Programmatic Environmental Assessment

Hawaii
Conservation Reserve Enhancement Program


Taro fields in Hawaii.

Farm Service Agency
United States Department of Agriculture

February 2006

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Cover Sheet

Mandated Action:

The United States Department of Agriculture, Commodity Credit Corporation (USDA/CCC) and the State of Hawaii have agreed to implement the Hawaii Conservation Reserve Enhancement Program (CREP), a component of the national Conservation Reserve Program (CRP).

USDA is provided the statutory authority by the provisions of the Food Security Act of 1985, as amended (1985 Act) (16 U.S.C. 3830 et seq.), the 2002 Farm Bill (signed into law on May 13, 2002), and the regulations at 7 CFR 1410. In accordance with the 1985 Act and the recently enacted 2002 Farm Bill, USDA/CCC is authorized to enroll lands through 2007.

The Farm Service Agency (FSA) of USDA proposes to enter into a CREP agreement with the State of Hawaii covering the islands of Kauai, Oahu, Molokai, Lanai, Maui, and Hawaii.

CREP is a voluntary land conservation program for agricultural land operators and land owners. National Environmental Policy Act (NEPA) compliance for this project included the drafting of the Final Programmatic Environmental Impact Statement (PEIS) for the CRP. The Notice of Availability for this PEIS was published in the Federal Register on January 17, 2003 and the Record of Decision (ROD) was published on May 8, 2003. The ROD detailed FSA's implementation of the re-authorized CRP according to the provisions of the Farm Security and Rural Investment Act of 2002, Public Law 107-121 (2002 Farm Bill). This Programmatic Environmental Assessment (PEA) is tiered off the CRP PEIS as authorized by Council on Environmental Quality regulations 40 CFR 1502.20.

Type of Document: Programmatic Environmental Assessment (PEA)

Lead Agency: United States Department of Agriculture, Farm Service Agency

Sponsoring Agencies: Hawaii Department of Land and Natural Resources

Cooperating Agencies: United States Departments of Agriculture, Natural Resource Conservation Service (NRCS).

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Comments:

This Programmatic Environmental Assessment was prepared in accordance with USDA FSA National Environmental Policy Act implementation procedures found in 7 CFR 799, as well as the National Environmental Policy Act of 1969, Public Law 91-190, 42 U.S.C. 4321-4347, 1 January 1970, as amended. Once this document is finalized a Notice of Availability will be printed in the Federal Register. Following the Notice of Availability FSA will provide a public comment period prior to any FSA decision.

Any written comments regarding this document shall be submitted to:

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Executive Summary

Purpose of and Need for the Programmatic Environmental Assessment

The purpose of this Programmatic Environmental Assessment is to provide to the general public an analysis of the environmental, social, and economic effects of implementing the Hawaii Conservation Reserve Enhancement Program. This Programmatic Environmental Assessment specifically addresses the consequences of implementing two alternatives: a no action alternative and a proposed action alternative.

The Farm Service Agency (FSA) has prepared this PEA in accordance with its National Environmental Policy Act Implementation regulations found in 7 CFR 799, as well as the National Environmental Policy Act of 1969, Public Law 91-190, 42 U.S.C. 4321-4347, 1 January 1970, as amended.

Purpose and Need for the Proposed Action

The purpose of the Hawaii Conservation Reserve Enhancement Program is to enhance the water quality and quantity and on the islands of Maui, Hawaii, Molokai, Lanai, Kauai, and Oahu by reducing the amount of nutrients, sediments, and chemical runoff from agriculture sources while increasing wildlife and wetland habit for birds and other aquatic organisms.

Description of Alternatives

The alternatives that will be discussed in the PEA include two possible actions: Alternative A (No Action)—Continue Current Agricultural Practices and Alternative B (Proposed Action)—Implement the Hawaii Conservation Reserve Enhancement Program. No other alternatives are being developed at this time.

No Action Alternative—No CREP

Under Alternative A current agricultural practices would continue and modes of agricultural production would remain as they have for decades. Land development, irrigation water use rates, and agricultural chemical application rates would most likely remain at current levels.

Proposed Action Alternative— Implement the Hawaii Conservation Reserve Enhancement Program

Alternative B is the preferred alternative and targets 30,000 acres in the Islands of Maui, Hawaii, Molokai, Lanai, Kauai, and Oahu. Land placed under Conservation Reserve Enhancement Program contracts would be retired from crop production and irrigation for 10-15 years. Conservation Reserve Enhancement Program would provide the financial and technical assistance necessary to assist eligible Hawaii farmers and ranchers in establishing conservation practices that would conserve soil and water; filter nutrients and pesticides; and enhance and restore wildlife habitat.

A summary comparison of the two alternatives can be found in Tables 2.4 and 2.5 on pages 2-12 and 2-14 respectively.

How to Read this Programmatic Environmental Assessment

The Programmatic Environmental Assessment is organized into the following three chapters:

- Chapter 1 (Purpose and Need for Action);
- Chapter 2 (Alternatives Including the Proposed Action); and
- Chapter 3 (Affected Environment and Environmental Consequences)

Chapter 1 is an introductory chapter that outlines the purpose and need for preparing this document of this type as well as the purpose and need for Conservation Reserve Enhancement Program. Chapter 1 also briefly introduces the resource issues and also discusses the resource issues that were eliminated and the reasons they were eliminated from further analysis.

Chapter 2 describes the actions proposed in the Programmatic Environmental Assessment including the two alternatives described above. Alternatives are compared in summary tables in terms of their individual environmental impacts and their achievement of objectives.

Chapter 3 provides a more detailed analysis of each of the resources most likely to receive impacts from the alternatives including:

- Surface Water Quality
- Drinking Water
- Wetlands
- Floodplains
- Marine Resources
- Protected Species
- Cultural Resources
- Human Health, Social, and Economic Issues
- Cumulative Effects

Each resource is discussed in a separate section which has combined the analyses of the Affected Environment (or Existing Conditions) and Environmental Consequences (Effects of Alternative A and B). Each section, in general, is organized as follows:

- Introduction
- Existing Conditions
- Impacts
- Effects of Alternative A
- Effects of Alternative B

How the Programmatic Environmental Assessment was Prepared

This document was prepared with the cooperation of State of Hawaii including personnel from the Hawaii DLNR. The best available information was used in the development of this document with the majority of information being obtained from State and Federal agency reports. The majority of these reports came from the following agencies:

- U.S. Fish and Wildlife Service
- U.S. Environmental Protection Agency
- USDA, National Agricultural Statistics Services

- USDA, Farm Service Agency
- Bureau of Reclamation
- U.S. Geologic Survey

Public Comments

A Notice of Availability for the Draft PEA was published in local newspapers concurrent with this PEA. Written or verbal comments were not received in response to the Draft PEA. Any written comments concerning the Final PEA should be submitted to:

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Table of Contents

List of Figures and Tables

Figures

Tables

Acronyms and Abbreviations

ACHP	Advisory Council on Historic Preservation
ANPP	Average Net Primary Productivity
BA	Biological Assessment
CABB	County Agriculture Development Board
CATEX	Categorical Exclusion
CBIA	Coastal Barrier Improvement Act
CBRA	Coastal Barrier Resources Act
CBRS	Coastal Barrier Resources System
CCAA	Candidate Conservation Agreement with Assurances
CCC	Commodity Credit Corporation
CCMP	Comprehensive Conservation and Management Plan
CCP	Coordinated Conservation Plan
CCP	Comprehensive Conservation Plan
CCSP	Conservation Cost Share Program
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CP	Conservation Practice
CREP	Hawaii Conservation Reserve Enhancement Program
CRP	Conservation Reserve Program
CSP	Conservation Security Program
CWA	Clean Water Act
CWB	Hawaii Department of Health, Clean Water Branch
CZMA	Coastal Zone Management Act
CZMP	Hawaii Coastal Zone Management Program
DAR	Hawaii Department of Aquatic Resources
DBET	Hawaii Department of Business, Economic Development and Tourism
DLNR	Department of Land and Natural Resources
DOFAW	Hawaii Department of Forestry and Wildlife
EA	Environmental Evaluation
EE	Environmental Evaluation
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
ENSP	Endangered and Nongame Species Program
EO	Executive Order
EPA	United States Environmental Protection Agency
EQIP	Environmental Quality Incentive Program
ESA	Endangered Species Act
FEMA	Federal Emergency Management Agency
FONSI	Finding of No Significant Impact
FOTG	Field Office Technical Guide
FPP	Farmland Preservation Program
FPPA	Farmland Protection Policy Act
FRPP	Farm and Ranchland Protection Program
FSA	Farm Service Agency
FWS	United States Fish and Wildlife Service
GRP	Grassland Reserve Program
GSWC	Ground and Surface Water Conservation
GWPC	Ground Water Protection Council
HASS	Hawaii Agricultural Statistics Service
HCRIRP	Hawaii Coral Reef Initiative
HEAR	Hawaiian Ecosystems at Risk Project
HEL	Highly Erodible Land

HIDOH	Hawaii Department of Health
HUC	Hydrologic Unit Code
LESA	Land Evaluation and Site Assessment
LIP	Landowner Incentive Program
MCL	Maximum Contaminant Levels
MGD	Million Gallons per Day
MOU	Memorandum of Understanding
NAPP	Natural Area Partnership Program
NASS	National Agricultural Statistics Service
NECM	National Environmental Compliance Manager
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NNL	National Natural Landmarks
NOAA	National Oceanic and Atmospheric Administration
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NRLC	Native Right, Land and Culture
OEQC	Hawaii Office of Environmental Quality Control
OHA	Office of Hawaiian Affairs
OPA	Otherwise Protected Areas
PCWS	Public Community Water Supply
PEA	Programmatic Environmental Assessment
PEIS	Programmatic Environmental Impact Statement
PIP	Practice Incentive Payment
PWS	Public Water System
SCD	Soil Conservation Districts
SHPO	State Historic Preservation Officer
SIP	Signing Incentive Payment
SSA	Sole-Source Aquifer
SSCC	State Soil Conservation Committee
SWAP	Source Water Area Protection
SWDB	Hawaii Department of Health, Safe Drinking Water Branch
SWQS	State Water Quality Standard
T&E	Threatened and Endangered
THPO	Tribal Historic Preservation Office
TMDL	Total Maximum Daily Load
TSS	Total Suspended Solids
UH	University of Hawaii
USDA	United States Department of Agriculture
USGS	United States Geologic Service
WHIP	Wildlife Habitat Incentive Program
WHPA	Well Head Protection Areas
WHPP	Wellhead Protection Program
WMA	Watershed Management Areas
WPP	Watershed Partnership Program
WRP	Wetlands Reserve Program
WRRC	Water Resources Research Center
WSRA	Wild and Scenic Rivers Act

Chapter 1.0 Purpose of and Need for Action

1.1 Introduction

1.1.1 Overview of the Farm Service Agency's Implementation of the Hawaii Conservation Reserve Enhancement Program (CREP)

The U.S. Department of Agriculture (USDA)/Commodity Credit Corporation (CCC) and the State of Hawaii propose to implement the Hawaii Conservation Reserve Enhancement Program (CREP) Agreement, administered by USDA's Farm Service Agency (FSA). The Hawaii CREP Agreement is designed to enroll 30,000 acres of cropland and marginal pastureland in 15-year CRP contracts. The enrollment period is expected to last over five years. Targeted islands of the Hawaii CREP Agreement include; Hawaii, Molokai, Maui, Oahu, Maui, and Kauai (see Figure 1.1).

CREP is a component of FSA's Conservation Reserve Program (CRP), which targets the specific environmental needs of a State. CRP was established under subtitle D of the Food Security Act of 1985. The purpose of CRP is to cost-effectively assist owners and operators in conserving and improving soil, water, and wildlife resources on their farms and ranches. Highly erodible and other environmentally sensitive acreage, normally devoted to the production of agricultural commodities, is converted to a long-term resource conservation cover. CRP participants enter into contracts for periods of 10 to 15 years in exchange for annual rental payments and cost-share assistance for installing certain conservation practices (CPs).

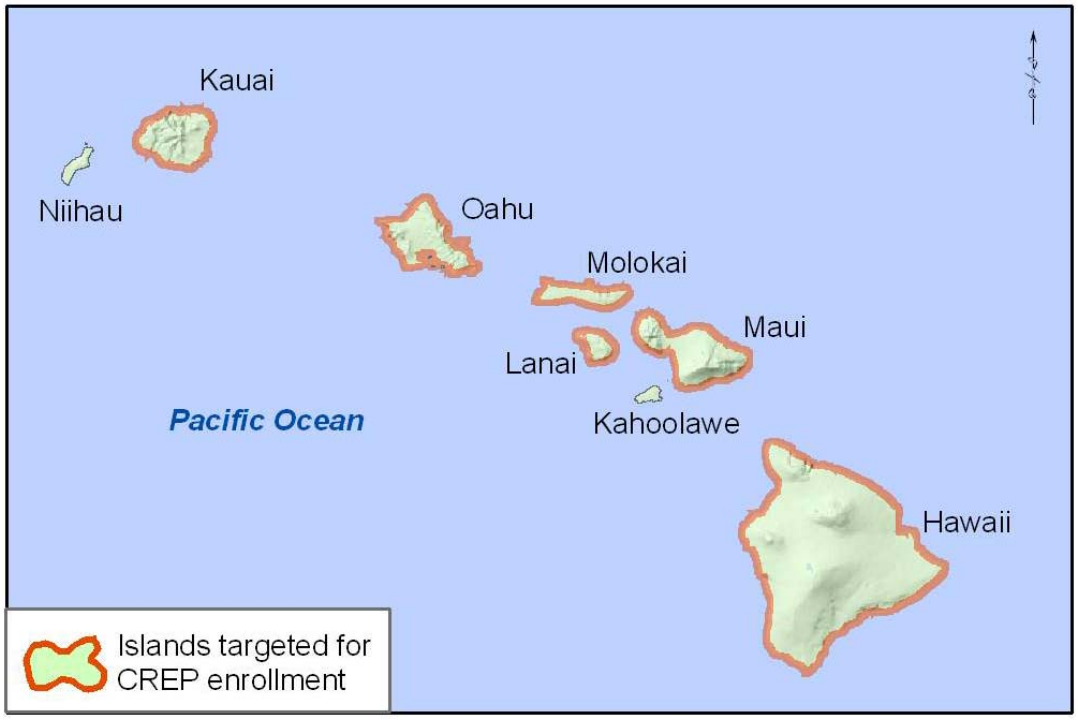


Figure 1.1. Location of CREP targeted islands.

The initial goal of CRP was to reduce soil erosion on highly erodible enrolled cropland. Subsequent amendments of CRP regulations have made certain cropland and pastureland eligible for CRP based on their targeted benefits to water quality and wildlife habitat. An environmental review of this program shift was examined in the 2002 Programmatic Environmental Impact Statement (PEIS). The Farm Security and Rural Investment Act of 2002 authorized CRP through 2007 and raised the overall enrollment cap to 39.2 million acres.

In 1997, the Secretary of Agriculture implemented CREP as a joint Federal-State partnership that provides agricultural producers with financial incentives to install FSA-approved CPs on enrolled eligible land. CREP is authorized pursuant to the 1996 Federal Agriculture Improvement and Reform Act. CREP agreements are done as partnerships between USDA, State and/or Tribal governments, other Federal and State agencies, environmental organizations, wildlife organizations, and other non-government organizations (NGOs). This voluntary program uses financial incentives to encourage farmers and ranchers to enroll in contracts of 10 to 15 years in duration to remove environmentally sensitive lands from agricultural production. Through CREP, farmers are eligible to receive annual rental payments and cost-share assistance to establish long-term, resource conserving covers on eligible land. The two primary objectives of CREP are to:

- Coordinate Federal and non-Federal resources to address specific conservation objectives of a State (or Tribal) government and the nation in a cost-effective manner.
- Improve water quality, erosion control, and wildlife habitat related to agricultural use in specific geographic areas.

National Environmental Policy Act (NEPA) compliance for CRP included preparing a Final Programmatic Environmental Impact Statement (PEIS). The Notice of Availability for this PEIS was published in the Federal Register on January 17, 2003 and the Record of Decision (ROD) was published on May 8, 2003. The ROD detailed FSA's implementation of the re-authorized CRP according to the provisions of the Farm Security and Rural Investment Act of 2002, Public Law 107-121 (2002 Farm Bill).

This Programmatic Environmental Assessment (PEA) has been conducted in accordance with the National Environmental Policy Act of 1969, as amended 42 USC 4321 – 4347, the NEPA implementing regulations of the Department of Agriculture, 7 CFR Part Ib, and the FSA NEPA implementation procedures found in 7 CFR Part 799: Environmental Quality and Related Environmental Concerns—Compliance with the National Environmental Policy Act. The National Historic Preservation Act (NHPA) compliance and other cultural resource considerations also are incorporated into FSA's NEPA process.

