

Draft - April 2002

**DRAFT ECONOMIC ANALYSIS
OF
PROPOSED CRITICAL HABITAT DESIGNATIONS
FOR THREATENED AND ENDANGERED PLANTS
ON KAUA'I AND NI'HAU
HAWAII
REVISED DETERMINATION**

April 2002

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FOREWORD

The U.S. Fish and Wildlife Service has added this preface to all economic analyses of critical habitat designations:

"The standard best practice in economic analysis is applying an approach that measures costs, benefits, and other impacts arising from a regulatory action against a baseline scenario of the world without the regulation. Guidelines on economic analysis, developed in accordance with the recommendations set forth in Executive Order 12866 ("Regulatory Planning and Review"), for both the Office of Management and Budget and the Department of the Interior, note the appropriateness of the approach:

'The baseline is the state of the world that would exist without the proposed action. All costs and benefits that are included in the analysis should be incremental with respect to this baseline.'

"When viewed in this way the economic impacts of critical habitat designation involve evaluating the 'without critical habitat' baseline versus the 'with critical habitat' scenario. Impacts of a designation equal the difference, or the increment, between these two scenarios. Measured differences between the baseline and the scenario in which critical habitat is designated may include (but are not limited to) changes in land use, environmental quality, property values, or time and effort expended on consultations and other activities by federal landowners, federal action agencies, and in some instances, State and local governments and/or private third parties. Incremental changes may be either positive (benefits) or negative (costs).

"In *New Mexico Cattle Growers Ass'n v. U.S.F.W.S.*, 248 F.3d 1277 (10th Cir. 2001), however, the 10th Circuit recently held that the baseline approach to economic analysis of critical habitat designations that was used by the Service for the southwestern willow flycatcher designation was 'not in accord with the language or intent of the ESA.' In particular, the court was concerned that the Service had failed to analyze any economic impact that would result from the designation, because it took the position in the economic analysis that there was no economic impact from critical habitat that was incremental to, rather than merely co-extensive with, the economic impact of listing the species. The Service had therefore assigned all of the possible impacts of designation to the listing of the species, without acknowledging any uncertainty in this conclusion or considering such potential impacts as transaction costs, reinitiations, or indirect costs. The court rejected the

baseline approach incorporated in that designation, concluding that, by obviating the need to perform any analysis of economic impacts, such an approach rendered the economic analysis requirement meaningless: 'The statutory language is plain in requiring some kind of consideration of economic impact in the CHD phase.'

"In this analysis, the Service addresses the 10th Circuit's concern that we give meaning to the ESA's requirement of considering the economic impacts of designation by acknowledging the uncertainty of assigning certain post-designation economic impacts (particularly section 7 consultations) as having resulted from either the listing or the designation. The Service believes that for many species the designation of critical habitat has a relatively small economic impact, particularly in areas where consultations have been ongoing with respect to the species. This is because the majority of the consultations and associated project modifications, if any, already consider habitat impacts and as a result, the process is not likely to change due to the designation of critical habitat. Nevertheless, we recognize that the nationwide history of consultations on critical habitat is not broad, and, in any particular case, there may be considerable uncertainty whether an impact is due to the critical habitat designation or the listing alone. We also understand that the public wants to know more about the kinds of costs consultations impose and frequently believe that designation could require additional project modifications.

"Therefore, this analysis incorporates two baselines. One addresses the impacts of critical habitat designation that may be 'attributable co-extensively' to the listing of the species. Because of the potential uncertainty about the benefits and economic costs resulting from critical habitat designations, we believe it is reasonable to estimate the upper bounds of the cost of project modifications based on the benefits and economic costs of project modifications that would be required due to consultation under the jeopardy standard. It is important to note that the inclusion of impacts attributable co-extensively to the listing does not convert the economic analysis into a tool to be considered in the context of a listing decision. As the court reaffirmed in the southwestern willow flycatcher decision, 'the ESA clearly bars economic considerations from having a seat at the table when the listing determination is being made.'

"The other baseline, the lower boundary baseline, will be a more traditional rulemaking baseline. It will attempt to provide the Service's best analysis of which of the effects of future consultations actually result from the regulatory action under review - i.e. the critical habitat designation. These costs will in most cases be the costs of additional consultations, reinitiated consultations, and additional project modifications that would not have been required under the jeopardy standard alone as well as costs resulting from uncertainty and perceptual impacts on markets."

DATED: March 20, 2002

PREFACE

1. CONTENT AND PURPOSE

This report assesses the economic impacts that may result from the designation of critical habitat for threatened and endangered plant species on the islands of Kaua'i and Ni'ihau in the State of Hawai'i. It was prepared for the U.S. Fish and Wildlife Service (the Service) to help them in their decision regarding designating critical habitat for the plant species.

As required by the Endangered Species Act, as amended (the Act), the decision to designate a particular area as critical habitat must take into account the potential economic impact of the critical habitat designation. If the economic analysis reveals that the economic impacts of designating any area as critical habitat outweigh the benefits of designation, then the Service may exclude the area from consideration, unless excluding the area will result in the extinction of the species.

The focus of the economic analysis is on section 7(a)(2) of the Act which requires consultation with the Service and possible project modification for certain projects and activities that may affect a species listed as threatened or endangered, or the habitat of a listed species. The consultations and possible project modifications will have economic impacts which, in this report, are referred to as "section 7 economic impacts" to distinguish them from the economic impacts related to other sections of the Act. Other sections of the Act are outside the scope of this economic analysis.

2. ORGANIZATION

This report is organized into six chapters:

— Chapter I: The Listed Plants and Proposed Critical Habitat

This chapter provides relevant information on the plant species and the proposed critical habitat units.

— Chapter II: Physical and Socioeconomic Profile of Kaua'i County

To provide the context for evaluating the economic impacts of the proposed critical habitat designation, this chapter presents a physical description of Kaua'i and Ni'ihau and the socioeconomic profile of Kaua'i County.

— Chapter III: The Endangered Species Act

Relevant information from the Act is presented in Chapter III, including the role of critical habitat designation in protecting threatened and endangered species, requirements for consulting with the Service, and the definition of taking and other restrictions.

— Chapter IV: Existing Protections

This chapter presents information on existing regulations and land management policies that protect wildlife species or their habitats.

— Chapter V: Approach to the Economic Impact Analysis

This chapter gives the general approach used to estimate section 7 economic impacts of the species listing and the critical habitat designation.

— Chapter VI: Economic Costs and Benefits

This chapter discusses planned projects, activities and land uses in the proposed critical habitat units and estimates section 7 economic costs and benefits. This chapter also identifies the effects which can be attributable solely to the critical-habitat provisions of section 7.

After learning about the proposed critical habitat (Chapter I), readers who are already familiar with Kaua'i County (Chapter II), the Act (Chapter III), existing protections (Chapter IV), or the approach to conducting the economic analysis (Chapter V) may wish to skip these chapters, as appropriate, and proceed to the economic analysis (Chapter VI).

3. TERMINOLOGY

The following Service terminology is *italicized* throughout this document for the benefit of readers who are unfamiliar with it and want to be reminded that the Service has given specific meanings to these words and terms: *Federal involvement*, *Federal nexus*, *occupied*, *unoccupied*, *primary constituent elements*, *jeopardy*, *adverse modification*, and *take*. The terms are explained in the body of the report.

4. MAPPING ACCURACY

Acreage estimates presented in Table I-1 (end of Chapter I) and used in the text are based on digitized maps and acreage calculations provided by the Service. The data files for these maps were generated by the Service, other Federal agencies, State and county agencies, and private contractors. For the most part, the digitized maps are reasonably accurate at a scale of 1:24,000. Nevertheless, they are not exact: the mapped

locations of certain features (borders, roads, structures, etc.) sometimes deviate from their actual locations; maps from different sources may differ as to the locations of certain features; mapped borders of adjacent parcels may not be in perfect alignment even if they come from the same source; etc. As a result of these mapping discrepancies, some acreage estimates may be incorrect (when a slight discrepancy extends over several miles, the estimate can amount to many acres); area components may not sum to the whole area; and small amounts of land may be included in a proposed critical habitat unit when the intention was to exclude this land (e.g., a small amount of urban or agricultural land may be included inadvertently).

5. ECONOMIC CONSULTANTS

The analysis was performed by Decision Analysts Hawaii, Inc. (DAHI) and Research Solutions, LLC, both Hawai'i-based economic consulting firms. They are under contract to Industrial Economics, Inc. (IEc), an economic consulting firm in Cambridge, Massachusetts. In conducting the analysis, DAHI and Research Solutions worked with the Service at the local level, while IEc worked with the Service at the national level.

EXECUTIVE SUMMARY

1. INTRODUCTION

The purpose of this report is to identify and analyze the potential economic impacts that would result from the proposed critical habitat designation for the threatened and endangered plant species on Kaua'i and Ni'ihau. Section 4(b)(2) of the Endangered Species Act (the Act) requires the Service to designate critical habitat on the basis of the best scientific and commercial data available after taking into consideration the economic impact, and any other relevant impact, of specifying any particular area as critical habitat. The Service may exclude areas from critical habitat designation when the benefits of exclusion outweigh the benefits of including the areas within critical habitat, provided the exclusion will not result in extinction of the species.

The focus of this economic analysis is on section 7(a)(2) of the Act, which requires Federal agencies to insure that any action authorized, funded, or carried out by the Federal government is not likely to *jeopardize* the continued existence of any endangered or threatened species or result in the destruction or *adverse modification* of critical habitat. Federal agencies are required to consult with the Service whenever they propose a discretionary action that may affect a listed species or its designated critical habitat. Aside from the protections provided under section 7, the Act does not provide other forms of protection to lands designated as critical habitat. Because consultation under section 7 only applies to activities that involve Federal permits, funding or involvement, the designation of critical habitat will not afford any additional protections under the Act with respect to strictly private activities. This analysis does not address impacts associated with implementation of other sections of the Act.

2. PROPOSED CRITICAL HABITAT DESIGNATION

The Service is proposing 16 critical habitat units: 15 on Kaua'i and one on Ni'ihau. Three of the units on Kaua'i are divided into eight subunits; thus the total number of units and subunits (referred to throughout this report as "units") is 21. Combined, these units cover 99,903 acres, most of which are in the remote mountainous regions and uninhabited shoreline areas of the islands of Kaua'i and Ni'ihau (Figure ES-1).

3. ECONOMIC IMPACTS

For most of the proposed designation, implementation of the section 7 listing and critical habitat provisions of the Act on the areas proposed for critical habitat would have minor economic impacts for the following reasons:

- As modified,¹ none of the units contains significant residential, commercial, industrial, or golf-course projects; crop farming; or intensive livestock operations. Furthermore, over the next 10 years, few projects are planned for locations in the proposed critical habitat. This situation reflects the fact that (1) most of the land is unsuitable for development, farming, or other economic activities due to the rugged mountain terrain, lack of access, and remote locations; and (2) existing land-use controls severely limit development and most other economic activities in the mountainous interior of Kaua'i and on Ni'ihau.
- Some existing and continuing activities involve the operation and maintenance of existing man-made features and structures. These are not subject to the critical habitat provisions of section 7 because they do not contain the *primary constituent elements* for the plants, and therefore would not be impacted by the designation.
- Some existing and planned projects, land uses, and activities that could affect the proposed critical habitat have no *Federal involvement* that would require section 7 consultation with the Service, so they are not restricted by the requirements of the Act.
- For the anticipated projects and activities that will have *Federal involvement*, many are conservation efforts that will not negatively impact the plants or their habitat, so they will be subject to a minimal level of informal section 7 consultation.

For various economic activities in the proposed critical habitat, Table ES-1 presents estimates of (1) the total direct and indirect costs and benefits attributable to the section 7 provisions of the Act that are associated with listing the plants as threatened and endangered species *and* with designating critical habitat for the plants; and (2) that portion of the total costs and benefits which is solely attributable to the critical habitat designation.

Over a 10-year period, total section 7-related costs associated with the species listings, plus the indirect cost to investigate the implications of critical habitat, are esti-

1. The Service has indicated that the final rule for the critical habitat will feature (1) remapped boundaries that exclude large areas that do not contain *primary constituent elements*, and (2) an expanded list of man-made features and structures that do not contain *primary constituent elements*.

mated at \$1,019,900 to \$2,601,000, while those attributable solely to the critical habitat designation are \$945,500 to \$2,468,700. These costs represent, in the worst case, about 0.02 percent of the total personal income of Kaua'i County over the same period (about \$1.3 billion per year). The highest direct cost would be for section 7 consultations and project modifications at the Pacific Missile Range Facility (PMRF): \$832,300 to \$1,955,700, all of which would be attributable to critical habitat (Units H1, H2 and H3). In addition, critical habitat might pose, as an indirect cost, a small risk of compromising national defense.

Although not subject to accurate quantification, other indirect costs could add substantially to the totals. The owner of urban land in Unit D2 could suffer a loss of development potential and a loss of potential profits in excess of \$10 million (an indirect cost related to "State and County Development Approvals"), and a related reduction in property value amounting to a few million dollars. In addition, there are slight to small probabilities of substantial indirect costs related to: (1) a change in game management to reduce ungulates and, as a result, hunting activity; (2) mandated conservation management; and (3) redistricting by the State of land in the Urban and Agricultural Districts to the Conservation District. Finally, some landowners may cooperate less on conservation projects in order to avoid critical habitat designation.

Economic benefits occurring as a result of designating the proposed critical habitat, and the related actions taken to control threats to the plant species (e.g., ungulate control), would include: (1) ecological improvements resulting from project modifications; (2) better siting of projects by developers so as to avoid costly project delays and modifications due to development inadvertent placed near populations of listed species; (4) preservation of plants that have ethnobotanical value; (5) improvements to the environment (i.e., fewer mosquitoes, less erosion, enhanced survival of native wildlife, healthier watersheds, cleaner and healthier streams and nearshore marine environments, and cleaner beaches); and (6) possibly an influx of new funds from outside the State for conservation management that would contribute to expanded economic activity.

Figure ES-1. Kaua'i and Ni'ihau Plants, Proposed Critical Habitat

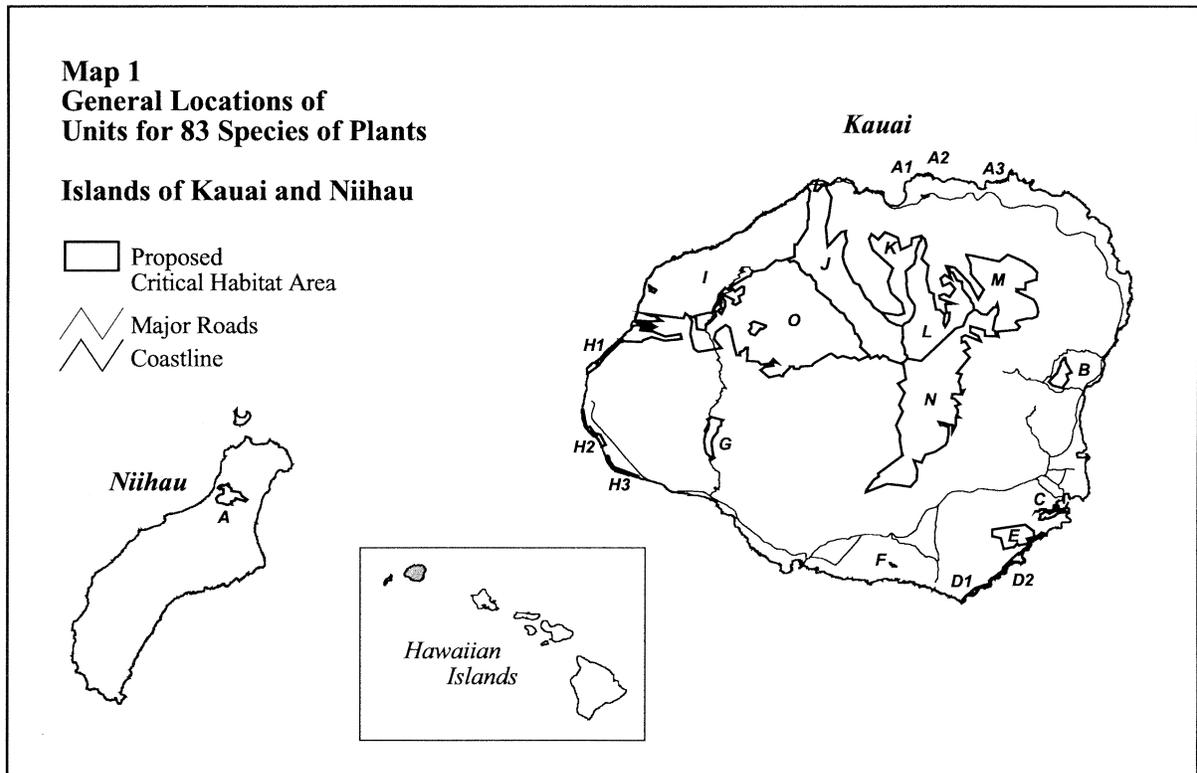


Table ES-1. Section 7 Costs and Benefits Attributable to the Plant Listings and Critical Habitat
(10-year estimates)

CH = critical habitat PMs = project modifications O&M = operation and maintenance Fed = Federal ne = not estimated

Item	Total		Share to CH		Explanation
	Low	High	Low	High	
DIRECT SECTION 7 COSTS					
Existing Man-Made Features, Consultations	None	None	None	None	No consultation for O&M of existing man-made features and structures.
Management of Game Hunting					
State-Managed Lands, Consultations	\$ 9,000	\$ 17,600	\$ 2,600	\$ 8,000	Consultation due to Pittman-Robertson funding.
State-Managed Lands, PMs	\$ 50,000	\$ 100,000	\$ 9,000	\$ 33,000	Based on prior PMs.
Private Lands, Consultations	None	None	None	None	No consultation required since no Fed involvement.
State Park, Consultations	None	None	None	None	No consultation required since no Fed involvement.
Botanical Gardens and Arboreta					
National Tropical Botanical Garden, Consultations on Expansion	\$ 10,400	\$ 10,400	\$ 10,400	\$ 10,400	If the NTBG receives funding from the Service, then the Service will conduct consultations on funded projects.
Makaha Arboretum, Consultations	None	None	None	None	No consultation required since no Fed involvement.
Conservation Projects					
The Nature Conservancy of Hawai'i, Consultations	\$ 10,400	\$ 10,400	None	None	If agreements are reached for TNCH to manage land, and TNCH receives funding from the Service, then the Service will conduct consultations on funded projects.
Watershed Partnership, Consultations	\$ 16,600	\$ 45,500	None	None	If a Watershed Partnership is formed and it receives funding from the Service, then the Service will conduct consultations on funded projects.
Ranching Operations					
Kipu Kai Ranch, Consultations	\$ 8,700	\$ 16,400	\$ 8,700	\$ 16,400	If private landowner continues to receive Fed funds, then the Service may reinitiate consultation.
Communications Facilities					
Consultations on New Facilities	\$ 9,100	\$ 41,600	\$ 9,100	\$ 41,600	Consultations due to FCC and FAA permits.
PMs	\$ -	\$ 200,000	\$ -	\$ 200,000	Could include moving the site.
Navigational Aids, Consultations	None	None	None	None	No consultation for O&M of existing man-made structures.
Power Transmission Lines, Consultations	None	None	None	None	No consultation for O&M of existing man-made structures. Also, no Fed involvement.
Hydropower Development, Consultations	None	None	None	None	No planned facilities that would impact CH.

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Table ES-1. Section 7 Costs and Benefits Attributable to the Plant Listings and Critical Habitat
(10-year estimates)

CH = critical habitat PMs = project modifications O&M = operation and maintenance Fed = Federal ne = not estimated

Item	Total		Share to CH		Explanation
	Low	High	Low	High	
Water Systems					
Major Repairs & Improvements, Consultations	\$ 16,600	\$ 27,100	\$ 16,600	\$ 27,100	Consultations due to DOA funding.
PMs	Minor	Minor	Minor	Minor	Few adverse impacts anticipated.
Roads	None	None	None	None	No projects planned in CH.
Resort/Residential Development					
Development within Urban District	None	None	None	None	No consultation required since no Fed involvement.
Development within Agricultural District	None	None	None	None	No projects planned in CH.
U.S. Military Activities					
Pacific Missile Range Facility, Consultations	\$ 46,300	\$ 64,700	\$ 46,300	\$ 64,700	Programmatic consultations due to DOD involvement.
PMs	\$ 786,000	\$ 1,891,000	\$ 786,000	\$ 1,891,000	Road construction, clearing vegetation, revegetation, firefighter, etc.
Ecotourism, Consultations	None	None	None	None	No consultation required since no Fed involvement.
Natural Disasters					
Recovery Projects, Consultations	\$ 3,800	\$ 7,500	\$ 3,800	\$ 7,500	Consultation due to FEMA funding.
PMs	Minor	Minor	Minor	Minor	Few adverse impacts anticipated.
INDIRECT COSTS					
Management of Game Mammals and Loss of Hunting Lands	Minor	Minor	Minor	Minor	Slight probability of a major impact.
U.S. Military Activities	ne	ne	ne	ne	Undetermined risk to programs.
Conservation Management	Minor	Minor	Minor	Minor	No obligation to proactively manage lands to control threats, but an undetermined probability of a major impact.
Redistricting of Land by the State	Small	Small	Small	Small	Small probability of significant impacts.
State and County Development Approvals	Large	Large	Large	Large	Potential loss of profits in excess of \$10 million.
Reduced Property Values	Large	Large	Large	Large	One property could decrease in value by a few million dollars.
Condemnation of Property	None	None	None	None	No condemnation resulting from CH. Also, the Service acquires land by negotiation, not condemnation.
Investigate Implications of CH	\$ 53,000	\$ 169,000	\$ 53,000	\$ 169,000	26 private landowners may investigate the implications of CH on their lands.
Reduced Cooperation on Conservation Projects	Modest	Modest	Modest	Modest	Some landowners want to avoid CH designation.

ES-6

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Table ES-1. Section 7 Costs and Benefits Attributable to the Plant Listings and Critical Habitat
(10-year estimates)

CH = critical habitat PMs = project modifications O&M = operation and maintenance Fed = Federal ne = not estimated

Item	Total		Share to CH		Explanation
	Low	High	Low	High	
DIRECT SECTION 7 BENEFITS					
Benefits of Project Modifications	ne	ne	ne	ne	Difficult to estimate ecological effects of PMs and their value.
Benefits to Developers	Small	Small	Small	Small	Helps developers site projects.
Ecotourism	Minor	Minor	Minor	Minor	The Service prefers that guides do not feature visits to threatened & endangered plants.
INDIRECT BENEFITS					
Species Preservation	ne	ne	ne	ne	Difficult to estimate benefits of preservation and its value.
Ethnobotanical Benefits	ne	ne	ne	ne	Difficult to estimate ethnobotanical benefits and their value.
Benefits to the Ecosystem	ne	ne	ne	ne	Difficult to estimate benefits of ecosystems and their value.
Economic Activity from Conservation Management	small	small	small	small	Potential for small increase.
TOTAL					
Costs Over 10 Years	\$ 1,019,900	\$ 2,601,200	\$ 945,500	\$ 2,468,700	Figures exclude costs that are difficult to estimate.
Benefits Over 10 Years	ne	ne	ne	ne	Difficult to estimate.

ES-7

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THE LISTED PLANTS AND PROPOSED CRITICAL HABITAT *

CHAPTER I

Under the Endangered Species Act of 1973, as amended (the Act), the United States Department of the Interior, Fish and Wildlife Service (the Service) proposes to designate critical habitat for threatened and endangered plant species on the islands of Kaua'i and Ni'ihau in Hawai'i. This chapter provides information on the listed plants and proposed critical habitat units, most of which comes from the document "Endangered and Threatened Wildlife and Plants; Revised Determinations of Prudency and Proposed Designations of Critical Habitat for Plant Species From the Islands of Kaua'i and Ni'ihau, Hawaii" (the proposed rule), drafted by the Service and published in the *Federal Register* on January 28, 2002 (50 CFR 17). In addition, the Service provided valuable information for this chapter in the form of overlay resource maps and detailed acreage data.

1. THE LISTED PLANTS

The Service proposes critical habitat for 83 threatened and endangered plant species on Kaua'i and Ni'ihau. The proposed rule contains a detailed discussion of the plant taxa, including taxonomy, ecology, habitat requirements, historical and current distribution, and threats for each of these species.

2. PROPOSED CRITICAL HABITAT UNITS

The Service is proposing 16 critical habitat units: 15 on Kaua'i and one on Ni'ihau. Three of the units on Kaua'i are divided into eight subunits; thus the total number of

* **Note to Reader:** After reading this chapter, those who are already familiar with Kaua'i County (Chapter II), the Act (Chapter III), existing protections (Chapter IV), or the approach used in conducting the economic analysis (Chapter V), may wish to skip these chapters, as appropriate, and proceed to the economic analysis (Chapter VI).

units and subunits (referred to throughout this report as “units”) is 21. Based on the proposed rule and other sources, this chapter and Table I-1 provide information on the units, including the *primary constituent elements* essential for the conservation of each plant species, their general location and terrain, excluded features and structures, acreages, land ownership, existing land management, and existing improvements and activities in the units. The proposed rule provides detailed information on the critical habitat boundaries and the map coordinates of boundary points.

2.a. Primary Constituent Elements

Each of the proposed critical habitat units provides one or more of the *primary constituent elements* essential for the conservation of the plant species. The Service defines *primary constituent elements* on the basis of the habitat features of the areas where the plant species are reported. Habitat features include the type of plant community, associated native plant species, locale (e.g., steep rocky cliffs, talus slopes, stream banks), and elevation.

2.b. Excluded Areas, Features and Structures

As indicated in the proposed rule, existing man-made features and structures do not contain, and are not likely to develop, *primary constituent elements*. As a result, they are excluded from the proposed critical habitat. The Service has also identified large areas that do not contain the *primary constituent elements* and are therefore excluded from the proposed critical habitat. The large areas in the designation are:¹

- Pacific Missile Range Facility, Barking Sands (part of Unit H)—a small part of the runway, possibly a building, beach cabin, and landscaped areas.
- Kipu Kai (part of Units D2 and E)—single-family homes, buildings and pasture lands.
- Hyatt Regency Resort (part of Unit D1)—part of a golf course, managed lawns and pools, and possibly some buildings.
- Haena State Park (northern portion of Unit J)—an archaeological complex (covering an overgrown *taro lo'i* that is planned for restoration, a *heiau*, a hula platform, and other archaeological/cultural features).
- Maha'ulepu (Unit D2)—narrow strips of land in the State's Agricultural District.

1. The Service has indicated that the final rule for the critical habitat will feature remapped boundaries that exclude these large areas that lack *primary constituent elements*.

Some of the existing man-made features and structures are small and cannot easily be excluded by mapping unit boundaries. In effect, they are “unmapped holes” that are found within the boundaries of critical habitat units but are not considered by the Service to be part of the critical habitat. The operation and maintenance of these man-made features and structures generally would not be impacted by critical habitat designation.

In addition to the man-made features and structures listed in the proposed rule, the Service has identified additional ones that do not contain the *primary constituent elements*. Below is the modified list of excluded man-made features and structures.

- Aqueducts and other water system features including, but not limited to, irrigation ditches, pipelines, siphons, tunnels, water tanks, gaging stations, intakes and wells
- Arboreta and gardens
- Buildings
- Electrical power transmission lines and associated rights-of-way
- *Heiau* (indigenous places of worship or shrines)
- Hydroelectric power plants
- Missile launch sites
- Radars
- Residences—single-family homes and condominiums, and lawns and landscaped residential areas.
- Roads
- Shoreline navigational aids operated by the U.S. Coast Guard
- State parks—parking areas, restrooms, camp grounds, picnic areas, cabins, and other improved portions of the parks
- Telecommunications towers and associated structures and equipment
- Telemetry antennas
- Trails

2.c. Acreage

As shown in Table I-1, the 21 proposed critical habitat units cover 99,903 acres, of which 99,206 acres are on Kaua'i (28.1 percent of the island) and 697 acres on Ni'ihau (1.6 percent of the island).

2.d. Location and Terrain

Figure ES-1 shows the general locations of the proposed critical habitat units on Kaua'i (Kaua'i Units A1 through O) and Ni'ihau (Ni'ihau Unit A). Detailed maps appear in the proposed rule.

The majority of the acreage is in uninhabited, remote areas. Proposed Units K, L, M, N and O are in mountainous areas, while Unit G is in Waimea Canyon; I is along the remote Na Pali coast; and J is in a deep valley. Units B, C and portions of E are less remote, but they are in uninhabited, mountainous areas. Unit F is less remote, but it is in an uninhabited, steep gulch. Ni'ihau Unit A is far from existing development, uninhabited, and primarily mountainous. These proposed critical habitat areas are not suitable for development or for most other economic uses due to their steep terrain, remote locations, and difficult access. The above units account for 97,894 acres (98 percent) of the total proposed designation.

Most of the smaller units along the shorelines are also unsuitable for development and other economic uses. Units A1, A2 and A3 are on sea cliffs along the north shore, while Units H1, H2 and H3 on the west shore overlap small portions of a State park and a military base. Combined, these areas account for 850 acres (1 percent) of the total proposed designation.

Portions of three ocean-front units, however, are not mountainous and are suitable for development and other economic uses. Proposed Units D1 and D2 run from Makahuena Point to Kipu Kai on the southeast end of the island in the Koloa District. A portion of proposed Unit E contains upland and mountainous portions of Kipu Kai. These units are potentially suitable for development or other economic uses because they are relatively flat, near the ocean, and close to existing roads and population centers. Combined, these areas account for 1,159 acres (1 percent) of the total proposed designation.

2.e. Occupied and Unoccupied Areas

The Service considers about 30,218 acres (30 percent) of the proposed critical habitat to be *occupied* by the listed species and 69,685 acres (70 percent) to be *unoccupied*. The *unoccupied* areas were included in the proposed designation because the Service believes that they are necessary to provide for the long-term survival and conservation of the species.

2.f. Land Ownership

Approximately 537 acres (1 percent) of the area proposed as critical habitat are owned by the Federal government. Most of the area (66,706 acres or 67 percent) is owned by the State, while just 2 acres are owned by the County of Kaua'i. Approximately 32,259 acres (32 percent) are owned by major private landowners (the Service defines "major landowners" as owners of at least 500 acres in Hawai'i), and 380 acres (less than 1 percent) are owned by minor private landowners. The remaining 20 acres are covered by State and county roads.

2.g. Existing Land Management

Land in the proposed critical habitat is subject to a variety of existing regulations and land-management programs that already limit activities in those areas. These include: Federal programs, State land-use controls and programs, county land-use controls, and land management by various public and private organizations. The regulations and land-management programs are described in Chapter IV.

Table I-1 at the end of this chapter identifies, by critical habitat unit, the amount of acreage under each type of control or management. Since some of the managed areas overlap with one another (e.g., portions of State Hunting Units are in State Forest Reserves), the percentages in Table I-1 do not always sum to 100 percent.

As indicated in the table, approximately 608 acres (1 percent) of the proposed critical habitat are controlled by the Federal government as part of the Pacific Range Missile Facility (PMRF) military installation. Other existing but limited Federal control of lands proposed for critical habitat includes areas that support populations of other listed threatened and endangered species (i.e., non-plants).

At the State level, nearly all (approximately 99 percent) of the land proposed for critical habitat is in the State Conservation District; 0.7 percent of it is in the State Agricultural District; and about 0.1 percent is in the State Urban District. In general, development and commercial activity is limited in the Conservation District with varying levels of restrictions based on the applicable Subzone (see Chapter IV for full a discussion).

