any is designated. Regulations implementing this interagency cooperation provision of the Act are codified at 50 CFR part 402. Section 7(a)(4) of the Act requires Federal agencies to confer with the Service 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. If a species is listed subsequently, section 7(a)(2) of the Act requires Federal agencies to ensure that activities they authorize, fund, or carry out are not likely to jeopardize the continued existence of the species or destroy or adversely modify its critical habitat. If a Federal action may affect a listed species or its critical habitat, the responsible Federal agency must enter into consultation with the Service.

The Act and its implementing regulations set forth a series of general prohibitions and exceptions that apply to all endangered wildlife. The prohibitions of section 9(a)(1) of the Act, codified at 50 CFR 17.21 for endangered wildlife, in part, make it illegal for any person subject to the jurisdiction of the United States to take (includes harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect; or to attempt any of these) any such species within the United States or the territorial sea of the United States or upon the high seas; to import into or export from the United States any such species; to deliver, receive, carry, transport, or ship in interstate or foreign commerce, by any means whatsoever and in the course of commercial activity any such species; or sell or offer for sale in interstate or foreign commerce any such species. In addition, prohibitions of section 9(a)(1) of the Act make it unlawful to possess, sell, deliver, carry, transport, or ship, by any means whatsoever, any such species taken in violation of the Act. Certain exceptions apply to agents of the Service and State conservation agencies.

We may issue permits to carry out otherwise prohibited activities involving endangered and threatened wildlife species under certain circumstances. Regulations governing permits are codified at 50 CFR 17.22 for endangered species. With regard to endangered wildlife, a permit may be issued for the following purposes: for scientific purposes, to enhance the propagation or survival of the species, or for incidental take in connection with otherwise lawful activities. Requests for copies of the regulations regarding listed species and inquiries about prohibitions and permits may be addressed to U.S. Fish and Wildlife Service, Pacific Region, Ecological Services, Eastside Federal Complex, 911 NE. 11th Avenue, Portland, OR 97232–4181 (telephone 503–231–6131; facsimile 503–231–6243).

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

Activities that result in take of any of the five species in American Samoa by causing significant habitat modification or degradation such that it causes actual injury by significantly impairing essential behaviors. This may include, but is not limited to, introduction of nonnative species in American Samoa that compete with or prey upon the species or the unauthorized release in the territory of biological control agents that attack any life-stage of these species.

Questions regarding whether specific activities would constitute a violation of section 9 of the Act should be directed to the Pacific Islands Fish and Wildlife Office (see **FOR FURTHER INFORMATION CONTACT**). Requests for copies of the regulations concerning listed animals and general inquiries regarding prohibitions and permits may be addressed to the U.S. Fish and Wildlife Service, Pacific Region, Ecological Services, Endangered Species Permits, Eastside Federal Complex, 911 NE. 11th Avenue, Portland, OR 97232–4181 (telephone 503–231–6131; facsimile 503–231–6243).

Critical Habitat

Section 3(5)(A) of the Act defines critical habitat as (i) the specific areas within the geographical area occupied by the species, at the time it is listed . . . on which are found those physical or biological features (I) essential to the conservation of the species and (II) which may require special management considerations or protection; and (ii) specific areas outside the geographical area occupied by the species at the time it is listed upon a determination by the Secretary that such areas are essential for the conservation of the species. Section 3(3) of the Act defines conservation as to use and the use of all methods and procedures which are necessary to bring any endangered species or threatened species to the point at which the measures provided pursuant to the Act are no longer necessary.

Section 4(a)(3) of the Act, as amended, and implementing regulations (50 CFR 424.12), require that, to the maximum extent prudent and determinable, the Secretary will designate critical habitat at the time the species is determined to be an endangered or threatened species. Our regulations (50 CFR 424.12(a)(1)) state that the designation of critical habitat is not prudent when one or both of the following situations exist:

(1) The species is threatened by taking or other human activity, and identification of critical habitat can be expected to increase the degree of threat to the species, or

(2) Such designation of critical habitat would not be beneficial to the species.

Besides the potential for unpermitted collection of the snails *Eua zebrina* and *Ostodes strigatus* by hobbyists, we do not know of any imminent threat of take attributed to collection or vandalism under Factor B for these plant and animal species. The available information does not indicate that identification and mapping of critical habitat is likely to increase the threat of collection for the snails or initiate any threat of collection or vandalism for any of the other four species proposed for listing in this rule. Therefore, in the absence of finding that the designation of critical habitat would increase threats to a species, if there are any benefits to a critical habitat designation, a finding that designation is prudent is warranted. Here, the potential benefits of designation include: (1) Triggering consultation under section 7 of the Act, in new areas for actions in which there may be a Federal nexus where it would not otherwise occur because, for example, it is unoccupied; (2) focusing conservation activities on the most essential features and areas; (3) providing educational benefits to State or county governments or private entities; and (4) preventing people from causing inadvertent harm to these species.