1.2 Purpose of the Proposed Action

The purpose of CREP is to provide substantial benefits to water quality and quantity, wildlife, Federally listed threatened and endangered (T&E) species, and soil. The Hawaii CREP Agreement seeks to increase coral cover and diversity, increase T&E species populations, control invasive species, and enhance and restore declining native habitats. The implementation of the approved FSA CPs will filter sediments and nutrients, restore or enhance native plant communities, and reduce soil erosion. The CREP Agreement would be implemented on six of the main islands including Maui, Hawaii, Molokai, Lanai, Kauai, and Oahu with work phased in over a five-year period (Proposal, 2004).

The primary goal of the CREP Agreement is to provide an opportunity, through financial and technical assistance, for Hawaii's farmers to pursue stewardship goals for the benefit of the environment and the larger community. This assistance would allow owners and operators to voluntarily restore wetlands,

install riparian buffers, restore rare and declining habitats, and plant native grasses and hardwood trees and other approved CPs that would improve water quality and enhance native habitats. It is expected that these CPs would help to (Proposal, 2004):

- Reduce sediment and nutrient loads in streams
- Increase in-stream water levels and create greater stability of in-stream flows
- Help maintain an adequate supply of fresh water for Hawaii
- Improve water quality of near-shore waters and coral reefs
- Increase coral cover and coral reef diversity
- Restore rare and declining habitats, wetlands, and native forests
- Improve aquifer recharge through riparian, wetland, and forest restoration
- Benefit rare aquatic species through water quality and quantity improvements
- Increase the population of rare, threatened, and endangered species
- Control invasive species and feral mammals

1.3 Need for the Proposed Action

Currently, there is no viable Federal, State, or private program in Hawaii that is focused on restoring riparian ecosystems and addressing the impact of sediment and nutrient-laden runoff on sensitive coral reefs and near-shore waters associated with agricultural practices. CRP has not been a meaningful option because of a number of issues including: lack of jurisdiction over intermittent streams; insufficient cost-share assistance; complex land ownership system, and the adjusted gross-income (AGI) limitation. These issues in combination or alone make most producers ineligible or unable to participate in CRP. In the past, numerous producers have expressed interest in CRP and attempted to enroll, but only 21 acres have been enrolled to date, giving Hawaii the lowest enrollment in CRP of any State. The CREP Agreement would address many of these issues affecting CRP's success in Hawaii and brings in additional incentive payments and collaboration with other USDA, Federal, and State programs to make CRP work (Proposal, 2004).

In Hawaii, landowners and agencies are attempting to work at a watershed scale, which reaches from mountain tops to near-shore waters and coral reefs. A watershed approach is needed to address Hawaii's resource concerns because in this steep topography adjoining lands greatly influence one another.

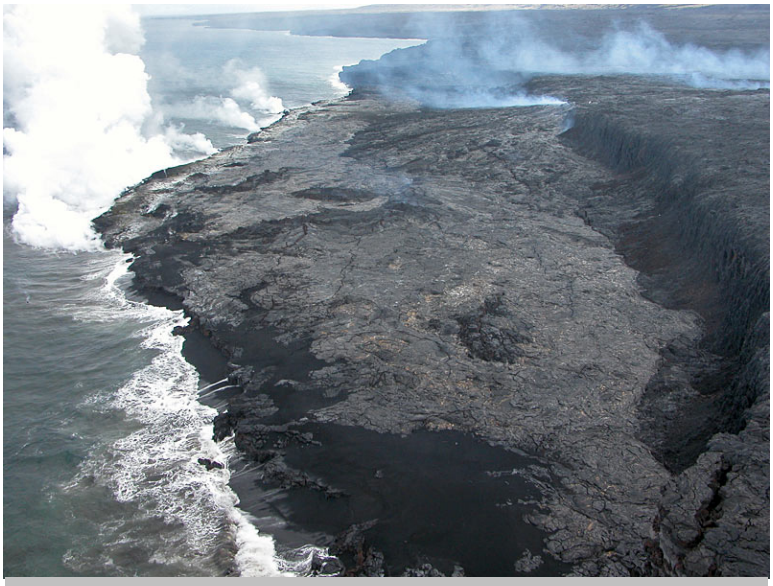
Also, to succeed, riparian restoration in Hawaii requires a voluntary, incentive-based conservation approach that brings together Federal, State, and private resources within existing watersheds. Such incentives are necessary to encourage sufficient enrollment within watersheds to achieve meaningful erosion and invasive species control, and nutrient runoff and wildlife benefits. CREP is ideally suited to creating partnerships of this nature and projects of this scale (Proposal, 2004).

Currently, Hawaii's agricultural is undergoing a transition— plantation agriculture is in significant decline and much of the farmland once used for sugarcane or pineapple plantations is being used for more diverse crops, pastureland, urban development, or left fallow. These changes in land use present a unique opportunity to use the conservation opportunities provided by CRP, along with Grassland Reserve Program (GRP), Wetlands Reserve Program (WRP), and Environmental Quality Incentive

Program (EQIP) to provide greater cumulative environmental benefits on agricultural land (Proposal, 2004).

The implementation of the CREP Agreement would also support the protection of a number of unique natural features across the State of Hawaii. Some of which include:

- 69 State Parks and Historic Sites
- 2 National Parks
  - Haleakala National Park
  - Hawaii Volcanoes National Park
- 1 National Marine Sanctuary
  - Hawaiian Islands Humpback Whale National Marine Sanctuary
- 1 Coral Reef Ecosystem Reserve
  - Northwestern Hawaiian Islands Coral Reef Ecosystem Reserve
- 5 National Historic Sites
  - Kalaupapa National Historical Park
  - Kaloko-Honokohau National Historical Park
  - Pu`uhonua O Honaunau National Historical Park
  - Puukohola Heiau National Historic Site
  - U S S Arizona Memorial
- 10 National Wildlife Refuges
  - James Campbell National Wildlife Refuge
  - Pearl Harbor National Wildlife Refuge
  - Oahu Forest National Wildlife Refuge
  - Hanalei National Wildlife Refuge
  - Huleia National Wildlife Refuge
  - Kilauea Point National Wildlife Refuge
  - Kealia Pond National Wildlife Refuge



Lava entering ocean in Hawaii Volcanoes National Park. Photo courtesy of NPS.

  - Kakahaia National Wildlife Refuge
  - Hakalau Forest National Wildlife Refuge
  - Kona Forest Unit National Wildlife Refuge
- 2 Sole-Source Aquifers
  - Southern Oahu Basal Aquifer
  - Molokai Aquifer
- 1,052 Miles of Tidally Influenced Shoreline
- 1 National Historic Trail
  - Ala Kahakai National Historic Trail
- 7 National Natural Landmarks
  - Diamond Head
  - I'ao Valley
  - Kanaha Pond
  - Ko'olau Range Pali
  - Makalawena Marsh
  - Mauna Kea
  - North Shore Cliffs

Makalawena Marsh. Photo Courtesy of NPS.

Protecting these areas, many of which provide essential wildlife habitat, is crucial to the survival of Hawaii's sensitive species. Habitat loss is a leading cause of endangerment for many sensitive organisms in the U.S. In Hawaii, these changes affect thousands of acres per year, resulting in the reduction of available habitat for native plant and animal species and decreasing the resilience of ecosystems to accommodate other natural- and human-caused stressors. About one quarter of all the endangered species in the United States are found in Hawaii. There are more endangered species per square mile on these islands than any other place on the planet (HEAR, 2004). Currently Hawaii is home to 317 Federally listed T&E species, more than any other State (Section 3.7 and Appendix B) (FWS, 2004c). CREP would serve to help protect and enhance the habitats of several Federally listed endangered species (Proposal, 2004).

Implementation of the CREP Agreement would also provide valuable benefits to the water resources of the State. The water resources that occur within the State's 6,423 square miles are:

- 249 miles of perennial rivers and streams
- 376 perennial rivers and streams
- approximately 1,500 intermittent streams

- 12 lakes, rivers, and ponds
- 2,168 acres of lakes, rivers, and ponds
- 55 square miles of estuaries, harbors and bays
- 1,052 miles of ocean coast (includes all the shorelines of the Hawaiian Chain and 964 shoreline miles of the main islands) (HIDOH, 1998)
- Two sole source aquifers (SSA)

1.4 Objectives of the Hawaii CREP Agreement

Overall, the Hawaii CREP Agreement will provide financial and technical assistance to eligible farmers/ranchers in Hawaii who enroll their eligible land and implement approved CPs. Specifically, the CREP Agreement seeks to achieve, to the extent practicable, the following four objectives. Each objective is accompanied by an indicator to help in determining if the objective has been met.

1.4.1 Objective #1: Protect Hawaiian Coral Reefs

Indicators:

CREP seeks to increase coral cover and increase coral diversity on coral reefs over 15 years.

Implementation of the CREP Agreement is expected to result in an increase in coral cover and diversity on targeted coral reefs in watersheds with significant CREP enrollment. Within individual watersheds where other sources of pollution (e.g. urban/suburban runoff, wastewater treatment) are minimal, the water quality benefits of CREP are expected to be greatest. Reductions in sediment and nutrient loads should increase coral cover, substrate diversity, and faunal diversity while reducing cover of invasive alien algae. During the term of this program, it is expected that fish and invertebrate populations will also respond positively to these changes. Impacts to coral cover and diversity from invasive algae, sediments, and nutrients are discussed in more detail in section 3.6.

1.4.2 Objective #2: Improve the Status of Hawaii's Protected Species

Indicators:

CREP would provide an increase in the populations of targeted Federally listed endangered species over 15 years. Also, CREP is expected to benefit a number of aquatic species including Hawaii's native freshwater fish (e.g. four freshwater gobies or o'opu) and a number of damselflies.

Implementation of the proposed action is expected to result in an increase in the populations of Federally listed plant and animal species. Targeted Federally listed species that are expected to benefit from CREP include but are not limited to the following: koloa duck (*Anas wyvilliana*), ʻaiea (*Nothocestrum breviflorum*, and *N. peltatum*), ma'o hau hele— the State flower (*Hibiscus brackenridgei*), uhiuhi (*Caesalpinia kavaiense*), haha (*Cyanea recta*), and lo'ulu (*Pritchardia schattaueri*). The proposal is also expected to benefit the State bird— the nene goose (*Branta sandvicensis*)— and candidate-endangered species, including damselflies *(Megalagrion leptodemas, M. nesiotes, M. nigrohamatum, M. oceanicum, M. pacificum*, and *M. xanthomelas*). Other listed and native plants would be outplanted (nursery grown plants transplanted onto a prepared site) through CP 25 with different species being used as appropriate on each island. It is anticipated that these outplantings would meaningfully contribute to the conservation of each species involved.

1.4.3 Objective #3: Reduce Sediments and Nutrients in Hawaiian Waterways

Indicators:

CREP seeks a 10 percent reduction in sediment and nutrient runoff into Hawaiian streams over 15 years.

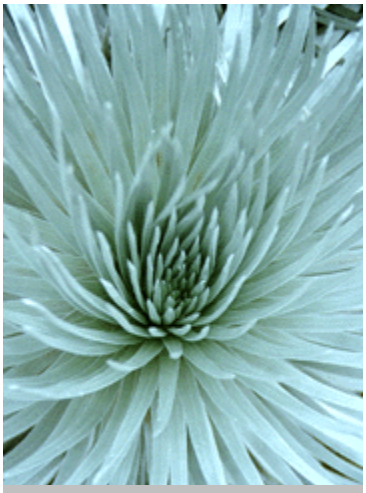
The CREP Agreement is expected to result in a 10 percent reduction in sediment and nutrient runoff into seasonal and perennial streams. In addition, riparian and forest restoration is expected to contribute to aquifer recharge, increase stream water levels, and result in greater stability of instream flows. Although difficult to estimate, these water quantity benefits are critical to ensuring Hawaii maintains an adequate supply of fresh water.

1.4.4 Objective #4: Preserve the Native Flora of Hawaii

Indicators:

CREP proposes to control invasive species on 10,000 acres of degraded pasture and cropland. Enroll and restore native vegetation and fauna on 30,000 acres of riparian buffer zones, forested watershed, degraded pasture lands and rare and declining native habitats.

The CREP Agreement is expected to have substantial benefits in terms of invasive species control with invasive plants being strategically removed from thousands of acres of sensitive land during the site preparation for approved CP installation. Invasive plant work undertaken with the implementation of CREP would shield pristine public forests from some invasive plants, reduce the distribution of some invasive species, and aid eradication efforts that are currently ongoing for some invasive plants. Such control efforts can be effective if they are done on a significant scale within watersheds and if habitats from which they are removed are restored so that they become more resistant to future re-infestations of the same species. This would require restoration of diverse native habitats in areas from which invasive species are removed and periodic maintenance in accordance with approved individual conservation plans during the time through which those native habitats are becoming established.



Mauna Kea Silversword. Photo by M.Bruegmann. Courtesy of FWS.

A partial list of the non-native invasive species that would be targeted with the implementation of CREP includes*: Miconia calvescens, Rubus spp., Schinus terebinthifolius, Pennisetum setaceum, Leptospermum scoparium, Delairea odorata, Citharexylum spp.*, and *Ulex europea*. These species have significant impacts on erosion, infiltration, and out-compete native plants.

These project objectives will be reached through the implementation of the seven CPs proposed for implementation by the Hawaii CREP Agreement. The implementation of these practices throughout the proposed 30,000 acres is expected to make significant contributions to achieving the objectives outlined in the CREP Agreement Proposal. Each of the CPs is discussed in detail in Section 2.2.2 with Appendix A containing the full description and requirements of each practice from the FSA Handbook.

Additionally, CREP objectives would be met through the development of a conservation and/or maintenance plan for each enrolled property and the installation of FSA-approved fencing. More information about the maintenance plan and fencing can be found in Section 2.2.2.

1.5 Relevant Laws, Regulations, Programs and Other Documents

Implementation of the Hawaii CREP Agreement would complement existing conservation programs. The Hawaii CREP Agreement would need to comply with a number of statutes, Executive Orders, and regulations. The following is a list of potentially applicable laws. A description of existing Federal and State conservation programs is also included in this section. A brief description of Federal laws can be found in Appendix C.

1.5.1 Federal Laws

The following is a list of potentially applicable Federal laws:

- Clean Water Act of 1972
- Coastal Wetlands Planning, Protection, and Restoration Act
- Coastal Zone Management Act of 1972 Endangered Species Act of 1973
- Farmland Protection Policy Act (FPPA) of 1981
- Federal Insecticide, Fungicide, and Rodenticide Act of 1947 Food Security Act of 1985
- National Environmental Policy Act of 1969 and Regulations
- National Historic Preservation Act of 1966 and Regulations
- Safe Drinking Water Act of 1974
- Sustainable Fisheries Act of 1996
- Wild and Scenic Rivers Act of 1968
- Executive Order 11514: Protection and Enhancement of Environmental Quality
- Executive Order 11988: Floodplain Management—Floodplains and Wetlands
- Executive Order 11990: Protection of Wetlands Executive Order 12898, Environmental Justice for Minority and Low Income Populations
- Executive Order 13061, Federal Support of Community Efforts along American Heritage Rivers
- Executive Order 13089, Coral Reef Protection
- Comprehensive State Groundwater Protection Program
- CRP Programmatic Environmental Impact Statement
- USDA Departmental Regulation 9500-3

1.5.2 Hawaii Laws

The Hawaii Department of Health (HIDOH) administers State and Federal laws pertaining to environmental quality. Through its Environmental Management Division (EMD), HIDOH administers

State and Federal laws pertaining to air and water pollution, drinking water, and solid and hazardous waste. The Environmental Planning Office (EPO) of the HIDOH administers the nonpoint source pollution program. Department of Land and Natural Resources (DLNR) enforces State laws and regulations that protect wildlife and endangered species and State laws pertaining to water quantity. Individual CREP projects would need to ensure compliance with the following laws, where necessary:

- Hawaii Water Pollution Law (HIWPL) (Haw. Rev. Stat. Ch. 342D)
- Nonpoint Source Pollution Control Law (NSPCL) (Haw. Rev. Stat. Ch 342E)
- Hawaii Safe Drinking Water Law (SDWL) (Haw. Rev. Stat. Ch. 340E)
- Hawaii Pesticides Act (PA) (Haw. Rev. Stat. ch. 149A)
- Conservation of Aquatic Life, Wildlife, and Land Plants Act (CALWLPA) (Haw. Rev. Stat. ch. 195D)

1.5.3 Coordinated Conservation Plan

The Coordinated Conservation Plan (CCP) is a management plan proposed by the Hawaii NRCS that would supplement CREP. The purpose of the CCP proposal is to receive approval for Hawaii NRCS to use certain special procedures and authorities and to facilitate use of funds available through EQIP, WRP, GRP, Farm and Ranchland Protection Program (FRPP), and Wildlife Habitat Incentive Program (WHIP). All of these programs are currently available to landowners and operators through NRCS. However, the CCP would create expanded opportunities to apply for additional funds through a process that is designed to maximize the environment benefits of NRCS programs in conjunction with CREP. The following is a summary of these programs and how these programs would be affected by the CCP.

While these programs and the CCP are designed to complement CREP, funds from these programs cannot be used to fund restoration or CPs on CREP acres, nor can CREP funding be used for these programs as CREP does not work with other Federally funded programs. Also, the easements would prevent properties from being eligible for CREP.