In addition to the State restrictions that are placed on land in the Conservation District, most of this land is managed by the State as follows: approximately 52,168 acres (52 percent of the proposed designation) are in State Forest Reserves; 4,657 acres (5 percent) are in a Natural Area Reserve (NAR); 9,776 acres (10 percent) are in a State Wilderness Preserve; 10,499 acres (11 percent) are in State parks; and 63,330 acres (63 percent) are in State Hunting Units. In the future, approximately 720 acres in Units D2

and E in the Kipu Kai Ranch are planned for eventual management by the State under the State Park System (Chapter VI).

With regard to county management, the land in the State's Urban, Rural, and Agricultural Districts in Kaua'i County is subject to county land-use and development controls. These include county community plans, zoning, and building-code regulations affecting farm, residential, commercial, and industrial development and use. Approximately 1,435 acres (1 percent) of the proposed critical habitat are in the Agricultural District and 36 acres (less than 1 percent) are in the Urban District. In Special Management Areas (SMAs) located along the shoreline, the county has an additional layer of regulation that provides special controls on development, even for land located within the Conservation District.

Finally, approximately 9,600 acres in Unit J in the Wainiha Valley and 1,400 acres in the Wahiawa Drainage in Unit N may come under the management of The Nature Conservancy of Hawai'i (TNCH) in the next 10 years (Chapter VI).

2.h. Existing Improvements and Activities

At the bottom of Table I-1, the section entitled "Improvements/Activities" identifies existing improvements and activities found in each of the proposed critical habitat units. The double asterisks in the table (**) indicate improvements that are existing man-made features and structures; as discussed above, these improvements are considered to be "unmapped holes" in the critical habitat. Also, the total counts for roads, trails, water improvements (i.e., irrigation ditches), and power transmission lines may double-count the small number of improvements that span more than one critical habitat unit.

As modified (see Section 2.b), none of the units contains significant residential, commercial, industrial, or golf-course projects; crop farming; or intensive livestock operations.

Table I-1. Information on the Proposed Critical Habitat

Item	Units	All Units		Kaua'i Unit A1	Kaua'i Unit A2	Kaua'i Unit A3	Kaua'i Unit B
		Total	Share				
Total Area*	Acres	99,903		6	16	16	669
Area Occupied by Listed Plants	Acres	30,218	30%	-	-	-	335
Land Ownership							
Federal	Acres	537	1%	-	-	-	-
State	Acres	66,706	67%	-	-	-	669
County	Acres	2	0%	-	-	-	-
Private, Major Owner	Acres	32,259	32%	-	1	-	-
Private, Small Owners	Acres	380	0%	6	14	16	-
State/County Roads	Acres	20	0%	-	-	-	-
Federally Controlled or Managed							
Military	Acres	608	1%	-	-	-	-
FWS, non-plant populations	Count	73		-	-	1	-
State-Controlled or Managed							
Conservation District	Acres	98,436	99%	4	4	16	667
Protective Subzone	Acres	60,541	61%	-	-	-	-
Limited Subzone	Acres	2,489	2%	4	4	16	371
Resource Subzone Subzone	Acres	34,388	34%	-	-	-	296
General Subzone	Acres	76	0%	-	-	-	-
Special Subzone	Acres	942	1%	-	-	-	-
Forest Reserves	Acres	52,168	52%	-	-	-	669
Natural Area Reserves (NARs)	Acres	4,657	5%	-	-	-	-
State Wilderness Preserve	Acres	9,776	10%	-	-	-	-
State Parks	Acres	10,499	11%	-	-	-	-
State Hunting Units	Acres	63,330	63%	-	-	-	-
County-Controlled or Managed							
Agricultural District	Acres	1,435	1%	-	-	0.2	-
Urban/Rural	Acres	36	0%	2	13	-	2
Special Management Areas	-	-	-	shoreline	shoreline	shoreline	-
Improvements/Activities							
Paved Roads**	Count	6		-	-	-	-
Unpaved Rds or 4-wd Trails**	Count	45		-	-	-	-
Hiking Trails**	Count	40		-	-	-	3
Park Improvements**	Count	34		-	-	-	2
Botanical Gardens & Aboretum**	Count	3		-	-	-	-
Communication Complexes**	Count	4		-	-	-	-
Navigational Lights or Beacons**	Count	4		-	-	-	-
Water Improvements**	Count	30		-	-	-	-
Power Transmission Lines**	Count	4		-	-	-	-
Hydroelectric Powerhouse**	Count	1		-	-	-	-
Residential/Condominium Projects*	Count	3		-	-	1	-
Heiau & Hula Platform**	Count	12		-	-	-	-
Other Structures**	Count	11		-	-	-	-
Golf Courses**	Count	1		-	-	-	-
Military Facilities** and Activities	Present	-		-	-	-	-
Beach Recreational Activities	Present	-		yes	yes	yes	-
Hunting on State-Managed Lands	Present	-		-	-	-	-
Grazing	Present	-		-	-	-	-

* Entries may not sum to totals due to rounding, slight acreage discrepancies, and overlapping land-management areas.

** Man-made features within critical habitat units, but excluded from critical habitat.

Table I-1. Information on the Proposed Critical Habitat
(continued)

Item	Units	Kaua'i Unit C	Kaua'i Unit D1	Kaua'i Unit D2	Kaua'i Unit E	Kaua'i Unit F	Kaua'i Unit G
Total Area*	Acres	239	35	594	1,390	12	784
Area Occupied by Listed Plants	Acres	186	-	-	671	11	100
Land Ownership							
Federal	Acres	-	-	-	-	-	-
State	Acres	-	1	-	-	-	779
County	Acres	-	1	-	-	-	-
Private, Major Owner	Acres	239	1	593	1,390	12	-
Private, Small Owners	Acres	-	31	1	-	-	-
State/County Roads	Acres	-	1	-	-	-	4
Federally Controlled or Managed							
Military	Acres	-	-	-	-	-	-
FWS, non-plant populations	Count	-	1	9	-	-	-
State-Controlled or Managed							
Conservation District	Acres	239	15	349	1,030	-	774
Protective Subzone	Acres	-	-	-	360	-	-
Limited Subzone	Acres	207	15	349	670	-	-
Resource Subzone Subzone	Acres	-	-	-	-	-	774
General Subzone	Acres	32	-	-	-	-	-
Special Subzone	Acres	-	-	-	-	-	-
Forest Reserves	Acres	-	-	-	-	-	-
Natural Area Reserves (NARs)	Acres	-	-	-	-	-	-
State Wilderness Preserve	Acres	-	-	-	-	-	-
State Parks	Acres	-	-	-	-	-	-
State Hunting Units	Acres	-	-	-	-	-	784
County-Controlled or Managed							
Agricultural District	Acres	-	1	245	360	12	9
Urban/Rural	Acres	-	19	-	-	-	-
Special Management Areas	-	-	shoreline	shoreline	-	-	-
Improvements/Activities							
Paved Roads**	Count	-	1	-	-	-	1
Unpaved Rds or 4-wd Trails**	Count	-	-	5	4	2	-
Hiking Trails**	Count	-	-	-	-	-	-
Park Improvements**	Count	-	-	-	-	-	-
Botanical Gardens & Aboretum**	Count	-	-	-	-	1	-
Communication Complexes**	Count	-	-	-	-	-	-
Navigational Lights or Beacons**	Count	1	1	-	-	-	-
Water Improvements**	Count	-	-	-	2	-	2
Power Transmission Lines**	Count	-	-	-	-	-	-
Hydroelectric Powerhouse**	Count	-	-	-	-	-	-
Residential/Condominium Projects*	Count	-	2	-	-	-	-
Heiau & Hula Platform**	Count	-	1	2	1	-	-
Other Structures**	Count	-	-	1	2	-	-
Golf Courses**	Count	-	1	-	-	-	-
Military Facilities** and Activities	Present	-	-	-	-	-	-
Beach Recreational Activities	Present	-	yes	yes	-	-	-
Hunting on State-Managed Lands	Present	-	-	-	-	-	yes
Grazing	Present	-	-	yes	yes	-	-

* Entries may not sum to totals due to rounding, slight acreage discrepancies, and overlapping land-management areas.

** Man-made features within critical habitat units, but excluded from critical habitat.

Table I-1. Information on the Proposed Critical Habitat
(continued)

Item	Units	Kaua'i Unit H1	Kaua'i Unit H2	Kaua'i Unit H3	Kaua'i Unit I	Kaua'i Unit J	Kaua'i Unit K
Total Area*	Acres	341	265	206	20,355	13,681	4,330
Area Occupied by Listed Plants	Acres	113	-	-	11,665	2,598	1,509
Land Ownership							
Federal	Acres	176	258	103	-	-	-
State	Acres	165	7	103	20,326	896	1,774
County	Acres	-	-	-	-	1	-
Private, Major Owner	Acres	-	-	-	29	12,471	2,556
Private, Small Owners	Acres	-	-	-	-	312	-
State/County Roads	Acres	-	-	-	-	2	-
Federally Controlled or Managed							
Military	Acres	165	252	39	151	-	-
FWS, non-plant populations	Count	-	-	-	17	6	-
State-Controlled or Managed							
Conservation District	Acres	309	258	205	20,354	13,681	4,330
Protective Subzone	Acres	-	-	-	9,382	11,586	4,330
Limited Subzone	Acres	266	258	205	60	24	-
Resource Subzone Subzone	Acres	-	-	-	10,883	1,159	-
General Subzone	Acres	44	-	-	-	-	-
Special Subzone	Acres	-	-	-	29	913	-
Forest Reserves	Acres	-	-	-	7,944	12,130	1,869
Natural Area Reserves (NARs)	Acres	-	-	-	4,627	27	-
State Wilderness Preserve	Acres	-	-	-	15	228	-
State Parks	Acres	147	-	-	7,508	105	-
State Hunting Units	Acres	-	-	-	19,583	-	1,869
County-Controlled or Managed							
Agricultural District	Acres	33	7	2	1	-	-
Urban/Rural	Acres	-	-	-	-	-	-
Special Management Areas	-	shoreline	shoreline	shoreline	shoreline	shoreline	-
Improvements/Activities							
Paved Roads**	Count	-	-	-	2	1	-
Unpaved Rds or 4-wd Trails**	Count	-	1	1	5	1	-
Hiking Trails**	Count	-	1	-	13	2	-
Park Improvements**	Count	2	-	-	14	-	-
Botanical Gardens & Aboretum**	Count	-	-	-	1	1	-
Communication Complexes**	Count	1	-	1	1	-	-
Navigational Lights or Beacons**	Count	1	-	1	-	-	-
Water Improvements**	Count	-	-	-	7	3	-
Power Transmission Lines**	Count	-	-	-	-	-	-
Hydroelectric Powerhouse**	Count	-	-	-	-	-	-
Residential/Condominium Projects*	Count	-	-	-	-	-	-
Heiau & Hula Platform**	Count	-	-	-	4	3	-
Other Structures**	Count	-	1	-	3	2	-
Golf Courses**	Count	-	-	-	-	-	-
Military Facilities** and Activities	Present	yes	yes	yes	yes	-	-
Beach Recreational Activities	Present	yes	yes	yes	yes	yes	-
Hunting on State-Managed Lands	Present	-	-	-	yes	yes	yes
Grazing	Present	-	-	-	-	-	-

* Entries may not sum to totals due to rounding, slight acreage discrepancies, and overlapping land-management areas.

** Man-made features within critical habitat units, but excluded from critical habitat.

Table I-1. Information on the Proposed Critical Habitat
(continued)

Item	Units	Kaua'i Unit L	Kaua'i Unit M	Kaua'i Unit N	Kaua'i Unit O	Ni'ihau Unit A
Total Area*	Acres	8,418	8,160	16,307	23,382	697
Area Occupied by Listed Plants	Acres	381	1,582	2,210	8,420	436
Land Ownership						
Federal	Acres	-	-	-	-	-
State	Acres	8,333	3,606	6,704	23,342	-
County	Acres	-	-	-	-	-
Private, Major Owner	Acres	85	4,554	9,603	27	697
Private, Small Owners	Acres	-	-	-	-	-
State/County Roads	Acres	-	-	-	13	-
Federally Controlled or Managed						
Military	Acres	-	-	-	-	-
FWS, non-plant populations	Count	1	2	2	33	1
State-Controlled or Managed						
Conservation District	Acres	8,418	8,157	16,242	23,382	-
Protective Subzone	Acres	5,177	7,088	9,918	12,701	-
Limited Subzone	Acres	-	-	39	-	-
Resource Subzone Subzone	Acres	3,241	1,069	6,285	10,681	-
General Subzone	Acres	-	-	-	-	-
Special Subzone	Acres	-	-	-	-	-
Forest Reserves	Acres	8,391	3,431	6,731	11,003	-
Natural Area Reserves (NARs)	Acres	-	-	-	3	-
State Wilderness Preserve	Acres	-	-	-	9,533	-
State Parks	Acres	-	-	-	2,739	-
State Hunting Units	Acres	8,391	3,431	6,731	22,540	-
County-Controlled or Managed						
Agricultural District	Acres	-	4	65	-	697
Urban/Rural	Acres	-	-	-	-	-
Special Management Areas	-	-	-	-	-	-
Improvements/Activities						
Paved Roads**	Count	-	-	-	1	-
Unpaved Rds or 4-wd Trails**	Count	1	2	8	14	1
Hiking Trails**	Count	1	1	2	17	-
Park Improvements**	Count	-	-	-	16	-
Botanical Gardens & Aboretum**	Count	-	-	-	-	-
Communication Complexes**	Count	-	-	1	-	-
Navigational Lights or Beacons**	Count	-	-	-	-	-
Water Improvements**	Count	1	1	10	4	-
Power Transmission Lines**	Count	1	1	2	-	-
Hydroelectric Powerhouse**	Count	-	-	1	-	-
Residential/Condominium Projects*	Count	-	-	-	-	-
Heiau & Hula Platform**	Count	-	-	1	-	-
Other Structures**	Count	-	-	1	1	-
Golf Courses**	Count	-	-	-	-	-
Military Facilities** and Activities	Present	-	-	-	-	yes
Beach Recreational Activities	Present	-	-	-	-	-
Hunting on State-Managed Lands	Present	yes	yes	yes	yes	-
Grazing	Present	-	-	yes	-	yes

* Entries may not sum to totals due to rounding, slight acreage discrepancies, and overlapping land-management areas.

** Man-made features within critical habitat units, but excluded from critical habitat.

PHYSICAL AND SOCIOECONOMIC PROFILE OF KAUA'I COUNTY *

CHAPTER II

To provide the context for evaluating the economic impacts of the proposed critical habitat designation, this chapter presents (1) a physical description of the islands of Kaua'i and Niihau, and (2) a socioeconomic profile of the County of Kaua'i, which includes Kaua'i and the small nearby island of Ni'ihau.

1. PHYSICAL DESCRIPTIONS OF KAUA'I AND NI'IIHAU

1.a. Kaua'i

Kaua'i is the northernmost and oldest of the eight major Hawaiian Islands. Formed by a single shield volcano, this highly eroded 553-square-mile island has a mountainous interior, deep canyons and valleys that extend from the interior of the island to the coast, and steep ridges and cliffs (see Figure II-1 at the end of this chapter). Rain falls throughout the upper elevations, especially at Mount Wai'ale'ale—Kaua'i's second highest point at 5,148 feet, and one of the wettest spots on earth, where annual rainfall averages 450 inches. The summit plateau constitutes the remains of a huge caldera that is now partially covered by Alakai Swamp, at about 4,000 to 4,600 feet. Two of Kaua'i's many remarkable topographic features are Waimea Canyon and the Na Pali Coast. Waimea Canyon, which cuts deep into the interior of the island, is 14-1/2 miles long and 2,750 feet deep. The Na Pali Coast was formed by streams that cut deep valleys into the northwestern coast, and by wave action that eroded the shoreline to form precipitous 3,000-foot cliffs.

Because of the age of the island and its relative isolation, levels of floristic diversity and endemism are higher on Kaua'i than on any other island in the Hawaiian archipelago. However, the native vegetation has undergone extreme alterations because

* **Note to Reader:** Readers who are already familiar with Kaua'i County may wish to skip this chapter and proceed to the next background-information chapters (Chapters III through V), or to the economic analysis (Chapter VI).

of (1) past and present land use (e.g., agriculture) and (2) the intentional and inadvertent introduction of non-native plants and animals. Browsing, digging and trampling by ungulates (pigs, goats, cattle, sheep and deer) have resulted in increased numbers of non-native plants because most of the non-native plants can colonize newly disturbed areas more quickly and effectively than can Hawai'i's native plants. As a result, native forests are now limited to Kaua'i's upper-elevation, moist and wet regions.

1.b. Ni'ihau

Located 17.2 miles to the west of Kaua'i is the slightly younger and much smaller 70-square-mile island of Ni'ihau. Although the island rises to only 1,281 feet, it has precipitous sea cliffs along its eastern coast. Lying in the rain-shadow of Kaua'i, this semi-arid island receives only about 20 to 40 inches of rain per year.

Naturally occurring vegetation on Ni'ihau includes coastal dry shrubland and grassland, dry-cliff plants, lowland dry forest and shrubland, lowland shrubland and grassland, lowland moist forest and shrubland, wetland, and Hawaiian coastal lakes that are abnormally high in salt. One of Ni'ihau's unique natural features is its several intermittent lakes. Ni'ihau's relative isolation and severe environmental conditions have produced a small number of endemic species. Human disturbance—primarily cattle and sheep ranching—has changed the vegetation and hydrologic parameters of the island drastically, leaving little native vegetation.

2. SOCIOECONOMIC PROFILE OF KAUA'I COUNTY

Table II-1 and the material below summarize socioeconomic information on Kaua'i County (i.e., Kaua'i and Ni'ihau). The data reflect almost entirely the population and economy of the island of Kauai because the privately owned island of Ni'ihau contains only 0.3 percent of the County's population and thus supports a very small fraction of the County's economic activity. As noted at the bottom of Table II-1, sources for the data were the *State of Hawai'i Data Book* (DBEDT, annual) and *Statistics of Hawai'i Agriculture* (Hawai'i Agricultural Statistics Service, annual).

2.a. Population and Distribution

In the year 2000, the County of Kaua'i had a population of about 58,500 residents, up 14.2 percent since the 1990 U.S. census. The total county population amounted to 4.8 percent of the State population, the smallest of the four counties. Only 160 of these county residents, mostly Native Hawaiians, lived on Ni'ihau.

Most residents on Kaua'i live in towns around the perimeter of the island, primarily along the east and south sides of Kaua'i, with smaller populations living in towns on the north shore. There are no towns on the northwest side of the island or in the mountainous interior.

2.b. Primary Economic Activities

The principal economic driving forces for the economy of Kaua'i County are tourism, agriculture, and defense expenditures.

2.b.(1) Tourism

Kaua'i County hosted nearly 1.1 million visitors in 2000, resulting in an average of 18,041 visitors present on the island (the average visitor census). Of the visitors present, approximately 90 percent were Americans and most of the remainder were Japanese. Visitor expenditures on Kaua'i totaled approximately \$1.2 billion in 2000, making it the dominant industry for the County.

Tourism counts declined during the 1990s, due largely to Hurricane Iniki in November 1992 which damaged many hotels. The annual number of visitors and the average visitor census were down 16.4 percent and 0.9 percent, respectively, since 1990. The smaller decline in the visitor census was due to an increase in the average length of stay on the island. Even though the visitor counts declined, visitor expenditures increased 26.9 percent during the 1990s due to an increase in average daily expenditures per visitor. However, this increase was only slightly greater than the 25.5-percent increase in inflation as measured by the Consumer Price Index.

Until the terrorist attack of September 11, 2001, Kaua'i County's visitor industry was on the rebound. Contributing factors included (1) the robust economic growth in California and other western States, and (2) a new generation of commercial aircraft that can depart from the short runway on Kaua'i with sufficient fuel to fly to the U.S. mainland.

2.b.(2) Defense

Located in the southwest corner of Kaua'i, the Pacific Missile Range Facility (PMRF) is the world's largest instrumented multi-environment range to support surface, subsurface, air and space operations. Operations vary from small, single-unit exercises to large, multiple-unit battle-group scenarios. Further facility development and operations are expected to evolve at PMRF in response to technological advances and defense initiatives.

PMRF is a major contributor to the economy of Kaua'i County, particularly on the west side of the island. In FY 2001, expenditures for PMRF and other defense initiatives on Kaua'i totaled about \$144 million. While substantial, defense expenditures represent just 12 percent of visitor expenditures.

2.b.(3) Agriculture

For more than a century, sugarcane was the economic mainstay on Kaua'i. However, the industry has suffered major contractions since the late 1960s. Four of five plantations have closed and about 46,100 acres of land have been released from sugarcane cultivation. Some of the fields have been planted in diversified crops, including coffee, papaya and other fruits, seed corn, flowers and nursery products, and vegetables and melons. Also, some fields have been converted to aquaculture, and some have been used for residential and other urban development. However, most of the former sugarcane land is now used for grazing cattle which, in recent years, has allowed a growing cattle industry on Kaua'i even though grazing is a comparatively low-value use of the land.

Due to the contraction in the sugar industry, revenues from agriculture (crops, livestock and aquaculture) declined from \$64.4 million in 1990 to \$48.5 million in 2000. As a result, agriculture is now the smallest of the three major industries in Kaua'i County, with sales representing only 4 percent of visitor expenditures and 34 percent of defense expenditures.

2.c. Economic Activities on Ni'ihau

The primary economic activities on Ni'ihau are cattle and sheep ranching, commercial game hunting, and military exercises to train downed combat pilots in how to evade capture.

2.d. Labor Force and Employment

In 2000, Kaua'i County's civilian labor force numbered 29,400 people, up 14.2 percent since 1990. But employment, which numbered 27,500 people in 2000, was up only 11.3 percent. The contraction in the sugar industry and related industries, coupled with flat inflation-adjusted growth in tourism and insufficient growth in other industries, contributed to an unemployment rate of 6.5 percent in 2000 compared to the 1990 rate of 4.1 percent.

While employment increased during the 1990s, the number of wage and salary jobs increased by a smaller percentage (11.3 percent versus 3.5 percent). At the same time, the number of self-employed workers and self-employed farmers increased. Most of the wage and salary jobs (excluding self-employed workers and farmers) were concentrated in: construction; transportation, communications, and utilities; trade (retail and wholesale); services (hotel, tourism, and health); government; and agriculture. The number of wage and salary jobs declined in all categories except trade, services and government. The declines are less dramatic if self-employed workers are counted, particularly self-employed farmers.

2.e. Personal Income

In 1999, total personal income and per-capita income for the County were \$1.3 billion and \$23,061, respectively—figures that were up 35.1 percent and 23.4 percent from 1990 levels. However, per-capita income failed to keep pace with inflation, which increased 25.5 percent over this same period. As suggested by the expenditure data discussed above, tourism makes the largest contribution to personal income.

2.f. Outlook for Growth and Socioeconomic Change

Over the next 10 years, most of the population and urban growth on Kaua'i will be in Kukui'ula and Poipu along the south shore; Lihu'e, Wailua, and Kapa'a on the windward side; the Princeville area on the north shore; other existing urban centers; and some agricultural subdivisions. Little or no growth is anticipated in the mountainous interior of the island.

The primary growing sectors of the economy continue to be tourism, military activities centered at PMRF and, to a lesser extent, diversified agriculture. However, given the uncertain outlook for the dominant tourism industry combined with development controls that limit new resort development, slow to moderate economic growth is anticipated over the next 10 years for Kaua'i County.

On Ni'ihau, little change is expected in the types or levels of economic activity (i.e., ranching, commercial game hunting and military training exercises), or in the size of the population.

Table II-1. Socioeconomic Profile, County of Kaua'i

Item	1990	1999	2000	Change Since 1990
Resident Population	51,177	-	58,463	14.2%
Kaua'i Island	50,947	-	58,303	14.4%
Ni'ihau Island	230	-	160	-30.4%
Visitors				
Annual Visitors	1,286,360	-	1,074,821	-16.4%
Average Visitor Census	18,200	-	18,041	-0.9%
U.S. Visitors	17,200	-	16,254	-5.5%
Foreign Visitors	1,000	-	1,787	78.7%
Income from Major Industries (\$ million)				
Visitor Expenditures	\$ 945.8	-	\$ 1,200.0	26.9%
Defense Expenditures	n/a	-	\$ 144.0	n/a
Agricultural Sales	\$ 64.4	-	\$ 48.5	-24.7%
Labor				
Civilian Labor Force	25,750	-	29,400	14.2%
Employed	24,700	-	27,500	11.3%
Unemployment Rate	4.1%	-	6.5%	
Jobs, Wage and Salary Only¹	25,450	-	26,350	3.5%
Construction, mining	1,450	-	1,000	-31.0%
Manufacturing	900	-	500	-44.4%
Transp, communications, utilities	2,400	-	1,750	-27.1%
Trade	7,050	-	7,450	5.7%
Finance, insurance, real estate	1,550	-	1,100	-29.0%
Services and miscellaneous	7,600	-	9,500	25.0%
Government	3,350	-	4,100	22.4%
Agriculture	1,150	-	950	-17.4%
Personal Income				
Total (\$ million)	\$ 965	\$ 1,304	-	35.1%
Per capita	\$ 18,692	\$ 23,061	-	23.4%
Consumer Price Index—All Urban Consumers, Honolulu	138.10	173.30	-	25.5%

Notes: 1. Year 2000 job counts are preliminary.

Sources: Department of Business, Economic Development & Tourism. *The State Data Book*. Annual.

THE ENDANGERED SPECIES ACT *

CHAPTER III

This chapter provides relevant information from the 1973 Endangered Species Act (the Act), including the role of critical habitat designation in protecting threatened and endangered species, requirements for consulting with the Service to insure that certain Federal actions do not endanger listed species or their habitats, and prohibited activities that apply to listed species.

1. ROLE OF SPECIES LISTING AND CRITICAL HABITAT DESIGNATION IN PROTECTING THREATENED AND ENDANGERED SPECIES

For species listed as threatened and endangered, the Act requires the Service to designate critical habitat to the maximum extent prudent and determinable. The Act defines critical habitat as the specific areas containing features essential to the conservation of a threatened or endangered species and that may require special management considerations or protection.

For listed species, section 7(a)(2) of the Act requires Federal agencies to consult with the Service in order to ensure that activities they fund, authorize, permit, or carry out are not likely to *jeopardize* the continued existence of the species. The Act defines *jeopardy* as any action that would appreciably reduce the likelihood of both the survival and recovery of the species.

For the critical habitat of listed species, section 7(a)(2) further requires Federal agencies to consult with the Service to ensure that activities they fund, authorize, permit, or carry out do not result in destruction or *adverse modification* of critical habitat. *Adverse modification* of critical habitat is defined as any direct or indirect alteration that

* **Note to Reader:** Readers who are already familiar with the Act may wish to skip this chapter and proceed to the next background-information chapters (Chapters IV and V), or to the economic analysis (Chapter VI).

appreciably diminishes the value of critical habitat for the survival and recovery of the species.

As stated in the proposed rule, "... critical habitat also provides non-regulatory benefits to the species by informing the public and private sectors of areas that are important for species recovery and where conservation actions would be most effective." "Critical habitat also identifies areas that may require special management considerations ... and may help provide protection to areas where significant threats to the species have been identified or help to avoid accidental damage to such areas."

2. CONSULTATION UNDER SECTION 7 OF THE ACT

As indicated above, section 7 of the Act requires Federal agencies to consult with the Service whenever activities they fund, authorize, or carry out may affect listed species or designated critical habitat. Section 7 consultation with the Service is designed to ensure that current or future Federal actions do not appreciably diminish the value of critical habitat for the survival and recovery of a listed species.

The Service has authority under section 7 to consult on activities on land owned by individuals, organizations, states, or local and tribal governments only if the activities on the land have a *Federal nexus*. A *Federal nexus* occurs when the activities require a Federal permit, license, or other authorization, or involve Federal funding. The Service does not have jurisdiction under section 7 to consult on activities occurring on non-Federal lands when the activities are not Federally funded, authorized, or carried out. In addition, consultation is not required for activities that do not affect listed species or their critical habitat.

When consultations concern activities on Federal lands, the relevant Federal Action agency initiates consultation with the Service. When an activity proposed by a state or local government or private entity requires a Federal permit or is Federally funded or carried out, the Federal agency with the *nexus* to the activity initiates consultation with the Service. For example, the Army Corps of Engineers is the agency that issues section 404 permits under the Clean Water Act, so it is the Action agency.

The consultation begins after the Federal Action agency determines that its action may affect one or more listed species or their designated critical habitat, even if the effects are expected to be beneficial since projects with overall beneficial effects could include some adverse impacts. Consultations are frequently conducted for multiple species if more than one species is affected by the action.

The consultation between the Federal Action agency and the Service may involve informal consultation, formal consultation in the case of adverse impacts, or both. Informal consultation may be initiated via a telephone call or letter from the Action agency, or a meeting between the Action agency and the Service. In preparing for an informal consultation, the Action agency compiles all the biological, technical, and legal information necessary to analyze the scope of the activity and discusses strategies to eliminate adverse effects on listed species or critical habitat. Through informal discussions, the Service assists the Action agency and the Applicant, if any, in identifying and resolving potential conflicts at an early stage in the planning process, and may make recommendations, if appropriate, on ways to avoid adverse effects.

If during informal consultation the Federal Action agency determines that its action (as originally proposed or revised and taking into account direct and indirect effects) “is not likely to adversely affect” listed species or critical habitat (e.g., the effects are beneficial, insignificant or discountable), and the Service agrees with that determination, then the Service provides concurrence in writing and no further consultation is required.

But if the proposed action, as revised during informal consultation, is still likely to adversely affect listed species or critical habitat, the Action agency must request in writing initiation of formal consultation with the Service and submit a complete initiation package. Formal consultations, which are subject to specific timeframes, are conducted to determine whether a proposed action is likely to *jeopardize* the continued existence of a listed species or destroy or *adversely modify* designated critical habitat. This determination depends on the extent to which a project may affect the species. Many variables, including the project’s size, location and duration, may influence the extent of the impact and, in turn, the determination of a “may effect” opinion.

If the Service finds, in its biological opinion, that a proposed action is not likely to *jeopardize* the continued existence of a listed species, or destroy or *adversely modify* the critical habitat—even though the action may adversely affect listed species or critical habitat—then the action likely can be carried out without violating section 7(a)(2) of the Act.

On the other hand, if the Service finds that a proposed action is likely to *jeopardize* the continued existence of a listed species and/or destroy or *adversely modify* the critical habitat, then the Service provides the Action agency with reasonable and prudent alternatives that will keep the action below the thresholds of *jeopardy* and/or *adverse modification*, if any can be identified.

The Service works with Action agencies and Applicants in developing reasonable and prudent alternatives. A reasonable and prudent alternative is one that (1) can be implemented in a manner consistent with the intended purpose of the action; (2) can be implemented consistent with the scope of the Action agency’s legal authority and

jurisdiction; and (3) is economically and technologically feasible. The Service will, in most cases, defer to the Action agency's expertise and judgment as to the feasibility of an alternative. Reasonable and prudent alternatives can vary from slight project modifications to extensive redesign or relocation of a project. Costs associated with implementing reasonable and prudent alternatives vary accordingly.

3. TAKING AND OTHER RESTRICTIONS OF THE ACT

3.a. Wildlife Species

Regardless of any *Federal involvement* and critical habitat designation, once a species has been formally listed as threatened or endangered, it is entitled to certain regulatory protections under the Act. First and foremost, section 9 of the Act specifically prohibits the *taking* of any endangered species of fish or wildlife (the prohibition does not extend to plants). The term *take* is defined as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct." The regulations at 50 CFR section 17.3 define "harm" to mean an act that actually kills or injures wildlife. This may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering. In addition, endangered species, their parts or any products made from them may not be imported, exported, possessed or sold. Section 4(d) of the Act gives the Service regulatory discretion to extend the protections of section 9 to threatened species.