Because we have determined that the designation of critical habitat will not likely increase the degree of threat to the species and may provide some measure of benefit, we determine that designation of critical habitat is prudent for all five species proposed for listing in this rule.

Our regulations (50 CFR 424.12(a)(2)) further state that critical habitat is not determinable when one or both of the following situations exists: (1) Information sufficient to perform required analysis of the impacts of the designation is lacking; or (2) the biological needs of the species are not sufficiently well known to permit identification of an area as critical habitat.

Delineation of critical habitat requires, within the geographical area occupied by the species, identification of the physical or biological features essential to the species' conservation. Information regarding these five species' life functions is complex, and complete data are lacking for most of them. We require additional time to analyze the best available scientific data in order to identify specific areas appropriate for critical habitat designation and to prepare and process a proposed rule. Accordingly, we find designation of critical habitat for these species in accordance with section 4(3)(A) of the Act to be ''not determinable'' at this time.

Required Determinations

Clarity of the Rule

We are required by Executive Orders 12866 and 12988 and by the Presidential Memorandum of June 1, 1998, to write all rules in plain language. This means that each rule we publish must:

(1) Be logically organized;

(2) Use the active voice to address readers directly;

(3) Use clear language rather than jargon;

(4) Be divided into short sections and sentences; and

(5) Use lists and tables wherever possible.

If you feel that we have not met these requirements, send us comments by one of the methods listed in **ADDRESSES**. To better help us revise the rule, your comments should be as specific as possible. For example, you should tell us the numbers of the sections or paragraphs that are unclearly written, which sections or sentences are too long, the sections where you feel lists or tables would be useful, etc.

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

We have determined that environmental assessments and environmental impact statements, as defined under the authority of the National Environmental Policy Act (NEPA; 42 U.S.C. 4321 *et seq.*), need not be prepared in connection with listing a species as an endangered or threatened species under the Endangered Species Act. We published a notice outlining our reasons for this determination in the **Federal Register** on October 25, 1983 (48 FR 49244).

References Cited

A complete list of references cited in this rulemaking is available on the Internet at *http://www.regulations.gov* and upon request from the Pacific Islands Fish and Wildlife Office (see **FOR FURTHER INFORMATION CONTACT**).

Authors

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

List of Subjects in 50 CFR Part 17

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

Proposed Regulation Promulgation

Accordingly, we propose to 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; 1531–1544; 4201–4245 unless otherwise noted.

■ 2. Amend § 17.11(h), the List of Endangered and Threatened Wildlife, as follows:

■ a. By adding an entry for: ''Bat, Pacific sheath-tailed (South Pacific subspecies)'' (*Emballonura semicaudata semicaudata*), in alphabetical order under MAMMALS, to read as set forth below; and

■ b. By adding an entry for ''Ground-dove, Friendly (American Samoa DPS)'' (*Gallicolumba stairi*), and ''Mao (honeyeater)'' (*Gymnomyza samoensis*), in alphabetical order under BIRDS, to read as set forth below; and

■ c. By adding an entry for *Eua zebrina* and *Ostodes strigatus,* in alphabetical order under SNAILS, to read as set forth below:

§ 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						
*	*	*	*	*	*	*	
MAMMALS							
*	*	*	*	*	*	*	
Bat, Pacific sheath-tailed (South Pacific subspecies) (= Peapea vai, American Samoa; =Tagiti, Samoa; = Bekabeka, Fiji).	*Emballonura semicaudata semicaudata.*	U.S.A. (AS), Fiji, Tonga, Vanuatu.	Entire	E		NA	NA
*	*	*	*	*	*	*	
BIRDS							
*	*	*	*	*	*	*	
Ground-dove, Friendly (= Tuaimeo) (American Samoa DPS).	*Gallicolumba stairi*	U.S.A. (AS)	American Samoa	E		NA	NA

Species: Common name	Species: Scientific name	Historic range	Vertebrate population where endangered or threatened	Status	When listed	Critical habitat	Special rules
*	*	*	*	*	*	*	
Mao (= Maomao) (honeyeater).	*Gymnomyza samoensis*.	U.S.A. (AS), Samoa	Entire	E		NA	NA
*	*	*	*	*	*	*	
SNAILS							
*	*	*	*	*	*	*	
Snail [no common name].	*Eua zebrina*	U.S.A. (AS)	Entire	E		NA	NA
Snail [no common name].	*Ostodes strigatus*	U.S.A. (AS)	Entire	E		NA	NA

* * * * *

Dated: Sept. 16, 2015.

James W. Kurth,

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

[FR Doc. 2015–25298 Filed 10–9–15; 8:45 am]

BILLING CODE 4333–15–P