The July 2004 proposal by the Hawaii State and Pacific Basin FSA serves as the source of information about the CCP.

The Environmental Quality Incentive Program

EQIP provides technical, financial, and educational assistance to producers for CPs that address natural resource concerns, such as water quality. Practices under this program include integrated crop management, grazing land management, well sealing, erosion control systems, agri-chemical handling facilities, vegetative filter strips and riparian buffers, animal waste management facilities and irrigation systems.

In Hawaii the CCP Subcommittee would work to establish new EQIP incentives, conservation practices, and ranking systems that would apply technologies and implement best management practices on working lands to improve water quality and native biodiversity benefits of the program. The following major priorities are likely to be established (along with ranking criteria) in initial years:

- Implementation of best management practices in farmed wetlands (taro, watercress, and other water-based crops) to maximize native wildlife benefits and reduce nutrient and sediment runoff into adjacent coastal waters;

- Control of invasive species (particularly miconia (*Miconia calvescens)*) to protect biodiversity, reduce erosion and facilitate groundwater recharge;
- Establishment of rotational grazing practices to reduce soil erosion and fire risk; and
- Targeting of erosion and nutrient control practices to coastal plain agriculture where immediate direct impacts on coral reef are likely after high rainfall events.

A special focus shall be placed on cooperative projects of multiple producers, which can dramatically enhance the chances for successfully controlling invasive species issues and to enhance water quality. Contracting to address invasive species through a cooperative project provides an opportunity to comprehensively address the invasive species issue on an area or watershed basis instead of approving individual projects that address invasive species problems farm-by-farm or ranch-by-ranch.

Cooperative EQIP projects are also needed to enhance water quality and quantity by reestablishing watershed-based management. Restoration of native riparian forest, reforestation of upper watersheds, and lowland wetland restoration are inextricably linked in reducing erosion, controlling sediment and nutrient-laden runoff, restoring water quality to streams, restoring hydrologic regimes, benefiting nearshore waters and coral reefs, and restoring habitat for imperiled native wildlife.

The Wetlands Reserve Program

WRP is an NRCS program designed to address the restoration of previously farmed wetlands. Easements are purchased for a 10-year, 30-year, or permanent duration. Freshwater wetlands are not common in Hawaii and are particularly rare in montane areas. As such, they are important habitat for five of Hawaii's Federally endangered water birds (Hawaiian coot, duck, nene goose, stilt, and gallinule) and numerous rare native damselflies. These all play an important role in increasing infiltration and storing and filtering water. CREP and WRP would function together to benefit these species through a concerted effort to enroll and restore wetlands in WRP and CRP.

The Grassland Reserve Program

GRP is part of the CCP and seeks to address issues on working rangeland within the CREP target areas to augment the CREP objectives. In particular, GRP would focus not just on enrollments, but also on projects that involve restoration funding. Such restoration is needed in areas where non-native fire promoting grasses are a hazard to improvements made through CREP and other programs. A second GRP priority is likely to be the use of prescribed grazing to reduce fire risks and invasive species problems near important areas of native habitat (that may be on adjacent land). Prescribed grazing potentially provides one of the most cost-effective ways to implement long-term management of invasive species and fire risks in some circumstances.

The Farm and Ranchland Protection Program

The Hawaii State Legislature has convened a working group to make recommendations on the development of a FRPP, and Hawaii received its first allocation from USDA for this program in 2003. Potential State FRPP match may be available through non-profit and/or local or county government sources. FRPP is an important component of the CCP given the high land values, extraordinarily strong development pressure, and critical importance of preserving open space in some of the CREP target areas, particularly those in the counties of Maui, Kauai and Honolulu. FRPP would be used in the enrollment areas to enroll land that is of high value for its erosion control, water quality, or biodiversity benefits and also is at high risk of conversion from agriculture to development. Within the CCP it is likely to be targeted at permanent easements for sites that are important for their agricultural value and that would

otherwise have an extremely significant impact if they were developed for residential uses and thus cause much greater nutrient runoff into near-shore waters.

Wildlife Habitat Incentive Program

The WHIP component of the CCP would focus on establishing projects within the CREP target area that augment investment in CREP by enhancing the wildlife values of the target watersheds. Projects may cover a variety of purposes related to CREP, including: T&E species habitat restoration, establishing corridors of native habitat between CREP restorations and native forest/riparian areas, and invasive species control, such as exclusion of feral ungulates. High priority would be given to projects located in areas within the CREP enrollment area that are also designated "critical habitat" by the FWS and to projects that seek to control "high priority" invasive plants or animals and noxious weeds.

This coordinated WHIP effort is needed for a number of reasons. First, there are activities that can be undertaken through WHIP that are unsuited to CREP, which would result in a net enhancement of the regional watershed and its resources. For example, the program might be used to:

- Restore habitat for T&E species, such as the Hawaiian goose or dark-rumped petrel;
- Establish corridors of native habitat between CREP restorations and native forest/riparian areas to allow the movement of wildlife between such areas;
- Carry out comprehensive restoration projects in areas to the benefit of native birds, such as the endangered Hawaiian hawk ('io), Hawaiian duck (koloa), or Newell's shearwater; and
- Install high cost, small acreage fences in and around particularly sensitive areas or plots of existing native forest upon which endangered and threatened native birds and plants depend.

Second, the implementation of WHIP initiatives in the CREP enrollment area would principally be targeted to projects on properties that do not meet the land eligibility requirements for CREP; e.g., cropping history. WHIP would be extremely useful in this regard since thousands of acres of cropland have gone out of production in the past decade and this acreage is in many cases interspersed among CREP-eligible lands. WHIP would be used to improve the habitat quality of WRP-ineligible montane wetlands that could serve as habitat for endangered or threatened waterfowl. The end result of incorporating the WHIP program is the enhancement of the overall watershed.

1.6 Scoping and Resource Issues

This section presents the record of planning and coordinating that occurred in conjunction with the planning of the Hawaii CREP. Resource issues are presented and can be tracked to section 2.3.2, Summary Comparison of the Effects of Alternatives A and B on the Resources, and to related sections of Chapter 3, Affected Environment and Environmental Consequences.

1.6.1 Scoping

As part of the official scoping process, FSA consulted with multiple agencies (copies of all consultation memoranda are included in Appendix E). Agencies consulted include: FWS, NMFS, Hawaii Coastal Zone Management Program (HICZMP), and SHPO. Consultation with these agencies was conducted in accordance with relevant Federal laws and regulations.

A broad array of organizations and individuals have expressed support for this proposal, including Hawaii Cattlemen's Council, agricultural and conservation groups, Native Hawaiian organizations as well as

Federal, State, and local governments. Large and small scale ranchers and farmers have expressed interest in and support for a CREP to USDA personnel in Hawaii during the past two years and many of these landowners have also written letters of support for this proposal.

From July 20 through July 22, 2004, CREP was introduced to stakeholders through site visits and a stakeholder discussion meeting. Personnel from DLNR and FSA presented information about CREP during a stakeholder discussion meeting that was held July 22,2004. This meeting allowed stakeholders to review and comment on the program. The following ranches had representatives that participated in the site visits and the stakeholder meeting:

- Ulupalakua Ranch
- Haleakala Ranch
- Piiholo Ranch

The following stakeholders attended the meeting held July 22, 2004:

- Hawaii Cattlemen's Council
- Tim Male, Environmental Defense

In a meeting held in September, 2005, Mike Robinson, Hawaii District land manager for the DHHL, expressed support for CREP (Peterson, 2005). DHHL was created by the Hawaii State Legislature in 1960 for the purposes of administering the Hawaiian home lands program and managing the Hawaiian home lands trust. The Hawaiian home lands trust consists of over 200,000 acres of land held in trust for native Hawaiians or individuals of at least 50 percent Hawaiian blood, as defined by the Hawaiian Homes Commission Act of 1920, as amended, and their successors (SCHHA, 2005).

Kamehameha Schools (KS) was founded by the will of Bernice Pauahi Bishop, great–granddaughter and last royal descendant of Kamehameha the Great. Bishop placed more than 375,000 acres of inherited Kamehameha lands in a perpetual endowment with one purpose: to create schools to improve the capability and well-being of Hawaiians. Today, KS owns more than 365,000 acres of real estate in Hawaii, making it the largest private landowner in the state. Ninety-eight percent of that land is in conservation and agriculture, and the remainder is in commercial and residential use. KS Land Asset Division manages more than 345,000 acres of agriculture and conservation land, including over 60 miles of ocean frontage, 100 miles of streams, historic fishponds, forests and lava fields (KS, 2005). Peter Simmons, Hawaii Land Manager for KS, expressed support for CREP in a 2005 meeting with USDA personnel (Peterson, 2005).

External scoping was conducted as part of this project with the Draft PEA being made available to the public in accordance with NEPA and FSA regulations. No comments were received concerning the Draft PEA.

1.6.2 Relevant Resource Issues

The following resources may be affected by the Hawaii CREP Agreement: surface water quality, drinking water, wetlands, floodplains, marine resources, protected species, and socioeconomics. These issues were identified during internal scoping between FSA, NRCS, and State of Hawaii personnel. They are adapted from the environmental effects worksheet that was developed by HI NRCS to identify impacts of

proposed NRCS activities at the site-specific level. Chapter 3 discusses each of the seven issues, along with four mandatory impact considerations, in detail. Affected resources issues are introduced below.

Issue #1: Surface Water Quality susceptibility to agricultural practices

Water quality in Hawaii continues to decline. This is evidenced by the addition of 11 new stream segments and 35 new coastal stations to the 2004 section 303(d) list of impaired waters in Hawaii. No waters were removed from the 2002 CWA section 303(d) list indicating that either there was no significant improvement in water quality or a reduction in water quality in Hawaii's waters. Runoff from agricultural areas contributes sediment and nutrients to receiving water bodies (HICZMP, 1996). For a full discussion see Section 3.2.

Issue #2: Drinking Waters susceptibility to agricultural practices

Groundwater provides about 99 percent of Hawaii's domestic water and about 50 percent of all freshwater used in the State. Contamination of groundwater has occurred from agricultural and industrial activity in areas of Central Oahu, North Maui, East Kauai, and East Hawaii (EPA, 2004a, GWPC, 1999, USGS, 2000). Section 3.3 discusses current issues affecting drinking water. Sole source aquifers (SSAs) are of particular concern because they supply at least 50 percent of drinking water to a community and there is no alternative source that could supply 100 percent of drinking water to that community. There are two SSAs in Hawaii: the Oahu SSA and the Molokai SSA. The Oahu SSA covers most of the island of Oahu and is the drinking water source for Honolulu. The Molokai SSA designated area covers the entire island of Molokai.

Issue #3: Wetlands susceptibility to agricultural practices

The main threats to wetlands from agriculture include diminishing water supply from irrigation diversions, agricultural development, increased sediment and nutrient loads from agricultural lands, and grazing. Coastal plains wetlands in Hawaii have decreased from an estimated 22,475 acres in the 1780s to 15,745 acres in 1990, a 30 percent decrease. Wetlands degraded by grazing practices are also more vulnerable to invasive species (HICZMP, 1996). Section 3.4 discusses wetlands issues in more detail.

Issue #4: Floodplains susceptibility to agricultural practices

All Federal actions must meet the requirements of EO 11988, Floodplain Management. Federal agencies are required to review all proposed projects to determine if it will be located within, or will affect, a 100 year floodplain. Floodplains are used for agricultural purposes throughout Hawaii. Current issues affecting floodplains are discussed in Section 3.5.

Issue #5: Marine Resources susceptibility to agricultural practices

Hawaii has 1,052 miles of ocean coastline. No point in Hawaii is more than 29 miles from the shore. Any activity that occurs inland has the potential to impact coastal resources. Sediments, nutrients and pesticides from agricultural runoff adversely impact coral reefs, estuaries, and other coastal resources (NOAA, 2004a). Current trends are discussed in Section 3.6

Issue #6: Protected Species susceptibility to agricultural practices

Hawaii is home to 317 Federally listed T&E species (Appendix B). Habitat degradation from development, invasive and exotic species, and pollution continue to threaten current listed species populations (FWS, 2004b). Current trends and issues affecting critical habitat and T & E species are discussed in Section 3.7.

Issue #7: Cultural Resources susceptibility to agricultural practices

Hawaii's wetlands and floodplain areas are important to traditional native Hawaiian agriculture for taro and fishponds. Siltation damages near-shore waters and coral reefs. Damage to wetlands, shore waters, and coral reefs can degrade ancestral native Hawaiian fishponds and taro fields and compromises traditional lifestyles and practices. Current trends and issues affecting cultural resources and traditional cultural activities are discussed in Section 3.8.

Issue #8: Human health, safety, and economic susceptibility to agricultural practices

Agriculture is a large component of Hawaii's economy. CREP may impact this economy in a number of ways affecting farm workers, land owners, service industries, etc. A discussion of socioeconomics can be found in Section 3.9.

All Federal programs, including CREP, must comply with Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations. CREP has the potential to affect minority populations such as migrant farm workers. A discussion of the issues affecting environmental justice is found in Section 3.9.

1.6.3 Resources/Issues Eliminated from Detailed Study

Air Quality

As CREP would have no discernable effect on Hawaii's air quality, the topic was eliminated from further consideration as part of this PEA. Minor benefits to air quality might result as revegetation of eroded areas would decrease the amount of airborne particulates and sediments. This benefit is expected to be greater on the leeward sides of all the islands. However, a thorough analysis of the topic is outside the scope of this PEA as analysis on a State-wide scale without knowledge of the location of all CREP acreage would be unreliable and an unrealistic approximation of possible positive effects. On a broader level it is reasonable to assume that the proposed action would not result in impacts on the attainment, non-attainment, or maintenance status of any of Hawaii's airsheds.

Prescribed burning may be used to control invasive plant species and could result in detrimental effects to air quality. However, these effects would be temporary (1-3 days) and all prescribed burns would be done with a fire plan in place that is approved by both DOFAW and the appropriate County Fire Department. Consideration of any potential impacts to air quality would take place in the site-specific environmental evaluation that would be conducted prior to each CREP contract being completed. Actions would be taken to avoid any potential negative impacts but marginal localized improvements would be allowed.

Noise

After a careful analysis it was determined that there would be no impacts from noise as a result of CREP. Following the short-term construction noise, as the CPs are installed, there would be no continual impacts on the local soundscapes. With long-term nature of the conservation practices, which would result in decreased agricultural activities on CREP lands, noise level can be expected to decrease slightly. As a result, FSA eliminated noise from further analysis as part of this PEA.

Protected Rivers

The National Wild and Scenic Rivers Act (16 U.S.C. 1271-1287) was enacted to establish a National Wild and Scenic Rivers System. Rivers are selected based upon outstanding scenic, recreational, geological, fish and wildlife, historic, cultural, or similar values. The Act mandates designated rivers to be

preserved in free-flowing condition and their adjacent borders to be protected for future generations. Rivers are designated as wild, scenic, or recreational according to the classifications outlined by the Act. Federal agencies involved in the use and development of water and related land resources are required to protect national wild, scenic, and recreational river areas. The Hawaiian Islands do not have any river designated for protection under this Act.

Also, the NPS maintains the NRI that lists segments of rivers that potentially qualify as national wild, scenic, or recreational areas. The Hawaiian Islands have 37 rivers, some with multiple river segments, on the NRI. In order to comply with the National Wild and Scenic Rivers Act, FSA must review the NRI to determine if the project is located adjacent to or within close proximity of a river on the NRI. FSA must consult with the NPS Regional Office before taking actions that could foreclose wild, scenic, or recreational status for rivers on the NRI. A negligible positive effect on protected rivers is possible as CREP implementation is likely to improve water quality in nearby and downstream waterbodies, including NRI river segments. Improved water quality would only enhance the values for which the NRI rivers segments were listed for protection, such as scenic, wildlife, and historic values, and the implementation of CREP would not foreclose the wild, scenic, or recreational status for rivers on the NRI. However, a thorough analysis of the topic is outside the scope of this PEA as analysis on a State-wide scale without knowledge of the location of all CREP acreage would be unreliable and an unrealistic approximation of possible positive effects. To further ensure that CREP contracts would not have negative impacts on protected rivers, the NRI would be referenced when completing site specific EEs. An FSA representative would verify that no protected rivers would be adversely affected as a result of the individual CREP contract.

Another classification of protected river is the American Heritage Rivers Initiative directed by the EPA. This program was created by EO 13061, which Stated that:

> Agencies shall commit to a policy under which they will seek to ensure that their actions have a positive effect on the natural, historic, economic, and cultural resources of American Heritage River communities. The policy will require agencies to consult with American Heritage River communities early in the planning stages of Federal actions, take into account the communities' goals and objectives and ensure that actions are compatible with the overall character of these communities.