However, the Act allows the Service to permit *take* by private applicants that would otherwise be prohibited, provided such *taking* is "incidental to, and not [for] the purpose of, the carrying out of an otherwise lawful activity." Section 10(a)(1)(B) of the Act allows non-Federal parties planning activities that have no *Federal nexus*, but which could result in the incidental *taking* of listed animals, to apply for an incidental *take* permit. The application must include a habitat conservation plan laying out the proposed actions, determining the effects of those actions on affected fish and wildlife species and their habitats (often including proposed or candidate species), and defining measures to minimize and mitigate adverse effects. The Service may elect to issue an incidental *take* permit if the incidental *take* is to be minimized by reasonable and prudent measures and implementing terms and conditions that are stipulated in the permit.

3.b. Plant Species

Section 9(a)(2) of the Act states that it is unlawful to remove and possess any endangered plant species from areas under Federal jurisdiction; maliciously damage or

destroy any such species on any such area; or remove, cut, dig up, damage, or destroy any such species on any other area in knowing violation of any state law. In addition, endangered species, their parts or any products made from them may not be delivered, received, transported, shipped or sold in interstate or foreign commerce. As above, section 4(d) of the Act gives the Service regulatory discretion to extend the protections of section 9(a)(2) to threatened plant species.

However, the Service may give permission to remove a listed plant from areas under Federal jurisdiction, and may also give permission for actions that are otherwise prohibited by section 9 of the Act for “scientific purposes or to enhance the propagation or survival of the affected species including, but not limited to, acts necessary for the establishment and maintenance of experimental populations.”

EXISTING PROTECTIONS *

CHAPTER IV

In addition to the Act, other existing regulations and land-management programs protect Hawai'i's threatened and endangered species and their habitats. This chapter provides an overview of these protections, including: other Federal programs, State protections for listed species, State land-use controls affecting public and private lands, county land-use controls, and land management by various public and private organizations. Land use management that applies specifically to the proposed critical habitat is summarized in Table I-1. As appropriate, this information is used in Chapter VI to estimate the section 7 economic impacts that occur over and above impacts attributable to existing protections.

1. FEDERAL SPECIES PROTECTIONS AND LAND MANAGEMENT

1.a. Integrated Natural Resources Management Plans

The Sikes Act Improvements Act (SAIA) of 1997 required every military installation containing land and water suitable for the conservation and management of natural resources to complete, by November 17, 2001, an Integrated Natural Resources Management Plan (INRMP). The purpose of the INRMP is to integrate the mission of the military installation with stewardship of the natural resources found there. Each military installation that has listed species or critical habitat consults with the Service on its INRMP.

* **Note to Reader:** Readers already familiar with existing protections in Hawai'i of threatened and endangered species and their habitats may wish to skip this chapter and proceed to the approach to the analysis (Chapter V), or to the economic analysis (Chapter VI).

1.b. Conservation Partnerships Program, Pacific Islands Ecoregion

The Service's Conservation Partnerships Program is a collection of voluntary habitat restoration programs having the goal of restoring native Pacific Island ecosystems through collaborative projects with private landowners, community groups, conservation organizations, and other government agencies. The Program can provide cost-share funds, as well as information on habitat restoration techniques, native species, Safe Harbor Agreements, additional funding sources, required permits, and potential vendors of restoration services (fence contractors, nurseries, etc.). The Program is divided into five sections, discussed below.

1.b.(1) Partners for Fish and Wildlife Program

The Partners for Fish and Wildlife (PFW) Program is the Service's habitat restoration program for long-term conservation on private land. The PFW Program was established to offer technical and financial assistance to landowners who wish to restore wildlife habitat on their property. PFW Programs can include constructing fences to exclude feral ungulates; controlling feral ungulates, weeds, rodents, and alien insects; restoring native ecosystem elements such as hydrology and micro-habitat conditions; and reintroducing native species.

The Service provides assistance ranging from informal advice on the location and design of potential restoration projects to cost-shared funding under a formal cooperative agreement with the landowner. If warranted, the Service also provides participating landowners with technical assistance to develop Safe Harbor Agreements that cover habitat managed for endangered or threatened species. The Agreements provide assurances to landowners that additional land, water, and/or restrictions on uses of natural resources will not be imposed as a result of their voluntary conservation actions.

Since funding is limited, projects given the highest priority are ones that manage or reestablish natural biological communities and provide long-term benefits to declining migratory bird and fish species, and species that are endangered, threatened, or proposed for listing; and projects on private lands that satisfy the needs of wildlife populations on National Wildlife Refuges.

1.b.(2) The Hawai'i Biodiversity Joint Venture

The Hawai'i Biodiversity Joint Venture (HBJV) is a public-private effort to protect, maintain, improve, and restore the native biological diversity of the Hawaiian Islands. The mission is to work with others to conserve, protect, and enhance fish, wildlife, and plants and their habitats.

The HBJV was initiated with the following goals:

- Maintain natural communities and habitats for native species
- Support efforts to cooperatively manage significant native ecosystems on public and private land
- Develop natural resource management techniques to address widespread threats (such as feral ungulates, weeds, rats, and alien insects) to Hawai'i's native ecosystems
- Restore former wetlands, native forests and other natural communities on public and private lands
- Protect native Hawaiian ecosystems and natural communities through land and water acquisition and management.

Since funding is limited, priority is given to projects that: (1) implement management or research actions that directly contribute to protecting or restoring habitats for multiple endangered, threatened, candidate, or rare species; (2) address key threats to native ecosystems or habitats; and (3) benefit rare or unique ecosystems or habitats.

1.b.(3) Pacific Islands Coastal Program

The Pacific Islands Coastal Program identifies and conserves important coastal natural resources. The goals of the program are to:

- Identify and prioritize coastal natural resources and threats
- Implement on-the-ground projects in partnership with others
- Promote public stewardship of coastal fish, wildlife, plants and their habitats.

The objectives of the program include:

- Protecting and restoring coastal wetlands and uplands, anchialine pools, estuaries, coral reefs and streams
- Preventing and eradicating invasive alien species in coastal areas
- Protecting and restoring watersheds for native species' habitat needs
- Building public support through partnerships, education and community involvement
- Inventory and map coastal resources.

1.b.(4) Endangered Species Landowner Incentive Program

The Endangered Species Landowner Incentive Program is a focused effort to combine cost-share funds and regulatory relief incentives (Safe Harbor Agreements and Candidate Conservation Agreements) to address high-priority habitat restoration needs of endangered, threatened and candidate species.

1.b.(5) Other Habitat Restoration Programs

Other Habitat Restoration Programs include the National Coastal Wetlands Conservation Grant Program and the North American Wetlands Conservation Grant Program. In addition, the Conservation Partnerships Program seeks to provide a connection between habitat restoration projects and non-Service funding sources.

1.c. Wildlife Habitat Incentives Program

Under the Wildlife Habitat Incentives Program (WHIP), the Natural Resources Conservation Service (NRCS) of the U.S. Department of Agriculture (USDA) provides assistance to landowners and lessees (leases must be for 5 years or more) to protect and restore Hawai'i's native habitats as well as habitats of threatened and endangered species. In Hawai'i, the focus is on the following habitats:

- Threatened/endangered plant species habitat
- Native forests/riparian areas adjacent or connected to a native forest reserve, wildlife refuge, or other preserved forest/riparian area
- Montane wetlands and bogs
- Coastal dunes that support rare plants, seabirds, monk seals or turtles
- Anchialine pools
- Endangered waterbird and migratory bird habitat
- Caves and rare species

The NRCS works with private landowners and lessees to help them develop a Wildlife Habitat Development Plan for their land that benefits native wildlife and meets other goals and objectives of WHIP. If the Plan is selected for funding, a 5- to 10-year contract is entered into whereby the landowner or lessee agrees to undertake wildlife habitat development practices such as noxious weed control, fencing, planting of native trees, and wetland restoration. In turn, NRCS reimburses the landowner or lessee 75 percent of the cost of carrying out these practices at specified rates. However, the funds cannot be used for mitigation of any kind, or on any land designated as converted wetland.

1.d. National Parks

The National Parks System, operated by the National Parks Service, was established to preserve natural areas in the United States so that they can be enjoyed by current generations and preserved for future generations.

1.e. National Wildlife Refuges

Over 530 National Wildlife Refuges across the United States form a system of refuges managed by the Service. Hawaii's refuges were established to protect the Islands' unique native plants and animals and their habitats. Kaua'i has three National Wildlife Refuges.

— Hanalei National Wildlife Refuge (917 acres)

This refuge in the Hanalei River Valley on the northern coast of Kaua'i is comprised of river-bottom land, taro farms, and wooded slopes. The refuge was established to protect the koloa and three other Hawaiian birds. It also provides habitat for migratory shorebirds and waterfowl.

— Huleia National Wildlife Refuge (238 acres)

This refuge, which protects the endangered Hawaiian duck (koloa), and three other Hawaiian birds, is comprised of seasonally flooded river bottom land, a river estuary, and the lush, wooded slopes of the Huleia River Valley in southeastern Kaua'i.

— Kilauea Point National Wildlife Refuge (31 acres)

About 1 mile north of the town of Kilauea on Kaua'i, this refuge is comprised of cliffs and headlands jutting up to 200 feet above the sea. Primary wildlife include red-footed boobies and shearwaters.

2. STATE LAND MANAGEMENT

2.a. State Districting

All lands in Hawai'i are allocated by the State into one of four districts: Conservation, Agricultural, Urban and Rural. The State, through its Department of Land and Natural Resources (DLNR) and its Board of Land and Natural Resources (the Board) has primary land-management responsibility for activities and development in the Conservation District, while the counties have primary responsibility in the Urban, Rural and Agricultural Districts.

2.b. The Conservation District

The purpose of the Conservation District is to conserve, protect and preserve the State's important natural resources through appropriate management in order to promote the long-term sustainability of these natural resources, and to promote public health, safety and welfare (Hawai'i Revised Statutes (HRS) Chapter 183C). To this end, limited development and commercial activity is allowed in the Conservation District. "Important natural resources" include the watersheds that supply potable water and water for agriculture; natural ecosystems and sanctuaries of native flora and fauna, particularly those which are endangered; forest areas; scenic areas; significant historical, cultural, archaeological, geological, mineral and volcanological features and sites; and other designated unique areas.

Permission is required to use land, construct facilities, or conduct many of the activities in the Conservation District (see below). Permits for routine uses or activities are issued by DLNR, while more complex activities or uses (such as certain construction projects and commercial operations) require formal approval of a Conservation District Use Application (CDUA) by the Board, and often require an approved management plan.

2.c. Conservation District Subzones

All land in the Conservation District has been assigned to one of five subzones that reflect a hierarchy of uses from the most restrictive to the most permissive. These subzones are the Protective Subzone (the most restrictive), Limited, Resource, General and Special (Hawai'i Administrative Rules, Title 13, Chapter 5). Except for the Special Subzone, all uses and activities allowed in a more restrictive subzone in the hierarchy are allowed in the less restrictive subzones. The five subzones are described below.

2.c.(1) Protective Subzone

The Protective Subzone, the most restrictive of the five subzones, was established to "... protect valuable resources in designated areas such as restricted watersheds ... plant and wildlife sanctuaries ... and other designated natural and unique areas." Correspondingly, lands and waters generally included in this subzone are needed to protect watersheds, water sources, and water supplies; and to preserve the natural ecosystems of native plants and wildlife, particularly endangered species.

No structures, homes, or farm activities are allowed in the Protective Subzone, with two exceptions. First, the land can be used by State and county governments and by non-government entities that serve the public (e.g., the local utility companies) "for public purpose"—i.e., to fulfill mandated government functions for the public benefit

such as transportation systems, water systems, and communications systems or recreational facilities. Second, Native Hawaiians owning *kuleana* land (land that was granted to Native-Hawaiian tenants in the mid-1800s) may use it for agriculture or single-family residences if their land was used “historically and customarily” for these purposes.

Allowed uses (by permit or Board approval) in the Protective Subzone include: replacing or reconstructing an existing structure and some types of accessory structures, habitat improvements for plant and wildlife sanctuaries, Natural Area Reserves, wilderness areas and scenic areas, limited removal of certain trees, and removal of noxious plants from small areas provided that the ground is not disturbed significantly. Limited landscaping is allowed, but is restricted to plants that are endemic or indigenous; alien subspecies are specifically prohibited.

2.c.(2) Limited Subzone

The Limited Subzone encompasses areas that are potentially dangerous to the public due to possible flooding, soil erosion, *tsunami* (tidal waves), volcanic activity or landslides. Lands having a general slope of 40 percent or more are also included in this subzone. The purpose of the Limited Subzone is to limit uses where natural conditions suggest that human activity should be constrained.

In addition to what is permitted in the Protective Subzone, the following activities and uses are allowed in the Limited Subzone by permit or Board approval: accessory structures near existing structures; single-family homes (one per lot) if State and county regulations are followed; agricultural activities; facilities or devices used to control erosion, floods and other hazards; botanical gardens and private parks; landscaping; and removal of noxious plants in areas larger than 10,000 square feet that result in significant ground disturbance.

2.c.(3) Resource Subzone

The Resource Subzone encompasses lands that are suitable for growing and harvesting commercial timber or other forest products, park land, and land for outdoor recreation (hunting, fishing, hiking, camping and picnicking, etc.). The purpose of the Resource Subzone is to develop properly managed areas to ensure the sustained use of Hawai'i's natural resources.

In addition to what is permitted in the Protective and Limited Subzones, the following activities and uses are allowed in the Resource Subzone by permit or Board approval: commercial forestry under an approved management plan, and mining and extraction of any material or natural resource.

2.c.(4) General Subzone

The General Subzone is used to designate open space where special conservation uses may not yet be defined, but where urban uses may be premature. This subzone encompasses lands that may not be adaptable to or needed currently for urban, rural or agricultural use. The General Subzone also includes lands that are suitable for farming, flower gardening, nursery operations, orchards and grazing. Golf courses are not allowed.

In addition to what is permitted in the Protective, Limited and Resource Subzones, facilities necessary for the above-mentioned uses are allowed by permit when these facilities are compatible with the natural physical environment, and the use promotes natural open space and scenic value.

2.c.(5) Special Subzone

Special Subzones are designated for educational, recreational and research purposes. These subzones set aside lands possessing unique developmental qualities that complement the natural resources of an area.

2.d. Additional Management in the Conservation District

In addition to the five subzones in the Conservation District, the State has established further controls by defining other areas it manages within the Conservation District. These include Forest Reserves, the Natural Area Reserve system, State Hunting Units, State parks and State trails. These are discussed below.

2.d.(1) Forest Reserves

State Forest Reserves were first established in Hawai'i over a century ago to protect the supply of high-quality water that was being threatened due to the destruction of Hawai'i's rainforests. The stated purpose of a Forest Reserve is to protect native ecosystems and important watersheds (HRS §§ 183-2 and 183-17). Most of Hawai'i's Forest Reserves are in the Resource Subzone. Limited collecting for personal use (e.g., *ti* leaves and bamboo) is allowed by permit, as is limited (no more than \$3,000 value per year) commercial harvesting of timber, seedlings, greenery and tree ferns. Commercial forestry operations are allowed only with approval from the Board. Permission is required to reside in a Forest Reserve, hunt (see below), camp and fish. Land vehicles, mountain bikes, horses, mules and leashed dogs are allowed on designated roads and trails.

Collecting endangered or threatened plants or wildlife is not allowed and, except in the situations described above or with Board approval, no forms of plant or animal life may be removed, injured or killed.

2.d.(2) Natural Area Reserves

A Natural Area Reserve (NAR) is based on the concept of protecting ecosystems rather than just single species, with the goal of preserving and protecting representative samples of Hawaiian biological ecosystems and geological formations (HRS §195-5). Although most NARs are located in the State Conservation District, they can include land in other Districts.

Management activities in a NAR include restoring and enhancing existing populations of native plants, removing non-native weeds, and working with local hunters to keep non-native animal populations low in sensitive areas.

Permitted activities in a NAR include hiking, nature study and bedroll camping. Game hunting and research or educational activities are allowed by permit. Prohibited activities in a NAR include: improvements or construction; tent camping; vehicles, except on designated roads; and removing, injuring, killing or introducing plants or wildlife.

Kaua'i has two NARs:

- Hono o Na Pali NAR (3,150 acres)

The Hono o Na Pali NAR on the northern side of Kaua'i contains two adjacent mountain valley systems terminating in sea cliffs. The landscape is etched by several continuous and intermittent streams, and contains the sea cliffs as well as coastal, stream, wet-forest, wet-shrubland, and grassland communities. The Reserve also protects rare plants and rare stream animals and is a possible nesting site for the Hawaiian dark-rumped petrel and Newell's shearwater.

- Kuia NAR (1,636 acres)

The Kuia NAR, located a few miles west of the Hono o Na Pali NAR on the western side of Kaua'i, is characterized by gradual to moderate slopes cut by intermittent streams. The Reserve contains two rare ecosystems—a koa/'ohi'a mixed montane mesic forest and a Kaua'i diverse lowland mesic forest—as well as examples of lowland dry shrublands and montane wet forests.

2.d.(3) Alakai Wilderness Preserve

The State sets aside wilderness preserves, wildlife preserves, plant sanctuaries and wildlife sanctuaries. The purpose of a State Wilderness Preserve is to preserve, protect and conserve “all manner of flora and fauna” (HRS §§183-2 and 183-4).

The only Wilderness Preserve in the State is the 9,939-acre Alakai Wilderness Preserve (also known as the Alakai Swamp) on the summit plateau of Mt. Wai'ale'ale between 4,000 and 4,600 feet elevation. It spans portions of two Conservation District subzones: Protective and Resource.

Restrictions include no construction of buildings, roads, or horse trails except under limited conditions; no domesticated animal grazing; no introduction of plants or animals deemed to be objectionable by the Board; no overnight camping except in approved camps; and no mining.

2.d.(4) State Parks

The State Parks System was established to govern the use and protection of all lands and historical and natural resources in Hawai'i's State parks (HRS §§184-3 and 184-5). Within State parks, approvals are required from the Board to erect communications equipment (such as aeriels, antennas and transmitters), vacation cabins, and concession facilities. Activities requiring permits include limited camping, lodging (e.g., private and State cabins), fresh-water fishing, and hiking on certain trails. Uses allowed without a permit from DLNR include limited collecting of renewable products (fruits, berries, flowers, seeds, and pine cones) for personal use; hiking on most trails; picnicking; and mountain biking (unless posted signs indicate otherwise).

State-administered parks on Kaua'i include:

— Ha'ena State Park (6.7 acres)

Ha'ena State Park, on the north shore of Kaua'i, is a beach park for shore fishing and swimming; it also serves as the trailhead for the 11-mile trail Kalalau Trail that runs along the Na Pali Coast. The park offers views of ancient sea caves and the Na Pali coastline, shore fishing and swimming.

— Na Pali Coast State Park (6,175 acres)

Located on the secluded and rugged northwestern coast of Kaua'i and accessible only by trail or boat, the Na Pali Coast State Park encompasses tall sea cliffs, lush forested valleys, numerous waterfalls, cultural

sites, scenic vistas, and a variety of flora and fauna. An 11-mile trail leads along the Na Pali Coast from Haena State Park (above) to a primitive camp at Kalalau. The primary recreational activities include hiking along the 11-mile trail and into the valleys, shore fishing, camping, and game hunting. Facilities in the Park include pit toilets and rudimentary camp grounds.

— Koke'e State Park (4,345 acres)

Koke'e State Park lies *mauka* (on the mountain side) of the Na Pali Coast State Park (above). Located in a mountainous part of the island, scenic lookouts provide an opportunity to view the Na Pali Coast and valleys in the Park. On its southern boundary, the Koke'e State Park adjoins Waimea Canyon State Park (below).

The Park offers views of the lush, amphitheater-headed Kalalau Valley from a lookout at the 4,000-foot elevation, wildland picnicking, tent camping, lodging, pig hunting, and hiking in native rain forests and along the rim of Waimea Canyon with additional trails into neighboring Forest Reserves.

Facilities in the Park include a concession, lodging, camping, picnicking, restrooms and scenic lookouts.

— Waimea Canyon State Park (1,866 acres)

Waimea Canyon State Park, adjacent to and south of Koke'e State Park, is a slender parcel of land that follows the upper end of the Waimea River for approximately 5 miles. The Park overlooks Waimea Canyon and offers views across to the island of Ni'ihau, wildland picnicking, fishing, and a short nature trail. Park facilities include picnic areas, restrooms, and the scenic overlooks.

— Polihale State Park (138 acres)

Polihale State Park is in western Kaua'i at the end of a 5-mile-long dirt road past the Pacific Missile Range Facility (PMRF). The Park encompasses coastal lands on a wide sand beach backed by tall dunes.

The primary recreational activities at this beach park include swimming, camping, picnicking, and shore fishing. Facilities include a camping area, a picnic pavilion, and restrooms. Also, a *heiau* (a Hawaiian place of worship or shrine) is located on the northeastern boundary of the Park.

2.d.(5) Hunting Units

A total of 47 Hunting Units, administered by DLNR, have been established across the State to control game hunting (Hawaii Administrative Rules, Title 13, Chapters 122 and 123). On Kauai, game animals and birds hunted include feral pigs and goats, black-tailed deer, pheasant (3 species), Japanese quail, Francolin (3 species), and dove (2 species).

Hunting is a licensed activity and is restricted within the Hunting Units. Restrictions address: bag limits, hunting seasons, days allowed, hours of the day, and hunting method (rifle, muzzleloader, handgun, bow and arrows). Game hunting restrictions on private land are set by the landowner. DLNR's intent is to manage the hunting areas, game-mammal populations, and the level of hunting activity to achieve a reasonable balance between (1) recreational benefits for hunters and (2) protection to native ecosystems and threatened and endangered plants.

2.d.(6) State Trail and Access Program

The purpose of the State Trail and Access Program is to preserve and perpetuate the integrity, condition, naturalness and beauty of State trails and surrounding areas, and to protect ... environmental resources (HRS §198D-11 and 198D-6).

Activities allowed under this program by permit from DLNR include camping, hunting and fishing. Some trails are designated for commercial activity (e.g., commercial hikes on designated trails), but no commercial activity is permitted on a trail if it will compromise the quality and nature of the experience or cause any damage to the integrity or condition of the trail or the surrounding environment. Prohibited uses include collecting, removing, injuring or killing a plant or animal; and introducing plants or wildlife.

2.d.(7) Natural Area Partnership (NAP) Program

Under the Natural Area Partnership (NAP) program, the State provides two-thirds of the management costs for private landowners who agree to permanently protect intact native ecosystems, essential habitat for threatened and endangered species, or areas with other significant biological resources. The NAP program can support a full range of management activities to protect, restore, or enhance significant native resources or geological features.

To qualify, the applicant must be a landowner or manager of private lands of high natural area quality. Other requirements include: (1) permanent dedication of the

private lands through a transfer of fee title or a conservation easement to the State or a “cooperating entity” such as The Nature Conservancy of Hawai'i, and (2) management of the lands according to a detailed management plan approved by the Board of Land and Natural Resources. A “cooperating entity” is a private non-profit landholding organization or any other body deemed by DLNR to be able to assist in the management of natural areas.

2.d.(8) Hawai'i Endangered Bird Conservation Program

The Hawai'i Endangered Bird Conservation Program is a partnership composed of non-profit conservation organizations, private landowners, and government agencies including DLNR and the Service.

The mission of the Program is to recover native Hawaiian ecosystems at the landscape level and to establish self-sustaining bird populations in the wild, using management programs that include captive propagation and reintroduction. Their efforts employ an integrated conservation strategy of research, habitat management, and public education, with a focus on ecosystem health and protection as a prerequisite to reintroduction.

On Kaua'i, the focus of the program is on conservation efforts in the Alaka'i Swamp for the endangered *Puaiohi* bird.

3. STATE SPECIES PROTECTIONS

3.a. Protection of Threatened and Endangered Wildlife and Ecosystems

The State has established various laws and administrative rules to protect threatened and endangered wildlife and their ecosystems. The Administrative Rule “Indigenous Wildlife, Endangered and Threatened Wildlife, and Introduced Wild Birds,” implements a State act that was specifically designed to conserve, manage, protect and enhance indigenous wildlife, endangered and threatened wildlife, and introduced wild birds (Hawai'i Administrative Rules §13-124). The State list of threatened and endangered species includes by reference species on the Federal list.

With regard to threatened and endangered wildlife species, prohibited activities include *taking*, possessing, processing, selling, offering for sale, or transporting these species. Nor can their nests be removed, damaged or disturbed, or their young, eggs, dead body or skin be removed from the State of Hawai'i. Nor does DLNR issue permits to destroy or otherwise control threatened or endangered species of wildlife or introduced wildlife. However, these rules do not apply to authorized employees of DLNR,

the State Department of Agriculture, and the Service if the employees are acting in the course of their official duties. Also, “incidental *takes*” are allowed subject to approved habitat conservation plans and safe harbor agreements (HRS Chapter 195D).

Similarly, the State has established various laws and Administrative Rules to protect threatened and endangered plants and their ecosystems, which in turn helps protect wildlife. The Administrative Rule “Threatened and Endangered Plants,” implements a State act that was specifically designed to conserve, manage, protect and enhance native threatened and endangered plants (HRS Chapter 195D). Prohibited activities include the *taking*, selling, delivering, carrying, shipping, transporting, or exporting of any native endangered or threatened plant. However, license holders may sell such plants if the plants are garden-grown. And “incidental *takes*” are allowed subject to approved habitat conservation plans and safe harbor agreements (HRS Chapter 195D).

As discussed above, additional protections of threatened and endangered wildlife and ecosystems are embedded in separate laws governing the State Conservation District, State Forest Reserves, State parks, and designated State trails. Also, the State has laws to protect, conserve and preserve ecosystems in NARs, as well as native ecosystems and important watersheds in State Forest Reserves. Under the NAP program, the State shares in the land management costs of private landowners who agree to permanently protect intact native ecosystems, essential habitat for threatened and endangered species, or areas with other significant biological resources. Limited taking of flora is allowed, but only in State parks and State Forest Reserves, and only if the flora is not endangered or threatened. In State parks, collecting or gathering reasonable quantities of natural renewable products—such as fruits, berries, flowers, seeds, and pine cones—is allowed for personal use without a permit. In Forest Reserves, limited collecting for personal use (e.g., *ti* leaves and bamboo) and limited commercial harvesting (e.g., timber, seedlings, greenery and tree ferns) is allowed by permit. Commercial forestry operations are allowed only with approval of the Board.

3.b. State Environmental Assessments and Environmental Impact Statements

Hawai'i State law calls for efforts to prevent or eliminate damage to the environment and biosphere and to protect endangered species and indigenous plants and animals. To meet this and other goals, Hawai'i's Environmental Impact Statement (EIS) law (HRS 343), which is administered by the State Office of Environmental Quality Control (OEQC), requires that an Environmental Assessment (EA) and/or EIS be prepared for many development projects. “The law requires that government give systematic consideration to the environmental, social and economic consequences of proposed development projects before granting permits” for construction (OEQC, 1997). For impacts on biological resources, OEQC guidelines call for biological

surveys, an ecosystem impact analysis, and proposed mitigating measures. The requirements and guidelines apply to development projects in the four State Agricultural, Urban, Rural and Conservation Districts.

4. COUNTY LAND MANAGEMENT

While the State manages land in the Conservation District, the counties have primary management responsibility for land in the other three State Districts: Agricultural, Urban and Rural. Also, development along the shoreline is subject to county regulation, even for land in the Conservation District.

4.a. Agricultural District

The Agricultural District includes “good” farm land and, from an agricultural perspective, land that is commonly referred to as “junk” land because it is unsuitable for farming or ranching. “Junk” land includes gulches, steep hillsides, rocky land and, on Maui and the Big Island, even relatively recent lava flows having little or no topsoil. This districting of “junk” land into the Agricultural District reflects the fact that this district is a catch-all category that includes all lands not otherwise categorized, regardless of the agricultural quality of the land.

Crops, livestock and grazing are permitted in the Agricultural District, as are accessory structures and farmhouses. Although land in the Agricultural District is not meant to be urbanized it is, in practice, sometimes used for large-lot subdivisions. On Kaua'i, most of these subdivisions are on former sugarcane land where few listed species are found.

Listed species are found in some parts of the Agricultural District, particularly in gulches, on hillsides, and on some of the land that is used for low-intensity grazing. In many cases, the fact that the land is in the Agricultural District indirectly protects listed species by limiting urban sprawl.

4.b. Rural and Urban Districts

Land-use and development in the State Urban and Rural Districts are subject to county regulations, including the county general plan, community plans, zoning, and building code regulations.

Before developer-initiated changes to the county general plan or community plans are approved, developers are required to address the impacts of their projects on rare, threatened, or endangered species or their habitat, and mitigate any adverse impacts.

4.c. Special Management Areas

As mandated by Hawai'i Coastal Zone Management (CZM) program, counties have an additional layer of regulation that provides special controls on development in Special Management Areas (SMAs) located along the shoreline, even for land in the Conservation District (HRS Chapter 205A and Public Law 92-583). Most development in an SMA requires an SMA Use Permit from the county where the development is proposed.

The intent of the CZM program is to avoid the permanent loss of valuable resources and to ensure adequate access to beaches, recreation areas and natural reserves (HRS Chapter 205A). Two of the objectives are: (1) "Protect valuable coastal ecosystems ... from disruption and minimize adverse impacts on all coastal ecosystems"; and (2) "Promote the protection, use and development of ... coastal resources to assure their sustainability." Related policies are: (1) "Exercise an overall conservation ethic, and practice stewardship in the protection, use and development of ... coastal resources"; (2) "Preserve valuable coastal ecosystems ... of significant biological or economic importance"; and (3) "Ensure that the use and development of ... coastal resources are ecologically and environmentally sound and economically beneficial." Finally, two of the implementing guidelines state that (1) "No development shall be approved unless the authority has first found that the development will not have any substantial adverse environmental or ecological effect, except as such adverse effect is minimized to the extent practicable and clearly outweighed by public health, safety, or compelling public interests"; and (2) "The authority shall seek to minimize, where reasonable, any development which would adversely affect ... wildlife habitats."

5. OTHER LAND MANAGEMENT

Other land management activities that are not the responsibility of the State or of county governments are discussed below.

5.a. TNCH Preserve

The Nature Conservancy of Hawai'i (TNCH) is a private, non-profit affiliate of a national organization that works with Federal, State and private partners to protect Hawaii's natural areas that shelter native species. The mission of TNCH is to preserve Hawai'i's native plants, animals, and natural communities by protecting the lands and waters needed for their survival.

Existing and possible TNCH preserves on Kaua'i include:

— Kaluahonu Preserve (213 acres)

Located in the southeast corner of the island, this Preserve is the largest privately owned nesting site for the Newell's Shearwater, a threatened seabird species. TNCH leases the land from Grove Farm.

— Wainiha Valley (possible 10,000-acre preserve)

TNCH is working with Alexander & Baldwin, Inc. (A&B), owner of most of Wainiha Valley to allow TNCH to manage about 10,000 acres of the valley. These lands are currently leased to DLNR and managed by DLNR.

— Lumaha'i Valley (possible preserve)

TNCH and Kamehameha Schools, owner of Lumaha'i Valley, are considering entering into an agreement that would allow TNCH, in collaboration with the Waipa Foundation, to manage the Lumaha'i Valley for conservation and for educational and cultural benefits.

5.b. National Tropical Botanical Gardens

The National Tropical Botanical Garden (NTBG) is dedicated to the conservation of tropical plant diversity, particularly rare and endangered species. The NTBG, which is supported by private contributions, operates three gardens on Kaua'i:

— Limahuli Garden and Preserve (1,000+ acres)

This garden is located in Limahuli Valley on Kauai's north shore.

— McBryde Garden (252 acres)

Located in the Lawa'i Valley on the south shore, this garden is the site of the NTBG's headquarters with research, education and propagation facilities.

— Allerton Garden (100+ acres)

This garden, which is located in Lawa'i Valley next to the McBryde Garden, is managed by NTBG for the Allerton Gardens Trust.

APPROACH TO THE ECONOMIC IMPACT ANALYSIS *

CHAPTER V

This chapter presents the approach used in Chapter VI to estimate the economic impacts of the section 7 listing and critical habitat provisions of the Act on projects, land uses and activities in proposed critical habitat for particular species. First, the scope of the economic analysis is described. This is followed by a discussion of the analytical concepts and steps used to conduct the analysis.

1. SCOPE OF THE ANALYSIS

The parameters below define the scope of the economic analysis.

1.a. Time Horizon for the Analysis

A 10-year time horizon is used because many landowners and managers do not have specific plans for projects beyond 10 years. In addition, the forecasts in this analysis of future economic activity are based on current socioeconomic trends and the current level of technology, both of which are likely to change over the long term.

1.b. Projects, Land Uses and Activities Subject to Analysis

The analysis focuses primarily on the "reasonably foreseeable" projects, land uses, and activities that could affect the physical and biological features of the proposed critical habitat units. In turn, these are the activities that could be affected by the critical habitat designation.

"Reasonably foreseeable" projects, land uses, and activities are defined for the purposes of this report as those which are (1) currently authorized, permitted, or funded;

* **Note to Reader:** Readers who are already familiar with the approach to the analysis may wish to skip this chapter and proceed to the economic analysis in Chapter VI.

(2) proposed in plans currently available to the public; or (3) projected or likely to occur within the next 10 years based on (a) recent economic or land-use trends, development patterns, evolving technologies, competitive advantages, etc., and (b) limits imposed by land-use controls, access, terrain, infrastructure, and other restrictions on development. Current and future activities that could potentially result in section 7 consultations and/or project modifications are considered to be reasonably foreseeable.

2. ANALYTICAL CONCEPTS AND STEPS

The approach used to estimate the economic impacts on specific projects, land uses and activities in areas proposed for critical habitat involved, as appropriate, the analytical concepts and steps described below.

2.a. Background Information

In order to provide context for the analysis, and to the extent that information was reasonably available, background information was obtained on projects, land uses, and activities that may potentially be affected by the proposed designation. Depending upon the situation, this background information included some or all of the following: (1) the location of a project, land use, or activity; (2) a description of the project, land use, or activity, including its magnitude; (3) the amount of economic activity associated with the project, land use, or activity (e.g., revenues and employment); (4) past section 7 consultations, project modifications and associated costs; and (5) whether the project site is within the geographic area known to be *occupied* by listed species other than those in the current proposal.

2.b. Federal Involvement

For the current and planned projects, land uses, and activities that may affect the physical and biological features of the proposed critical habitat units, the next step in the analysis was to determine *Federal involvement*. As discussed in Chapter III, Federal agencies must consult with the Service whenever an activity they fund, authorize, or carry out may affect designated critical habitat. When consultations concern an activity on Federal lands, the relevant Federal agency consults with the Service. When consultations involve an activity proposed by a State or local government or by a private entity, the Federal "Action agency" to the activity consults with the Service.

Activities on State, county, municipal and private lands that do not have a *Federal nexus* (i.e., they do not involve Federal funding, a Federal permit, or other Federal actions) are not restricted by critical habitat designation. Therefore, these activities were not addressed further in the analysis.

In practice, not every single project, land use, and activity that has a *Federal nexus* has been subject to section 7 consultation with the Service. Thus, the analysis was further confined to those projects, land uses, and activities which are, in practice, likely to be subject to consultation. This assessment was based on a review of past consultations, current practices, and the professional judgments of Service and other Federal agency staff.

2.c. Exclusion of Man-Made Features and Structures

In practice, the critical habitat provisions of section 7 do not apply to the operation and maintenance (O&M) of existing man-made features and structures because these features and structures normally do not contain, and are not likely to develop, any *primary constituent elements*. Examples of man-made features and structures include buildings, roads, aqueducts, telecommunications equipment, arboreta and gardens, and *heiau* (indigenous places of worship or shrines). As a result, O&M of man-made features and structures were not considered further in the analysis.

An equivalent interpretation is that existing man-made features and structures are unmapped holes that are within the boundaries of a critical habitat unit, but are not part of the unit.

2.d. Existing Protections

The next step in the analysis involved identifying the impacts on activities that were expected to result from existing protections unrelated to section 7 (e.g., other existing Federal, State, and county land-use controls and environmental protections). If some other existing statute, regulation, or policy limits or prohibits a project, land use, or activity, the economic impacts associated with those limitations or prohibitions are not attributable to section 7 listing provisions and/or critical habitat provisions. For example, State protections include land-use restrictions for activities in the State Conservation District and specific protections of threatened and endangered species and their ecosystems.

2.e. Consultations and Project Modifications

For current and planned projects, land uses, and activities that are likely to be subject to consultations under section 7 of the Act, the next step in the analysis was to estimate (1) the quantity and nature of the consultations (e.g., formal or informal); and (2) changes that are likely to occur in such items as project designs, schedules, land uses, activities and programs.

The estimates reflect the availability of information which, in many cases, was limited (e.g., the outcome of future consultations will not be known until they occur).

2.f. Economic Costs

The next step in the analysis was to estimate the costs of consultations and the changes to projects, land uses and activities prompted by implementing the section 7 provisions. The types of economic costs that were considered included, but were not limited to, changes in revenues, costs, and property values. The analysis then determined what proportion of those section 7-related costs were attributable solely to the critical habitat provisions of section 7 (as opposed to the listing provisions).

2.g. Qualitative Impacts

In some cases, costs were described but were not quantified for one or more of the following reasons: (1) the economic impacts attributable to both the species listing and the critical habitat are expected to be small; (2) the probability that the impacts will occur is small; (3) the impacts are highly speculative; or (4) data needed to quantify impacts are not reasonably available.

2.h. Economic Benefits

The final step in the analysis was to estimate the benefits (e.g., species preservation) associated with the section 7 listing and critical habitat provisions. In most cases, a qualitative discussion of benefits is provided because market prices or existing economic studies on which to base values are not available (e.g., the economic value of preserving certain species).

The approach outlined above relied primarily on information provided by the Service; the State of Hawai'i's Department of Land and Natural Resources (DLNR); county planning departments; other Federal, State and county agencies; public and private landowners and land managers; affected companies; and other interested parties.

3. SOURCES OF INFORMATION

The approach described above relied primarily on information provided by the Service (GIS map overlays, acreage tables, public testimony; comment letters on prior critical habitat proposals, etc.); DLNR; the State Department of Business, Economic Development & Tourism; county planning and finance departments; other Federal, State and county agencies; public and private landowners and land managers; affected companies;

and other interested parties. Public documents used included the proposed rule, *Hawai'i Revised Statutes* and *Hawai'i Administrative Rules* related to land use, *The State of Hawai'i Data Book*, applicable county land-use plans, and property tax data.

ECONOMIC COSTS AND BENEFITS

CHAPTER VI

1. INTRODUCTION

As noted in the Preface, the Service may exclude an area from critical habitat designation if it determines that the benefits of excluding the area outweigh the benefits of inclusion. To aid in this determination, this chapter presents an analysis of the section 7-related economic costs and benefits associated with listing the plants as threatened and endangered species, and with designating critical habitat for the plants. However, the Service cannot exclude an area from critical habitat designation if it determines that the exclusion will result in extinction of the species.

As explained in Chapter V, the approach used in this economic analysis involves estimating both (1) the total section 7-related economic costs and benefits (also referred to as economic impacts) of the plant listings and critical habitat designation, and (2) the subset of these costs and benefits that is solely attributable to critical habitat designation. As a result, for each potential impact, the analysis presents two estimates:

- **Total Section 7 Costs and Benefits.** These estimates include the economic impacts likely to occur from implementing both the species listing provision and the critical habitat provision of section 7 of the Act.
- **Costs and Benefits Attributable to Critical Habitat.** These estimates represents those portions of the section 7-related economic impacts that are most likely attributable to the proposed plants critical habitat designation but not to the plant listings.

The discussion and analysis of costs and benefits in this chapter is divided into the following sections: section 7 consultation history and typical costs (Section 2), direct section 7-related costs (Section 3), indirect costs (Section 4), potential impacts on small entities (Section 5), direct section-7 related benefits (Section 6), and indirect benefits (Section 7). A summary of the direct and indirect costs and benefits is given in Section

8. For some land-use activities and projects, the designation of critical habitat may generate both direct and indirect costs, or both costs and benefits, etc. As a result, the analysis of economic impacts for some land-use activities and projects is split among two or more sections, as appropriate.

2. SECTION 7 CONSULTATION HISTORY AND TYPICAL COSTS

In order to provide a context for the analysis, this section gives a summary of the consultations and project modifications that concerned one or more of the listed plants. It also presents the costs generally associated with section 7 consultations, biological surveys and associated project modifications. This information is used in Section 3 below to estimate future section 7-related economic impacts.

2.a. History of Section 7 Consultations and Project Modifications

Service records indicate that since the 83 plant species were listed (between 1990 and 1996), the Service conducted five informal section 7 consultations, three internal consultations, and no formal consultations. A brief description of the consultations follows.

- In March 1995, the Service conducted an internal consultation regarding Federal Aid in Wildlife Restoration (commonly known as Pittman-Robertson) funding for a series of Department of Land and Natural Resources (DLNR) projects Statewide. The Service approved with some modification all of the game-management projects on Kaua'i proposed by DLNR. Appendix VI-A presents a discussion of the outcome of this consultation.
- In July 1996, the U.S. Navy (Navy) initiated an informal consultation regarding the construction of a missile support facility at the Pacific Missile Range Facility (PMRF). With a few minor modifications to protect seabirds, the Service determined that the project was not likely to adversely affect the one listed plant species.
- In October 1998, the Navy initiated an informal consultation regarding enhancements to support activities at PMRF (installing new instrument components in existing facilities, constructing new facilities for instrumentation on Ni'ihau, and potential construction of new launch facilities at PMRF and on Ni'ihau). The Navy completed a biological assessment which stated that the proposed activities would not result in the loss of habitat for the listed plant species. The Service concurred with Navy.

- In December 1998, the Service conducted an internal consultation on Federal aid for a series of Statewide plant conservation projects. Activities such as construction of firebreaks and fences were to be closely supervised by botanists or knowledgeable field staff to ensure work crews did not harm endangered plants. The Service determined that the proposed projects were not likely to affect listed plant species.
- In May 1999, the U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS), initiated a consultation with the Service regarding the Wildlife Habitat Incentives Program (WHIP) at Koke'e State Park. This program involved weed control and the Service recommended that NRCS undertake surveys to ascertain whether listed plants were present. If located, the Service recommend that the plants be flagged and avoided. Provided that these steps were taken by NRCS, the Service concurred that the proposed project was not likely to adversely affect listed plants.
- In July 1999, the Navy initiated an informal consultation regarding the creation of mountaintop surveillance tests at Koke'e, Makaha Ridge, and the main base at PMRF. The Navy determined that none of the listed plants occurs in the areas of planned ground disturbance. The Service concurred that the action was not likely to adversely affect listed plants.
- In March 2001, the Service completed an internal informal consultation regarding Pittman-Robertson funding for a series of DLNR projects on Kaua'i. The Service approved with some modification 65 of 67 game-management projects Statewide proposed by DLNR. Appendix VI-A presents a discussion of the outcome of this consultation.
- In May 2001, the Service and the Navy completed an informal consultation regarding the Integrated Natural Resources Management Plan (INRMP) for PMRF on several Hawaiian islands. The INRMP is a guide for future protection, conservation, and management of natural resources at PMRF, Makaha Ridge, Koke'e, and Kamokala; a parcel on Ni'ihau; and areas on other islands. The Service concurred with the Navy that implementation of the INRMP is not likely to adversely affect listed species.

2.b. Cost of a Typical Section 7 Consultation, Biological Survey and Project Modification

2.b.(1) Focus of Consultations

For the plants, the proposed rule indicates that future section 7 consultations are likely to focus on projects and activities that could directly or indirectly adversely affect critical habitat, including:

- Activities that appreciably degrade or destroy the *primary constituent elements* for the plants including the following: overgrazing; maintaining feral ungulate levels; clearing or cutting native live trees and shrubs (e.g., woodcutting, bulldozing, construction, road building, mining, herbicide application); introducing or enabling the spread of non-native species; taking actions that pose a risk of fire, etc.
- Activities that alter watershed characteristics in ways that would appreciably reduce groundwater recharge or alter natural, wetland, or vegetative communities. Such activities include new water diversion or impoundment, excess groundwater pumping, and manipulation of vegetation through activities such as the ones mentioned above.
- Rural residential construction that includes concrete pads for foundations and installing septic systems
- Recreational activities that appreciably degrade vegetation
- Mining sand or other minerals
- Introducing or encouraging the spread of non-native plant species
- Importing non-native species for research, agriculture, and aquaculture, and releasing biological control agents

2.b.(2) Cost of Consultations

As discussed in Chapter III, participants in a consultation may include the Service, the Federal Applicant or Federal Action agency, and possibly a non-Federal applicant. Although the Service does not charge fees for its consultations, participants in consultations normally spend time assembling information about the site and their proposed project or activity; preparing for one or more meetings; participating in meetings; arranging for biological surveys and any associated reports; and responding to correspondence and phone calls.

For three levels of complexity (“Low,” “Medium” or “High”), Table VI-1 gives the estimated cost to those participating in consultations with the Service. The estimate is based on: (1) a review of consultation records across the country related to other critical habitat rulemakings; (2) the typical amount of time spent by all participants; and (3) the relevant standard hourly rates and overhead allowances for the Service, other Federal agencies, and private applicants in Hawai'i.

As indicated in the table, consultation costs could range from as little as \$3,800 to as much as \$20,700 if Federal agencies only are involved, and from \$5,200 to \$28,900 if there is a non-Federal applicant.

Table VI-1—Estimated Cost of a Section 7 Consultation

<u>Item</u>	<u>Low</u>	<u>Medium</u>	<u>High</u>
Federal Action agency or Federal Applicant	\$2,200	\$ 6,400	\$10,700
U.S. Fish & Wildlife Service	<u>\$1,600</u>	<u>\$ 5,100</u>	<u>\$10,000</u>
Total for Federal Agencies	\$3,800	\$11,500	\$20,700
Non-Federal Applicant (if any)	<u>\$1,400</u>	<u>\$ 4,200</u>	<u>\$ 8,200</u>
Total for a Non-Federal Applicant	\$5,200	\$15,700	\$28,900

Sources: Project consultants and U.S. Office of Personnel and Management, 2002 General Schedule Salary Table.

2.b.(3) Cost of Biological Surveys

The cost of a biological survey for a particular parcel and a technical report on the findings varies according to a number of parameters:

- Size of the parcel: The consultation history for the plants suggests that projects are of three sizes: small (fewer than 10 acres), medium (11-100 acres), or large (101-500 acres). Large parcels take longer to survey and thus are more costly to survey.
- Ease of access to the parcel: Some parcels can be reached easily while others can be reached only by helicopter. More remote parcels are more costly to survey.
- Type of ecosystem: Forested areas are more difficult to survey than open areas and therefore are more costly to survey.

Based on these parameters, Table VI-2 presents the estimated cost of surveying parcels with different combinations of features, plus the estimated cost of preparing a report on the findings. The estimates assume the following: (1) a three-person team can survey 100 acres in one day if the area is open, and 30 acres if it is forested; (2) sites having "easy" access can be reached in an hour of driving or hiking, "medium" access

**Table VI-2—Estimated Cost of Biological Surveys for
Threatened and Endangered Plants**

<u>Size and Location</u>	<u>Accessibility</u>		
	<u>Easy</u>	<u>Medium</u>	<u>Difficult</u>
10 Acres, Open or Forested Area	\$ 3,700	\$ 3,900	\$ 5,100
100 Acres, Open Area	\$ 4,500	\$ 4,900	\$ 5,900
100 Acres, Forested Area	\$10,200	\$11,400	\$14,900
500 Acres, Open Area	\$15,900	\$17,700	\$22,900
500 Acres, Forested Area	\$44,600	\$50,600	\$67,900

Sources: Project consultants and discussions with a Hawai'i-based biological consulting firm, 2002.

takes 2 hours, and "difficult" access takes a half-hour by helicopter; (3) biologist and field-assistant services are \$50 to \$80 per hour; (4) travel costs are \$1,000 to \$1,500 for round-trip airfare from O'ahu, car rental, and per diem for a three-person team; and (5) helicopter time is \$700 per hour.

As Table VI-2 indicates, the cost of a biological survey could range from as little as \$3,700 in a 10-acre, easily accessible, open area to as much as \$67,900 in 500-acre, remote, forested area. The estimates are based on average projects of each type; specific projects of each type may require more or less survey effort than the average used in the cost estimates, depending on the characteristics.

2.b.(4) Cost of Project Modifications

As discussed above and in Appendix VI-A, consultations with the Service on listed plant species on Kaua'i in most cases have not resulted in significant project modifications. Furthermore, they vary by project. Thus, project modification costs are determined on a project-by-project basis and are not based on standardized costs of typical project modifications.

3. DIRECT SECTION 7-RELATED COSTS

The following analysis of direct section 7-related costs addresses ongoing land-use activities in the proposed critical habitat, but excludes certain areas and man-made features and structures that are not considered to be part of the proposed critical habitat because they do not contain the *primary constituent elements* of listed plants (see Chapter I). The analysis also addresses foreseeable developments and major land-use changes in the proposed critical habitat.

3.a. Management of Game Hunting

Presented below is an analysis of the direct economic impacts of the proposed critical habitat designation on the management of game hunting on State lands. Additional indirect costs are addressed in Section 4 below, while Appendices VI-A and VI-B provide background information on hunting and game-mammal management.

3.a.(1) Affected Hunting Acreage

All or portions of six proposed critical habitat units on Kaua'i cover about 63,325 acres of Kaua'i's 13 public hunting areas. This area amounts to about half the 126,202 acres of Kaua'i's State-managed Hunting Units. There are no State hunting areas on Ni'ihau.

Taking into account the additional private lands that are available for game hunting but are not managed by DLNR as State Hunting Units, the proposed critical habitat on Kaua'i would cover significantly less than 50 percent of the total lands available on the island for game hunting. However, public access to private lands is limited.

Potential Project or Activity, Next 10 Years: Game management and hunting-related projects.

Federal Involvement: Federal cost-sharing of many DLNR game-management projects.

The *Federal involvement* is the Federal funding provided by the Service to DLNR to restore and rehabilitate wildlife habitat and to support wildlife management research. The funding is provided as part of the Pittman-Robertson Act (see Appendix VI-A).

Presence of Other Listed Species: Listed wildlife species are found in five of the proposed critical habitat units that also overlap with portions of State Hunting Units.

Other Land Management: All the State hunting lands in the proposed critical habitat (except Unit G) are also in Forest Reserves, Natural Area Reserves, State Wilderness Areas, and State parks (see Table I-1).

Consultations and Cost:

- Total Section 7 Cost: \$9,000 to \$17,600

Consultations involving DLNR will be required on game-management projects that are partially funded under the Pittman-Robertson Act and which affect listed species or critical habitat. No consultations are required for Pittman-Robertson projects that do not affect listed species or their habitats; projects that are entirely funded by the State (even if they do affect listed species or their habitats); or projects undertaken by private parties on privately-owned land.

Because of the *Federal involvement* and the presence of listed plants (and wildlife) throughout much of the State hunting lands, internal Service consultations already take place on game-management projects that are partially funded under the Pittman-Robertson Act. However, if the proposed critical habitat is designated, the scope of future section 7 consultations will be expanded to include portions of the critical habitat where no listed species are present. The main focus for the consultation is likely to be the impact of ungulate activity on listed plants and their habitat.

Statewide consultations between DLNR and the Service occur every 5 years, so two consultations are likely over the next 10 years. The 2001 consultation cost the Service and DLNR a total of about \$27,600, of which about \$6,400 was attributable to Kaua'i (see Appendix VI-A). The cost was high because new issues were raised. Without critical habitat designation, information from the Service and DLNR suggests that the next two consultations would have cost about 50 to 75 percent of the 2001 consultation, or about \$3,200 to \$4,800 for Kaua'i. Two consultations over the next 10 years would increase the cost to \$6,400 to \$9,600.

Future consultations will address areas that have not been considered before critical habitat designation. The increase in cost is estimated at 20 to 50 percent based on an evaluation that involves a much larger area, but about the same number of game-management projects; about the same number of staff; and staff who are already familiar with the issues. This increases the 10-year consultation cost to between \$7,700 and \$14,100.

Also, the 2001 consultation on Pittman-Robertson funding may be reinitiated due to critical habitat designation. Since many issues were resolved in the original consultation, the reinitiation is likely to involve a low level of effort. Similar to the above, the assumed cost is 20 to 50 percent of the initial cost (\$6,400), or \$1,300 to \$3,200.

In addition to the Statewide consultation, there is the potential for an internal Service consultation involving DLNR concerning the conversion of some former sugarcane fields on Kaua'i to State hunting lands. However, consultation costs for this conversion are not estimated because former sugarcane fields most likely do not contain listed plants or their *primary constituent elements*. Furthermore, the former sugarcane fields are outside the proposed critical habitat. All of the consultation costs are conservatively assigned to the plants, even though the consultation may also address listed wildlife species that may be present.

- Cost Attributable to Critical Habitat: \$2,600 to \$8,000

Without the critical habitat designation, consultation costs are estimated at \$6,400 to \$9,600 (see above). Thus, any additional amounts would be attributable to critical habitat.

Anticipated Project Modifications and Cost:

- Total Section 7 Cost: \$50,000 to \$100,000

For the most part, DLNR can avoid costly project modifications by using Pittman-Robertson funds for game-management projects that do not adversely affect listed species or their habitat and, if needed, use only State funds on projects that the Service believes could have adverse impacts. By doing this a *Federal nexus* is avoided. Thus, project-modification costs are expected to be modest.

Nevertheless, to avoid adverse impacts on listed plants and their habitat, funds must be diverted from other potential game management projects. For example, the 2001 consultation resulted in funds being expended to prevent game mammals from using game-bird watering stations at an average cost of about \$1,000 each.

Over the next two consultations, the cost of project modifications is expected to be similar to 2001, or about \$110,000 Statewide for each consultation. Over the 10-year period, the Kaua'i share would be about \$50,000 (2 x \$110,000 x 23 percent). As a high estimate, this analysis conservatively assumes that the total cost could be twice this estimate, or about \$100,000.

- Cost Attributable to Critical Habitat: \$9,000 to \$33,000

Consistent with the above increase in consultation costs, an estimated 17 to 33 percent of the total cost is attributed to the proposed critical habitat (i.e., a 50-percent increase corresponds to 33 percent of the total).

3.b. State Parks

3.b.(1) State Parks Included within Proposed Critical Habitat

The State parks that are entirely or partially within proposed critical habitat are Koke'e, Waimea Canyon, Na Pali Coast, Polihale and Ha'ena (portions of Units H1, I, J and O). Most of the activity associated with these parks involves operating and maintaining them, which is State-funded. As discussed above in the subsection on excluded areas, features and structures, existing man-made features and structures in State parks are excluded from critical habitat.

In Koke'e and Waimea Canyon State Parks, existing improvements include three lookout areas, two picnic areas, two structures on an unpaved road, portions of the Koke'e Road, several hiking trails, several unpaved roads, and several four-wheel-drive trails. Planned improvements include new connecting trails that will link existing trails into a continuous system of trails and improvements to camping areas.

In Polihale State Park, existing improvements include the Polihale campground and a hunter check station. Planned improvements include upgrading existing facilities and installing vehicle barriers.

In Na Pali Coast State Park, existing improvements include the Kalalau, Hanakoa, and Hanakapi'ai campgrounds and numerous *heiau*. The current focus is on better management to restore and protect native plants, protect streams, control invasive plants (e.g., Java plum), reduce illegal camping in areas having native plants, and restore archeological sites.

As discussed in Chapter I, a portion of Haena State Park in the northern part of Unit J does not contain the *primary constituent elements* for plants and is excluded from the critical habitat. Thus, planned projects and improvements limited to this portion of Haena State Park will not be affected. However, the following projects may occur in portions of Haena State Park that do contain the *primary constituent elements* for plants and are included in critical habitat: (1) installing additional restroom facilities and potentially a visitor center next to the overflow parking lot site, (2) constructing a home for a resident caretaker, and (3) constructing a dormitory to house management personnel and visiting students.

Potential Project or Activity, Next 10 Years: Constructing new trails, conservation projects, and constructing several buildings.

Federal Involvement: None

State park projects are nearly always funded by the State without Federal cost-sharing.

Anticipated Cost of Consultation and Project Modification: None

No consultations or project modifications involving State park projects are anticipated because there is no *Federal involvement*.

3.b.(2) Potential New State Park at Kipu Kai Ranch

Potential Project or Activity, Next 10 Years: State recreation or park projects

The land in the southern portion of Unit E and the northern portion of Unit D2 is known as Kipu Kai Ranch. This privately owned ranch is surrounded by low mountains on the east, north and west; and by the ocean on the south. Kipu Kai Ranch is only accessible by a private unpaved road. The land will eventually be transferred to the State. The State plans to make the area a land preserve and may manage it as a State park.

Federal Involvement: None

A combination of trust funds and State funds will be used for the park.

Anticipated Cost of Consultations and Project Modifications: None

No consultations or project modifications involving State recreational or park projects in Kipu Kai Ranch are anticipated because there is no *Federal involvement*.

3.c. Botanical Gardens and Arboretum

3.c.(1) National Tropical Botanical Garden

The National Tropical Botanical Garden (NTBG) is a privately-funded non-profit research organization that operates botanical gardens in Lawa'i Valley and Limahuli Valley (portions of critical habitat Units F and J, respectively). As indicated in Chapter IV, the NTBG is dedicated to conserving tropical plant diversity, particularly rare and endangered species. The specific goal of Limahuli Garden and Preserve is to protect and enhance various habitats of native species living in the valley, and to restore important elements of the remnant native forest.

For the most part, the managed portions of the Limahuli and Lawa'i Gardens are outside the boundaries of the proposed critical habitat. Any managed portions of the Gardens within the critical habitat units are regarded as existing man-made features. As such, their O&M are not subject to section 7 consultation.

However, as discussed below, the NTBG does have plans to expand the managed portions of its Gardens into non-managed areas in the proposed critical habitat. In addition, the NTBG will develop a master plan for managing of the Lawa'i Valley gardens. This master plan may include projects that overlap Unit F.

Potential Project or Activity, next 10 Years: Expansion of the areas of restoration management in Limahuli Garden and Preserve, and development and implementation of a master plan for Lawa'i Valley

Federal Involvement: Service funding for specific projects and surveys

Presence of Other Listed Species and Critical Habitat for Other Species: Possible, depending upon the location of the conservation projects

Consultation and Cost

If the NTBG requests funding from the Service, the Service will conduct an internal informal consultation. NTBG could be involved in the consultation.

- Total Section 7 Cost: \$10,400

Estimate is based on the following: (1) two consultations on Federal funding of two projects (one in Limahuli Valley and one in Lawa'i Valley), (2) Low cost (from Table VI-1) of a consultation with a non-Federal agency as the Applicant, and (3) no biological survey because the NTBG will conduct its own surveys. All of the consultation costs are conservatively assigned to the plants, even though the consultation may also address listed wildlife species that may be present.

- Cost Attributable to Critical Habitat: \$10,400

There is no history of the NTBG consulting with the Service regarding the listed plants, so all of the consultation costs are attributable to critical habitat.

Anticipated Project Modifications and Cost: None

Since Service-funded projects are generally designed to promote the conservation of endangered species, it is unlikely that proposed activities would adversely affect the plants.

3.c.(2) Makaha Arboretum

Along Makaha Ridge, Unit I contains the Makaha Arboretum (the Arboretum), which was established in the 1960s as a demonstration forest for windbreak plant species. The Arboretum sustained major damage from Hurricane Iwa in 1982, Hurricane Iniki in 1992, and from wildfire in 2000. A few original eucalyptus and pine species remain that were planted in the 1960s. The Arboretum is reached via the Pine Forest Drive which branches off Koke'e Road. A 1-mile trail, shelter and picnic area are located at the site. The Kaua'i Branch of DLNR's Division of Forestry and Wildlife (DOFAW) maintains the shelter and picnic area, but does not actively manage the plants or the remaining trees.

Potential Project or Activity, Next 10 Years: Expansions or improvements—none planned

Federal Involvement: None

Anticipated Cost of Consultation and Project Modifications: None

No consultations or project modifications involving the Arboretum are anticipated because there are no plans for improving or expanding the facilities or to plant or propagate new trees and there is no *Federal involvement*.

3.d. Conservation Projects

3.d.(1) Potential TNCH Land Management

TNCH and Alexander & Baldwin, Inc. (A&B), the private landowner of most of Wainiha Valley and the Wahiawa Drainage, are considering entering into an agreement that would allow TNCH to manage about 10,000 acres of the valley and a large portion of the drainage. Currently, A&B leases the Wainiha Valley to DLNR who manages the land.

If agreement is reached, TNCH will develop a master plan for the valley and the drainage, and conduct conservation projects designed to protect the entire ecosystem and the diverse native species. In order to complete these projects, it is likely that TNCH will seek funding from private foundations, DLNR and the Service.

Potential Project or Activity, next 10 Years: Conservation projects in the Wainiha Valley and the Wahiawa Drainage

Federal Involvement: Partial funding from the Service

Presence of Other Listed Species and Critical Habitat for Other Species: Possible, depending upon the location of the conservation projects

Consultation and Cost

If TNCH requests funding from the Service, the Service will conduct an internal informal consultation. TNCH may be involved in the consultation.

- Total Section 7 Cost: \$10,400

Estimate is based on the following: (1) two consultations on Federal funding of conservation projects to implement plans (one consultation for Waihina Valley and one for Wahiawa Drainage); (2) the Low cost (from Table VI-1) of a consultation with a non-Federal agency as the Applicant; and (3) no biological survey because TNCH is likely to conduct surveys as part of its conservation projects (e.g., in areas proposed for fencing). All of the consultation costs are conservatively assigned to the plants, even though the consultation may also address listed wildlife species that may be present.

- Cost Attributable to Critical Habitat: \$0

The Wainiha Valley and the Wahiawa Drainage have large concentrations of listed plants and the Service has a history of conducting informal internal consultations when it provides funding for conservation projects. Thus, it is likely that the consultation would have occurred without the proposed critical habitat designation.

Anticipated Project Modifications and Cost: None

Since Service-funded projects are generally designed to promote the conservation of endangered species, it is unlikely that proposed activities would adversely affect the plants.

3.d.(2) Potential Watershed Partnership

The Kaua'i County Board of Water Supply and various landowners and land managers on Kaua'i are considering entering into a watershed partnership similar to those currently in place on other islands. If plans for the watershed partnership are finalized, the affected area could include most of the land in the Conservation District on Kaua'i. Management activities in other watershed partnerships in Hawai'i have been designed to enhance water retention and to control threats to the watershed. Since most of the proposed critical habitat for the plants are in the Conservation District, a large percentage of the units could be included in the watershed partnership.