Hawaii has one of 14 Presidentially designated American Heritage Rivers, the Hanalei River on the Island of Kauai. The Hanalei River is approximately 16 miles long from its source to the ocean. It is a free-flowing river terminating in an estuarine bay, the third largest and most pristine in Hawaii. Hanalei River is actively managed to protect its agricultural uses, including traditional Hawaiian wetland taro production (EPA, 2004c). All CREP contracts would undergo site specific EEs which would ensure that CREP implementation would not have any negative impacts on the Hanalei River. While there is a chance that CREP would have beneficial effects on Hanalei River, by filtering sediment, agricultural chemicals, and nutrients from the waters that feed the river, a thorough analysis of the topic is outside the scope of this PEA and the topic was also eliminated from further consideration as part of this PEA.

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Chapter 2.0 Alternatives Including the Proposed Action

2.1 Introduction

This chapter describes the actions proposed in the PEA, beginning with the No Action Alternative—Continue Current Agricultural Practices, and ending with the Action Alternative—Implement Hawaii CREP. Alternatives will be compared in terms of their individual environmental impacts and their ability to achieve objectives listed in section 1.4.

2.2 Description of Alternatives

2.2.1 Alternative A (No Action)—Continue Current Agricultural Practices

Alternative A would allow current agricultural practices to continue and would rely on Federal and State programs already in place to slow the current rates of water quality degradation, soil erosion, coral cover loss, and wildlife habitat loss. There would be no incentives to implement FSA approved CPs. Benefits from these CPs would not occur under Alternative A.

Agriculture Practices in Hawaii

Hawaii produces and exports numerous agricultural products. The climate of Hawaii makes it ideal for growing coffee, sugarcane, cut florals, vegetables, pineapples, and macadamia nuts (Hawaii accounts for 100 percent of the U.S. production of pineapple and macadamia nuts) (USDA, 2004).

Agricultural production in Hawaii utilizes 1,300,499 acres, or 32 percent of the State's 4,110,720 acres. There are approximately 5,398 farms in the State and farms average 241 acres. Approximately 91.9 percent of Hawaii farms are less than 100 acres. Table 2.1 summarizes agricultural land use for each county (NASS, 2004, DBEDT, 2004).

Table 2.1. Summary of Agricultural Land Use in Hawaii. Sources: NASS, 2004; DBEDT, 2004.

	Total Land (Acres)	Land in Farms (Acres)	Percent Of Total Land In Farms	Number of Farms	Average Size of Farm (Acres)
State Of Hawaii	**4,112,388**	**1,300,499**	**32**	**5,398**	**241**
Hawaii County	2,573,400	821,276	32	3,216	255
Maui County	750,900	256,690	34	823	312
Honolulu County	386,188	70,705	18	794	89
Kauai County	353,900	151,828	43	565	269

Historically, native Hawaiians established coastal fishponds and small farms, growing a multitude of food and fiber crops. Lowland river and stream valleys were highly modified for the production of crops, while high elevation and upland areas remained primarily forested. There were no domesticated ungulates, although wild pigs that roamed the forest are an important food and cultural resource. Between 1835 and 1950, increasing acreage came under use for cattle grazing, or for the production of pineapple and sugarcane. By the 1940s and 1950s, there was almost 300,000 acres in large sugar cane and pineapple plantations and over 1.2 million acres in extensive pasture. Much of this expansion occurred on mid to upper elevation lands that were first cleared of forest (Proposal, 2004). Currently plantation agriculture is in decline and from 1992 to 2002 land cropped to sugarcane had declined from 145,700 acres to 47,500 acres (DBEDT, 2004). Much of this land is fallow, some has been developed for housing, and an increasing acreage is being used for the production of a diverse set of crops for local and specialty markets, which are generally produced on small farms (Proposal, 2004).

Management of croplands and pasture has not always been conducive to resource concerns that were affected by such land use either because operations pre-dated knowledge of such best management practices or because producers did not have the resources to manage their lands in such a manner. For example, areas on Molokai were heavily deforested and eroded as a result of the onslaught of newly introduced goats, horse, and cattle in the 19th century. This period of intense grazing by feral animals as well as later control cattle grazing, in some areas has resulted in the loss of topsoil, alteration of local microclimates, and drying up of streams and springs (Proposal, 2004).

Current agricultural practices utilize pesticides and fertilizers for a number of uses. In 2002, 4,042 (75 percent) of Hawaii farms used commercial fertilizers, treating 127,996 acres. Application of pesticides and fertilizers has the potential to adversely affect surface and groundwater quality, wetlands, and marine resources. Fertilizer and pesticide use is summarized by county in Table 2.2. Out of all Hawaii farms:

- 730 (14 percent) used manure
- 1,840 (34 percent) used sprays, dust, etc. to control insects 2,820 (52 percent) used sprays, dust, etc. to control weeds
- 275 (5 percent) used sprays, dust, etc. to control nematodes
- 800 (15 percent) used sprays, dust, etc. to control diseases
- 216 (4 percent) used sprays, dust, etc. to control growth, thin fruit, or defoliate (NASS, 2004)

Table 2.2. Fertilizers And Chemicals Applied to Hawaii Farmland: 2002. Source: NASS, 2004; DBEDT, 2004.

	Commercial Fertilizer, Lime, And Soil Conditioners (Acres)	Manure (Acres)	Chemicals Used To Control				
			Insects (Acres)	Weeds, Grass, Or Brush (Acres)	Nematodes (Acres)	Diseases In Crops And Orchards (Acres)	Growth, Thin Fruit, Or Defoliate (Acres)
State of Hawaii	**127,996**	**3,812**	**41,616**	**101,258**	**8,169**	**30,824**	**26,378**
Hawaii County	43,697	2,136	14,536	29,117	879	16,290	1,396
Honolulu County	17,864	9,51	13,575	13,986	4,861	6,749	306
Kauai County	14,790	4,12	3,604	17,222	699	4,620	(D)*
Maui County	51,645	3,13	9,901	40,933	1,730	3,165	(D)

* (D) = Withheld to avoid disclosure of individual operations.

2.2.2 Alternative B (Proposed Action)—Implement the Hawaii CREP

Alternative B—Implementation of the proposed CREP Agreement would begin a five year enrollment period to target 30,000 acres for the installation and maintenance of selected CPs. Of that acreage, 10,000 acres would be targeted for the installation of native, forested riparian buffers and 20,000 acres would be targeted for the installation of native tree-planting. Special efforts would be made to install CPs on land containing highly erodible cropland and marginal pastureland located within critical watersheds, groundwater recharge areas, and areas that contribute to the State's sedimentation problems. CREP would provide the financial and technical assistance necessary to assist eligible producers in voluntarily establishing CPs to help control water runoff, chemical and organic contamination, sedimentation, soil erosion, and improve wildlife habitat.

The proposed 30,000 acres to be enrolled in CREP would affect less than one percent of the State's land area and 2.3 percent of the State's agricultural land. Agriculture occurs on each of the main islands: Hawaii, Maui, Molokai, Lanai, Kauai, and Oahu. The proposed action would service each of the main islands incrementally within the initial five years. CREP would be phased in incrementally across the State to allow the State and Federal agencies time to develop and examine new restoration techniques, allow development of infrastructure to support the approved CPs such as nursery capacity to produce native plants for out-planting, and also allow the State and Federal agencies time to add and train technical and administrative staff necessary to implement the program throughout the State. The program would be phased in as follows and as demand and staffing capabilities allow:

Increment 1. Hawaii and Maui
Increment 2. Molokai and Lanai
Increment 3. Kauai
Increment 4. Oahu

Federal Funding

Overall, total Federal project costs equal $77,252,000. Average annual costs equal $3,862,600 per year over the 5-year period during which contracts would be initiated and the 15-year term of those contracts (a total period of 20 years). The non-Federal contribution (not counting individual landowner contributions) would consist of watershed management, invasive species control, reforestation, erosion control efforts, and monitoring. Under USDA rules, these non-Federal sources must contribute 20 percent or $19,313,000 over a 15-year period. The total annual estimated cost of the non-Federal contribution is $1,287,533 per year. These costs are summarized in Table 2.3 State funding is described in more detail below.

Table 2.3. Costs summary for CREP Agreement. Source: Proposal, 2004.

Enrollment	Amount	USDA Cost per Acre	USDA Total Cost
Buffers	10,000 acres	$2,500.00	$25,000,000
Forest Restoration	20,000 acres	$2,662.60	$52,252,000
Total Federal Costs	**30,000 acres**		**$77,252,000**
Non-Federal Programs			**$19,313,000**
Total Federal and Non-Federal Costs			**$96,565,000**

State Funding

The State and private partners would contribute in-kind services and supportive State expenditures for watershed management, invasive species control, stream restoration, reforestation and program administration equal to 20 percent of the overall cost of the Hawaii CREP program. The estimated average cost of the State 20 percent contribution over a 15-year period is $1.288 million per year. The State funds used to provide the 20 percent contribution may also be used to leverage other funds from private, Federal and local sources to expand and enhance supportive management efforts in CREP watersheds. The exact programs contributing to the match may vary from year to year. At the end of each State fiscal year, the State shall provide USDA with a report providing its estimated expenditures for CREP-supportive activities. The State would describe the strategy and measures it employs to tailor the benefits of these programs and expenditures in a manner that enhances the benefits of CREP (Proposal, 2004).

The following non-Federal expenditures and commitments shall be counted toward the 20 percent non-Federal contribution to the extent they are expended in CREP watersheds:

1. Natural Area Reserve funding for activities that relate to the management or control of invasive species, to restoration of watersheds, or to erosion control [estimated at $1,600,000 per year];
2. Near-shore marine and coral reef monitoring and management funds in areas below CREP watersheds [estimated at $400,000 per year];
3. Invasive Species Committee expenditures in CREP watersheds [estimated at $1,200,000 per year];

4. Expenditures on DLNR-Department of Forestry and Wildlife (DOFAW) field crews involved in invasive species control in CREP watersheds [estimated at $250,000 per year];
5. Watershed restoration funding in CREP watersheds [estimated at 1,200,000 per year];
6. Funding of invasive species control and watershed management on private lands in CREP watersheds via the Natural Area Partnership Program (NAPP) [estimated at 900,000 per year];
7. Funding private forest management and restoration efforts via the State forest stewardship program in CREP watersheds [estimated at $450,000 per year];
8. Conservation easements on private land in CREP watersheds donated by private landowners [amount unknown]; and
9. Expenditures for salary and overhead of a State CREP coordinator [estimated at $50,000 per year] (Proposal, 2004).

All of these State and private efforts contribute significantly toward the accomplishment of CREP objectives.

Implementation Procedure for the Hawaii CREP Agreement

Oversight of CREP shall be undertaken by a joint CREP implementation committee, which would be chaired by State FSA officials, but shall include at least representatives of the following entities:

- State FSA Committee
- State NRCS
- FWS
- Hawaii DLNR
- Hawaii Department of Agriculture
- Hawaii Department of Health
- University of Hawaii (UH) at Manoa
- Local watershed partnerships
- Producer and conservation community

Special technical assistance shall be established to assist landowners in the implementation of CREP and in the coordinated NRCS conservation plan development. NRCS would investigate issuing, through a competitive bidding process, a contract to one or more third party providers to coordinate this technical assistance. A team shall be established of one NRCS official, one FSA official and one representative of the third party provider(s) to receive CREP applications and to assign either Federal personnel or a third party agent to work with the landowner on the development of the conservation plan and the enrollment process. The State of Hawaii intends to engage in the program at the policy oversight level through participation in the steering committee. Once a conservation plan is developed and other required paperwork is completed, it would be approved by the CREP work team, the responsible NRCS personnel in charge of approving the technical aspects, and the FSA personnel responsible for approval of financial assistance and payment. Third party technical service providers (TSPs) would also be responsible for verifying implementation according to the developed schedule (Proposal, 2004).

A requirement of approving CREP contracts under Alternative B would be the completion of a site specific environmental evaluation, referred to as an EE. The EE would ensure that site-specific local issues eliminated as part of this broad PEA would be addressed prior to implementation of a CREP contract as appropriate (Proposal, 2004).

Enrollment in the Hawaii CREP

Lands must meet cropping or marginal pastureland and land ownership requirements in order to be enrolled in CREP. In addition, Hawaii requests that lands otherwise meeting the cropland definition except that they have not been in crop production for more than six years prior to passage of the Food Security Act of 2002 should be considered if they meet the following criteria:

- Have been cropped for at least three consecutive decades
- Have been removed from production because of fundamental changes in market conditions outside of the control of the producer
- Have not been put to any active, non-agricultural use since they were removed from active crop production

To be eligible, FSA in consultation with NRCS must determine that enrollment of such lands would significantly contribute to the conservation goals of the CREP. In general, the CREP seeks to restore native forested riparian buffer zones of varying widths; restore native forest in critical groundwater recharge areas; and restore riparian and other wetlands (Proposal, 2004).

To be eligible, FSA in consultation with NRCS must determine that enrollment of such lands would significantly contribute to the conservation goals of CREP. In general, CREP seeks to restore native forested riparian buffer zones of varying widths; restore native forest in critical groundwater recharge areas; and restore riparian and other wetlands for 15 years by requiring participants to sign a contract or rental agreement (Proposal, 2004).

Maintenance Plan for Enrolled Property

Active management is required to preserve the conservation value of established CRP plantings because of the special management needs created by the overwhelming invasive species problem in the State. Invasive species would likely re-invade enrollment areas after initial projects are completed and thus would require additional control efforts. Control methods may include the use of pesticides, mechanical means (e.g. pull by hand, mow, or cut/chop), and/or prescribed burning (Peterson, 2005). To address this special concern, each enrolled property would develop a special maintenance plan that describes what actions would be taken over the 15-year life of the contracts to deal with invasive species problems (Proposal, 2004). This maintenance plan will ensure that only registered pesticides will be used and that pesticides will be applied according to label directions. If prescribed burning is used as a control method, a fire plan that is approved by both the DOFAW and County Fire department will be required (Peterson, 2005).

Enrollment Opportunities

CREP project areas have been chosen because of the local and national significance of the near-shore waters and coral reefs within these watersheds, the habitat they could provide for targeted Federally listed T&E species, and their importance for groundwater recharge. Many of the areas include State water quality limited segments for which agriculture has been identified as one contributing source of nutrient and sediment loading.

Conservation Practices

Seven FSA CPs were selected as the best methods for achieving the Hawaii CREP Agreement objectives. These practices would enable producers to productively use areas that are wetlands, in a floodplain, or that discharge to wetlands or floodplains. Detailed rental and incentive payments, cost share and

maintenance payments, and technical requirements and operating procedures for each practice are outlined in the FSA Handbook, Exhibit 9, and can be found in Appendix A.

CPs must meet the minimum specifications outlined in the NRCS field office technical guide (FOTG) as well as all other applicable Federal, State, and local requirements. A TSP would provide the consultation necessary for the implementation of the practices, such as how to construct the areas to most effectively achieve the goals of the CP. The formulation of these conservation options and their application to particular lands would be based on the consideration of landowner objectives, the suitability of a site for a CP, and the extent of the potential benefits expected from that CP. Available CPs are based upon eligibility criteria and have been divided into two categories: buffers and forest restoration (Proposal, 2004).

Buffers

The goal for this category shall be to restore up to 10,000 acres of native, forested riparian buffers to improve water quality in streams, reduce flow of polluted runoff to near-shore waters and coral reefs, and restore terrestrial and aquatic wildlife habitat. This acreage represents between 15 and 30 percent of all riparian habitat that traverses agricultural land in Hawaii. All efforts would be phased in over a five-year period.

Buffers along permanent or seasonal/intermittent streams would be allowed, whether they are fed by surface runoff or groundwater. Intermittent streams are defined as: rivers or streams that are seasonally flowing waters that drain land surfaces in defined channels, with flowing water decreasing to pools before drying up. Characteristic plants and animals that are found in these areas need water for at least a few weeks. Implementation of CPs would be allowed adjacent to intermittent streams because the unique geology and highly variable rainfall of Hawaii give such streams a disproportionate impact on freshwater and marine water quality and quantity (NRCS, 2003).

The following is a brief description of the USDA FSA National Practices that would be available under this category:

CP 2 (Establishment of Permanent Native Grasses): This practice establishes a permanent vegetative cover of native grasses on eligible cropland that would enhance environmental benefits. It is used to reduce soil erosion and sedimentation, improve water quality and create or enhance wildlife habitat.

CP 3A (Hardwood Tree Planting): This practice establishes a stand of predominantly hardwood trees in a timber planting that would enhance environmental benefits. Hardwood trees benefit the environment by providing permanent cover for wildlife and preventing soil erosion. Preventing soil erosion would improve water quality by preventing nutrient-laden soil from entering the water system.

CP22 (Riparian Buffer): Riparian buffers are strips of grass, trees, or shrubs established adjacent to streams, ditches, wetlands, or other water bodies. Riparian buffers reduce pollution and protect surface and subsurface water quality while enhancing the aquatic ecosystem.

Hawaiian Coot. Photo courtesy of USDA NRCS

CP 23 (Wetland Restoration): This practice restores the functions and values of wetland ecosystems devoted to agricultural use. This practice demonstrates excellent phosphorus reduction efficiency and improves quality of downstream waters. These benefits would contribute to meeting CREP objectives and improving conditions in the CREP project areas.