Potential Project or Activity, next 10 Years: Selected reforestation, feral ungulate control to protect and enhance watershed

Federal Involvement: Potential funding provided by the Service

Presence of Other Listed Species and Critical Habitat for Other Species: Possible, depending upon the location of the restoration projects

Consultation and Cost

If a watershed partnership requests funding from the Service, the Service will conduct an internal informal consultation. A representative of the watershed partnership may be involved.

- Total Section 7 Cost: \$16,600 to \$45,500

Estimate is based on (1) one consultation on the Federal funding of conservation projects to implement plans; (2) the Low to Medium cost (from Table VI-1) of a consultation, with a non-Federal agency as the Applicant; and (3) one or two biological surveys of a 100-acre forested area with moderate to difficult access. All of the consultation costs are conservatively assigned to the plants, even though the consultation may also address listed wildlife species that may be present.

- Cost Attributable to Critical Habitat: \$0

The watershed partnership area supports many threatened and endangered species and the Service has a history of conducting informal internal consultations when it provides funding for conservation projects. Thus, it is likely that the consultation would have occurred without the proposed critical habitat designation.

Anticipated Project Modifications and Cost: None

Since watershed partnership projects are designed to enhance the quality the watershed, it is unlikely that proposed activities would adversely affect the plants.

3.e. Ranching Operations

The proposed critical habitat includes approximately 1,435 acres of land in the State Agricultural District. Kaua'i Units D2, E and N; and Ni'ihau Unit A have larger portions of land in the Agricultural District that could be used for agriculture. These areas are described in more detail below:

- Unit D2 contains approximately 245 acres of Agricultural land, most of which is used for grazing. As discussed in Chapter I, narrow strips of agricultural land inland from the Maha'ulepu coastline do not contain *primary constituent elements* and are excluded from the proposed critical habitat.
- Unit E contains two portions of land in the Agricultural District totaling approximately 360 acres. The southern portion is on the Kipu Kai Ranch and is used for grazing. The northern portion is on the other side of the mountains and contains lower quality agricultural land. There is no known grazing or other agricultural activity in the northern portion.
- Unit N contains 65 acres of Agricultural land. This land has no access roads or known trails, and does not appear to be farmed actively. Grazing may occur there.
- Ni'ihau Unit A contains 697 acres of land in the State Agricultural District, a portion of which may be used for cattle and sheep grazing.

Ranching can have a *Federal nexus* if a rancher receives a loan from the Federal Farm Service Agency, or receives a small grant from the NRCS to voluntarily adopt environmentally friendly practices. For example, in December 2001 before the proposed rule was published, the Service completed an informal consultation with the NRCS on implementing a conservation plan and an Environmental Quality Incentives Program (EQIP) contract with Kipu Kai Ranch. The project involved NRCS and Kipu Kai Ranch working together to remove noxious weeds, and replanting the area with guinea grass for grazing. The Service determined that no threatened or endangered species occur in the area, so the project was not likely to adversely affect listed species.

Potential Project or Activity, Next 10 Years: Reinitiation of the section 7 consultation on the December 2001 NRCS EQIP funding for Kipu Kai Ranch

If critical habitat is designated, the completed consultation on the EQIP contract for Kipu Kai Ranch may be reinitiated. However, because few proposed critical habitat areas outside Kipu Kai Ranch support agricultural uses, it is unlikely that NRCS funding will trigger another consultation in the next 10 years.

Federal Involvement: NRCS funding.

Presence of Other Listed Species: Coastal areas occupied by listed animal species; however, the December 2001 consultation on EQIP funding found that none of these species was present in the project area

Consultation and Cost

- Total Section 7 Cost: \$8,700 to \$16,400

Estimate based on (1) one reinitiation in the next 10 years; (2) the Low to Medium cost (from Table VI-1) of a consultation with a Federal agency as the Applicant; and (3) one biological survey of the entire 100-acre open site with moderately difficult access. All of the consultation costs are conservatively assigned to the plants, even though the consultation may also address listed wildlife species that may be present.

- Cost Attributable to Critical Habitat: \$8,700 to \$16,400

The completed consultation for the Kipu Kai Ranch would be reinitiated due to critical habitat designation. Thus the cost is attributable to critical habitat.

Anticipated Project Modifications and Cost: None

The NRCS funded project is to remove noxious weeds and replant the area with guinea grass for grazing purposes. Since these areas are dominated by noxious weeds and used for grazing, they are not likely to contain the *primary constituent elements* essential for the conservation of the listed plant species. Thus, the removal of noxious weeds is not likely to require any project modifications due to the designation of critical habitat.

The Service indicates that replanting the area with guinea grass (a non-native species) is not ideal because the seeds of the grass could spread to areas of critical habitat that do contain the *primary constituent elements* essential for the conservation of the listed plant species (Service, 2002). However, NRCS staff indicate that noxious weeds are already present in the mountainous areas, and that guinea grass would have little additional impact on the listed plant populations. Also, guinea grass is already present in the grazing areas of the ranch, so there would be little or no incremental impact if more guinea grass was planted (NRCS, 2002). Thus, the planting of guinea grass is not likely to require any project modifications as a result of the proposed critical habitat designation.

3.f. Communications Facilities

The proposed critical habitat for the listed plants includes a communications facility in Unit N. Permits are required from the Federal Aviation Administration (FAA) to ensure the communications facilities will not interfere with aircraft, and from the Federal Communications Commission (FCC) to operate the facility.

As discussed above, O&M of existing man-made features and structures are not subject to section 7 consultation. But planned modifications and additions to the communications facilities in critical habitat would be subject to consultation. Improvements are likely to occur on lands where similar facilities are already present.

In 2001, the FCC completed a series of informal consultations on proposed communications antenna sites across the State. On Kaua'i, the proposed sites are in the urban areas of Lihu'e, Puhi and Kapa'a. The antennas will be installed on top of existing buildings, water tanks, or newly constructed towers. None of the proposed sites is in proposed critical habitat. All of the consultations concerned listed birds.

Potential Project or Activity, Next 10 Years: Permitting of one to two communications facilities

A review of applications to the FCC indicates that there are no current plans to construct new communications facilities in proposed critical habitat. However, it is possible that additional applications will be filed in the next 10 years. Since there is only one large non-military communications facility in the proposed critical habitat, and the most recent FCC permits have been issued for antenna sites near the urban areas of Kaua'i rather than in the mountainous regions, there is only a small probability of future consultations on communications facilities in the next 10 years. However, it is conservatively estimated that one or two non-military communications facilities will be sited in the proposed critical habitat that will require Federal permits in the next 10 years.

Federal Involvement: FCC and/or FAA permits

Presence of Other Listed Species: Possible, depending on the location of facilities

Other Land Management: Possible, depending on the location of facilities

Consultation and Cost

- Total Section 7 Cost: \$9,100 to \$41,600

Estimate based on (1) one to two consultations in the next 10 years, (2) the Low to Medium cost (from Table VI-1) of a consultation with a non-Federal agency as the Applicant; and (3) the cost of a biological survey, based on a 10-acre forested site with moderate to difficult access. All of the consultation costs are conservatively assigned to the plants, even though the consultation may also address listed wildlife species that may be present.

- Cost Attributable to Critical Habitat: \$9,100 to \$41,600

Since there have been no consultations on Kaua'i for communications facilities in the mountainous areas where listed plant species are found, it is difficult to determine whether a consultation would occur without critical habitat designation. It is assumed, conservatively, that all of the section 7 costs would be attributable to critical habitat.

Anticipated Project Modifications and Cost:

- Total Section 7 Cost: \$0 to \$200,000

Due to the small footprints of communications facilities, it is likely that the facility will not adversely affect listed plant species. However, if a listed plant is found, the project may have to be modified. One modification would be to move the site far enough away from the plant species so that construction will not affect it. If the siting change is made early in the permit process, then the cost of moving the site could be negligible. However, if some or all of the permits have been obtained before the plant is discovered, new permits may be required for the changed location. The cost of obtaining a Conservation District Use Permit would be between \$25,000 and \$100,000 (based on information from planning consultants). This range represents the potential cost per facility of project modifications.

- Cost Attributable to Critical Habitat: \$0 to \$200,000

It is assumed, conservatively, that all of the project modification costs would be attributable to critical habitat.

3.g. Navigational Aids

The proposed critical habitat contains three navigational aids maintained by the U.S. Coast Guard (USCG): Unit D1 has a navigational aid at Makahuena Point; Unit H1 is at Nohili Point; and Unit H3 is at Kokole Point. The aids are small, unmanned structures that contain a navigational light and reflective panels. The USCG visits the sites periodically to maintain these existing man-made structures.

Unit C contains an aerial navigational beacon on the ridge above Carter Point, which is owned and maintained by the Hawai'i State Department of Transportation (DOT), Airports Division. Routine maintenance includes replacing beacon components and occasionally clearing surrounding grass from around electronic panels on the beacon.

Since these are existing structures and the main activity associated with them is O&M, they are not subject to section 7 consultation.

3.h. Power Transmission Lines

A high-voltage power line and a four-wheel-drive service road pass through Unit N and along the border of Units L and M. Another power line begins at a hydroelectric plant in Unit N (discussed below) and stretches into the town of Lihu'e. Since these are

existing structures and the main activity associated with them is O&M, they are not subject to section 7 consultation.

It is unlikely that new power transmission lines will be installed in the proposed critical habitat on Kaua'i. This is due in part to the recent decision to locate a new power generation plant near Lihu'e, the center of Kaua'i's electrical loads. Kaua'i Electric, Kaua'i's electrical utility company, believes that siting new energy facilities at this site is likely to eliminate the need to build new transmission lines from the west side of the island to Lihu'e. But if such projects are proposed in the future in one or more of the proposed critical habitat units, they would not be subject to section 7 consultation as long as there is no *Federal involvement*.

Potential Project or Activity, Next 10 Years: New power lines—none anticipated

Federal Involvement: None

Anticipated Cost of Consultations and Project Modifications: None

No consultations or project modifications involving electric power transmission lines are anticipated because there are no plans for power lines and there is no *Federal involvement*.

3.i. Hydropower Development

Kaua'i's abundance of relatively large fast-flowing rivers has made it attractive to proponents of hydropower development. Seven hydropower plants, ranging in size from 0.5 megawatt (MW) to 3.8 MW, operate on Kaua'i. All were built before 1930 by various private landowners.

Within the proposed critical habitat, a major water diversion structure is located at the 700-foot elevation of the Wainiha River (near the center of Unit J). Water diverted by this structure powers the largest hydropower plant on Kaua'i. However, the plant, which is located on the Wainiha River and is operated by A&B, is not in the proposed critical habitat. The diverted water is transported along the valley wall in a series of ditches and tunnels for 4.4 miles until it drops approximately 565 feet to the power generation house at the base of the valley (Wilcox, 1996).

Also within the proposed critical habitat, a second hydropower plant is located on the east side of Kaua'i in Unit N. Water diverted from the North Fork of the Wailua River and other smaller streams is diverted through the Waiahi-Iliiliula-North Wailua ditches. The water then drops approximately 250 feet into Grove Farm's Upper Powerhouse hydropower plant. Power is then conducted through a power line into Lihu'e.

Electrical power generated by this plant, the A&B plant, and the other hydropower plants on Kaua'i accounted for 10.4 percent of the island's electricity generation in 1996.

O&M activities on the existing hydropower plants include maintaining the diversion, ditch and tunnel systems, and repairing the power generation turbines and machinery. However, O&M of existing man-made features and structures are not subject to section 7 consultation.

Several additional hydropower developments were proposed in the 1980s. During this time, the Service conducted eleven informal consultations on hydroelectric development projects: four on the Lumaha'i River, five on the Hanalei River, and two on the upper Wailua River. Applicants and Action agencies included the State, private entities, the Federal Energy Regulatory Commission (FERC), and the U.S. Army Corps of Engineers (ACOE). None of these projects was completed due to public opposition, environmental concerns, and difficulties in obtaining permits. In May 2001, a company that specializes in hydroelectric power plants filed an application with FERC for a 3-year preliminary permit to explore the possibility of building a dam on the lower Wailua River several miles downstream from the proposed critical habitat (FERC, 2001).

While there was significant interest in hydropower development in the 1980s, it is highly unlikely that additional plants will be built in the next 10 years in areas that could impact the proposed critical habitat. The 1995 Renewable Energy Resource Assessment Plan prepared for the State Department of Business, Economic Development and Tourism (DBEDT) states that due to existing protections and the history of hydropower development on Kaua'i, only the lower Wailua River is likely to have hydropower development (RLA Consulting, 1995). However, development at this location would not impact the proposed critical habitat, and it may not occur due to conflicts with recreational activities on the Wailua River and because of a variety of environmental concerns. Thus, DBEDT projects that hydropower development will not be a significant aspect of Kaua'i's future renewable energy generation over the next 10 years.

The DBEDT projection is reflected in the current lack of plans for hydropower development by the landowners and managers on Kaua'i. However, some private landowners want to retain the option of building hydropower plants in the future. Regarding rivers on State land, it is unlikely that the State would divert their natural flow to support hydropower development due to existing environmental protections and concerns.

Furthermore, it is unlikely that landowners and managers on Kaua'i will develop plans for additional hydropower development in the next 10 years because additional capacity will not be needed. Kaua'i Electric recently received approval to build a 26.4-MW steam-injected combustion turbine power plant in 2002. This plant is designed to

meet the projected demands for electrical power on the island for the next 10 years or more.

Potential Project or Activity, Next 10 Years: Hydropower development—none anticipated

Anticipated Cost of Consultations and Project Modifications: None

No economic impact on hydropower development because there are no plans for new facilities in areas that will impact proposed critical habitat.

3.j. Water Systems

3.j.(1) Existing Water Systems Within Proposed Critical Habitat

As indicated in Table ES-1, components of water systems are located in Units E, G, I, J, L, M, N and O. These include gauging stations, wells, water tanks, pipelines, and major irrigation ditches to deliver mountain water to water tanks and reservoirs. Some of the named water improvements partially or completely within proposed critical habitat include the Koke'e Ditch, Waiahi-Kuia Aqueduct, Waiahi-Ililiula-North Wailua Ditch, Wainiha Ditch, Anahola Ditch and Hanalei Tunnel. Most of these improvements are components of major irrigation ditch systems that were developed in the late 1800s and early 1900s to deliver large volumes of water to irrigate sugarcane fields. Many of the ditch systems are still in use for irrigating farm lands. The systems are operated by the Hawai'i Department of Agriculture and by private parties, while others are not maintained at all.

Water improvements require periodic maintenance to insure that pumps continue to run, leaks are detected and repaired, vegetation is cleared from ditch systems, etc. However, O&M of existing man-made features and structures are not subject to section 7 consultation.

3.j.(2) New Water Improvements

New water improvements could be subject to section 7 consultation if there is *Federal involvement*. Examples are funding from the U.S. Department of Agriculture to share in the cost of rebuilding an irrigation ditch system, or Federal permits under the Clean Water Act for projects that affect streams (e.g., improving a diversion dam, or replacing a high-maintenance flume that crosses a stream with a pipe syphon that is anchored on each side of the stream, etc.). However, it is highly unlikely that a new ditch system or a major expansion to an existing one would be proposed or approved.

The reason for this is that such improvements would directly or indirectly reduce stream flow, which would be a major environmental concern.

In addition, there is little demand on Kaua'i for additional stream diversion to irrigate farmlands. The reason for this is that the existing water systems were built to support the cultivation of sugarcane and all but one plantation has closed. Some former sugarcane fields have been replanted in diversified crops but most fields remain fallow. Also, most diversified crops require half as much water per-acre as sugarcane. Thus, the current water diversion systems are likely to be more than adequate to meet future demand for irrigation water.

However, some existing systems will undergo major improvements, with the Koke'e Ditch water system being the most likely of the systems within the proposed critical habitat to be repaired within the next 10 years.

Potential Project or Activity, next 10 Years: Repair and improve existing Koke'e Ditch water systems

Federal Involvement: Potential partial funding from the U.S. Department of Agriculture (USDA) for the Koke'e Ditch system

Over the next 10 years, USDA funding of water improvements is likely to be limited to the Koke'e Ditch system due to the State's involvement and priorities.

Man-made Features: Yes

Presence of Other Listed Species: Possible, depending on locations of repair and improvement projects

Consultations and Cost:

If the Hawai'i DOA receives funding from the USDA, the USDA is likely to initiate a consultation with the Service. The Hawai'i DOA may be involved in the consultation.

- Total Section 7 Cost: \$16,600 to \$27,100

Estimate based on (1) one consultation in the next 10 years, (2) the Low to Medium cost (from Table VI-1) of a consultation with a non-Federal agency as the Applicant, and (3) one biological survey of approximately 100 acres along the existing ditches with moderately difficult access. All of the consultation costs are conservatively assigned to the plants, even though the consultation may also address listed wildlife species that may be present.

- Cost Attributable to Critical Habitat: \$16,600 to \$27,100

Since there have been no consultations with the USDA on Kaua'i for water system repair and improvement projects, it is difficult to determine whether a consultation would occur without critical habitat designation. It is assumed, conservatively, that all of the section 7 costs would be attributable to critical habitat.

Anticipated Project Modifications and Cost: Minor

The repair and improvement projects are likely to be limited to existing water system features. As long as the projects are planned so that they avoid damage to forests and streams—which is likely to be the case—the proposed critical habitat designation would have little or no economic impact on these projects.

3.k. Roads and Trails

Access to forest and shoreline areas in the proposed critical habitat is by numerous hiking trails, four-wheel-drive trails, unpaved access roads, and a few paved roads (see Table I-1).

A segment of Waimea Canyon Drive and the upper reaches of Koke'e Road are included in Units G, I and O. The State DOT indicates that no widening or major improvements are planned for these portions of road. In addition, the northern portion of Unit J contains less than a mile of the Kuhio Highway. As mentioned above, the State Parks Division of DLNR is seeking to gain control of the road and limit vehicular access.

The maintenance of trails and roads would not be subject to section 7 consultation because they are existing man-made features. Also, access improvements having no *Federal involvement* would not be subject to consultation.

The *Kaua'i Long Range Land Transportation Plan* and the *Kaua'i County General Plan* identify several road construction and improvement projects, one of which may affect Unit F and may include *Federal involvement*. The project involves the construction of a new two-lane State road to connect Port Allen and Poipu. In the *Kaua'i County General Plan*, the Port Allen and Poipu connector road is planned to be constructed along an existing cane-haul road which passes through the southern portion of Unit F. However, the State DOT indicates that due to funding constraints and other project requirements, it is not likely to begin work on the Port Allen and Poipu connector road in the next 10 years.

Potential Project or Activity, Next 10 Years: Road construction—none anticipated

Anticipated Cost of Consultations and Project Modifications: None

No economic impact on road construction because there are no plans for new roads that will impact proposed critical habitat over the next 10 years.

3.1. Resort/Residential Development

3.1.(1) Potential Development Within the Urban District

Proposed Unit A1 and A2 include about 15 acres of Urban land located along the cliffs in Princeville. There are many resorts condominium developments along the top of the cliffs, but critical habitat only includes the faces of the cliffs, which are too sheer to support any development.

Proposed Unit D1 contains about 19 acres of Urban land along the Poipu coastline. This area contains portions of the Hyatt Regency Kaua'i Resort and Spa, the Embassy Vacation Resort Poipu Point, and the Makahuena navigational marker. As mentioned in Chapter I, these existing improvements do not contain the *primary constituent elements* and are not considered critical habitat.

Unit D1 also contains one 10-acre Urban lot that is not improved. This lot is zoned for resort development in the *Kaua'i County General Plan*. The current landowners indicate that the lot is likely to be developed with resort development sometime in the next 10 years.

Potential Project or Activity, Next 10 Years: Resort development in undeveloped parcel in Unit D1

Federal Involvement: None

The landowner indicates that it does not anticipate any *Federal involvement* associated with future development on this lot. The parcel is on top of some low sea cliffs with no beach, so it is unlikely that future development will alter the shoreline in such a way as to require a shoreline alteration permit from the ACOE. In addition, there are no streams or drainages running through the property, so a Section 404 permit from ACOE is also not likely.

Anticipated Cost of Consultations and Project Modifications: None

No consultations or project modifications involving urban development are anticipated because there is no *Federal involvement*.

3.1.(2) Potential Development within the Agricultural District

Land in the Agricultural District is generally used for crops, livestock, and grazing as well as for accessory structures and farmhouses. Land in the Agricultural District is not meant to be urbanized, although, in practice, it is sometimes used for large-lot subdivisions. In addition, the probability of the State redistricting land for urban uses is higher for land in the Agricultural District than land in the Conservation District.

As mentioned above, the proposed critical habitat contains approximately 1,435 acres in the Agricultural District. Based on the location of existing infrastructure and developments, most of this land is not in the path of potential development over the next 10 years.

The only Agricultural land within the proposed designation that appears to be in the path of development is in Unit D2 along the Maha'ulepu shoreline where the landowner plans a resort/residential project. This area is near existing development and other infrastructure. As indicated in Chapter I in the section on excluded areas, features and structures, narrow strips of land in the State's Agricultural District along the Maha'ulepu coastline do not contain *primary constituent elements* and are not considered critical habitat. Therefore, critical habitat designation will not impact the Maha'ulepu development as it is currently planned.

Potential Project or Activity, Next 10 Years: Resort/residential development—none anticipated

Anticipated Cost of Consultations and Project Modifications: None

No consultations or project modifications are anticipated because no plans exist for resort/residential development in the Agricultural District that overlaps with proposed critical habitat units.

3.m. U. S. Military Activities

The Pacific Missile Range Facility (PMRF), run by the U.S. Navy (the Navy) is the world's largest instrumented, multi-environment range capable of supporting surface, subsurface, air and space operations (Navy, 2002). PMRF's unique natural assets (unencumbered airspace, open ocean, and cliffs close to a coastal plain and adjacent submerged lands) and the substantial investment in facilities provide an exceptional platform for military training and testing of new systems. Military personnel train at PMRF aboard ships, submarines, aircraft, and amphibious landing craft. Crews of these craft practice their skills at PMRF to become sufficiently proficient to take their place in times of conflict. Their proficiency is critical to their performance in wartime and to the security of the United States and its allies. In addition, the PMRF facilities provide a

place where the capabilities of systems under design can be tested safely before being utilized for national defense.

Approximately half of Unit H1 (165 acres), almost all of Unit H2 (252 acres), and half of Unit H3 (103 acres) overlap with portions of PMRF at Barking Sands. About 150 acres of Unit I overlap with the undeveloped portions of the Makaha Ridge site. All of the proposed critical habitat on Ni'ihau (about 697 acres) is in the Navy's mobile operations area.

O&M of Existing Man-Made Features and Structures:

As indicated in Chapter I, existing man-made features and structures and landscaped areas at PMRF are not within the proposed critical habitat. Service Field Office biologists indicate that the features and structures described below do not contain, and are not likely to develop, *primary constituent elements* essential for the conservation of the listed plant species (based on information from the Service, 2002). They include areas that have been regularly mowed, bulldozed, quarried, or covered with compost.

— Unit H2:

- The Navy regularly mows the runway clear zone along the runway adjacent to Unit H2 to minimize bird-airstrike hazards and to prevent birds and animals from nesting alongside the runway. The western half of the runway clear zone extends 750 feet from the center line of the runway, and is almost entirely in Unit H2.
- The area around an existing boresighting tower is mowed regularly.
- The Majors Bay Recreation Area contains 14 beach cottages, the officers' beach facility, restrooms, a pavilion, a compacted coral parking lot, and areas landscaped with non-native grasses and shrubs.
- A borrow pit site is used to mine sand and soil for construction fill. Sand and gravel have been removed regularly from this area.
- A composting facility is used to recycle green material generated from base landscaping, maintenance and construction activities. This area is regularly covered in compost.
- A leachfield, part of the wastewater treatment system, requires periodic O&M including regular clearing by bulldozers.

Unit H3:

- Several antennas and associated ground-radial systems lie partially or completely within Unit H3. The ground-radial systems are composed of wires that are either buried or laid on the ground and radiate from a central tower. All of the antennas are controlled by the Navy except for one that is controlled by a lessee. The Navy mows approximately 25 acres around the antennas and the ground-radial systems it controls for maintenance, safety, and security reasons.

Potential Projects or Activities, Next 10 Years:

— **Unit H1:**

- Missiles are launched from a number of launch pads located just outside Unit H1, and more launch pads are planned for an area just outside H1. However, all of Unit H1 is included either in the explosive safety quantity distance (ESQD) arc and/or in a ground hazard area for these launch pads. These safety zones are established around missile launch sites to delineate the areas within which all potentially hazardous debris from a missile launch malfunction will be contained. Although the malfunction rate for missile launches is low, the potential for a malfunction exists. In this event, cranes, heavy equipment, and emergency-response personnel would be utilized to perform immediate debris-recovery procedures. Most of the vegetation in ground hazard areas could be impacted from an associated fire, a missile impact, and cleanup activities.
- Simulated surface-to-air missiles called “Smokey SAMs” are launched from portable launch sites in Unit H1 on the sand dunes and along the shoreline.
- An inactive small-arms firing range and construction-debris stockpile share a common area. In the near future, the backstop dune for the firing range will be cleaned of residual lead contaminants from bullets. This will require the removal of approximately 5 acres of vegetation and sand. Once the small arms firing range and construction debris stockpile are cleared of lead, the Navy plans to continue to use portions of the area as a stockpile or for other unidentified uses.

— **Unit H2:**

- Small-unit amphibious assault training (i.e., landing and maneuvers) takes place at Majors Bay. Joint Task Force exercises use air cushion landing craft, utility landing craft, and amphibious assault vehicles to land on the

beach and cross over to an abutting staging area. Both the beach and staging area are in Unit H2. The movements of the tracked vehicles disturb the vegetation and substrate.

- The Navy has appropriated funding to construct six new beach cottages in a previously disturbed area to the south of the existing cottages. Future plans call for additional cottages after the six are completed.
- Smokey SAM launches also occur in Unit H2 (see Unit H1 above for a description of the launch activity).

— **Unit H3:**

- Missiles are launched from a launch pad that is located just outside Unit H3. However, portions of Unit H3 are included either in an ESQD arc and/or in a ground hazard area for a missile launch pad that is adjacent to but outside of the unit. For a description of these safety zones, see Unit H1 above.
- A lessee operates an antenna for which the ground-radial system lies completely within Unit H3. Although the ground-radial system is reported to be mowed regularly, the area contains the *primary constituent elements* for one listed plant species.
- The U.S. Department of Commerce, National Institute of Standards and Technology (NIST) plans to construct a pair of low-frequency antennas near the existing antenna field. Two potential sites have been identified. Nearly half of the ground-radial system of one of them is in Unit H3, and the other is outside but adjacent to Unit H3.

— **Unit I:**

- Existing facilities at Makaha Ridge are surrounded by but not in Unit I. The Navy indicates that it is unlikely that new facilities will be built in the surrounding proposed critical habitat.

— **Ni'ihau Unit A:**

- The Navy has a contract with the private owner of the island of Ni'ihau to use a portion of the island to train downed combat pilots in how to evade capture. On occasion, a pilot may use the trail that passes through the proposed critical habitat.

Federal Involvement: Navy ownership or use of land; Navy or other Federal ownership of most facilities; military and other Federal funding of projects and activities.

Presence of Other Listed Species: PMRF at Barking Sands contains several nesting areas for the threatened Newell's Shearwater. Other listed birds, bats, seals, and sea turtles are also found on PMRF lands.

Other Land Management: Integrated Natural Resources Management Plan (INRMP)

As discussed in Chapter IV, the Navy has developed an INRMP for PMRF. Its purpose is to integrate the mission of each military area with stewardship of the natural resources, including any listed species found in the area.

Consultations and Cost

It is anticipated that two programmatic section 7 consultations will occur in the next 10 years. However, as part of these consultations, only one survey at PMRF Barking Sands is assumed since the base was recently surveyed and no threatened or endangered plants were found (Navy, 2002). In addition, the Navy may conduct biological surveys of certain project sites before they are cleared.

- Total Section 7 Cost: \$46,300 to \$64,700

The estimate is based on: (1) two programmatic section 7 consultations in the next 10 years; (2) the Medium to High costs for each of the consultations, with a Federal agency as the Applicant (from Table VI-1); (3) one biological survey of a large-sized open site with easy access; and (4) two biological surveys of two small, open sites with easy access. All the consultation costs are conservatively assigned to the plants, even though the consultation may also address listed wildlife species that may be present.

- Cost Attributable to Critical Habitat: \$46,300 to \$64,700

All consultation costs are attributable to the proposed critical habitat designation since it is known from recent surveys that the PMRF Barking Sands site does not support any listed plant species.

Anticipated Project Modifications and Costs:

- Total Section 7 Cost: \$786,000 to \$1,891,000

The two projected programmatic section 7 consultations could result in project modifications to the current and future military projects and activities at PMRF Barking Sands and on Ni'ihau. No project modifications are anticipated for areas that are excluded from critical habitat or do not contain the *primary constituent ele-*

ments essential for the conservation of the listed plant species. However, for projects and activities in areas having the *primary constituent elements*, the costs directly related to the anticipated project modifications are presented below:

— **Unit H1:**

- Increased potential for fire due to missile launches: As a result of the section 7 programmatic consultations, the Navy may be required to reduce the probability that vegetation in Units H1 and H3 might be destroyed by an inadvertent fire. The Navy currently has a fire department and two fire trucks to respond to inadvertent fires, so additional firefighters and equipment may not be necessary. However, one firefighter could be hired to reduce the amount of damage done to vegetation. Assuming the Navy hires zero to one additional firefighter at \$60,000 per year (including overhead), the total cost over 10 years would be \$0 to \$600,000. Also, limits could be imposed on the types of missiles launched and the frequency of the launches.
- Smokey SAM launches: Since this activity results in no permanent disturbance to vegetated areas, project modifications are unlikely.
- Lead contamination at the small arms firing range: The Navy indicates that approximately 5 acres of vegetation may be disturbed during the lead-cleaning project. Before starting the project, the Navy may have to survey the area for listed plant species and the *primary constituent elements* essential for the conservation of the species. The cost of this biological survey is included in the subsection above on consultations and cost. In addition, the Navy may have to revegetate the disturbed area with native plants. Recent revegetation programs on Kaua'i have cost approximately \$2,000 per acre (based on information provided by the Service, 2002), so the total cost for 5 acres would be approximately \$10,000.
- Expansion of the construction debris stockpile: It is likely that the Navy will have to stockpile additional construction debris over the next 10 years. As a result of the outcome of the projected section 7 programmatic consultations, the Navy may not be able to expand the existing stockpile into areas of undisturbed critical habitat. Thus, additional debris would have to be stockpiled in areas just inland of the existing stockpile and outside Unit H1. In order to use this area, the Navy would have to construct a new road to the site at an estimated \$500,000 for an unpaved road and \$1 million for a paved road (information provided by the Navy, 2002).

— **Unit H2:**

- Amphibious assault training and staging: The Navy indicates that Majors Bay is the only area at PMRF that can be used as a training beach for amphibious assaults. Possible project modifications to reduce *adverse modification* to the critical habitat could include limitations to certain areas, types of landing craft, etc. Also, another area to the east of the existing staging area and outside Unit H2 could possibly be used for staging, but the landing craft would have to cross the current staging area in Unit H2 to get there, and cross the main base road. The Navy may have to reinforce the foundation of the road to reduce damage by tracked vehicles. Depending on the size of the portion of the road to be reinforced, the costs would range from \$20,000 to \$25,000. In addition, the Navy would have to clear the new area of the existing vegetation. The Navy estimates that this could require approximately 2,000 hours of labor and cost \$250,000.
- Additional beach cottages: The vegetation at the planned construction site for the beach cottages has already been disturbed, so major project modifications are not anticipated. However, the Navy may have to conduct a biological survey for listed plant species and the *primary constituent elements* essential for the conservation of the species before beginning construction. The cost of this biological survey is included in the subsection above on consultations and cost.
- Smokey SAM launches: Since this activity results in no permanent disturbance to vegetated areas, project modifications are unlikely.

— **Unit H3:**

- Increased potential for fire due to missile launches: See the discussion under Unit H1 for potential cost of project modifications.
- Construction of two low-frequency antennas: As mentioned above, two sites have been identified for a pair of low-frequency antennas. One of the sites is partially inside Unit H3 (Site 1), and one is outside Unit H3 (Site 2). If Site 1 cannot be used due to the critical habitat designation, NIST would have to identify a replacement site and negotiate with PMRF for its use. NIST indicates that the terms of their existing and potential future contracts with PMRF are not public, but that the cost of identifying a suitable replacement site and renegotiating for the site could be significant.

— **Unit Ni'ihau A:**

- Training for downed combat pilots: As a result of the section 7 programmatic consultations, the Navy may place stakes in the ground to mark the boundaries of areas which should be avoided. The Navy may also give

maps to military personnel before they are deployed to the area to delineate these areas. Assuming that it costs \$2,000 for materials and labor to install the stakes; \$3,000 for the helicopter time to bring the labor and material to the site; and \$1,000 to prepare and produce maps, the total cost is estimated at \$6,000.

The total cost of potential modifications to military activities on Kaua'i and Ni'ihau is estimated at \$797,000 to \$1,902,000. This total does not include the potential cost to NIST and the Navy of identifying a suitable replacement site for a planned antenna, and negotiating NIST's use of this site. Furthermore, the cost could be significantly higher if certain activities and developments at PMRF are modified in such a way as to reduce their effectiveness and safety, or compromise PMRF's mission. These issues are discussed below in the section on indirect costs.

- Cost Attributable to Critical Habitat: \$786,000 to \$1,891,000

All project modifications costs are attributable to the proposed critical habitat designation since it is known from recent surveys that the PMRF Barking Sands site does not support any listed plant species.

3.n. Ecotourism

Commercial hiking tours, led by professional naturalist guides and featuring Hawai'i's unique ecosystems and endemic plants, are offered in the Na Pali Coast region, along the Maha'ulepu coast, in Koke'e and Waimea Canyon State parks, and in other natural areas of Kaua'i. As shown in Table I-1, the proposed critical habitat designation contains approximately 40 hiking trails.

Potential Project or Activity, next 10 Years: Commercial hiking tours

Federal Involvement: None

Anticipated Costs of Consultations and Project Modifications: None

No consultations or project modifications are anticipated because the activity does not have *Federal involvement*.

3.o. Natural Disasters

3.o.(1) Recovery From Natural Disasters

The most likely natural disaster to affect proposed critical habitat—and the one that would cause the most damage—would be a major hurricane passing over

Kaua'i. In the past 50 years, Kaua'i has been hit or nearly hit by three hurricanes. In the mountainous regions proposed for critical habitat, wind and water damage caused by a major hurricane would include downed trees and branches as well as washed out roads, trails, and irrigation ditch systems. Recovering from a natural disaster would involve clearing away downed trees, branches, and other debris, and rebuilding damaged structures.

Potential Project or Activity, next 10 Years: Possible recovery from a natural disaster

Federal Involvement: Financial assistance from the Federal Emergency Management Agency (FEMA)

Consultation and Cost:

In the event of a natural disaster, a consultation with the Service would be required if financial assistance is sought from FEMA to help residents, businesses or government recover from the occasional natural disaster in areas where there are listed species and/or critical habitat. In such emergencies, the Service expedites consultations.

- Total Section 7 Costs: \$3,800 to \$7,500

Estimate is based on 5 to 10 days of effort by Service biologists to review the proposed projects at approximately \$750 per day. All of the consultation costs are conservatively assigned to the plants, even though the consultation may also address listed wildlife species that may be present.

- Cost Attributable to Critical Habitat: \$3,800 to \$7,500

FEMA has not consulted with the Service in the past on funding for the recovery of natural disasters on Kaua'i, so it is likely that the costs of any future consultations would be attributable to critical habitat

Anticipated Project Modifications and Cost: Minor

As long as hurricane recovery projects are planned so that they avoid further damage to forests and streams—which is likely to be the case—the proposed critical habitat designation would have little or no economic impact on FEMA projects following a hurricane.

4. INDIRECT COSTS

4.a. Introduction

Aside from the protection provided by the Act as described in Chapter III, the Act does not provide other forms of protection to lands designated as critical habitat. And because consultation under section 7 only applies to activities that have *Federal involvement*, the designation of critical habitat does not afford any additional protections for listed species with respect to strictly private activities.

However, designation of critical habitat may have indirect impacts beyond those associated with the Act. For example, designation may provide the impetus for the State and counties to require additional protections for designated critical habitat that would not otherwise be subject to such protections. These protections may affect both the management of affected lands as well as State and county development approvals. Also, the critical habitat designations may affect property values. These and other indirect impacts are addressed below.

4.b. Management of Game Mammals and Loss of Hunting Lands

4.b.(1) The Game-Management Issue

One of the major issues surrounding the proposed critical habitat designations concerns the management of game-mammal populations (i.e., feral pigs, goats and deer) and the potential loss of valued hunting lands. This is a highly sensitive issue throughout the State that for decades has been debated among environmental groups, hunters, biologists and government agencies. The concern does not extend to game birds on Kaua'i, however, since the Service currently believes that these birds and the hunting of them do not have a significant adverse impact on listed species or their habitats.

As discussed in the proposed rule, the major threat to the survival and conservation of Hawai'i's native plants comes from ungulates, combined with competition from non-native plants. Ungulates feed on the succulent seedlings, stems and roots of various native plants; trample native groundcover and uproot seedlings and other low-growing plants; and create openings and sites where invasive non-native plants can become established and spread. Finally, ungulates carry seeds of non-native weedy and invasive plants in and on their bodies, thereby distributing invasive plants to new areas, especially along trails, in and around wallows, and in areas that have been rooted up or grazed. Many invasive non-native plants are able to colonize newly disturbed areas more quickly and effectively than can the native plants.

Furthermore, the Service believes conservation goals for endangered Hawaiian plant species cannot be achieved when feral ungulates are present in “essential habitat areas.” Ranked in order of importance, the first of 13 recommended management actions needed to assure the survival and conservation of Hawai'i's endangered plants is “feral ungulate control” (proposed rule, 50 CFR 17). Consistent with this finding, the Service opposes land management that allows or enhances the free ranging of large populations of feral ungulates in areas having vulnerable plant species.

Measures to control feral ungulates in protected areas typically include strategic fencing, or barrier fencing, to prevent or limit their migration into designated areas; exclosure fencing to prevent ungulates from entering protected areas; organized hunting to remove them from protected areas; and monitoring ungulate activity so land managers can direct hunters to problem areas. If increased hunting pressure does not reduce feral ungulate activity, land managers may work with hunters to identify and implement alternative methods, which may include trapping in remote areas. All of these activities may reduce the number of game mammals available to hunters and the sizes of hunting areas.

In Kaua'i County, an estimated 4,700 hunters comprise about 8.2 percent of the population, or about 27.9 percent when family members are included (Appendix VI-A). While many of these hunters accept the need to protect limited portions of the native forest from damage by ungulates, the majority of hunters strongly oppose removing game mammals from large portions of existing hunting areas. Furthermore, many hunters fear that critical habitat designation will lead to a loss of prized hunting areas as was the case with the court-ordered eradication of sheep and goats from the *palila* critical habitat on the Island of Hawai'i 20 years ago (see Appendix VI-A). Instead, most hunters advocate that game-mammal populations continue to be sustained at levels that are sufficient to allow recreational and subsistence hunting in all but possibly a few of the existing State Hunting Units. They also see themselves as important contributors to controlling feral ungulate populations at reasonable levels and at little cost to the taxpayer.

Also, hunters have expressed concern that critical habitat designations could affect wildlife management projects proposed for Pittman-Robertson funding (see Appendix VI-A). The concern stems from the perception that the Service, over the objections of DLNR and its subsequent appeal to the Service, withheld Pittman-Robertson funds for game-management projects in areas proposed for critical habitat designation.

4.b.(2) Indirect Impacts on Game Management

Section 7(b)(2) of the Act does not require DLNR to manage State hunting lands to protect critical habitat; assure the survival and conservation of listed species; or participate in projects to recover species for which critical habitat has been established. That is, critical habitat designation does not require (1) creating any reserve, refuge, or wilderness areas; (2) fencing for any reason; (3) removing ungulates; or (4) closing areas to hunters. Furthermore, DLNR can use Federal Pittman-Robertson funds to selectively fund game-management projects that do not affect critical habitat, thereby obviating the need for consultations on game management in these areas.

Nevertheless, critical habitat designation would add weight to the argument that game-mammal populations should be eliminated or reduced substantially in affected areas due to the threat to Hawai'i's native plants. In turn, DLNR may elect to change its game-management strategies to reflect this shift in priorities.

4.b.(3) Indirect Impacts on Hunting Conditioned on a Change in Game Management

Assuming, for the sake of illustration, that DLNR adopts a policy of reducing game-mammal populations substantially in the State Hunting Units that overlap critical habitat units, then the following impacts related to hunting can be expected.

Hunting Activity

Initially, the number of hunting trips into the more accessible critical habitat units would increase. But after the populations dropped to lower levels, the number of hunting trips into these units would probably drop also because of low success rates.

Some hunters might continue to hunt in the critical habitat units for the wilderness experience. And some might switch to hunting game birds. But the most likely outcome is that most of them would switch to State Hunting Units outside the proposed critical habitat, increasing hunting pressures in these areas even more. And some hunters might choose to hunt less or not at all, spending their discretionary time and funds instead on other recreational pursuits.

Economic Activity

To illustrate the magnitude of the impacts, if about half of those who hunt game mammals on the affected lands were to give up hunting, then hunting activity on Kaua'i could drop by about 25 percent (half of 50 percent, which is the estimated percentage of the accessible State-managed hunting lands proposed for designation). This translates into a decrease in economic activity related to hunting on Kaua'i of about \$600,000 in direct sales (25 percent of \$2.4 million); \$1.2 million in total direct and indirect sales (25 percent of \$4.6 million); 21 jobs (25 percent of 84 jobs); and \$480,000 in income (17 percent of \$1.9 million). Total economic activity related to hunting on Kaua'i is documented in Appendix VI-A.

For the most part, the \$600,000 decrease in expenditures by the displaced hunters would probably be spent on other recreational activities, goods and services. This increase in expenditures would create economic activity that would offset the decrease in economic activity related to the reduced expenditures on hunting. Thus, the net economic impact would probably be small. However, there would be distributional impacts, where some providers of goods and services would benefit at the expense of the stores and service-providers that cater to hunters.

Benefits to Hunters

Although a reduction in hunting activity would probably result in a small net change in economic activity, it would result in a loss in value or benefit to hunters (consumers' surplus)—see Appendix VI-A for the total benefits related to hunting on Kaua'i. Under the given assumptions, this loss is estimated at \$230,000 (25 percent of the current \$930,000 in surplus value). But partially offsetting this loss to hunters would be benefits derived from recreational activities that replace game-mammal hunting.

Pittman-Robertson Funding

In some states, a reduction in the number of licensed hunters could reduce the amount of Federal Pittman-Robertson funding the State receives. The reason for this is that the formula used to calculate the distribution of funds is based in part on the number of licensed hunters. However, Hawai'i currently receives the minimum amount of funding in relation to the number of hunters.

Thus, any drop in the number of hunters would have no effect on the amount of funding Hawai'i receives. Furthermore, if a Pittman-Robertson project is denied by the Service, or DLNR decides not to proceed with a proposed project, the associated Pittman-Robertson funds would not be lost. Instead, DLNR could use the funds to support another wildlife-management project.

State Expenditures

Finally, DLNR would probably have to expend more funds to maintain low game-mammal populations in areas that no longer attract hunters due to low success rates, and to control the non-native plants and weeds in degraded areas where large populations of game mammals no longer browse (DLNR, 2001). Degraded areas are comprised mostly of exotic plants and weeds and few native plants.

4.b.(4) Probability of a Change in Game Management

The above outcome would occur only if the State were to adopt a new policy to reduce game-mammal populations substantially in critical habitat units that overlap with State Hunting Units. However, a major change in State management of game mammals is not expected.

As mentioned above, the debate about the management of game-mammal populations is a highly divisive and contentious one that has been argued for many decades in Hawai'i—a debate that long preceded the Kaua'i plant species listings and the proposed critical habitat designations. Critical habitat designations would not change the nature of the debate significantly, but it would expand the geographic focus to include areas that were not considered in previous consultations because they do not support listed plant species.

But, even with the added weight of this argument, DAHI judges that the probability is slight that the State would adopt a policy to substantially reduce game-mammal populations in critical habitat units that overlap with State Hunting Units. This judgment reflects discussions with DLNR, others familiar with the subject, and decades of public testimony by hunters. Simply put, the scenario is not regarded as politically realistic: hunters would vigorously oppose a proposed reduction in game populations.

In addition to the political problem, there are concerns within DLNR about the initial cost of fencing and the removal of large numbers of game mammals from 63,330 acres dispersed among so many critical habitat units. The most costly item would be removing ungulates from inaccessible areas and the stragglers remaining

after hunters lose interest when their success rates drop. DLNR could utilize helicopters at this stage to hunt game, but this is expensive and ineffective in forested areas. Also, snares could be used to trap animals, but DLNR believes that checking them daily is costly; they pose risks to hunting dogs; they are regarded as inhumane; and they evoke complaints from the public.

Once the game mammal populations are reduced, there are additional concerns within DLNR about the cost of maintaining low populations and of intercepting game mammals that migrate from adjoining non-critical-habitat areas—particularly if hunters are not interested in hunting in an area due to low success rates or difficult access. And if strategic fencing is in place, there are concerns about the periodic cost of repairing or replacing sections that are vandalized.

4.b.(5) Net Economic Impact

In summary, the probability of a major change in game management in Hawai'i is regarded as slight, even though the proposed critical habitat designation would add weight to the argument that game-mammal populations should be reduced substantially in affected areas. Thus, designation of critical habitat is expected to have minor economic impacts related to management of game mammals and to hunting.

4.c. U.S. Military Activities

As previously mentioned, PMRF's unique natural assets and the substantial national investment in facilities provide an exceptional platform for military training and testing of new systems. However, the Navy is concerned that designation of critical habitat could compromise its value for training and research and development (R&D). In turn, this could adversely affect future investment at PMRF as well as growth in Kauai's economy. These indirect impacts are discussed below.

4.c.(1) Military Training

Military personnel train at PMRF aboard ships, submarines, aircraft and amphibious landing craft. Certain military areas essential to training are included within the proposed critical habitat, including portions of the safety zone for missile launch pads and the beach at Majors Bay which is used for amphibious assault training.

If the Service determines that missile launches or amphibious assault training adversely impacts critical habitat (which may or may not be a realistic assumption), then these activities might be limited to certain types of vehicles, frequency, areas,

etc. As a result, military personnel may not be able to practice fully all of the skills they need to perform a mission successfully. Without proper training, missions in future conflicts could be jeopardized, and equipment and lives lost.

The costs associated with these indirect impacts are not quantified because of a lack of information on: (1) potential changes to training exercises, (2) reductions in skills (if any), (3) increases in the probability of having poorly conducted missions, (4) potential outcomes resulting from poorly conducted missions, and (4) the cost of these outcomes. The probability of adverse impacts may be small (or even negligible) but, if one should occur, the cost could be very high.

4.c.(2) R&D of National Defense Systems

PMRF facilities provide a place where the capabilities of systems under design can be tested safely before being utilized for national defense. For example, the Navy has indicated that the Missile Defense Agency may seek to conduct unspecified R&D activities at PMRF, although no concrete plans have been developed (Navy, 2002).

If future R&D or investment in R&D facilities are reduced because of adverse impact to the proposed critical habitat or because of a lack of available space outside the critical habitat (which may or may not be a realistic assumption) then, over the long term, this could compromise national security. However, information needed to estimate the probability of an adverse impact to national security, the nature of the impact, and its value are not available. Again, the probability of adverse impacts may be small (or even negligible) but, if they do occur, the cost could be very high.

4.c.(3) Impact on Economic Activity

If critical habitat results in a reduction in military training, R&D, or investment in facilities at PMRF (which may or may not be a realistic assumption), then this could result in slower economic growth and reduced employment on Kaua'i. But again, information is not available to estimate the magnitude of the potential impact, if any.

4.d. Conservation Management

Some private landowners are concerned that they will be required to alter the management of their lands that fall within critical habitat so as to assure the survival and conservation of listed species—regardless of whether they plan to propose any

changes to their use of the land or activities on it. Specifically, they express concern that this new obligation will be expensive, and that they will have to pay most or all of any costs that may be associated with managing the land to assure survival and conservation of the species. Discussed below are the existing and potential obligations under the Act associated with this type of land management; management activities that would enhance the survival and conservation of listed plants; and the costs of such management activities.

4.d.(1) Requirements for Conservation Land Management

Existing Federal Requirements

Section 7(b)(2) of the Act does not require landowners to manage their lands to protect critical habitat, assure the survival and conservation of listed species, or participate in projects to recover species for which critical habitat has been established. That is, critical habitat designation, by itself, does not require any landowner to: (1) create any reserve, refuge, or wilderness areas; (2) fence for any reason; (3) remove ungulates, rodents, or weeds; (3) close areas to hunters or hikers; (4) initiate conservation or conservation projects; or (5) prepare special land-management plans.

Instead, designation can help identify areas that would benefit from additional conservation land management.

Existing State Requirements

Under existing State law, a Federal designation of critical habitat would not subject the land to any additional State requirements. In fact, Hawai'i's endangered species law (HRS Chapter 195D), does not include or even mention "critical habitat."

Potential Requirements: Court Ruling on Taking

Even though there is no direct requirement under Federal or State law to proactively manage lands to protect listed species and their habitats, some landowners speculate that, pursuant to litigation, a Federal or State court might mandate conservation management of privately owned critical habitat. The legal decision would be based on an interplay among the Act, the State's endangered species law, and various State laws and State Administrative Rules that protect the ecosystems of threatened and endangered species (see Chapter IV for more detail on these State requirements).

Under State law, prohibited activities include the *taking* of any native threatened or endangered plant (see Chapter IV and HRS Chapter 195D). If a court finds that an action degrades a critical habitat, then landowners foresee that this action could be viewed as “injury” to the plant, regardless of whether the individual plant would be harmed directly by the proposed action (i.e., the action could harm a portion of the habitat of a listed plant, but not the plant itself). In turn, this “injury” to the habitat could be viewed as an illegal *taking* of the plant. Under State law, all projects and activities could be covered, regardless of *Federal involvement*. For example, allowing ungulates to roam free could be viewed as an activity that degrades a critical habitat and therefore amounts to a *taking* of a listed species. This argument is similar to the one that was used successfully in Federal court to order the eradication of sheep and goats on Mauna Kea to protect the critical habitat of the endangered *palila* bird (discussed in the appendix to this chapter, Appendix VI-A). In this case, the population of sheep and goats was actively managed by DLNR for the purpose of game hunting.

Under Federal law, the prohibition on *taking* in the Act applies to fish and wildlife, but not to plants outside areas under Federal jurisdiction. Nevertheless, Section 9(a)(2) of the Act makes it unlawful to “remove, cut, dig up, or damage or destroy any such (listed plant) species on any [land outside Federal jurisdiction] in knowing violation of any law or regulation of any state or in the course of any violation of a state criminal trespass law.” Since the *taking* of listed species in Hawai’i is unlawful under State law, it is therefore unlawful under Federal law (23(3): 307-320). As a result, in Hawai’i, the Act’s prohibition against *taking* applies not only to fish and wildlife, but also to listed plants.

Application to Critical Habitat

As noted above, the precedent set in the *palila* case already looms as a potential requirement for private landowners. For example, in a case brought under the Act, a court might mandate conservation management of privately owned land in existing habitat and/or Federally-designated critical habitat based on the argument presented in the *palila* case. For this situation, the effect of the proposed critical habitat designation could be to expand and define more precisely the geographic extent of habitat that could be the subject of such a court decision.

In the event that a case is brought under State law, landowners speculate that State agencies or a State court might interpret various State Administrative Rules and State laws that protect “ecosystems” of threatened and endangered species to mean protection of the “critical habitat” of these species—even though “critical

habitat" is not mentioned in State laws. As a result, the proposed critical habitat designation could expand and define more precisely the areas that might be affected by State court rulings.

4.d.(2) Conservation Management to Protect Listed Plants

As indicated in the proposed rule, the major threats to native plants come from ungulates, combined with competition from non-native plants. In response to these and other threats, management actions needed to assure the survival and conservation of Hawai'i's listed species include: (1) feral ungulate control (e.g., strategic or barrier fencing to prevent or limit ungulates from migrating into large protected areas, exclosure fencing to prevent them from entering an area, extensive hunting and trapping to remove them from protected areas, one-way gates that allow animals to leave but not to enter an area, and monitoring transects for the presence of ungulates); (2) non-native plant control; (3) rodent control; (4) invertebrate pest control; (5) fire management; (6) maintenance of genetic material of the endangered and threatened plant species; (7) propagation, reintroduction and/or augmentation of existing populations into areas deemed essential for the conservation of species; (8) ongoing management of the wild, outplanted and augmented populations; and (9) habitat management and restoration in areas deemed essential for the conservation of species.

4.d.(3) Costs of Conservation Management Activities

The cost of implementing the above management actions would depend on the circumstances: the size of the area being managed, its location and access, the terrain, the quality of the native vegetation, ungulate populations, the extent of weeds, the risk of fire, land-management goals, etc.

For large mountainous areas such as watersheds, the greatest costs typically are incurred in the early years, with the most expensive items being fencing and removing ungulates. Depending upon location and terrain, the cost of fencing, including materials and installation, ranges from less than \$30,000 per mile for areas that are accessible via a short drive, to as much as \$170,000 per mile for remote locations that must be reached by helicopter (based on information from DLNR and the National Park Service).

Depending upon the circumstances, annual conservation-management costs range from an average of less than \$30 per acre to more than \$80 per acre (based on information from DLNR, the National Park Service, and private organizations).

These figures are based on managing large, contiguous areas in the mountains; per-acre costs for managing small, dispersed areas could be significantly higher.

In addition to land-management costs, conservation of endangered plants (i.e., propagation, reintroduction and/or augmentation, monitoring, etc.) can be expensive. For example, a 5-year effort to plant 25,000 silversword on Mauna Loa and Mauna Kea on the Big Island, which is regarded as being relatively straightforward and does not require weed control, is estimated at \$1 million (estimate provided by DLNR, 2001).

Government cost-sharing programs are available to fund conservation projects (see Chapter IV), but current funding is inadequate to support such projects for all the lands in Hawai'i that are being proposed for critical habitat.

4.d.(4) Potential Cost of Conservation Land-Management Due to Critical Habitat

In summary, an undetermined probability exists that a Federal or State court could mandate conservation management of critical habitat based on the interplay between the Act and State requirements. However, it is beyond the scope of this economic analysis to assess the legal merits of the above arguments, or the probability that one or more lawsuits would be filed and, if filed, to identify possible outcomes of a court decision and the associated probabilities.

But assuming that conservation management is mandated, then this could cost landowners on Kaua'i \$3 million or more per year to manage 98,400 acres (98.5 percent) of the proposed critical habitat that are in the mountains (based on \$30 per acre). To varying degrees, some of these lands are already managed as part of Natural Area Partnership programs and State Wilderness Preserves (see Table I-1 and Chapter IV). Based on land ownership of mountainous areas, about \$2 million per year would be a State obligation and about \$1 million per year would be an obligation of private landowners. The related increase in economic activity is discussed in the section on indirect benefits (Section 7).

For private landowners, a related economic impact would include a loss in property value of about \$10 million (about \$300 per acre). The land would lose value because the assumed new financial obligation would make the land less appealing to own for both current landowners and potential buyers. The \$10 million loss is based on discounting the annual obligation at a 10 percent discount rate. The annual cost and the loss in property value are alternative ways of expressing the same cost: to avoid double-counting, one or the other should be used, but not both.

If the required conservation management were to include removing ungulates, an additional loss could include the economic activity and benefits related to hunting. As discussed above, this loss would amount to about \$1.2 million per year in direct and indirect sales, and \$230,000 per year in benefits to hunters. However, any loss in economic activity and benefits would be largely offset by hunters spending on recreational and other activities that replace hunting.

4.e. Redistricting of Land by the State

4.e.(1) Concerns about Redistricting

Another concern expressed by private landowners is that once critical habitat is designated on their land, the State may redistrict it from the Agricultural, Rural or Urban District to the Conservation District. In turn, this will result in (1) a substantial reduction in the value of the land; (2) lost current or potential agricultural use of the land; (3) higher property taxes because Conservation land can be assessed at a higher value than Agricultural land; and (4) reduced ability to secure bank financing. These concerns, as they relate to Kaua'i and Ni'ihau, are discussed below.

4.e.(2) Affected Lands

On Kaua'i, about 180 acres of privately owned Agricultural lands are proposed for critical habitat—a figure that excludes land willed to the State and areas that do not contain the *primary constituent elements* (see Chapter I). Most of the affected areas are grazing land in Units E and N. In addition, about 10 acres of privately owned ocean-front land are in the Urban District (Unit D1).

On Ni'ihau, 697 acres of privately owned Agricultural land are proposed for critical habitat. Portions of it are being grazed.

4.e.(3) Probability of Redistricting

The concern about potential redistricting of land designated as critical habitat stems from State statutes for Conservation of Aquatic Life, Wildlife and Land Plants (HRS Chapter 195D) and the Land Use Commission (HRS Chapter 205):

— Protection of Hawai'i's Unique Flora and Fauna (HRS §195D-5.1)

DLNR "... shall initiate amendments to the Conservation District boundaries ... in order to include high quality native forest and the habitat of rare native species of flora and fauna within the Conservation District."

— Districting and Classification of Lands (HRS §205-2(e))

“Conservation Districts shall include areas for conserving indigenous or endemic plants, fish and wildlife, including those which are threatened or endangered.”

— Land Use Commission Decision-making Criteria (HRS §205-17)

“In its review of any petition for reclassification of district boundaries ..., the commission shall specifically consider ... the impact of the proposed reclassification on ... (the) preservation or maintenance of important natural systems or habitats.”

DBEDT’s Office of Planning is responsible for conducting a periodic review of State District boundaries, referred to as the “boundary review.” During the boundary review, the Office of Planning considers whether the existing District boundaries are appropriate, taking into account current land uses, environmental concerns, and other factors. Critical habitat would prompt the Office of Planning to consider redistricting from the Agricultural, Rural or Urban Districts to the Conservation District (DBEDT, Office of Planning).

However, such redistricting of privately owned land is likely to occur in only a limited number of cases. This assessment is based on the following:

- Critical habitat designation alone would not prompt the State to propose redistricting. A number of other factors would come into play, such as the quality of the native habitat, the value of the land as watershed, slopes, etc. (DBEDT, Office of Planning).
- Approval of redistricting requires six affirmative votes from the nine commissioners, with the decision based on a “clear preponderance of the evidence that the proposed boundary is reasonable” (HRS §205-4).
- Private landowners strongly oppose proposals to redistrict their lands if they believe this might result in a decrease in property value and/or a loss in the economic use of their lands. Furthermore, they may file lawsuits claiming an unconstitutional taking of property.
- In the last State District boundary review, only four privately owned parcels were redistricted to Conservation.

4.e.(4) Cost of Contesting Redistricting

Even though the probability of redistricting private land to Conservation may be low, contesting a redistricting action can be time-consuming and costly for the landowner. Based on the last boundary review, some landowners report spending over \$50,000.

4.e.(5) New Restrictions on Land

Even if land is not redistricted, the State may seek agreements with landowners to protect the habitats of listed species as an incentive to retain their existing District designation. Based on the last boundary review, this could involve agreements to reforest lands using native species, or to not subdivide or develop land that is habitat for listed species. Such requirements restrict future land use, thereby lowering property values.

4.e.(6) Reduction in Land Values Due to Redistricting

On Kaua'i, reductions in land values due to redistricting land from the Agricultural District to Conservation could range from less than \$1,000 per acre for remote Agricultural land, to more than \$300,000 per acre for land suitable for large-lot residential development (County of Kaua'i, Finance Department, 2002). For a particular parcel, the per-acre reduction in value resulting from redistricting would depend upon location, access, terrain, county plans and zoning, available infrastructure, development potential, etc. However, the lower value would apply to most of the privately owned Agricultural land being proposed for critical habitat on Kaua'i.

For Urban land in Unit D1, redistricting to Conservation could reduce the land value from about \$237,000 per acre to about \$800 per acre (County of Kaua'i, Finance Department, 2002).

For Ni'ihau, the corresponding reduction in land value could amount to about \$500 per acre (County of Kaua'i, Finance Department, 2002). The lower value reflects less development potential on Ni'ihau.

Even if a landowner has no plans to sell the land, the loss in land value would reduce potential mortgage financing.

4.e.(7) Reduction in Agricultural Use of the Land

If land is redistricted to Conservation, grazing could continue depending upon which subzone is assigned: grazing is not allowed in the Protective Subzone, but is allowed in other subzones with permission of the State Board of Land and Natural Resources.

Even if grazing is not allowed, the per-acre loss in economic activity would be small since grazing is a low-value, marginally profitable activity that typically generates land rents of less than \$10 per acre per year (based on information from landowners and ranchers).

4.e.(8) Change in Property Taxes, Agricultural Land

Even though land values would decrease if Agricultural land were redistricted to Conservation, property taxes could remain the same, or they could increase or decrease. The change in taxes would depend on whether the land was dedicated to agriculture; if so, the land would be assessed at a low agricultural value rather than its higher market value. Because of a State policy to encourage agriculture, property taxes on land dedicated to agriculture are generally lower than they are with similar land in the Conservation District that is not used for agriculture.

For grazing land, assessed values on Kaua'i range from \$78 to \$350 per acre. The applicable tax rate is \$8.10 per \$1,000 of assessed value for a 10-year dedication, and half that for a 20-year dedication—i.e., annual property taxes of \$0.32 to \$1.42 per acre for a 20-year dedication. If the land is in the Conservation District and used for grazing, then the assessed value and property taxes would be the same as for Agricultural land.

If Conservation land is not used for agriculture, then the property taxes will be higher than they would be for similar land being used for agriculture. Conservation land is assessed at \$200 to \$800 per acre depending upon location, and is taxed at \$8.60 per \$1,000 of assessed value—i.e., annual property taxes of \$1.72 to \$6.88 per acre.

Thus, if Agricultural land used for grazing is redistricted to Conservation and grazing is allowed to continue, then property taxes would remain the same. In both cases, the land will be assessed at its agricultural value and taxed at the rate for land in the Agricultural District.

But if Agricultural land used for grazing is redistricted to Conservation and grazing is not allowed to continue, then property taxes will increase because of the higher assessed value and the higher tax rate for Conservation land. Property taxes would be higher even though the land value would be lower. This counter-intuitive result reflects the tax break the State gives to encourage agriculture.

If Agricultural land is not used for agriculture, then its assessed value will be its estimated market value. In this case, redistricting to Conservation would result in a lower assessed value for the land and lower property taxes.