CP 25 (Rare and Declining Habitat): The purpose of this practice is to restore the functions and values of endangered and threatened habitats. This practice targets land or aquatic habitats that have been degraded by human activities. It is intended to provide habitat for rare and declining wildlife species by restoring and conserving native plant communities. Restoration and conservation of native plant communities serves to increase native plant community diversity. Additionally improvements in vegetative cover would serve to reduce soil erosion from lands degraded by human activities.

CP 29 (Marginal Pastureland Wildlife Habitat Buffer): The purpose of this practice is to remove nutrients, sediment, organic matter, pesticides, and other pollutants from surface runoff and subsurface flow through the processes of deposition, absorption, plant uptake, and denitrification. Wildlife habitat buffers reduce pollutants, protect surface water quality and subsurface water quality, and enhance ecosystem of the water body. The restoration of native plants would assist in stabilizing stream backs, reduce flood damage impacts, and restore and enhance wildlife habitat.

The Nene Goose, a T&E species and Hawaii's State Bird. Photo Courtesy of NRCS USDA.

CP 30 (Marginal Pastureland Wetland Buffer): The purpose of this practice is to remove nutrients, sediment, organic matter, pesticides, and other pollutants from surface runoff and subsurface flow through the processes of deposition, absorption, plant uptake, and denitrification. The practice would enhance and/or restore hydrology and plant communities associated with existing or degraded wetland complexes. The goal is to enhance water quality, reduce nutrient and pollutant levels and pollutant levels, and improve wildlife habitat.

Forest Restoration

The goal for this category shall be to enroll up to 20,000 acres of cropland and marginal pastureland in native and non-invasive species planting practices in critical groundwater recharge areas or areas that contribute to sedimentation problems.

Enrollments under this category would occur on the islands of Maui, Hawaii, Lanai, Molokai, Kauai, and Oahu. Plantings and natural regeneration would improve recharge capacity of water and decrease peak flows and sediment loads of permanent and seasonal streams during high rainfall events. Such plantings would also increase the likelihood that downstream riparian buffers would not be destroyed in periodic floods (Proposal, 2004).

The FSA CPs that would be available under this category have been briefly described above and include:

- CP 3A (Hardwood Tree Planting)
- CP 23 (Wetland Restoration)
- CP 25 (Rare and Declining Habitat)

Additional Conservation Activities

A significant challenge to the management of CREP is the overwhelming invasive species problem in Hawaii. After the initial project is completed, exotic plant species are likely to reinvade enrollment areas and feral mammals could dramatically disturb restored plant communities and riparian areas. The success of CREP would depend on effectively controlling invasive plant and animal species and preserving the conservation value of the CPs.

From the onset of CP installation, special efforts would be needed during site-preparation to prevent invasive species from becoming dominant. Ongoing active management after the initial project is completed would also be necessary and a special maintenance plan would be developed for each enrolled property. The approved conservation and maintenance plans would describe what actions and control efforts would be taken over the 15-year life of the contract to address invasive species problems.

Control of feral mammals would require fencing that is of sufficient strength and design to exclude grazing and browsing mammals. The type of fencing installed would be dependant on site-specific criteria including: topography; type of animal to be excluded; and remoteness of the enrollment area.

Payments in CREP

Buffer

Buffer enrollments using CP 22, CP 29, and CP 25 shall receive an annual payment for 15 years of the maximum county rental rate for the soils in question (estimated at $30 acre/year to $70 acre/year), plus a 20 percent incentive payment bonus (estimated at $6 per year to $14 per year) or a 40 percent incentive payment bonus (estimated at $12 per year to $28 per year) for CP 25, plus a sign-up incentive payment of $10/acre/contract year ($150 per acre). This yields an average 15-year incentive cost of $690 for buffers with an average soil rental rate of $30/acre (Proposal, 2004).

Forest Restoration

Forest restoration, using CP 3A, CP 25, and CP 23, shall receive an annual payment for fifteen years of the maximum county soil rate (estimated at $30 acre/year to $70 acre/year), plus a 20 percent incentive payment bonus (estimated at $6 per year) or a 40 percent incentive payment bonus (estimated at $12 per year) for CP 25, plus a sign-up incentive payment of $10/acre/contract year ($150/acre). This yields an average 15-year incentive cost of $690 per acre for forest restoration (Proposal, 2004).

Monitoring Program

The State of Hawaii would use the ongoing water quality-monitoring program implemented by the HIDOH Clean Water Branch and Environmental Planning Office to monitor and assess the success of CREP in improving water quality and reducing sedimentation and polluted runoff into streams and near-shore waters. The HIDOH monitors over 150 water bodies that are known to be water quality impaired in watersheds across the State. HIDOH also compiles information from other agencies and organizations on their water quality monitoring efforts and provides reports on the status of State surface waters. The DLNR would compile HIDOH historic and current data and reports on CREP watersheds to monitor water quality changes over the life of the program. DLNR would work with HIDOH to target new monitoring efforts to include CREP areas (Proposal, 2004).

1. University of Hawaii Watershed-Based Environmental Monitoring

The UH is planning a major watershed based monitoring initiative funded by the National Science Foundation's Experimental Program to Stimulate Competitive Research (EPSCOR) and is interested in working with CREP partners to monitor water quality changes from CREP watershed management activities. The UH has received multi-year funding from the National Science Foundation to engage in State-of-the-art monitoring of a broad range of water quality, water quantity, and biological parameters in a number of Hawaii watersheds.

Initial monitoring arrays would be installed within watersheds targeted by the CREP enrollment area on Kauai. Other monitoring arrays are planned for Maui and Hawaii. If EPSCOR funding continues, the researchers are interested in potentially collaborating with CREP partners and providing additional data

2. Coral Reef Assessment and Monitoring Program

The Hawaii Division of Aquatic Resources (DAR) has an ongoing monitoring program to assess the status of coral reefs in key areas throughout the State. DAR monitors trends in percentage of coral cover and species diversity on reefs over time. Where conducted in CREP watersheds, this monitoring program would be used to assess the positive benefits of CREP restoration activities on coral reefs in near-shore waters. Plans are underway to develop additional monitoring programs at the UH to assess sedimentation and nutrient inputs on select coral reefs throughout the State. As these programs are developed, this additional monitoring information would be compiled and reported for CREP targeted watersheds.

3. Watershed and Habitat Restoration Monitoring Program.

DLNR would compile information on native and watershed trees out-planted, as well as out-plantings of rare plants (number of individuals out-planted) on enrolled properties. Annual reports would be completed by DLNR in collaboration with the CREP Steering Committee and would focus on the extent of lands enrolled, farm and ranch participation, numbers of native plants out-planted, wetland acreage restored, watershed acreage protected and maintenance completed. Data would be provided such that it is directly comparable between years and would provide measures that indicate progress toward achieving the goals laid out in the objectives section (see Section 1.4).

Monitoring would demonstrate program success in achieving voluntary enrollments and conservation goals. DLNR would make every effort to make proportionate progress each year in enrollments. If enrollments and goals are not sufficiently attained, DLNR would recommend appropriate changes to the program, including, but not limited to, modifying the cost tables and making additional outreach efforts. Native habitat restoration is a relatively new management field in Hawaii and one in which the science is rapidly developing. This program would contribute substantially to developing restoration techniques and it is likely that practices would need to be amended as site preparation, planting, fencing, and invasive species control techniques are applied and modified to develop best management practices for CREP enrollment areas.

Public Outreach and Support

The success of CREP depends on effective outreach to landowners in targeted watersheds. Hawaii has roughly 5,000 farms, of which 3,000 are of 9 or fewer acres and are not considered to have high interest in CREP. The remaining 2,000 farms would be targeted through the following efforts:

- During the first phase of the CREP enrollment period, third-party technical deliverers would have personal calls and meetings with producers controlling at least 80 percent of the potentially eligible land within six months of the program's approval. Similar outreach efforts would be carried out during subsequent phases of the program.
- NRCS would include CREP information on its website and in all Farm Bill outreach efforts.
- All existing watershed coordinators would assist with outreach efforts to producers.
- The Hawaii Landowner Incentive Program (LIP) within the DLNR would prepare and update a pamphlet providing information on CREP. This pamphlet would be mailed to the 2000 larger producers. The FWS also has a private landowner program, and it has agreed it would distribute this pamphlet broadly.
- An ongoing effort would be made to provide speakers about CREP at appropriate local events such as meetings of farm and ranch groups.

For training purposes, a half-day workshop would be developed for all NRCS and FSA field staff members who could become involved in the program. The CREP Steering Committee would coordinate this workshop. Once a year, a technical workshop would be arranged for those involved in developing conservation plans and otherwise involved in technical work.

2.3 Comparison of Alternatives

Implementing either alternative would have specific environmental implications for the State's watersheds and the ability of this project to meet the project objectives outlined in Section 1.4. The following two tables provide a summary comparison of the alternatives. To provide consistency, the following impact terminology would be used in the comparison table below and throughout the document.

Impact Categories

Environmental effects that may occur as a result of implementing one of the alternatives would be described in the succeeding resource sections in the following manner:

- No Effect—A change to a resource's condition, use, or value that is not measurable or perceptible.
- Beneficial Effect—An action that would improve the resource's condition, use, or value compared to its current condition, use, or value.
- Minor Adverse Effect—A measurable or perceptible, minor, localized degradation of a resource's condition, use, or value that is of little consequence.
- Moderate Adverse Effect—A localized degradation of a resource's condition, use, or value that is measurable and of consequence.
- High Adverse Effect—A measurable degradation of a resource's condition, use, or value that is large and/or widespread and could have permanent consequences for the resource.
- Short-term Effect—An effect that would result in the change of a resource's condition, use, or value lasting less than one year.
- Long-term Effect—An effect that would result in the change of a resource's condition, use, or value lasting more than one year and probably much longer.

2.3.1 Summary Comparison of Achievement of Project Objectives of Alternatives A and B

Table 2.4 provides a key part of the information needed by the Secretary of Agriculture and the public to make an informed, reasoned decision regarding the implementation of the proposed CREP agreement..

Table 2.4. Comparison of achievement of project objectives of Alternatives A and B.

Objectives	Indicators	Alternative A: No Action	Alternative B: Implement CREP
Objective #1: Protect Hawaiian Coral Reefs	An increase in coral cover and increased coral diversity on coral reefs over the 15- years life of the project.	Current agricultural practices would continue. FSA CPs would not be implemented or funded. Sediments and nutrients would continue to discharge into Hawaii's waterbodies. Sedimentation has resulted in a 33 percent decrease in coral cover in Honolua Bay (HCRIRP, 2004b).	Up to 30,000 acres would be enrolled in FSA CPs. These CPs would result in reducing sediment and nutrient loads in waters that discharge into coral reefs.
Objective #2: Improve the Status of Hawaii's Protected Species	A an increase in the populations of Federally listed T&E species over the 15-year life of the project. Targeted species include: koloa duck (*Anas wyvilliana*), 'aiea (*Nothocestrum breviflorum*, and *N. peltatum*), ma'o hau hele— the State flower (*Hibiscus brackenridgei*), uhiuhi (*Caesalpinia kavaiense*), haha (*Cyanea recta*), and lo'ulu (*Pritchardia schattaueri*).	Current agricultural practices would continue and existing State and Federal programs would continue their limited efforts to preserve and restore the habitat of protected species. There are currently 317 Federally listed T&E species in Hawaii and over 3,000 species are listed by the State as at risk species.	Up to 30,000 acres would be enrolled in FSA CPs. Benefits would come from all of the CPs and activities associated with the CPs. CREP CPs would restore native habitats, enhance existing native habitats, improve water quality, and control nonnative species.
Objective #3: Reduce Sediments and Nutrients in Hawaiian Waterways	A 10 percent reduction in sediment and nutrient runoff into Hawaiian streams over the 15-year life of the project.	Current agricultural practices would continue. Agricultural runoff introduces contaminants into the waters of Hawaii and any improvements in water quality would be dependant upon existing and proposed programs. Eleven new streams and 35 coastal waters were added to Hawaii's CWA 303(d) list of impaired waters. The majority of high priority waters on the State's are listed for sediments, nutrients, and bacteria.	Up to 30,000 acres would be enrolled in FSA CPs. The CPs are designed to reduce soil erosion and filter nutrients and sediment from agricultural runoff, reducing the amount of pollutant entering receiving waterbodies.
Objective #4: Preserve the Native Flora and Fauna of Hawaii	Control invasive species on 10,000 acres of degraded pasture and cropland.	Current agricultural practices would continue. Degraded pasture and cropland would continue to provide prime conditions for the establishment of invasive plant species. Fencing for the control of feral mammals that would occur under Alternative B would not be installed.	Invasive plants would be removed from thousands of acres of sensitive and strategic land. Invasive plant work undertaken would shield pristine public land forests, reduce the distribution, and aid eradication efforts of invasive plants.

Objectives	Indicators	Alternative A: No Action	Alternative B: Implement CREP
	Enrollment and restoration of native vegetation and fauna on 30,000 acres of riparian buffer zones, forested watershed, degraded pasture lands and rare and declining native habitats.	Current agricultural practices would continue. Benefits from implementing Alternative B would not occur. Limited restoration of rare and declining habitats would continue reducing benefits to protected and native species.	Up to 30,000 acres would be enrolled in FSA CPs which would directly improve the ecological functions of unique and protected lands, and improve the habitats of several Federal and State-listed T&E species.

2.3.2 Summary Comparison of the Effects of Alternatives A and B on the Relevant Resource Issues

Table 2.5 provides a key part of the information needed by the Secretary of Agriculture and the public to make an informed, reasoned decision regarding the implementation of the proposed CREP.

Table 2.5. Comparison of the effects of Alternatives A and B on the relevant resource issues.

Issues	Alternative A: No Action	Alternative B: Implement CREP
Issue #1: Surface Water Quality susceptibility to agricultural practices	Long-term, moderate adverse effects—Surface water quality would continue to decline. Nutrients, sediments, pesticides, and other negative byproducts of agricultural runoff would continue to contaminate the waters of Hawaii. Any improvement in water quality would be dependant upon existing programs.	Long-term, moderate to high beneficial effects—Large improvements to water quality across the State would be achieved. CP implementation would reduce sediments, nutrients, pesticides, and other contaminants that accompany agricultural runoff. This reduction would translate into improved surface water quality.
Issue #2: Drinking Waters susceptibility to agricultural practices	Long-term, minor adverse effects—Groundwater quality would continue to decline as a partial result of polluted agricultural runoff recharging aquifers. Pesticides and nutrients have been identified as contaminants of concerns	Long-term, minor beneficial effect – Minor positive effects on sole-source aquifers would occur. CPs would directly improve the quality of runoff. Well heads and recharge areas would be indirectly improved, benefiting aquifers.
Issue #3: Wetlands susceptibility to agricultural practices	Long-term, moderate adverse effects—Wetland values would continue to slowly decline as a result of existing and projected agricultural runoff. Wetland would continue to degrade because of invasive plant and animal species impacts.	Long-term, moderate to high beneficial effects—Wetland acreage would increase as wetlands are restored. Wetlands values would benefit directly from improved water quality and in turn be able to filter more water. Additional benefits to wetlands would occur from the control of invasive plant and animal species.
Issue #4: Floodplains susceptibility to agricultural practices	No effects—Floodplains are routinely used for agricultural production and normally have little adverse effect on flowage areas or floodways; these effects are considered to be negligible.	Minor, long-term beneficial effects—CPs would assist in controlling flood events and result in improvements to floodplains and stream values.
Issue #5: Marine Resources susceptibility to agricultural practices	Long-term, moderate adverse effects—Current agricultural practices contribute sediment and nutrients to receiving waterbodies. These contaminants adversely affect the functions of coral reef and estuary ecosystems.	Long-term, moderate to high beneficial effects— CPs would reduce the amount of sediments and other contaminants in urban and agricultural runoff. Water quality of near-shore waters and estuaries would improve, resulting in improved habitat for protected aquatic animal and plant species. Reduced sedimentation is expected to result in an increase in coral cover and coral diversity.

Issues	Alternative A: No Action	Alternative B: Implement CREP
Issue #6: Protected Species susceptibility to agricultural practices	Long-term, minor to moderate adverse effects— Habitat values would not benefit from the leveraged effects of the habitat restoration and watershed improvement CPs and these values may continue to decline. Control of feral animals and of invasive plants would not occur and habitat would continue to decline as a result. Degradation of water quality would be expected to continue adversely affecting protected aquatic species.	Long- term moderate to high benefits—Implementation of the proposed action would provide additional habitat and enhance existing native terrestrial and aquatic habitat by improving water quality and restoring native plant communities. Conservation easements would also provide for the permanent protection of important habitat of protected species. Control of invasive species would also benefit protected species.
Issue #7: Cultural resources susceptibility to agricultural practices	Long-term, minor adverse effects—No Action may result in continued degradation of coral reefs and waters used from traditional cultural practices, including taro fields and fishponds. The degradation would not be reversed as no additional land preservation programs are currently being implemented.	Long-term, minor beneficial effects—Implementation of the proposed action would reduce sediments, nutrients, pesticides, and other contaminants that accompany agricultural runoff, which would decrease sedimentation affecting cultural fishponds and would improve the quality of water used in traditional taro production.
Issue #8: Socioeconomics susceptibility to agricultural practices	Long-term, minor adverse effects—No Action may result in adverse impacts to recreation and tourism as water quality continues to be degraded, changes to land use in Hawaii as no additional land preservation programs would be implemented, and population growth may be limited by the State's ability to provide additional clean drinking water.	Long-term, minor beneficial effects—The proposed action would result in: stable farm incomes from the steady and guaranteed receipt of CREP funds by enrolled producers; improvements in the recreation and tourism economy as water quality, natural resource, and recreation values are improved; decreased land use changes as CREP provides a means of preserving and protecting land; and improve drinking water conditions which may allow for future population growth.