4.e.(9) Potential Redistricting-Related Costs Due to Critical Habitat

An undetermined probability exists that critical habitat designation could result in some privately owned Agricultural or Urban land being proposed for redistricting to Conservation. If this were to occur, then the affected landowner could spend more than \$50,000 fighting the redistricting. Since this could involve four private landowners on Kaua'i and Ni'ihau, total costs could exceed \$200,000.

Further, there is a small probability that critical habitat designation could in fact result in Agricultural or Urban land being redistricted to Conservation. Assuming that grazing is not allowed on redistricted land, the economic impacts could be as shown in Table VI-3.

4.f. State and County Development Approvals

4.f.(1) Concerns about Development Approvals

As discussed below, a major concern among a number of private landowners, developers, and other interested parties is that critical habitat designation will significantly affect State and county development approvals, even when there is no *Federal involvement*. They are concerned that areas designated as critical habitat will be interpreted by government officials as “environmentally sensitive,” and that this will result in increased difficulty in securing development approvals. The argument against approvals would be that critical habitat must be protected, and development should be limited or not allowed within critical habitat boundaries.

Related concerns are that critical habitat will result in more expensive environmental studies; delayed projects; costly project modifications; increased risks of projects being denied; and, for projects that are approved, the possibility of high legal fees to fight lawsuits designed to prevent or substantially alter projects.

The primary focus of the concern lies with potentially controversial projects that: (1) are in portions of the critical habitat that were not previously recognized as being environmentally sensitive because they contain no listed species; and (2) require major funding or discretionary approvals by the State or county. Discretionary approvals could include redistricting by the State Land Use Commission, approvals by the Board of Land and Natural Resources for projects in the State's Conservation District, General Plan or Community Plan amendments by county councils, etc.

Table VI-3. Potential Economic Impacts Assuming State Redistricting of Urban and Agricultural Land to the Conservation District

	<u>Amount</u>
Change in Property Values¹	
Kaua'i Urban Land (Unit D1) (about 9.8 acres at loss of \$236,500 per acre)	\$-2,318,000
Kaua'i Ag Land (Units E and N) (about 180 acres at loss of \$1,000 per acre)	\$ -180,000
Ni'ihau Ag Land. (about 697 acres at loss \$500 per acre)	<u>\$ -350,000</u>
Total Change in Property Value.	\$-2,848,000
Change in Annual Rent or Equivalent, Ag Land. (877 acres at \$10 per acre)	\$ -9,000
Change in Annual Property Taxes	
Kaua'i Urban Land (Unit D1) ¹ (9.8 acres assessed at \$237,300 per acre for Urban land and taxed at \$5.64 per \$1,000, and assessed at \$800 per acre for Conservation and taxed at \$8.60 per \$1,000)	\$ -13,049
Kaua'i Ag Land (Unit E). (about 115 acres assessed at \$100 ² per acre for Ag land and taxed at half of \$8.10 per \$1,000, and assessed at \$400 ¹ per acre for Conservation and taxed at \$8.60 per \$1,000)	\$ 349
Kaua'i Ag Land (Unit N). (about 65 acres assessed at \$100 ² per acre for Ag land and taxed at half of \$8.10 per \$1,000, and assessed at \$200 ¹ for Conservation and taxed at \$8.60 per \$1,000)	\$ 86
Ni'ihau Ag Land. (about 697 acres assessed at \$78 ² per acre for Ag land and taxed at half of \$8.10 per \$1,000, and assessed at \$200 ¹ for Conservation and taxed at \$8.60 per \$1,000)	<u>\$ 979</u>
Total Change in Annual Property Taxes.	\$ -11,635

1. Based on assessed or estimated market values.
 2. Based on the assessed agricultural value of the land, which is lower than the market value.

4.f.(2) State and County Environmental Review

Based on discussions with planning consultants and government officials, critical habitat designations are likely to increase the level of environmental analysis. The reason for this is that State and county agencies would require developers to address the impact of projects on critical habitat and related public concerns.

Subject to certain exemptions, a State Environmental Assessment (EA) or Environmental Impact Statement (EIS) is required for projects that: (1) use State or county lands or funds; (2) are in the Conservation District; (3) are in the Shoreline Setback Area (usually 40 feet inland from the certified shoreline); (4) require an amendment to a county plan that would designate land to some category other than agriculture, conservation or preservation; or (5) involve reclassification of State Conservation District lands. If a project “substantially affects a rare, threatened, or endangered species, or its habitat,” then a State EIS might be required instead of the simpler and less expensive EA.

It is reasonable to assume that the term “habitat” (which, in Hawai'i, includes areas that support listed threatened and endangered species) may eventually be interpreted by decision-makers to include “critical habitat” (which may include areas that could support listed species but presently do not). Those arguing in favor of this interpretation would include environmental groups, those who may oppose development, and possibly some government agencies. Eventually a developer may elect to, or be required to, submit a State EIS based on the fact that a project is located in a critical habitat. Once the precedent is set, succeeding developers may be required to submit State EISs under similar circumstances. Furthermore, a court may interpret “habitat” to include “critical habitat.”

If critical habitat designation results in a requirement for a State EIS instead of an EA then, depending upon the complexity of the project, this could cost \$25,000 to \$75,000 more than an EA (based on estimates from Hawai'i planning firms, 2002). Also, preparing and processing a State EIS would take about two months longer than an EA. In addition, biological surveys could be required.

4.f.(3) Project Modification

If a proposed project requires major State or county approvals and is within critical habitat, developers are likely to be required by State and county agencies to request comments from the Service on the project. If the Service indicates that the project would have a negative impact on the habitat of listed species, then State and county agencies probably would require project mitigation to address Service concerns. This would be expected even when there is no *Federal involvement*. The cost of the mitigation would depend upon the circumstances.

4.f.(4) Affected Projects and Potential Costs

A potential residential/residential project in Unit D1 involves a vacant 13.07-acre ocean-front parcel at Makahuena Point, of which about 9.8 acres (75 percent) are proposed for critical habitat on land where no listed species are present. The parcel is in the State Urban District, designated for resort development in the General Plan, and zoned "Open" by the County of Kaua'i. Open zoning allows development of 13 single-family homes on this parcel (i.e., 1-acre estates). The Open zoning for the subject property reflects its history as part of the parcel for Makahuena Lighthouse before the land was sold to the current landowner, a Native Alaskan corporation.

The 13.07-acre parcel is assessed at \$3,101,200, or \$237,276 per acre (County of Kaua'i Finance Department, 2001). However, neighboring parcels are zoned to allow higher-density development and thus have higher value. To the west, the 3.9-acre parcel for Makahuena at Poipu is zoned for 20 residential units per acre, and the land is assessed at about \$1,021,500 per acre. To the east, the 20.4-acre parcel for the Embassy Vacation Resort Poipu Point is zoned for 20 resort units or 10 residential units, and the land is assessed at about \$642,500 per acre.

Profit to a developer from selling single-family homes with the current zoning could amount to about \$1.3 million (based on 13 homes at \$100,000 profit per home). From a planning perspective, however, 1-acre estates probably would be considered to be incompatible with the two higher-density, low-rise developments that border the property. Thus, a compelling argument could be made to the county to rezone the parcel to allow similar low-rise development. If the parcel were to be rezoned to be compatible with surrounding parcels, about 260 ocean-front resort or residential units could be developed. Depending on zoning, the land value could (1) increase by about \$5.3 million to about \$8.4 million (\$642,500 per acre) if zoned for 20 resort units per acre, or (2) increase by about \$10.3 million to about \$13.4 million (\$1,021,500 per acre) if zoned for 20 residential units per acre. Higher-density development could return a profit to the developer of over \$13 million (based on 260 units at \$50,000 profit per unit). Thus, higher-density development could increase profits by \$11.7 million or more.

A third possibility is that the county would approve higher-density development but with a smaller number of units, and condition the approval on keeping a portion of the land in its natural state. This could occur if, in a request for comments, the Service indicates that the project would have a negative impact on the habitat of listed species, and the developer voluntarily works with the Service to mitigate the impact. Depending on the number of units approved by the county, this would reduce potential developer profits from rezoning.

In summary, critical habitat designation could increase costs for environmental studies and, more importantly, increase the risk that rezoning to higher density would be only partially approved or even denied. To avoid the costs and risks, the landowner would be more likely to take advantage of existing entitlements and develop single-family homes on 1-acre lots. Thus, the proposed critical habitat designation could mean lost profits to the developer of about \$11.7 million.

As discussed in the section below on reduced property values, this potential loss in profit would translate into an actual loss in property value. The entire loss would be attributable to the proposed critical habitat designation since no listed species are known to occur on the property.

Other affected projects on Kaua'i and Ni'ihau are not reasonably foreseeable, but could arise. However, over the next 10 years, the number of such projects is expected to be small because most of the proposed critical habitat units are (1) in mountainous areas that are unsuitable for development due to difficult access and terrain, and (2) within the State Conservation District where land-use controls severely limit development.

Depending on how much the proposed critical habitat designation contributes to additional environmental studies, project delays, project modifications, and potential project denials, the cost ranges from insignificant to substantial. However, information is insufficient to meaningfully quantify potential additional costs to developers, landowners and government agencies.

4.g. Reduced Property Values

4.g.(1) General Factors Underlying Reduced Property Values

An issue often raised by private landowners, and closely related to the above discussions, is that their property may lose value because of critical habitat designation. They are concerned that the designation will make their land less desirable by restricting its potential use or its development potential, or by increasing landowners' land-management or development costs.

Reduced property values need not be based in fact. Perceptions of the economic impact of critical habitat designation can result in a temporary loss in property value if landowners or buyers believe that the designation will restrict land uses, require modifications to the property, or cause project delays or other problems. Such a loss in property value can be experienced for as long as the perceptions persist.

Similarly, uncertainty about the impact of a critical habitat designation can cause a temporary reduction in land value that will continue until clear and correct information is distributed. To reduce the uncertainties, landowners may feel it necessary to retain

counsel, land surveyors, biologists, and other experts to determine the implications of the designation on their property (see below). This can be particularly important for landowners who plan to sell their property and so must address concerns of potential buyers.

4.g.(2) Potentially Affected Properties and Impacts on Property Values

The concern of landowners about reduced property values primarily involves land that is: (1) privately owned; (2) in the State's Urban, Rural or Agricultural District; and (3) suitable for eventual development or commercial use based on access, gentle slopes, proximity to infrastructure and services, etc.

However, only a few such properties are proposed for plant critical habitat designation. As indicated previously and shown in Table I-1, most of the land is: (1) owned by government; (2) in the Conservation District; and (3) not suitable for development due to poor access and difficult terrain. And, as noted in Chapter I in the discussion on excluded areas, features and structures, much of the acreage that is in the Agricultural, Urban, and Rural Districts does not contain the *primary constituent elements* and is therefore excluded from the critical habitat designation. Also, some private Agricultural land has been willed to the State for conservation purposes (i.e., Kipu Kai Ranch in Units D2 and E).

After considering the above adjustments, privately owned Agricultural land proposed for critical habitat includes the following: about 115 acres in Unit E, 65 acres in Unit N, and 697 acres on Ni'ihau. Assessed market values for these lands are comparatively low. The highest is about \$1,100 per acre in Unit E. However, in the foreseeable future none of these lands will be subject to development pressures or significant changes in use.

Under the conditions described above for these properties, any decrease in property value due to critical habitat designation is expected to be small—at least in theory and assuming fully informed buyers and sellers. Nevertheless, perceptions could contribute to a more significant reduction in property values. The worst-case scenario—and one that is not expected over the long term—would be a perception among potential buyers that the land should be valued as if it were subject to the same restrictions as land in the Conservation District. In this case the decrease in property value for this Agricultural land could approach \$530,000 (see Table VI-3, Change in Property Values, Ag Land: \$180,000 plus \$350,000).

As discussed above, privately owned Urban land proposed for critical habitat designation includes 9.8 acres of undeveloped ocean-front land in Unit D1. Because of the potential of rezoning this land to a higher density development, its market value could be higher than its assessed value. But, as discussed above in the section on State and county development approvals, critical habitat designation could lower the probability of successful rezoning. This, in turn, could result in a reduction in market value of the land. The loss could amount to a few million dollars.

4.h. Condemnation of Property

Some landowners suspect that, following critical habitat designation, the Service eventually will condemn private property at depressed land values. However, the Service is not proposing nor is it contemplating purchasing any land being proposed for critical habitat designation.

On occasion, the Service does purchase land (e.g., land for a wildlife refuge). But this would be a separate action from critical habitat designation. As such, any proposed land purchase should be evaluated at the time it is proposed, and should be based on what is actually proposed. When the Service does purchase private property, the normal practice is to do so only when (1) the landowner is willing to sell the land, and (2) the price and other terms are acceptable to the landowner.

4.i. Costs to Investigate Implications of Critical Habitat

Many of the private landowners may hire attorneys or use their own professional staff to investigate the implications of critical habitat designation on their property. They may want to learn how the designation may affect (1) the use of their land (either through restrictions or new obligations), and (2) the value of their land.

On Kaua'i and Ni'ihau a total of 26 private landowners are included in the proposed critical habitat designation. While some of them own extensive acreage in Hawai'i and are familiar with the Act, this analysis assumes that most, or all, of them will investigate the potential impacts on their properties.

- Total Section 7 Costs: \$53,000 to \$169,000

This cost is based on the following assumptions: (1) 20 to 26 landowners will investigate the implications of critical habitat; (2) about 15 to 25 hours will be spent on the investigation at rates of \$150 to \$200 per hour; and (3) Service staff will spend 4 to 10 hours at \$100 to \$150 per hour responding to inquiries from each landowner.

- Cost Attributable to Critical Habitat: \$53,000 to \$169,000

Since this cost is incurred by landowners to reduce uncertainty about the impacts of the designation, it is attributable solely to critical habitat.

4.j. Reduced Cooperation on Conservation Projects

Some parties have expressed concern that the ongoing activities of the Service to designate critical habitat could cause some landowners to cooperate less with the Service, NRCS, and DLNR on conservation projects. By not cooperating, they hope to avoid having listed species discovered on their lands or having their lands identified as favorable habitat for listed species. More to the point, the landowners hope to avoid having their lands designated as critical habitat in an attempt to shield their existing property rights and property values.

Reduced cooperation from landowners which, in fact, has occurred in Hawai'i on occasion, may include refusal to allow biological surveys of their land, or refusal to participate in watershed and conservation partnership programs sponsored by the Service, NRCS and DLNR. Reduced cooperation could result in lower-quality land management, environmental degradation, and increased risks to native plants and wildlife. If a value were placed on these environmental losses, it could reflect an economic loss to society.

Any change from the current level of cooperation from landowners will depend on how much land is designated, which land is designated, actual and perceived restrictions on land use and development due to the designations, and perceived risks in the future. The assessment would be based on other landowners' experiences in Hawai'i as well as in other states.

For the listed plants on Kaua'i and Ni'ihau, the proposed critical habitat designation is expected to have a modest impact on land use and development over and above existing restrictions. This is especially true for land in the Conservation District which accounts for 98.5 percent of the proposed critical habitat. Thus, as landowners gain experience with the actual effects of critical habitat, their concerns about cooperating on conservation projects may diminish.

Nevertheless, the proposed critical habitat is large—amounting to 25 percent of Kaua'i County—and includes some privately owned land in the Agricultural and Urban Districts. As a result, a modest but undetermined reduction in cooperation may occur, along with a corresponding but undetermined environmental loss to society.

5. POTENTIAL IMPACTS ON SMALL ENTITIES

5.a. Regulatory Flexibility Act

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

SBREFA amended the Regulatory Flexibility Act to require Federal agencies to provide a statement of the factual basis for certifying that a rule will not have a significant economic impact on a substantial number of small entities.

While SBREFA does not explicitly define either “substantial number” or “significant economic impact,” the U.S. Small Business Administration and other Federal agencies have interpreted “substantial number” to mean 20 percent or more of the small entities in any industry, and “significant economic impact” to equal 3 percent or more of a business’s annual sales.

5.b. Impact on Small Entities

The RFA/SBREFA defines “small governmental jurisdiction” as the government of a city, county, town, school district, or special district with a population of less than 50,000. By this definition, Kaua’i County is not a small governmental jurisdiction because its population was 58,463 in 2000 (Chapter II). As indicated above, certain State agencies may be affected by the proposed critical habitat designation—such as DLNR and the State DOT. However, for the purposes of the RFA, state governments are considered independent sovereigns, not small governments.

Because of *Federal involvement*, TNCH and the NTBG could be affected by the proposed critical habitat designation and would possibly be considered to be small organizations. The SBREFA defines “small organization” as any not-for-profit enterprise which is independently owned and operated and is not dominant in its field. While this definition leaves some room for interpretation, TNCH and NTBG are both large organizations that are dominant in Kaua’i County in their respective fields.

The primary projects and activities that might be affected by the proposed designation and which could affect small businesses include ranching operations and resort/residential development. As mentioned above, only one ranching operation is expected to enter into a section 7 consultation with the Service. However, consultation costs are generally borne by the Federal agencies and project modifications are not anticipated. Thus, the economic impact to the ranching operation is likely to be negligible.

As mentioned above in the discussion on reduced property values, one resort/residential developer on Kaua'i may be adversely affected by a decrease in property values. However, this is a public company that received over \$100 million in net income in 2000. It is therefore not considered to be a small business. Thus, the proposed critical habitat designation is not likely to affect small development companies on Kaua'i.

Based on the above analysis, the proposed critical habitat designation will not have a significant economic impact on a substantial number of small entities.

6. DIRECT SECTION 7-RELATED BENEFITS

6.a. Introduction

There is little disagreement in the published economics literature that real social welfare benefits can result from the conservation and recovery of endangered and threatened species (Bishop (1978, 1980), Brookshire and Eubanks (1983), Boyle and Bishop (1986), Hageman (1985), Samples *et al.* (1986), Stoll and Johnson (1984)). Such benefits have also been ascribed to preservation of open space and biodiversity (see examples in Pearce and Moran (1994) and Fausold and Lillieholm (1999)) both of which are associated with species conservation. Likewise, a regional economy can benefit from the preservation of healthy populations of endangered and threatened species, and the habitat on which these species depend.

It is not feasible, however, to fully describe and accurately quantify these benefits in the specific context of this economic analysis. For example, most of the studies in the economics literature do not allow for the separation of the benefits of listing (including the Act's *take* provisions) from the benefits of critical habitat designation. The discussion presented in this section and the following section provides examples of potential benefits, which derive primarily from the listing of the species, based on information obtained in the course of developing the economic analysis. It is not intended to provide a complete analysis of the benefits that could result from section 7 of the Act in general, or of critical habitat designation in particular. In short, the Service believes that the benefits of critical habitat designation are best expressed in biological terms that can be weighed against the expected cost impacts of the rulemaking.

6.b. Benefits of Project Modifications

As indicated in the discussion on direct section 7-related costs (Section 3), several projects are likely to occur in the proposed critical habitat. Some of them may be modified during the section 7 consultation process in order to reduce impacts on listed species. However, most of the anticipated project modifications will affect relatively small areas and will result in little change to the projects. As such, they are not likely to provide significant benefits to the ecosystem. That is, they are not likely to protect entire watersheds, enhance ground-water quality, or stop development on undeveloped shorelines.

6.c. Benefits to Developers

The main advantage to developers of critical habitat designations is to provide them with more information on where they can site their projects. By knowing the critical habitat boundaries, they can site projects outside the boundaries, thereby avoiding certain issues related to threatened and endangered species. This might occur, for example, when siting communications towers.

But even if there is no flexibility in siting a project, it can still be helpful to developers to know the boundaries of a critical habitat. If a project is located outside the boundaries, then the developer can proceed with project planning with less risk of facing issues related to listed species. On the other hand, if a project is located inside a critical habitat boundary and there is *Federal involvement*, then the developer should know that informal consultations with the Service must take place before proceeding with detailed site plans.

6.d. Ecotourism

As discussed above, commercial hiking tours, led by professional naturalist guides and featuring Hawai'i's unique ecosystems and endemic plants, are offered in some of the mountainous areas proposed for critical habitat. Designation could benefit these operations by providing a marketing dimension that enhances the appeal of the hiking tours to visitors. However, this benefit is expected to be slight inasmuch as the area is already regarded as being special—as indicated by the Alakai Wilderness Preserve, the Natural Area Reserves, Forest Reserves, Limahuli Garden and Preserve, and numerous State parks.

In most if not all cases, the Service prefers that these commercial operations do not feature visits to view threatened and endangered plants since revealing their locations increases the risk that a species may be collected or damaged or its habitat harmed. Thus, the potential benefit to ecotourism operators is negligible.

7. INDIRECT BENEFITS

7.a. Species Preservation

The primary purpose of critical habitat is to protect areas that are needed to conserve threatened and endangered species. Conserving species in their natural settings, their own habitat, is key to ensuring their long-term survival. Critical habitat can also help educate the unaware landowner or land manager about the importance of protecting the habitat of listed species on their land.

If these endeavors are successful, environmental and other benefits include the survival and conservation of listed plant species, greater biodiversity and healthier ecosystems, aesthetics, enhanced opportunities for scientific experts to study native plants, preservation of genetic material, possible medical uses, etc. In addition, many people derive satisfaction simply from knowing that threatened and endangered species are being preserved and that the species will be on earth for future generations to appreciate.

If the proposed critical habitat designation culminates in the successful conservation of threatened and endangered plant species, then related benefits would be: (1) reduced internal costs to the Service and to the other Federal agencies that are involved in consultations on listed species; (2) reduced internal costs for the non-Federal applicant, if any; and (3) reduced costs for biological assessments. For the listed species in Kaua'i County, any reduction in these costs is likely to be modest given the outlook for few consultations (see Section 3 on direct section 7-related costs).

Some landowners have questioned these environmental and related benefits, arguing that critical habitat would make little or no contribution to the ultimate conservation of Hawai'i's threatened and endangered plants. They observe that many of these native plants are vulnerable because they are weaker and more fragile than non-native plants, and they grow more slowly. In particular, native plants lack the natural defenses (e.g., thorns, bitter tastes, offensive odors, etc.) to protect them from non-native pests (insects, diseases, rats, nematodes, birds, grazing animals, etc.)—a vulnerability that reflects the fact that native plants evolved in isolation in a benign environment. Finally, many of the native plants cannot compete against aggressive fast-growing exotic plants, particularly when they are stressed, such as during droughts. In the long term, some argue that many listed plants will not be able to survive in the wild, with or without critical habitat designations.

Nevertheless, critical habitat designations are mandated by law. And as long as these designations enhance the probability of the survival and conservation of listed species, regardless of how small that probability, critical habitat has value.

In any case, a monetary value is not estimated for the incremental benefits related to species preservation due to: (1) the difficulty of quantifying the net changes in these benefits attributable to the critical habitat designations (i.e., the benefits that would occur over and above what will occur due to the listing of these plants and other existing protections) and (2) the lack of existing economic studies on the value of the changes. Few studies have focused on the value of preserving endangered plants and, given the scope of this analysis, no primary economic research was conducted on the value of species preservation.

Most research on the value of species preservation has focused on mammals (e.g., the grizzly bear, gray wolf, humpback and gray whales, sea turtle, sea otter, bighorn sheep, etc.), birds (e.g., bald eagle, spotted owl, whooping crane, red-cockaded woodpecker, etc.), and fish (e.g., Pacific and Atlantic salmon, steelhead, cutthroat trout, squawfish, striped shiner, etc.). Depending upon the species, studies indicate that households are willing to pay an average amount ranging from \$6 per year for the striped shiner to \$70 per year for the spotted owl. Alternatively, they are willing to pay lump-sum amounts of \$15 for the cutthroat trout to \$216 for the bald eagle (Loomis and White, 1996). Household willingness-to-pay for a single species of endangered plant is likely to be lower than these amounts, particularly if the species is not well known to the general public.

The value of general conservation, including preservation of native plants, is presented below in the discussion on benefits to the ecosystem.

7.b. Ethnobotanical Benefits

Closely related to the benefits of preserving threatened and endangered plant species is the benefit of preserving a subset of them that have ethnobotanical uses; that is, they are found in historical plant lore and in the agricultural customs of Native Hawaiians.

On Kaua'i and Ni'ihau, 15 plant genera are found in the proposed critical habitat. They include:

Kaua'i

Dye: *Kokia*

Food: *Alectryon, Cyanea*

Food and Thatching: *Pritchardia*

Medicinal Use: *Brighamia, Chamaesyce, Cyrtandra, Hibiscus, Nothocestrum, Plantago, Solanum*

Medicinal Use and Wood: *Alectryon*

Scent for Barkcloth: *Dubautia*

Wood: *Zanthoxylum*

Ni'ihau

Medicinal Use: *Brighamia*

Designating critical habitat where these plant genera occur could contribute to their survival and conservation. However, no monetary value of the incremental economic contribution is estimated because of the difficulty of quantifying this contribution, and the lack of existing economic studies on the benefits of preserving these plants.

7.c. Benefits to the Ecosystem

As discussed above in the subsection on conservation management, the survival and conservation of Hawai'i's native plants will require controlling feral ungulates since ungulates constitute the major threat to the listed plants.

It is also recognized that ungulates cause additional environmental problems. Their browsing, digging, and trampling contribute to a loss of native habitat which, in turn, contributes to the loss of listed birds and other native birds, the endangered Hawaiian bat, and snails and insects that are either currently listed or are candidates for listing. Also, mosquitoes hatched in pig wallows frequently carry avian malaria and pox that contribute to the decline of native bird populations. Furthermore, certain ungulates (especially sheep and goats) can remove vegetation to such an extent that erosion becomes a major issue. In turn, the loss of vegetation can degrade watersheds, and the soil run-off can increase silt in streams thereby harming aquatic life; create layers of mud on otherwise sandy beaches; and bury near-shore reefs, thereby harming marine communities. Adverse impacts are more severe for bays and other protected marine environments that are not flushed by strong ocean currents.

If a significant reduction in the ungulate population were to occur—possibly in mountainous areas of the critical habitat that do not overlap with accessible portions of Hunting Units—then the following additional environmental benefits would be expected: (1) fewer mosquitoes, (2) less erosion, (3) enhanced survival of native wild-life, (4) healthier watersheds, (5) cleaner and healthier streams and nearshore marine environments, and (6) cleaner beaches. In turn, these environmental benefits would enhance the experience of hikers, birdwatchers, beach visitors, etc. For critical habitat units that do overlap with Hunting Units, a substantial reduction in the ungulate population is regarded as unlikely (see the subsection above on the management of game hunting).

A monetary value is not estimated for these incremental environmental improvements because of the difficulty of quantifying the magnitude of the changes and the lack of existing economic studies on their value.

However, a survey sponsored by the Trust for Public Land and conducted in April 2000, revealed the approximate amount that Maui County voters were willing to pay to better protect open space, wildlife habitats, recreational areas, and land around rivers and streams. According to the survey, approximately 66 percent of the voters would support a “community lands and open space preservation fund” to protect land and water in Maui County, and funded by a 2.5-percent increase in the property tax. This works out to a total of about \$1.38 million per year (based on estimated property-tax revenues of \$83.4 million in FY 2000 x 2.5 percent x 66 percent), or an average of about \$11 per resident per year (based on a county population of 128,100 in 2000). Assuming that the survey is applicable to Kaua'i and Ni'ihau, the corresponding total for both islands is about \$640,000 (based on a combined population of 58,500 residents in 2000).

When voters were asked the same questions from another perspective, 57 percent of them were willing to pay \$28 per year to support the fund; another 2 percent were willing to pay \$21 per year; another 8 percent were willing to pay \$14 per year; and another 4 percent were willing to pay \$13 per year. This works out to a total of about \$1.67 million per year or about \$13 per resident per year (based on an estimated 93,800 adult taxpayers and a county population of 128,100 in 2000). Assuming that the survey is applicable to Kaua'i County, the corresponding total is about \$760,000 (based on the County population of 58,500 residents in 2000).

Of 18 potential projects that could be financed by a Conservation Fund, six relate to the benefits of preserving native plants and the environmental benefits of reducing ungulates (discussed above). These projects, along with their ranking and support by those surveyed, are as follows:

- Ranking #1: protect native forest areas (85 percent of surveyed voters reported this to be extremely important or very important, and 12 percent reported it to be somewhat important)
- Ranking #2: preserve critical watershed lands (85 percent reported this to be extremely important or very important, and 11 percent reported it to be somewhat important)
- Ranking #3: permanently protect natural lands threatened by development (81 percent reported this to be extremely important or very important, and 12 percent reported it to be somewhat important)

- Ranking #4: protect beaches and coastal areas (80 percent reported this to be extremely important or very important, and 15 percent reported it to be somewhat important)
- Ranking #5: save habitats for whales, seals, turtles, birds, and other fish and wildlife (79 percent reported this to be extremely important or very important, and 15 percent reported it to be somewhat important)
- Ranking #7: purchase land by rivers and streams to protect water quality (78 percent reported this to be extremely important or very important, and 14 percent reported it to be somewhat important)

Assuming that this County of Maui survey reflects preferences and values in Kaua'i County, the above rankings suggest that a major portion of the \$640,000 to \$760,000 that voters are willing to pay annually for additional conservation on Kaua'i and Ni'ihau would be in support of: (1) protecting native plants (particularly those in native forests) and (2) the benefits that would result from controlling ungulates to protect native plants (i.e., enhanced survival of native wildlife, healthier watersheds, cleaner and healthier streams and nearshore marine environments, and cleaner beaches). Residents of other islands in Hawai'i and even residents of other states and countries would add to this dollar amount, although the average per-capita amount they would be willing to pay for conservation on Kaua'i surely would be much lower than the amount Kaua'i residents would be willing to pay.

However, the value of the environmental benefits that would be attributable specifically to the critical habitat designations (i.e., the benefits over and above those which will occur due to other existing protections, and over and above the benefits from other conservation projects that Kaua'i voters would support) is undetermined.

7.d. Economic Activity Generated by Conservation Management

In FY 2001, the Service spent an estimated \$340,000 on conservation management for listed plants in Kaua'i County, including expenditures on salaries, equipment, supplies and services. In turn, workers and companies that benefited from the Services's expenditures on conservation management purchased additional goods and services, thereby generating additional economic activity. In total, the initial Service expenditure generated approximately \$710,000 in direct and indirect sales for the year on Kaua'i and other islands, and supported about 12 direct and indirect jobs in Hawai'i (based on multipliers from the Hawai'i Input-Output Model, DBEDT, 1998). The State and other organizations also spend a considerable amount on conservation management that involve listed plants in Kaua'i County (e.g., State expenditures to manage NARs).

If the proposed critical habitat results in an increase in conservation management in Kaua'i County, then the increase in expenditures could contribute to an increase in economic activity in Hawai'i. Based on State multipliers, each additional \$1 million of new money spent in Hawai'i would generate approximately \$2.1 million in direct and indirect sales in Hawai'i, and would support approximately 35 direct and indirect jobs in Hawai'i.

If all of the 98,400 acres of mountainous land in Kaua'i County that is proposed for critical habitat designation were to be managed at an average cost of \$30 per acre (which is not expected unless mandated by a court order), then the resulting expenditure of about \$3 million per year would generate about \$6.3 million per year in direct and indirect sales in Hawai'i, and would support about 105 direct and indirect jobs in Hawai'i.

However, the economic activity supported by expenditures on conservation management may or may not represent an expansion of Hawai'i's economy, depending upon how the expenditures are financed.

If the increase in conservation management is financed by an influx of new funds from outside the State, then the increase in expenditures will contribute to increased economic activity in Hawai'i. New funding for conservation management could come from the Federal government, grants from non-profit organizations outside Hawai'i, etc. While this is possible, no known projections are available that indicate a significant increase in funding for conservation management from outside Hawai'i due to the proposed critical habitat designation.

At the national level, however, increased funding of conservation programs in Hawai'i would result in no significant change in economic activity for the economy as a whole because any funds spent in Hawai'i would be at the expense of expenditures elsewhere in the economy (e.g., funds diverted from some other Federal program). In effect, the increase in economic activity in Hawai'i would represent a transfer of economy activity from elsewhere in the national economy.

A similar situation applies to Hawai'i's economy if increased expenditures on conservation management are funded from within Hawai'i, or funded from outside Hawai'i if the money is diverted from some expenditure that would otherwise be made in Hawai'i. For this situation, there would be no significant change in economic activity for Hawai'i's economy as a whole since any funds spent in Hawai'i would be at the expense of expenditures elsewhere in the State economy. In effect, the increase in economic activity due to increased expenditures on conservation management would represent a transfer of economy activity from elsewhere in Hawai'i's economy.

8. SUMMARY OF ECONOMIC IMPACTS

For various economic activities in the proposed critical habitat, Table VI-4 presents estimates of (1) the total direct and indirect costs and benefits attributable to the section 7 provisions of the Act that are associated with listing the plants as threatened and endangered species *and* with designating critical habitat for the plants; and (2) that portion of the total costs and benefits which is solely attributable to the critical habitat designation.

Over a 10-year period, total section 7-related costs associated with the species listings, plus the indirect cost to investigate the implications of critical habitat, are estimated at \$1,019,900 to \$2,601,000, while those attributable solely to the critical habitat designation are \$945,500 to \$2,468,700. These costs represent, in the worst case, about 0.02 percent of the total personal income of Kaua'i County over the same period (about \$1.3 billion per year). The highest direct cost would be for section 7 consultations and project modifications at the Pacific Missile Range Facility (PMRF): \$832,300 to \$1,955,700, all of which would be attributable to critical habitat (Units H1, H2 and H3). In addition, critical habitat might pose, as an indirect cost, a small risk of compromising national defense.

Although not subject to accurate quantification, other indirect costs could add substantially to the totals. The owner of urban land in Unit D2 could suffer a loss of development potential and a loss of potential profits in excess of \$10 million (an indirect cost related to "State and County Development Approvals"), and a related reduction in property value amounting to a few million dollars. In addition, there are slight to small probabilities of substantial indirect costs related to: (1) a change in game management to reduce ungulates and, as a result, hunting activity; (2) mandated conservation management; and (3) redistricting by the State of land in the Urban and Agricultural Districts to the Conservation District. Finally, some landowners may cooperate less on conservation projects in order to avoid critical habitat designation.

Economic benefits occurring as a result of designating the proposed critical habitat, and the related actions taken to control threats to the plant species (e.g., ungulate control), would include: (1) ecological improvements resulting from project modifications; (2) better siting of projects by developers so as to avoid costly project delays and modifications due to development inadvertent placed near populations of listed species; (4) preservation of plants that have ethnobotanical value; (5) improvements to the environment (i.e., fewer mosquitoes, less erosion, enhanced survival of native wildlife, healthier watersheds, cleaner and healthier streams and nearshore marine environments, and cleaner beaches); and (6) possibly an influx of new funds from outside the State for conservation management that would contribute to expanded economic activity.

Table ES-1. Section 7 Costs and Benefits Attributable to the Plant Listings and Critical Habitat
(10-year estimates)

CH = critical habitat PMs = project modifications O&M = operation and maintenance Fed = Federal ne = not estimated

Item	Total		Share to CH		Explanation
	Low	High	Low	High	
DIRECT SECTION 7 COSTS					
Existing Man-Made Features, Consultations	None	None	None	None	No consultation for O&M of existing man-made features and structures.
Management of Game Hunting					
State-Managed Lands, Consultations	\$ 9,000	\$ 17,600	\$ 2,600	\$ 8,000	Consultation due to Pittman-Robertson funding.
State-Managed Lands, PMs	\$ 50,000	\$ 100,000	\$ 9,000	\$ 33,000	Based on prior PMs.
Private Lands, Consultations	None	None	None	None	No consultation required since no Fed involvement.
State Park, Consultations	None	None	None	None	No consultation required since no Fed involvement.
Botanical Gardens and Arboreta					
National Tropical Botanical Garden, Consultations on Expansion	\$ 10,400	\$ 10,400	\$ 10,400	\$ 10,400	If the NTBG receives funding from the Service, then the Service will conduct consultations on funded projects.
Makaha Arboretum, Consultations	None	None	None	None	No consultation required since no Fed involvement.
Conservation Projects					
The Nature Conservancy of Hawai'i, Consultations	\$ 10,400	\$ 10,400	None	None	If agreements are reached for TNCH to manage land, and TNCH receives funding from the Service, then the Service will conduct consultations on funded projects.
Watershed Partnership, Consultations	\$ 16,600	\$ 45,500	None	None	If a Watershed Partnership is formed and it receives funding from the Service, then the Service will conduct consultations on funded projects.
Ranching Operations					
Kipu Kai Ranch, Consultations	\$ 8,700	\$ 16,400	\$ 8,700	\$ 16,400	If private landowner continues to receive Fed funds, then the Service may reinitiate consultation.
Communications Facilities					
Consultations on New Facilities	\$ 9,100	\$ 41,600	\$ 9,100	\$ 41,600	Consultations due to FCC and FAA permits.
PMs	\$ -	\$ 200,000	\$ -	\$ 200,000	Could include moving the site.
Navigational Aids, Consultations	None	None	None	None	No consultation for O&M of existing man-made structures.
Power Transmission Lines, Consultations	None	None	None	None	No consultation for O&M of existing man-made structures. Also, no Fed involvement.
Hydropower Development, Consultations	None	None	None	None	No planned facilities that would impact CH.

Table ES-1. Section 7 Costs and Benefits Attributable to the Plant Listings and Critical Habitat
(10-year estimates)

CH = critical habitat PMs = project modifications O&M = operation and maintenance Fed = Federal ne = not estimated

Item	Total		Share to CH		Explanation
	Low	High	Low	High	
Water Systems					
Major Repairs & Improvements, Consultations	\$ 16,600	\$ 27,100	\$ 16,600	\$ 27,100	Consultations due to DOA funding.
PMs	Minor	Minor	Minor	Minor	Few adverse impacts anticipated.
Roads	None	None	None	None	No projects planned in CH.
Resort/Residential Development					
Development within Urban District	None	None	None	None	No consultation required since no Fed involvement.
Development within Agricultural District	None	None	None	None	No projects planned in CH.
U.S. Military Activities					
Pacific Missile Range Facility, Consultations	\$ 46,300	\$ 64,700	\$ 46,300	\$ 64,700	Programmatic consultations due to DOD involvement.
PMs	\$ 786,000	\$ 1,891,000	\$ 786,000	\$ 1,891,000	Road construction, clearing vegetation, revegetation, firefighter, etc.
Ecotourism, Consultations	None	None	None	None	No consultation required since no Fed involvement.
Natural Disasters					
Recovery Projects, Consultations	\$ 3,800	\$ 7,500	\$ 3,800	\$ 7,500	Consultation due to FEMA funding.
PMs	Minor	Minor	Minor	Minor	Few adverse impacts anticipated.
INDIRECT COSTS					
Management of Game Mammals and Loss of Hunting Lands	Minor	Minor	Minor	Minor	Slight probability of a major impact.
U.S. Military Activities	ne	ne	ne	ne	Undetermined risk to programs.
Conservation Management	Minor	Minor	Minor	Minor	No obligation to proactively manage lands to control threats, but an undetermined probability of a major impact.
Redistricting of Land by the State	Small	Small	Small	Small	Small probability of significant impacts.
State and County Development Approvals	Large	Large	Large	Large	Potential loss of profits in excess of \$10 million.
Reduced Property Values	Large	Large	Large	Large	One property could decrease in value by a few million dollars.
Condemnation of Property	None	None	None	None	No condemnation resulting from CH. Also, the Service acquires land by negotiation, not condemnation.
Investigate Implications of CH	\$ 53,000	\$ 169,000	\$ 53,000	\$ 169,000	26 private landowners may investigate the implications of CH on their lands.
Reduced Cooperation on Conservation Projects	Modest	Modest	Modest	Modest	Some landowners want to avoid CH designation.

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Table ES-1. Section 7 Costs and Benefits Attributable to the Plant Listings and Critical Habitat
(10-year estimates)

CH = critical habitat PMs = project modifications O&M = operation and maintenance Fed = Federal ne = not estimated

Item	Total		Share to CH		Explanation
	Low	High	Low	High	
DIRECT SECTION 7 BENEFITS					
Benefits of Project Modifications	ne	ne	ne	ne	Difficult to estimate ecological effects of PMs and their value.
Benefits to Developers	Small	Small	Small	Small	Helps developers site projects.
Ecotourism	Minor	Minor	Minor	Minor	The Service prefers that guides do not feature visits to threatened & endangered plants.
INDIRECT BENEFITS					
Species Preservation	ne	ne	ne	ne	Difficult to estimate benefits of preservation and its value.
Ethnobotanical Benefits	ne	ne	ne	ne	Difficult to estimate ethnobotanical benefits and their value.
Benefits to the Ecosystem	ne	ne	ne	ne	Difficult to estimate benefits of ecosystems and their value.
Economic Activity from Conservation Management	small	small	small	small	Potential for small increase.
TOTAL					
Costs Over 10 Years	\$ 1,019,900	\$ 2,601,200	\$ 945,500	\$ 2,468,700	Figures exclude costs that are difficult to estimate.
Benefits Over 10 Years	ne	ne	ne	ne	Difficult to estimate.

APPENDIX VI-A

INFORMATION ON HUNTING AND GAME-MAMMAL MANAGEMENT

1. INTRODUCTION

Presented below is background information on hunting on Kaua'i and DLNR's game-mammal management. The material is used in Chapter VI in addressing direct and indirect economic impacts of critical habitat on game-mammal management. Subjects addressed include the following: hunting activity on Kaua'i, economic activity associated with hunting, the value of hunting to hunters, DLNR game management, the loss of hunting areas due to the *palila* critical habitat, information on the Pittman-Robertson Act, consultation with the Service on Pittman-Robertson projects, and recent changes in hunting fees.

2. HUNTING ACTIVITY ON KAUAI

Hunting is an important activity for many Kaua'i residents because it provides recreation, subsistence, and a desired lifestyle. Subsistence hunting is particularly important on Kaua'i because of the rural lifestyle and the high level of unemployment in some areas. Also, hunting is largely a local activity with, at most, 5 percent of the game-mammal hunters coming from off-island (based on DLNR estimates, 2001).

Game mammals hunted on the island include feral pigs, goats and black-tailed deer. Game birds include pheasant (2 species), Francolin (3 species), chukar partridge, Japanese quail, and dove (2 species).

3. ECONOMIC ACTIVITY ASSOCIATED WITH HUNTING

In 1996, 23,000 hunters in Hawai'i, most of whom were local residents, spent an estimated 258,000 days and about \$16.4 million on hunting, of which about \$8 million was trip-related and about \$8.4 million was for equipment and other expenses (1996 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation). Approximately 70 percent of their hunting trips were spent hunting game mammals and the remaining trips were for game birds. Based on hunting licenses issued, about 4,700

hunters (about 20.5 percent of the State total) live on Kaua'i (information provided by DLNR 2001).

Companies that supply goods and services to hunters, and the employees of these companies, in turn purchase goods and services from other companies, thereby creating even more sales, and so on. These "indirect" sales are scattered throughout the economy and the State. When both "direct" and "indirect" sales are included, total Statewide sales due to hunting in Hawai'i amounted to about \$31.8 million in 1996. In turn, this economic activity supported an estimated 580 jobs and generated an estimated \$13.5 million in income (an average of about \$23,300 per job). These estimates are based on multipliers from the Hawai'i Input-Output Model (DBEDT, 1998).

In 1996, economic activity supported by just game-mammal hunting on Kaua'i amounted to about \$2.4 million in direct sales, \$4.6 million in total direct and indirect sales, 84 jobs, and \$1.9 million in income. These figures are order-of-magnitude estimates based on 70 percent of the hunting trips being spent hunting game mammals, and 20.5 percent of the the State's hunting activity taking place on Kaua'i.

In terms of relative importance, the estimated 23,000 hunters in Hawai'i in 1996 comprised about 1.9 percent of the State's population, and the estimated 580 jobs supported by hunting activity comprised about 0.1 percent of Hawai'i's total employment (based on figures from the DBEDT Data Book). For Kaua'i, hunters comprised about 8.2 percent of the County's 1996 population, and supported about 0.3 percent of the jobs. Families with hunters comprise about 6.5 percent of the State population and 27.9 percent of the Kaua'i County population (based on an average of 3.4 people per family).

4. VALUE OF HUNTING TO HUNTERS

The net value of hunting to hunters is based on an estimate of the amount they would be willing to pay that is above and beyond what they actually pay for hunting equipment, supplies, travel, etc.—an amount referred to by economists as "consumers' surplus." It is the extra value consumers derive from consuming an item compared to what they actually spend on the item. Net willingness to pay (consumers' surplus) is the standard measure of value used in benefit-cost analyses.

The Statewide value of all hunting for 1996 is estimated at \$6.5 million, based on (1) the assumption that hunters value their experience at \$25 per day above and beyond their actual expenditures; and (2) they hunted a total of 258,000 days that year. For Kaua'i, the value of just game hunting amounted to about \$930,000 (\$6.5 million x 70 percent x 20.5 percent). These figures on the value of game hunting should be interpreted as order-of-magnitude estimates, not precise estimates.

The valuation of hunting at \$25 per day is similar in concept to golfers being willing to pay green fees, and is based on resident green fees in Hawai'i. It is also consistent with estimates of the valuation of hunting from the following studies:

- \$19.18 or \$26.86 per day for hunting deer in Idaho in 1986, with the different amounts being based on methodology, but with the higher amount being deemed more accurate (Donnelly and Nelson, 1986)
- \$22.45 or \$28.50 per day hunting for jack rabbits and game birds in Idaho in 1986, with the different amounts being based on methodology, but with the higher amount being deemed more accurate (Young, et al., 1986)
- \$21.66 or \$24.44 per day for hunting pheasant in Idaho in 1986, with the different amounts being based on methodology, but with the higher amount being deemed more accurate (Young, et al., 1986)
- \$16.56 per day for hunting pheasant in Idaho in 1971 (Shulstad, 1978)

A valuation of hunting based on the market value of the meat harvested in excess of the hunters' expenditures on hunting (i.e., the subsistence value of hunting) would be lower. In effect, hunting is largely a recreational pursuit for which expenditures on equipment and travel, and the value of the time spent hunting and butchering the animals, are partially offset by the value of the meat harvested.

5. DLNR GAME MANAGEMENT

DLNR is the State agency responsible for managing game-mammal populations in State Hunting Units. However, it must carry out this responsibility in the context of two conflicting mandates: provide for sustained-yield recreational hunting in some of the State Hunting Units and protect native ecosystems and plants in other areas.

According to DLNR staff (2001 and 2002), they achieve a reasonable balance between the two mandates by permitting access to hunting areas which varies according to site conditions (e.g., animal population and food supply) and habitat quality (nearly pristine, highly degraded, or somewhere in between) (see Appendix VI-B). The most liberal hunting (e.g., year-round pig hunting) is permitted in nearly pristine areas where the native forest has suffered the least environmental damage. This helps keep game-mammal populations low in these sensitive areas, thereby minimizing harm to native ecosystems and to endangered and threatened plants. However, hunting is not possible in many remote areas that are inaccessible to hunters.

In areas where the native forest is highly degraded and DLNR sees no hope that the native vegetation will return, hunting is restricted in order to sustain larger populations of game mammals (see below for the methods used to restrict hunting). When hunting is restricted, the larger animal populations allow hunters collectively to harvest more animals each year than would be the case with smaller populations. In addition to the recreational benefits to hunters of having higher game harvests, reasonable numbers of game mammals are available to browse on the non-native plants and weeds, thereby helping control the seed reservoir of noxious non-native plants and their spread into other areas.

Finally, in degraded areas, enclosure fencing of small areas (of less than 1/4 acre to 2 acres) may be used to protect rare native plants and their seeds from foraging animals. These enclosures are small enough to make it practical to weed the overgrowth of aggressive alien plants which would otherwise choke out the native plants or carry a damaging wildfire.

According to DLNR, the combined strategy of using game mammals to help control non-native plants and weeds in degraded areas, and using hunters to help control ungulate populations in pristine areas is accomplished at little cost to the taxpayer while providing recreational benefits to hunters.

However, it should be noted that Service staff and expert biologists question the effectiveness of DLNR's game-management approach in protecting native forests, arguing that so long as large populations of feral ungulates are free to range, they will migrate into areas that are not degraded, possibly because they are fleeing from hunters or searching for better forage than what they can find in degraded game-production areas. In turn, their migration into these areas will contribute to the loss of listed plants and to the spread of noxious plants. Also, the State enclosures are regarded by the Service as too small to sustain viable populations of threatened and endangered plants (Service, *Recovery Plan for the Multi-Island Plants*, 1999).

The methods employed by DLNR to manage game-mammal populations take advantage of the fact that the demand for hunting opportunities exceeds the availability of game mammals. Within each State Hunting Unit, DLNR controls the amount of hunting activity by using such restrictions as: bag limits, hunting method (rifle, muzzleloader, bow and arrow, dogs and knives); days allowed (week-ends only), hunting seasons; hours of the day; and for some areas, a limit on the number of daily permits issued (Hawai'i Administrative Rule, Title 13, Chapter 123). However, hunting activity decreases if hunters' success rates are low (which usually occurs when too many hunters are after too few animals) or if certain areas are difficult to access. Also, some of the hunting restrictions are for safety purposes: limiting the number of hunters prevents dangerous overcrowding and risks to both hunters and other recreational users in the area (e.g., hikers and campers).

If game-mammal surveys by DLNR reveal that game-mammal populations have become too high for an area, DLNR responds by allowing more hunting. But if increased hunting does not reduce the population sufficiently—possibly because of difficult access to a remote area—then DLNR may direct staff to remove the animals where economically feasible.

To provide guidance for adjusting the controls on hunting activity, DLNR monitors the following: (1) hunting activity (including the number of hunting trips, game harvests by type of game, and success rates); (2) game populations (using habitat transects, harvest data, hunter reports, and aerial and ground surveys); and (3) vegetation (including the coverage, composition by type of plant, invasion by non-native plants, trends, comparisons with vegetation inside animal exclosures, and impacts to plants from game mammals). But the management of game-mammal populations is not an exact science. For example, animal population estimates may be inaccurate; populations vary with rainfall and food availability; and animals move from one area to another.

6. LOSS OF HUNTING AREA DUE TO THE *PALILA* CRITICAL HABITAT

Based on past experience, most hunters in Hawai'i associate critical habitat designation with loss of prized hunting areas. Although a parallel situation does not exist with the proposed critical habitat on Kaua'i, the association hunters make is based on the *palila* critical habitat on the island of Hawai'i.

In 1975, the Service listed the *palila* (*Psittirostra bailleui*), a Hawaiian honeycreeper (a bird), as an endangered species. The *palila* depends entirely on the *mamane-naio* ecosystem—a broad band of sparse forest encircling Mauna Kea between about 7,000 and 10,000 feet elevation. In 1977, in an effort to further protect the *palila*, the Service designated the *palila* critical habitat, encompassing about 67,000 acres (105 square miles) of hunting land.

The *palila* were at risk because sheep and goats on Mauna Kea browsed on the *mamane* trees in the *mamane-naio* ecosystem, which was very destructive to the *palila*'s habitat. Starting in the late 1940s, the population of game mammals was allowed to increase on the mountain to allow sustained harvest by hunters. Even after the *palila* was listed as endangered and its critical habitat was designated, DLNR continued to manage the feral sheep and goat populations at sustainable levels for hunting, causing continued harm to the *palila*'s habitat.

This situation led the Sierra Club Legal Defense Fund to file a lawsuit in Federal court, *Palila v. Hawaii Department of Land and Natural Resources*, to require DLNR to remove the feral sheep and goats from Mauna Kea. The case tested the prohibition in

the Act on *taking* of any endangered species of fish or wildlife, where *take* is defined as “to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct.” At issue was whether modifying a habitat (i.e., in this case sheep browsing on *mamane* trees) may result in “harm” to a species thereby meeting the definition of “*taking*.”

In 1979, a Federal court rendered an opinion in support of the plaintiff. Since studies showed clearly that the sheep and goats were “destroying or altering” the *palila* habitat, the court ordered DLNR to eradicate them from Mauna Kea and this was nearly achieved by 1981. The ruling did not affect the management of pigs on the mountain.

Following this case, the Service regulations defined “harm” to be “an act which actually kills or injures wildlife.” The regulations further explain that “[s]uch act may include significant modifications where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering.”

Even though Hawai'i hunters associate critical habitat designation with eradicating game animals and loss of prized hunting areas, the eradication of sheep and goats from the *palila* critical habitat was based on the Federal *taking* provision of the Act and not on *adverse modification* to the critical habitat. Furthermore, under Federal law, a situation similar to the *palila* critical habitat would not apply to the critical habitat for plants since the Federal *taking* provision applies only to listed wildlife and not to plants. However, the State's endangered species act does have a *taking* provision for listed plants.

7. PITTMAN-ROBERTSON ACT

Game-management funding is provided as part of the Federal Aid in Wildlife Restoration Act, commonly referred to as the Pittman-Robertson Act. This Act was passed by Congress in 1937 to help restore the nation's wildlife following accumulated damage to forests and grasslands and extensive commercial killing of wildlife. Hawaii's local hunters help fund this program, since revenues for it are derived from an 11-percent Federal excise tax on the price of sporting arms, ammunition, and archery equipment, and a 10-percent tax on handguns. Each state's share of these revenues is determined by a formula that considers the total area of the state and the number of licensed hunters in the state, subject to a minimum level of funding. Each state provides matching funds of at least 25 percent of the program costs from a non-Federal source. Also, each state specifies how the funds are to be spent, while the Service serves as an administrative check to insure that the funds are spent in compliance with the Act.

Because of its small area and population, Hawai'i receives the minimum level of Pittman-Robertson funding. For FY2001, total funding amounted to nearly \$1.1 million, of which about \$817,000 was Federally funded and about \$272,000 was State-funded. The County of Kaua'i received about \$200,000 for its game-management program plus another \$50,000 for non-game programs.

8. GAME MANAGEMENT CONSULTATION HISTORY

8.a. 1995 Pittman-Robertson Consultation

In March 1995, the Service conducted an internal consultation regarding Pittman-Robertson funding for a series of DLNR projects Statewide. The projects on Kaua'i included: game bird and game-mammal surveys; the construction of game-bird hunting units, fenced exclosures for endangered plants, and campsites; rerouting trails; clearing 500 acres of non-native weedy vegetation from the Kekaha Game Management Area; restoring a ring-necked pheasant population; maintaining existing structures and features; and mowing 100 acres of highly degraded game habitat. In order to minimize impacts to listed plant species, DLNR proposed to construct exclosure fencing around listed plants; construct new game units in disturbed or previously cleared areas; survey all areas before they were cleared or mowed; and have a knowledgeable person supervise other mowing or maintenance activities to ensure that no inadvertent harm came to listed plants. With these precautions, the Service determined that the proposed projects were not likely to affect the listed species.

8.b. 2001 Pittman-Robertson Consultation

The 2001 Pittman-Robertson Statewide consultation required approximately one man-month of the Service's time, and 60 man-days of the State's time. Based on current salaries and benefit levels, administrative time, and overhead costs, the time spent in consultation cost the Service about \$15,600 and the State about \$12,000. Since 23 percent of the 2001 Pittman-Robertson funds went to projects on Kaua'i, approximately 23 percent of the Statewide consultation costs are attributable to Kaua'i projects. Thus, the Kaua'i consultation costs were approximately \$3,600 for the Service and \$2,800 for the State, or a total of \$6,400.

During consultation, the Service approved with some modification 65 of 67 game-management projects proposed by DLNR. The Service determined that the two remaining projects could adversely affect listed species. One concerned the hunter check stations and game-mammal surveys on Kaua'i. In this case, the Service requested assurances from DLNR that information collected from check stations and surveys would not be used to maintain or enhance free-ranging game-mammal populations that could

adversely affect Federally listed species. For all island except Kaua'i and Lana'i, DLNR provided the necessary assurances and the Service concluded that these projects were not likely to adversely affect listed species. For Kaua'i, DLNR chose to withdraw the project from consideration rather than (1) modify it to avoid adverse impacts to listed species, or (2) pursue a formal consultation.

The second exception concerned a portion of a project that involved leasing 30,000 acres on Lana'i for State-managed game hunting, maintenance of hunter check stations, maintenance of game-mammal watering units, and game-mammal population surveys. Because the Service determined that funding the Lana'i portion of this project was likely to adversely affect listed species, the Service was unable to approve it as requested. Again, DLNR opted to withdraw the offending Lana'i portion of the project rather than (1) modify it to avoid adverse impacts to listed species, or (2) pursue a formal consultation. Modification could have involved expensive fencing to prevent game mammals from migrating into areas that support listed species.

For either or both of the two projects discussed above, DLNR could have pursued formal consultation with the Service with the possibility that they would have received a determination by the Service that the projects were not likely to *jeopardize* the continued existence of listed species and could be funded. But DLNR opted not to do so because: (1) time was too short to assemble needed information and complete the formal consultation; (2) the staff had to make fiscal and budgetary commitments; and (3) the outcome was uncertain.

Instead, DLNR elected to shift funding sources for its wildlife management projects: State monies were used to fund the Kaua'i and Lana'i projects mentioned above, and the remaining Pittman-Robertson funds were used for projects that were originally scheduled to be funded by the State (e.g., game-bird projects). The net effect was no change in the amount of Pittman-Robertson funding provided to DLNR, and modest changes to the wildlife management projects themselves.

On Kauai, DLNR elected to drop a proposed helicopter goat survey project rather than fund it entirely with State monies. The helicopter services would have cost about \$4,000. No changes were required for O'ahu projects.

The more significant changes in Maui and Hawai'i Counties involved some new fencing and lids to protect game-bird water stations from being used by game mammals in areas having listed plants. The cost totaled about \$110,000 for 29 units on Maui Island, 12 units on Moloka'i, and about 70 units on Hawai'i Island (based on information provided by DLNR, 2002). These projects (1) decreased game-mammal populations in the affected areas or required separate State-funded water stations for game mammals; and (2) diverted Pittman-Robertson and State funds from other projects to pay for the additional fencing, lids, and new game-mammal water stations.

Plant critical habitat designations had no role in the above decisions, however, since critical habitat had not yet been designated. The consultation between DLNR and the Service on projects proposed for Pittman-Robertson funding, modifications that were made to projects to avoid adverse impacts, and DLNR's decisions to withdraw the Kaua'i and Lana'i projects and to shift funding sources among projects occurred entirely because of the presence of listed species in affected areas.

9. HUNTING FEES

In February 2002, the State Board of Land and Natural Resources increased State hunting fees which are expected to increase revenues to the State by about \$200,000 per year. The increased fees will give DLNR additional money and flexibility in funding game-management projects.

APPENDIX VI-B

RESOURCE MANAGEMENT GUIDELINES

DEPARTMENT OF LAND AND NATURAL RESOURCES

DIVISION OF FORESTRY & WILDLIFE

The basis of the Division of Forestry & Wildlife's (DOFAW's) Resource Management Guidelines is the status of the native vegetation in an area. The character of the vegetation is classified as: "Most Pristine Native," "Predominantly Native," "Considerably Disturbed," or "Badly Degraded or Highly Altered." The vegetation status is then considered in conjunction with public safety, public demand for specific resources, and the effect of the proposed use on the vegetation.

Potential game management strategies have been divided into four categories, called Game Animal Management Classifications. These are:

- Game Production. Game is a primary objective. Areas are managed for public hunting on a sustained-yield basis. Habitat may be manipulated for the purpose of increasing or maintaining the game carrying capacity of the habitat. Hunting seasons and bag limits are set to provide sustained public hunting opportunities and benefits. Some of the Game Management Areas are in this class.
- Mixed Game and Other Uses. Production of game is an objective integrated with other uses such as hiking, production of forest products, and protection of native resources. Game populations are managed to acceptable levels using public hunting. Habitat manipulation for game enhancement may be conducted, but only when it is consistent with other uses. Seasons and bag limits are designed to ensure compatibility with other uses. These areas include portions of forest reserves and some Game Management Areas.
- Game Control. Protection of resources is the primary objective, with emphasis on native plant community and watershed protection. Hunting is used to reduce animal impacts to those resources. Bag limits or seasons are liberal. These areas include watershed areas, portions of forest reserves, Natural Area Reserves, and wilderness preserves.
- Staff Control. Areas designated for animal removal by staff or agency designees because of remoteness, environmental sensitivity, or public safety.

Game mammal control is the objective. Control actions can include but are not limited to staff shooting or animal translocation. These areas include portions of forest reserves, Natural Area Reserves, wilderness reserves, and plant and wildlife sanctuaries.

Under DOFAW's Resource Management Guidelines, maintaining game bird populations is considered compatible with other uses in most areas. Game birds are managed for "Game Production" or "Mixed Game and Other Uses" in most areas.

Because of potential detrimental effects of game mammals on native ecosystems, management strategy for game mammals is more complex. Areas managed for game mammal production; i.e., "Game Production," are located primarily in areas classified as "Badly Degraded or Highly Altered." These areas have a preponderance of weedy species, contain very few native plants, and are managed to produce game animals for recreational hunting. Under this management approach, known individuals or populations of listed plants are fenced or otherwise protected from feral ungulates. Areas classified as "Predominantly Native" and "Considerably Disturbed" are managed as "Mixed Game and Other Uses" for game mammals and have seasons and bag limits designed to ensure compatibility with other uses, including native ecosystem protection. Areas classified as "Most Pristine Native" are managed for "Game Control or Staff Control" and have the most liberal hunting seasons to minimize the pressure of feral animals on native ecosystems.

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Information was provided in communications with representatives of:

Government

- County of Kaua'i, Department of Water
- County of Kaua'i, Finance Department
- County of Kaua'i, Planning Department
- County of Kaua'i, Police Department
- County of Kaua'i, Public Works Department
- Hawai'i Department of Agriculture
- Hawai'i Department of Land and Natural Resources
- Hawai'i Department of Transportation
- Hawai'i Office of Environmental Quality Control
- National Park Service
- U.S. Coast Guard
- U.S. Department of Agriculture, Natural Resources Conservation Services
- U.S. Department of Commerce, National Institute of Technology and Standards

- U.S. Department of the Navy
- U.S. Fish and Wildlife Service, Pacific Islands Fish and Wildlife Office

Private

- Alexander & Baldwin, Inc.
- Belt Collins Hawai'i, Ltd.
- CIRI Land Development
- Char & Associates
- Construction Consultants Pacific, Inc.
- Garden Isle Disposal
- Glover Jas W. Ltd.
- Grove Farm Co., Inc.
- Industrial Economics, Inc.
- Kaua'i Coffee Company, Inc.
- Kaua'i Commercial Company, Inc.
- Kaua'i Nursery & Landscaping, Inc.
- Kipu Kai Ranch
- Robinson Family Partners
- Urban Planner, Inc.
- William Hyde Rice, Ltd.
- Wilson Okamoto & Associates, Inc.

Non-Profit

- Earthjustice Legal Defense Fund
- Hawai'i Agriculture Research Center
- Kamehameha Schools
- National Tropical Botanical Garden
- Pacific Legal Foundation
- The Nature Conservancy of Hawai'i