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Chapter 3.0 Affected Environment and Environmental Consequences

3.1 Introduction

The analyses of Affected Environment and Environmental Consequences have been combined in this section to simplify the document. Relevant resource issues related to the Hawaii CREP are discussed below in Sections 3.2 through 3.13. This section will explore the identified environmental resources potentially affected by the No Action Alternative—No CREP and the Proposed Action Alternative—Implementation of the Hawaii CREP, as well as what effects the alternatives would have if implemented.

This chapter discusses the resources most likely to be impacted by the alternatives and compares the impacts of the alternatives on the resource issues. Resources discussed in this chapter are:

- Surface water quality (3.2)
- Drinking water (3.3)
- Wetlands (3.4)
- Floodplains (3.5)
- Marine resources (3.6)
- Protected species (3.7)
- Cultural resources (3.8)
- Human Health, Safety, and Economics (3.9)

This chapter also discusses three mandatory impact considerations including:

- Cumulative effects (3.10)
- Unavoidable adverse impacts (3.11)
- Relationship of short-term uses and long-term productivity (3.12)
- Irreversible and irretrievable commitments of resources (3.13)

The general nature of this PEA limits discussion of the resources to a wide scale. An in-depth, site-specific EE would be completed in association with FSA for each contract at the completion of the conservation plan. As impacts become clear at each site, the appropriate steps would be taken to ensure compliance with all applicable environmental and cultural resource requirements.

3.1.1 Assumptions and Background Used in Analysis

An understanding of the planned effect of the 30,000 acres proposed for the Hawaii CREP is essential to the discussion of resource impacts. The reason for this discussion is that a one-to-one comparison of acreage impacts is not a valid assumption for analysis due to the anticipated uses of the CREP acreage. The impacts of one acre added to CREP are not equal to only one acre of the watershed being benefited by the nutrient reduction or conversion to a wetland or riparian buffer strip. Land enrolled in CREP is expected to have a positive impact on additional adjacent acres. For example, implementation of riparian

and wetland buffers on CREP land would have the expected benefit of intercepting agricultural runoff from several acres of adjacent non-CREP land reducing the overall sediment and nutrient loads delivered to the receiving waters.

Using a one-to-one comparison, up to 30,000 acres (2.3 percent) of a possible 1,300,499 agricultural acres are allowed to be enrolled in CREP, or 0.73 percent of the total 4,110,720 acres throughout the State.

Specific impacts and the degree to which the CPs can be effective would depend on site-specific analysis of each CREP contract and for all CPs and combinations of CPs proposed for that contracted acreage. Acreage is limited for some of the CPs, yet the overall benefits are measured as impacts to larger acreage. Mitigation measures are in place and outlined steps would be followed to ensure compliance with NEPA and other relevant Federal regulations for each implementation area.

3.2 Surface Water Quality

3.2.1 Introduction

The HIDOH is responsible for administering Federal and State laws pertaining to water quality. The Clean Water Act of 1972 requires the HIDOH to create two reports about the water quality of the State's waterbodies.

Under Section 303(d) of the CWA, the HIDOH is required to biennially develop a Water Quality Limited Segments List (commonly called a 303(d) List). This is a list of waterbodies that are not meeting State water quality standards. The HIDOH is required to develop the 303(d) list using all appropriate readily available data.

Some of the types of data that are gathered to create a 303(d) list include (HIDOH, 2004):

- Physical/chemical data
- Sediment data
- Habitat data
- Biological data such as:
- Macroinvertebrate
- Fish population
- Algal data
- Shellfish data
- Fish tissue data

Section 303(d) requires a total maximum daily load (TMDL) for waters that do not meet State water quality standards. A TMDL is a "pollution budget" for a specific river, lake, or stream, and is an established wasteload allocation for point and non-point sources. HIDOH following the EPA's guidelines developed the 2004 303(d) list titled the *Final 2004 List of Impaired Waters in Hawaii Prepared Under Clean Water Act §303(d)* (HIDOH, 2004).

Under Section 305(b) of the CWA, the HIDOH is required to biennially report to the EPA on the water quality of Hawaii's waterbodies. These reports (HIDOH, 1998):

- Offer a general overview of water quality conditions
- Identify the most frequent water quality problems
- Identify sources and causes of pollution
- Describe water resources management programs
- Quantify the ability of Hawaii's waterbodies to support designated uses and attain water quality standards

3.2.2 Existing Conditions

The Hawaiian Archipelago is located in the central Pacific Ocean, approximately 3,000 miles from the continental U.S.. The State of Hawaii consists of the 8 major and 124 minor islands in the 1,523 mile archipelago. The eight major islands include the islands of Hawaii, Oahu, Maui, Kauai, Molokai, Lanai, Niihau, and Kahoolawe. The water resources that occur within the State's 6,423 square miles are (HIDOH, 1998):

- 249 miles of perennial rivers and streams
- 376 perennial rivers and streams
- approximately 1,500 intermittent streams
- 12 lakes, rivers, and ponds
- 2168 acres of lakes, rivers, and ponds
- 55 square miles of estuaries, harbors and bays
- 1,052 miles of ocean coast (includes all the shorelines of the Hawaiian Chain and 964 shoreline miles of the main islands)

The unique characteristics of Hawaii's topography, climate and geology result in a highly variable and complex surface hydrology. Most streams originate in the mountains of Hawaii and terminate in the ocean.

In general, Hawaii's islands can be divided into two regions, windward and leeward, which are related to the northeasterly trade winds and mountains. On the windward side, orographic rainfall results in high mean annual rainfall sometimes 15 times greater than the mean for Hawaii (25- 30 inches). Consequently, the majority of Hawaii's perennial streams are located on the windward side of islands. Mean annual rainfall on the leeward side can be in the single digits and intermittent streams that are dry during most of the year are more commonly located in leeward watersheds. Variations in ocean tides, rainfall, soil type, and geology can result in streams having both gaining and losing reaches (Oki, 2003).

Streams in Hawaii also experience extreme flashy events characterized by high flows of short duration (stream levels can increase by several feet in less than an hour). These temporal variations in stream flow are due to frequent storms of intense rainfall, small watersheds, steep topography, and limited channel storage. These flashy events can cause massive erosion and deliver tons of sediments to receiving water bodies (Oki, 2003).

Surface water in Hawaii is used for irrigation, hydroelectricity, traditional taro cultivation, and in some areas as a main source of drinking water. Many of the perennial streams have been diverted for agricultural or other uses. Streams provide important riparian and instream habitats for many unique native species, and possess valued aesthetic qualities. Streams affect the physical, chemical, and aesthetic quality of receiving waters, such as estuaries, bays, and near-shore waters, which are critical to the tourism-based economy of the islands (Oki, 2003).

Section 303(d)

The Hawaii 2004 Section 303(d) list contains a total of 70 streams and 174 coastal stations. No streams were entirely delisted from the 2002 list and 11 new streams and 35 new coastal waters were added to the 2004 list (HIDOH, 2004)

The *Final 2004 List of Impaired Waters in Hawaii Prepared Under Clean Water Act §303(d)* summarized water quality data collected by a variety of sources including but not limited to the UH, United States Geological Survey (USGS), HIDOH's Clean Water Branch, and AECOS, Inc. Data that were reviewed include:

- Physical and chemical data (including turbidity, total suspended solids, total nitrogen, total phosphorus, and nitrite/nitrate)
- Organochlorine pesticide, PCB concentration, trace element and semi-volatile organic compound data from fish and sediments
- Stream surveys
- Biological assessments

Overall for the State of Hawaii, five streams and seven coastal waters have been designated as high priority waters. A stream is prioritized according to the severity of pollution, use of the water, type and location of water, degree of public interest, and vulnerability of particular waters. TMDLs have been established for two streams and for one coastal water and there are currently TMDLs being established for sixteen streams and for one coastal water. TMDLs are being established or are in the processes of being established for sediment, nutrients, and bacterial indicators. The majority of these water bodies are listed because of turbidity, nutrients including nitrogen and phosphorus, and bacteria (HIDOH, 2004).

Section 305(b)

The rugged topography of the islands has restricted most human activity and impacts to coastal and lowland areas. As a result, most of the State's water quality monitoring activities are restricted to the lowland areas. It is assumed, but unproven, that most upland areas of the State such as the Alakai Swamp and many miles of coastline such as the north coast of East Molokai are in pristine condition (HIDOH, 1998).

The 1998 305(b) report included the assessment of 3,905 stream miles. Assessment for overall use indicates that 50 percent of the assessed miles were designated not supporting, 17 percent partially supporting, and 33 percent fully supporting (HIDOH, 1998). Table 3.1 provides a summary for specific uses.

In 2000, the EPA prepared The National Water Quality Inventory: 2000 Report. The purpose of this report was to provide a summary of the nation's water quality as well as a summary for each State. According to this report, the most significant pollution problems in Hawaii are siltation, turbidity, nutrients, organic enrichment, toxics, pathogens, and pH from nonpoint sources, including agricultural and urban runoff. Additional stressors of concern include introduced species and stream alteration (EPA, 2002).

Table 3.1. Individual use support summary for rivers and streams (reported in miles). Source: HIDOH, 1998.

Goals	Use	Size Assessed	Size Fully Supporting	Size Supporting, But Threatened	Size Partially Supporting	Size Not Supporting	Size Not Attainable	Size Not Assessed
	Overall	3,865	1,290	0	658	1,918	0	0
Protect And Enhance Ecosystem	Aquatic Life	3,905	1,566	0	0	2,339	0	0
Protect And Enhance Public Health	Fish Consumption	3,892	3,878	0	0	13	0	0
	Shellfishing	3,905	3,904	0	0	1	0	0
	Swimming	3,898	3,897	0	0	1	0	0
	Secondary Contact	3,905	3,904	0	0	1	0	0
	Drinking Water	3,889	3,889	0	0	1	0	0
Social Economic	Non-Degradation	3,905	1,611	0	69	2,224	0	0
	Aesthetics	3,881	3,857	0	0	24	0	0
	Agriculture	3,905	3,904	0	0	1	0	0
	Cultural Or Ceremonial	3,905	3,904	0	0	1	0	0

Agricultural Impacts to Surface Water Quality

As discussed above, Hawaii's waterbodies are impaired by a number of contaminants. Most of these contaminants have a direct link to agricultural practices and agricultural nonpoint source pollutants include pesticides, sediment, nutrients, and animal waste (FSA, 2003). The majority of streams on Hawaii's 303(d) list are listed for sediment, nutrients, and bacteria. These contaminants are discussed in more detail below.

Sediment

Sediment is the result of erosion. It is the solid material, both mineral and organic, that is in suspension, is being transported, or has been moved from its site of origin by air, water, or gravity. The fine soil and organic products comprising sediment can be held in suspension in agricultural runoff and carried to nearby waterbodies. Once sediment is carried to nearby waterbodies, it can then be deposited in a stream, estuary, embayment, or open coastal waters. Sediments smother corals and other benthic species and create unsightly and odorous mud flats in enclosed bays (HICZMP, 1996).

Nutrients

Nitrogen and phosphorus are the two major nutrients from agricultural land that may degrade water quality. Nutrients are applied to agricultural land in several different forms and come from various sources, including commercial fertilizers, manure from animal production facilities, effluent and sludge

from (domestic) wastewater treatment plants, legumes and crop residue, irrigation waters, and atmospheric deposition (HICZMP, 1996).

All plants require nutrients for growth. In aquatic environments, nutrient availability usually limits plant growth. When these nutrients are introduced into a stream, lake, or estuary at higher rates, aquatic plant productivity may increase dramatically. This process, referred to as cultural eutrophication, may adversely affect the suitability of the water for other uses (HICZMP, 1996).

Bacteria

Animal waste (manure) includes the fecal and urinary wastes of livestock and poultry; process water (such as from a milking parlor); and the feed, bedding, litter, and soil with which they become intermixed. Pollutants that may be contained in manure and associated bedding materials include oxygen-demanding substances; nitrogen, phosphorus, and minor nutrients; organic solids; salts; bacteria, viruses, and other microorganisms; and sediments (HICZMP, 1996).

Unique Characteristics of Hawaiian Agricultural Practices

While most agricultural practices in Hawaii that contribute to the degradation of water quality are similar to those in the mainland United States (land disturbance, application of pesticides and fertilizers), agriculture in Hawaii has some unique characteristics that make management of agricultural pollution difficult. These characteristics include year-round intensive agriculture, small watersheds, significant use of marginal lands, significant amount of leased land, and higher cost of land, goods and services (HICZMP, 1996).

Year-round intensive agriculture— Due to Hawaii's year-round sub-tropical temperatures, agriculture can be practiced year-round. This possibility together with the high cost of land leads to year-round cultivation to maximize production. Year-round cultivation means year-round land disturbance and year-round use of fertilizers and pesticides (HICZMP, 1996).

Small watersheds— Watersheds in Hawaii are typically small, and storms are high intensity. Physical controls such as retention/detention basins generally require a significant amount of land area. Since land prices in Hawaii are high and the amount of available land area is limited, operators may be more reluctant to use retention/detention basins than on the U.S. mainland (HICZMP, 1996).

Significant use of marginal lands— Because land prices in Hawaii are high and the available land area is limited, agricultural production is often maximized by cultivating even marginal lands. These lands are often steep and may require additional best management practices (BMPs) to meet pollution prevention goals. Additional BMPs may not be economically achievable in many cases (HICZMP, 1996).

Significant amount of leased land— A significant amount of the land used by agricultural operations in Hawaii is leased from either the State or large private land owners. There are relatively few landowners and a large number of land lessees. This can lead to less incentive for lessees to install permanent structures and to take on other long-term stewardship responsibilities (HICZMP, 1996).

Higher cost of land, goods and services— Hawaii's average property values for agricultural lands are comparable to urban land in other States. Because of the islands' distance from mainland sources, a majority of goods must be shipped in, therefore adding significantly to their cost. Labor costs are also higher than comparable agriculture industries in other States (HICZMP, 1996).

3.2.3 Effects of Alternative A (No Action) on Surface Water Quality

Surface water quality would continue to decline under Alternative A. Agricultural runoff introduces contaminants into the waters of Hawaii and any improvements in water quality would be dependant upon existing and proposed programs. Currently, there are no viable State or private programs in Hawaii that focus on restoring riparian ecosystems. Without the filtering capacity of functioning riparian buffers, sediment and nutrient loads in surface water would either increase or remain at current levels. Decreasing water quality is evidenced in the additional waterbodies that were added to the 2004 303(d) list.

Selection of Alternative A would not contribute to achieving any of the CREP Objectives listed in Section 1.4.

3.2.4 Effects of Alternative B (CREP Agreement) on Surface Water Quality

Implementation of a CREP agreement would provide long term, moderate to high beneficial effects on water quality. Alternative B would also result in significant localized improvements to water quality and would help Hawaii's water bodies achieve and meet State water quality standards.

All of the CPs are designed to have a positive long-term direct or indirect effect on water quality. For example, CP2 and CP3A (establishment of permanent native grasses, hardwood tree planting) reduce soil erosion and help reduce sediments in water. These CPs have the potential to increase water penetration and infiltration, slow the flow of surface water runoff, and reduce water and wind erosion thereby contributing to the protection and maintenance of downstream water quality.

Buffers such as CP22, CP29 and CP30 (riparian buffers, wildlife habitat buffers, and wetland buffers) remove nutrients, sediment, organic matter, pathogens, pesticides, and other pollutants from surface runoff and subsurface flow. Riparian buffers also create shade to lower water temperature to improve habitat for aquatic organisms, provide a source of detritus and large woody debris for aquatic organisms, and help stabilize and restore damaged stream banks, and reduce erosion of stream banks. CP23 (wetland restoration) would provide larger areas for retention of solids and removal of nutrients. CP25 helps restore native plant communities thus reducing soil erosion and sediment loading to receiving waters.

These specific CPs would help to reduce the year-round impacts of intensive agriculture, alleviate impacts from the agricultural use of marginal lands, and maximize CP land use for each watershed. These benefits will occur for at least fifteen years during the enrollment period, but will probably occur beyond that period if maximum enrollment and proper maintenance is achieved.

Implementing CREP CPs would facilitate meeting current and future pollutant discharge limits under the TMDL and other State water quality programs. CREP is also expected to reduce sediment and nutrient runoff into streams, create greater stability in instream flows, and increase instream water levels.. Instream water levels would increase with the removal of agricultural land from production, thereby reducing the amount of water diverted for irrigation. Vegetated riparian buffers stabilize instream flow by function by slowing flood flows which allows water to spread and soak into the soil thereby recharging local groundwater near streams. Water stored in local groundwater is then slowly released into streams increasing the duration and quantity of instream flows. Water quantity and quality improvements are expected to benefit rare native aquatic species of fish and rare species of damselflies inherent to aquatic ecosystems like those targeted by this CREP.

Activities associated with the implementation of CPs could potentially result in short-term, adverse impacts to surface water quality and quantity, including:

- Site preparation— CP establishment could require site preparation activities including building physical structures such as dikes and clearing enrolled land of undesirable plant species using chemicals such as herbicides and/or physical methods such as burning, discing, and plowing.
- Establishment of desirable plants and controlling invasive species or noxious weeds—Until desired plants are established, acres enrolled in CREP may be irrigated, potentially affecting water quantity. Prescribed burns and pesticides may also be used to control invasive species.
- Maintenance of CPs—Maintaining CPs on enrolled CREP land may include additional shifting soil to repair dikes or buffer strips, applying herbicides and/or pesticides to control invasive species, or irrigating land during critical growing periods of drought years.

A conservation and maintenance plan for each CP would be prepared and BMPs will be used to mitigate any adverse impacts of implementing specific CPs. These impacts are expected to only last until the CP is permanently established and are minor compared to the overall long-term benefits of the CPs. These temporary impacts could be expected to last anywhere between one to three years.

The beneficial impacts of the CPs discussed above would provide long-term moderate to high beneficial effects, assisting in the achievement of all four CREP Objectives (Section 1.4)

3.3 Drinking Water

One of the primary sources of drinking water in Hawaii is groundwater, providing drinking water to roughly 90 percent of Hawaii's population. Groundwater is found in aquifers throughout Hawaii. Aquifers are water-bearing geologic formations. These structures store and/or transmit water, such as to wells and springs.

Special care must be taken to protect aquifers which the EPA has designated SSA. The EPA defines SSA as one that supplies at least 50 percent of the drinking water consumed in the area overlying the aquifer. To be designated an SSA, the area must not have an alternative drinking water source, which could supply all who depend on the aquifer for drinking water (EPA, 2004b). SSA designations are one tool to protect drinking water supplies in areas with few or no alternative sources to the ground water resource, and where if contamination occurred, using an alternative source would be extremely expensive (EPA, 2004b).

Section 1424(e) of the Safe Drinking Water Act of 1974 (Public Law 93-523, 42 U.S.C. 300 et. seq) authorizes the Sole Source Aquifer Protection Program. The Act States:

> *"If the Administrator determines…that an area has an aquifer which is the sole or principal drinking water source for the area and which, if contaminated, would create a significant hazard to public health, he shall publish notice of that determination in the Federal Register. After the publication of any such notice, no commitment for Federal financial assistance… may be entered into for any project which the Administrator determines may contaminated such aquifer through a recharge zone so as to create a significant hazard to public health, but a commitment for Federal assistance may, if authorized under another provision of law, be entered into to plan or design the project to assure that it will not so contaminate the aquifer."*

Proposed Federal financially assisted projects that have the potential to contaminate a designated SSA are subject to EPA review. This project's review area includes the aquifer's recharge zone and its stream-flow source zone. The recharge zone is the area through which water recharges the aquifer, while the source zone is the upstream area that contributes recharge water to the aquifer.

The 1986 Federal Safe Drinking Water Act Amendments (SDWA) directs all States to develop a Well Head Protection Program (WHPP) plan to protect water supply wells. Each State was directed to develop, with public participation, a Wellhead Protection Program Plan that was to be reviewed and approved by EPA. The States are required to submit to EPA a Biennial Wellhead Protection Report, summarizing their accomplishments. Some of the goals of WHPP Plans can include but are not limited to:

- Preventing contamination of groundwater resources
- Cleaning up groundwater contamination
- Delineating a wellhead protection area based on ground water flow and other hydrogeologic information
- Inventorying pollution sources
- Developing and implementing best management practices to protect ground water
- Promoting proper land-use planning
- Educating the public to promote awareness of each person's role in protecting ground-water resources

The 1996 reauthorization of the SDWA included an amendment requiring States to develop programs to assess sources of drinking water and encouraged the establishment of protection programs. Accordingly, the HIDOH has prepared Hawaii's Source Water Assessment Program (HISWAP) Plan (WRRC, 2004).

3.3.1 Existing Conditions

There are two SSAs in Hawaii: the Southern Oahu Basal Aquifer and the Molokai Aquifer. The Molokai Aquifer encompasses the entire island of Molokai and the Southern Oahu Basal Aquifer services the county of Honolulu, the most populated area in Hawaii (see Figure 3.1) (EPA, 2004a).

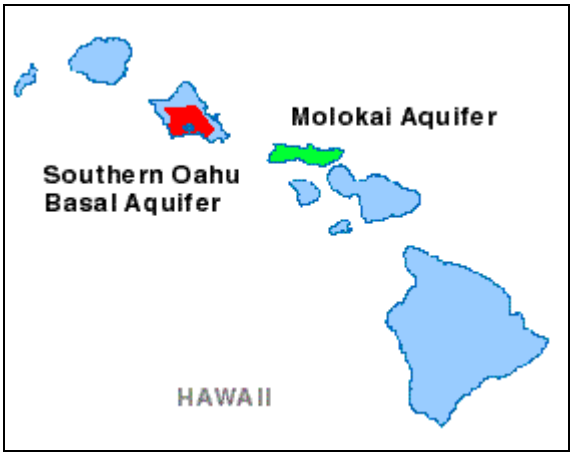


Figure 3.1 . Location of Hawaii sole source aquifers. Source EPA, 2004a.

Since approximately 90 percent of drinking water in Hawaii is from groundwater, groundwater contamination is of special concern. Contaminants have been detected in drinking water wells in Central Oahu, North Maui, East Kauai, and East Hawaii. No chemical contaminants have been detected in the drinking water wells on Molokai and Lanai. Currently, contaminant levels are below Federal and State standards for drinking water, meaning that contamination levels do not pose a serious health risk. However, groundwater is highly susceptible to contamination (GWPC, 1999, HIDOH, 2000). Table 3.2 summarizes the characteristics of aquifers in Hawaii.

Wellhead/Source Water Protection

Hawaii's WHPP Plan was approved by the EPA in May 1995. However, according to the 2000 305(b) report, the Hawaii Wellhead Protection Program (HIWHPP) has not been fully completed. The HIWHPP has provided data and other information for HISWAP. Many elements of these two programs are interchangeable; HISWAP is more comprehensive. For this reason HISWAP is the major groundwater protection program in Hawaii. HISWAP is administered by HIDOH's Safe Drinking Water Branch (HIDOH, 2000, WRCC, 2004).

Threats to Drinking Water

The need for more potable water increases yearly. In 1990, a resident population of 1,108,229 used nearly 136 million gallons per day (mgd) or 123 gallons per person per day. By 2010, population projections show an increase of the resident population to 1,367,000 people, and the HIDOH anticipates that 168 mgd would be needed if the 1990 per person consumption does not change. Population growth proportionate with water demand continually challenges the ability of Hawaii's groundwater to sustain its population needs (GWPC, 1999).

The main factors limiting groundwater availability in the State of Hawaii are saltwater intrusion; the reduction of discharge to streams and the ocean; and lowering of water levels (USGS, 2000).

Table 3.2. Characteristics of aquifers in Hawaii. Source: HIDOH, 2000.

Island	Number of Aquifer Sectors	Number of Aquifer Systems	Number of Aquifer Types	Number of unconfined aquifers	Number of Aquifer Types Highly Vulnerable to Contamination	Percent of Aquifer Types Highly Vulnerable to Contamination
Kauai	3	13	120	98	77	64%
Oahu	6	24	90	66	66	73%
Molokai	4	16	60	60	59	98%
Lanai	4	9	22	22	22	100%
Maui	6	25	113	106	72	64%
Hawaii	9	24	82	82	69	84%

Groundwater contamination is of particular concern since groundwater is the major source of drinking water. While current contamination levels are below Federal and State standards, groundwater is highly susceptible to contamination. HIDOH has been publicly reporting existing and historic groundwater contamination through its Groundwater Contamination Maps and Reports. The groundwater contamination maps show that groundwater contamination occurs in Hawaii. The maps indicate that once a groundwater source becomes contaminated, it remains contaminated for many years (HIDOH, 2002).

Agriculture continues to be a source of contamination with pesticide and fertilizer application being two of the ten highest priority contamination sources identified by the 2000 305(b) report (HIDOH, 2000).

3.3.2 Effects of Alternative A (No Action) on Drinking Water

Declining quality in drinking water would continue to be a minor adverse effect under the No Action alternative. This effect, essentially an on-going cumulative effect, would be minor because State water quality standards prevent any major discharges that would significantly degrade a drinking water source. However, if population growth continues, more demand for drinking water may deplete the aquifer and continue to degrade the recharge area of these aquifers. Still, the cumulative impacts of agricultural activities and other industrial activities in Hawaii have an ongoing adverse effect on the State's drinking water.

Selection of Alternative A would not contribute to the achievement of any of the CREP Objectives cited in Section 1.4.

3.3.3 Effects of Alternative B (CREP Agreement) on Drinking Water

The implementation of Alternative B would result in some positive effects on drinking water. Each of the CPs either indirectly or directly improve surface water quality and potentially could improve the quality of water that recharges groundwater.

Since the entire island of Molokai is a SSA, it is probable the areas in the Molokai SSA would be enrolled in CREP. It is also likely that areas in the Southern Oahu Basal Aquifer would also be enrolled in CREP. Implemented CREP CPs have a beneficial effect on surface water quality, it is likely that groundwater quality would also improve. Acres removed from active agricultural production would have the potential to result in less agricultural pollutants in groundwater. A properly maintained aquifer would also assist with the saltwater intrusion problems that some of the aquifers face. Restoration of wetlands would have the expected benefit of increasing the volume and quality of groundwater recharge. The water purifying capabilities of the CPs would contribute to the achievement of CREP Objective 3 discussed in Section 1.4 (Remove pollutants from Hawaii Waterways).

3.4 Wetlands

Section (a) (16) of the Food Security Act, Public Law 99-198, December 23, 1985, defines a wetland as:

> land that has a predominance of hydric soils and that is inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances does support, a prevalence of hydrophytic vegetation typically adapted for life in saturated soil conditions.

Several statutes and EOs exist that govern FSA program actions in relation to wetlands including:

- Executive Order 11990, Protection of Wetlands
- Clean Water Act
- Food Security Act, Title XII

Benefits of Wetlands

Wetlands are some of the most productive and dynamic habitats in the world. The physical, chemical, and biological interactions within wetlands are often referred to as wetland functions. These functions include surface and subsurface water storage, nutrient cycling, particulate removal, maintenance of plant and animal communities, water filtration or purification, and groundwater recharge. Similarly, the characteristics of wetlands that are beneficial to society are called wetland values. Some examples of wetland values include reduced damage from flooding, water quality improvement, and fish and wildlife habitat enhancement.

It is important to maintain and restore wetland functions and values because wetlands contribute to the overall health of the environment. Some basic wetland functions and wetlands associated values are listed below (NRCS, 2002):

- **Surface water storage:** This function helps reduce flooding by temporarily storing water, allowing it to soak into the ground or evaporate. This temporary storage can help reduce peak flows after a storm.
- **Subsurface water storage:** Wetlands are reservoirs for rainwater and runoff. As this water is released into the ground, it recharges water tables and aquifers, and extends the period of stream flows in many parts of the U.S.. Recharge of fresh water in coastal areas can also help prevent saltwater intrusion in underlying aquifers.
- **Nutrient cycling:** Wetlands enhance the decomposition of organic matter, incorporating nutrients back into the food chain.
- **Sediment control:** By filtering out sediments and particles suspended in runoff water, wetlands help prevent lakes, reservoirs, and other water resources from being affected by downstream sediment loading. In Hawaii sedimentation of coastal areas is of special concern, wetlands reduce the amount of sediment reaching coastal resources through flood control and sediment storage.
- **Maintenance of plant and animal communities:** Both coastal and inland wetlands provide breeding, nesting, and feeding habitat for millions of waterfowl, birds, fish, and other wildlife.
- **Values to society:** Wetlands often provide sites for hunting, fishing, trapping, photography, outdoor classrooms or environmental education, and the enjoyment of open spaces.
- **Protection from storm waves and erosion:** Coastal wetlands reduce impacts from storm tides and waves before they reach upland areas. Wetlands at the margins of lakes, rivers, bays, and the ocean protect shorelines and stream banks against erosion. (EPA, 2004d).

3.4.1 Existing Conditions

The main threats to wetlands from agriculture include diminishing water supply from irrigation diversions, agricultural development, increased sedimentation , nutrient loading , and grazing (HICZMP, 1996). Approximately 30 percent of Hawaii's wetlands have been lost, primarily when they were filled in

and used for sugar cane planting (Proposal, 2004). Although 70 percent of wetlands remain, many of these are highly degraded and no longer provide significant water filtration and retention services. Many remaining wetlands are farmed to support flooded crops like taro (Proposal, 2004). Erosion from agricultural lands can result in wetlands becoming inundated with sediment and can result in a subsequent decrease in the filtering capacity of wetlands (Proposal, 2004).

Impacts to Wetlands

Other impacts to wetlands include decreasing water supplies from drinking water well withdrawals, urban development, and channelization of rivers and streams. Over withdrawal from wells can lead to the drying-up of wetlands and ponds that are hydrologically connected to the underlying aquifer. Upland development and upstream channel modifications can erode wetlands, upset sediment and nutrient balances, and kills existing vegetation (Proposal, 2004).

Wetlands are further impacted by the invasion of non-native species. Grazing, trampling, and rooting by feral pigs and other animals disturb soil, destroy native plant species, and create bare patches of ground. These conditions are particularly suited for invasion of non-native plant species. The invasion of non-native plant species inhibits the re-establishment of indigenous species in wetlands. Erosion from degraded wetlands contributes to sediment loads of nearby streams and water bodies. Furthermore, the loss of lowland wetlands results in an increased volume of freshwater delivered to near-shore waters (Proposal, 2004).

3.4.2 Effects of Alternative A (No Action) on Wetlands

With the selection of the No Action Alternative, wetland values (including vegetation, water quality, and habitat) would continue to decline based on current agricultural pressure. A segment of this undesirable decline can be attributed to existing and projected sediment loads and agricultural chemical loads found in runoff from surrounding agricultural lands. Total wetland acres would likely be stable or slightly reduced under Alternative A because current Federal laws, such as Section 404 of the CWA, are very restrictive in allowing physical destruction of wetlands through draining or conversion of existing wetlands for other uses. However, wetland values would continue to decline as the amount of sediments and chemicals from agricultural runoff remain near their current levels.

Alternative A would not achieve any of the CREP Objectives listed in Section 1.4.

3.4.3 Effects of Alternative B (CREP Agreement) on Wetlands

Alternative B would provide both direct and indirect benefits to wetlands. Direct benefits to wetlands would occur through CP23 and CP30, wetland restoration and wetland buffers. Restoration of wetlands would increase the number of wetland acres and increase the value of degraded wetlands. Fencing to protect restored wetlands, wetland buffers, and reforested areas would be designed to exclude feral mammals and provide grazing management. The exclusion of grazing mammals would limit damage to the restored wetlands and buffers and would allow the restored wetlands and riparian buffers to perform the important functions of nutrient cycling, sediment retention, and flood controls.

Implementation of this alternative would result in indirect benefits to existing wetlands as well. Other CPs, which include the establishment of permanent native grasses, hardwood tree planting, riparian buffers, restoration of rare and declining habitat, and wildlife habitat buffer, are all intended to reduce soil erosion and improve surface water quality. Reduced sediment loads in surface water could result in less sedimentation of wetlands, which would help maintain wetland functions.

Installation of CPs to restore or enhance wetlands may result in short-term adverse impacts to adjacent land. These include:

- Establishment of desirable plants—Until wetland vegetation is permanently established and until the hydrology of restored wetlands is stabilized, flooding of wetlands may also result in flooding of adjacent land.
- Site preparation— Wetland restoration might require earth moving activities and soil disturbance. These activities have the potential to introduce sediments into nearby waterbodies.

A conservation and maintenance plan for each CP would be prepared and BMPs will be used to mitigate any adverse impacts of implementing specific CPs. Effects of wetland installation are expected to only last until the CP is permanently established (1-3 years) and they are minor compared to the overall long-term benefits of the CP.

All four of the objectives in Section 1.4 would be met under Alternative B. Higher functioning wetlands filter pollutants from surface water and would reduce the amount of sediment impacting coral reefs and improve water quality of surface and groundwater. Restoration of wetlands would provide important habitat for protected species and restore native plant communities.

3.5 Floodplains

Floodplains are defined as lowlands or relatively flat areas adjoining inland or coastal waters, including at a minimum areas subject to a one percent or greater chance of flooding in any given year. Floodplains serve a variety of functions and values including:

- dissipate the energy of floods, reducing flood damage downstream
- floodwater storage which slowly releases water into adjacent streams, maintaining base flows

Development and activities in floodplains may affect these functions, potentially increasing the impact of floods on human health and safety. All Federal actions must meet the requirements of EO 11988, Floodplain Management. The purpose of the EO is to avoid incompatible development. It states, in part, that:

> "Each agency shall provide leadership and shall take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health and welfare, and to restore and preserve the natural and beneficial values served by floodplains in carrying out its responsibilities for (1) acquiring, managing, and disposing of Federal lands and facilities; (2) providing Federally undertaken, financed, or assisted construction and improvements; and (3) conducting Federal activities and programs affecting land use, including but not limited to water and related land resources planning, regulating, and licensing activities."

In accordance with the EO, and prior to any action, Federal Emergency Management Agency (FEMA) Floodplain Insurance Rate Maps (FIRM) would be reviewed to determine if the proposed action is located in or would affect a 100 -year floodplain. Soil survey maps, aerial photography, and topographical maps would be used when no FEMA maps are readily available. The Agency should complete surveys in areas where no flood hazard or flood elevation data are available and the amount of Federal investment in the proposed action is significant if the action could create a significant adverse effect on the floodplain.

FIRMs are available for the counties Hawaii, Honolulu, Maui, and Kauai. These maps are computed water surface elevations that are combined with topographic mapping data to develop flood hazard maps. They provide information on areas subject to flooding. They are used to guide future development away from flood-prone areas and to regulate development that is proposed to occur within such areas. Although some of the FIRMs need to be updated, they can be a good starting point.

Applicable development permits must be obtained from local authorities prior to construction activities within a floodplain because some CP installations can be considered a type of construction project.

3.5.1 Existing Conditions

In Hawaii, land is limited and floodplains continue to be used for residential and agricultural activities (Oki, 2003). Since Hawaii is prone to flash flooding (see section 3.2), damage to urban areas and to agriculture located in floodplains can be severe. According to FEMA, between 1978 and 2003 the National Flood Insurance program paid over $56.4 million in claims to Hawaii policy holders (FEMA, 2004).

Urbanized channel in Oahu. Photograph by Anne Brasher, USGS.

Increased impervious cover resulting from urbanization can dramatically alter the hydrology of a watershed. As natural areas are converted to impervious cover, flood velocities increase, flood volumes increase, and floods occur more frequently. Hawaii's floods naturally characterized as "flashy" (high peaks in short time span) can become "flashier" which can lead to more downstream erosion, destruction of floodplains, destruction of property, and increased pollutant loads in runoff (HICZMP, 1996).

Another factor affecting floodplains is channelization. As outlined above and in previous sections, Hawaii's flashy storm events present unique flooding hazards. County drainage standards were developed to safely handle runoff volumes and protect life and property. Many streams were channelized in the form of concrete box culverts. DLNR's Hawaii Stream Assessment conducted in 1990 concluded that over 19 percent of Hawaii's perennial streams have been channelized to some degree. Most of the streams on Oahu have been channelized. (HICZMP, 1996). Channelization can disconnect streams from their floodplains, resulting in higher flood velocities and increasing the amount of flood damage downstream.

All islands have some grazable floodplains, but Kauai, as the oldest island, has a higher percentage. Floods along these grazable areas are common and generally unpredictable. Frequent flooding often makes permanent fences parallel to streams uneconomical. Such fences are prone to being washed out and deposited downstream or along beaches. Instead, most of these areas have minimal "knockdown," easy to repair fences running perpendicular to the stream. Streams are used both as a boundary fence and watering source (HICZMP, 1996). Grazing along stream banks and in floodplains can reduce the functions of riparian areas and wetlands. Grazing reduces the amount of vegetation, increases soil erosion, and compacts soils. Loss of vegetation and compacted soils reduces the ability of soils to absorb surface water, resulting in higher amounts of surface water runoff and higher flood volumes.

3.5.2 Effects of Alternative A (No Action) on Floodplains

Floodplain areas would not change, and stream profiles (a major factor in the determination of floodplain areas) would not change based on Federal actions. Not implementing the proposed action would prevent or reduce the creation of wetlands or the restoration of vegetation, both of which have beneficial effects on floodplain conditions, especially the ability of floodplains to store floodwaters. The impacts of channelization, human development, and agriculture would continue to have a minor adverse affect on the floodplains of Hawaii.

Under the No Action Alternative, new construction of facilities would not occur with Federal financial assistance, unless a Federal agency makes a finding that no practicable alternative exists for such new construction. Even with such a finding, construction within a floodplain is usually coordinated with the Corps of Engineers and local flood management authorities. Therefore, effects on floodplain conditions would be negligible under the No Action Alternative. with this alternative not contributing to the achievement any of the four objectives listed in Section 1.4

3.5.3 Effects of Alternative B (CREP Agreement) on Floodplains

The CPs utilized under this CREP agreement would have minor beneficial effects on the functions and values of Hawaii's floodplains. CPs that involve construction activities, substantial earth movement, diking, or other means of altering the flowage area would need to be reviewed and appropriate public notice provided. In all appropriate instances, applicable development permits must be obtained from local authorities prior to any construction activities within a floodplain.

With the implementation of the Alternative B, beneficial effects may occur as agricultural lands in floodplains or adjacent to floodplains may be enrolled in CREP. Improvements in floodplains and stream valleys would occur through the implementation of CPs. CP23 and CP30, wetland restoration and wetland buffer, would have the greatest beneficial effect on floodplains. Both of these practices enhance or restore the hydrology of degraded wetlands providing more water storage capacity and reducing flood flows.

Marginal improvements to floodplains would come from the CPs, riparian buffer, hardwood tree planting, establishment of native grasses, restoration of rare and declining habitat, and pastureland habitat buffer. These practices would result in more natural stream profiles and return some of the benefits of the floodplains, such as improved habitat and water storage capacity and reduced erosion. These activities would both slow and filter stormwater runoff resulting in less severe flooding events and a more natural floodplain. A natural floodplain would help to decrease any adverse impacts associated with channelization and flood control projects upstream.

These practices would all help control flood events by providing more water storage in floodplain areas (and wetlands and other natural storage structures) and by maintaining or improving floodplain values. The permanent easements, implemented as part of the Proposed Action Alternative, would limit development within floodplains. This would result in potential long-term minor benefits as these areas are allowed to remain and continue natural floodplain processes and would result in long term minor beneficial effects to floodplains and would contribute to achieving all the CREP Objectives discussed in Section 1.4.

3.6 Marine Resources

The main Federal law that applies to the management of Hawaii's marine resources is the CZMA of 1972. CZMA established the planning and management program for U.S. coastal land and water resources. The Act directs Federal agencies to preserve, protect and develop, and where possible, to restore or enhance the resources of the nation's coastal zone. Coastal zones include the coastal waters and the adjacent shore land strongly influenced by each other and in proximity to the shorelines of the coastal States, and includes islands, transitional and intertidal areas, salt marshes, wetlands, and beaches.

The CZMP, authorized by the CZMA, leaves day-to-day management decisions at the State level in the 34 States and territories with Federally approved coastal management programs. Federal coastal zone management efforts are guided by the CZMP's strategic framework, which is organized around three major themes: Sustain Coastal Communities, Sustain Coastal Ecosystems, and Improve Government Efficiency. Authorized by Section 6217 of the Coastal Zone Act Reauthorization Amendments of 1990, this amendment requires States and territories with approved coastal zone management programs to develop and implement coastal non-point pollution control programs (NOAA, 2004b).

The nation's coastal and ocean resources are under increasing pressure from population growth and development. Coastal areas host over 50 percent of the total U.S. population within only 17 percent of the nation's land area. Between 1994 and 2015, coastal population is projected to increase by 28 million people (NOAA, 2004b).

The HICZMP was approved in 1978. Its mission is to balance marine and coastal resources protection and sustainable economic development, anticipating emerging issues and facilitating their resolution by coordinating among interests, developing and articulating appropriate management policies, and involving the public in resource management efforts (HICZMP, 2004).

HICZMP is advised by the Marine and Coastal Zone Management Advisory Group (MACZMAG), which is composed of State and local agencies and citizens groups. MACZMAG is charged with implementation of the Hawaii Ocean Resources Management Plan (ORMP). The 1995 enactment of Act 104, Session Laws of Hawaii integrated the ORMP with the HICZMP to strengthen the State's ability to coordinate marine and coastal policy development and resources management responsibilities (NOAA, 2004b, HICZMP, 2004).

3.6.1 Existing Conditions

Hawaii has 1,052 miles of ocean coastline, a coastal population of 1,159,600, 410,000 acres of coral reef, and 55 square miles of estuaries (NOAA, 2004a, Proposal, 2004).

The Coastal Zone Management area encompasses the entire State of Hawaii including all marine waters seaward to the extent of the State's police power and management authority, including the 12-mile U.S. territorial sea and all archipelagic waters (HICZMP, 2004). Therefore, Federal actions which occur throughout the State are reviewed by the State for consistency with the HICZMP (HICZMP, 2004). Prior to enrollment in CREP all CREP contracts must meet the CZMA requirement.

Section 305(b) of the CWA requires that the EPA report periodically on the condition of the nation's waters. As part of this process, coastal States provide valuable information about the condition of their coastal resources to EPA. This information is compiled into a report titled: National Coastal Condition Report and describe the ecological and environmental conditions in U.S. coastal waters.

Estuaries and Near-shore Waters

Hawaii's near-shore waters are a rich ecosystem supporting a tremendously diverse range of species from endemic seal and turtles to sponges and corals. These waters are important to the State's 1.2 million residents and 7 million visitors in terms of aesthetics and recreational activities, including fishing, swimming, and surfing. A number of Hawaii's beaches have ranked year after year among the top ten in the world for their exceptional recreational qualities (Proposal, 2004). In addition, commercial food harvest of octopus, crab, and fish contributes millions to the State's economy, and the harvest for the aquarium trade is also important (Proposal, 2004).

These near- shore waters support the highest percentage (24.3 percent) of endemic warm-water marine fish in the world, two resident species and four transient species of sea turtles, including the State and Federally listed threatened green sea turtle and the endangered Hawaiian hawksbill sea turtle, and 24 species of marine mammals, including the endangered Hawaiian monk seal (Proposal, 2004).

According to the Draft National Coastal Condition Report II, the State of Hawaii assessed 99 percent of its 55 square miles of estuaries. Of the assessed estuarine square miles, 43 percent fully support their designated uses and 57 percent are impaired by some form of pollution or habitat degradation. Figure 3.2 summarizes individual use support for assessed estuaries (EPA, 2004e).

The State of Hawaii assessed 871 miles of its 1,052 shoreline miles. Of assessed shoreline, 96 percent fully supports its designated uses, 1 percent is threatened for one or more uses, and 3 percent is impaired by some form of pollution or habitat degradation. Individual use support for assessed shoreline in Hawaii is shown in Figure 3.3 (EPA, 2004e).

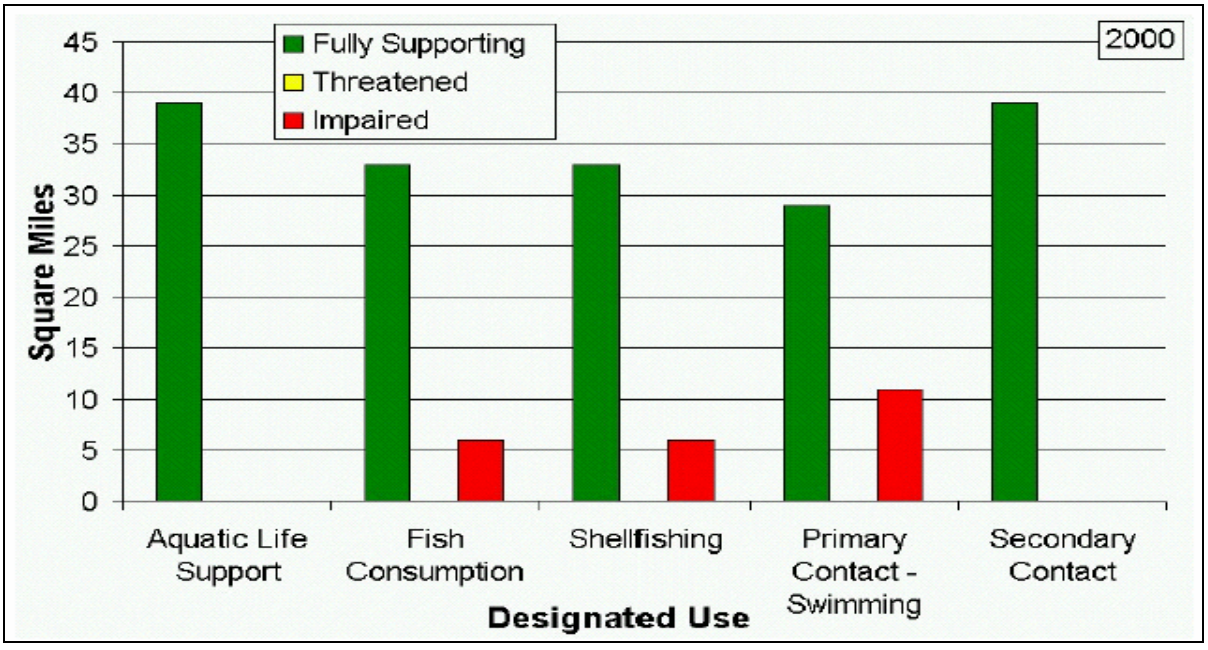


Figure 3.2. Individual use support for assessed estuaries in Hawaii. Source: EPA, 2004e.

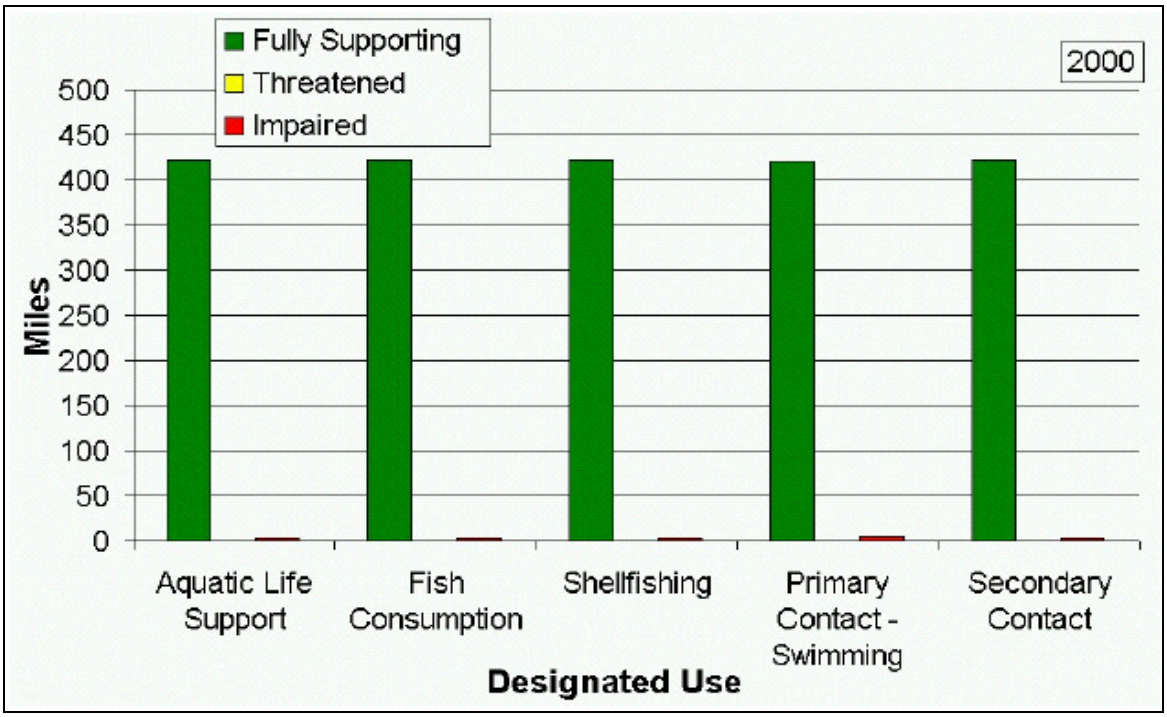


Figure 3.3. Individual use support for assessed shoreline miles in Hawaii. Source: EPA, 2004e.

Coral Reefs

Recognizing the need for better management and a better understanding of Hawaiian coral reefs, the UH established the Hawaii Coral Reef Initiative Research Program (HCRIRP) in June 1998. Its primary purpose is to support monitoring and research activities aimed at building capacity to manage Hawaii's coral reef ecosystems. The HCRIRP is jointly managed by the Division of Aquatic Resources (DAR) of the DLNR and the UH (HCRIRP, 2004a).

The coral reefs of the main Hawaiian Islands comprise approximately 410,000 acres, which protect and stabilize shorelines from wave action, particularly during storms, and are responsible for Hawaii's white sandy beaches. The State's coral reefs ecosystems have over 5,000 known species of marine plants and animals, many of which are endemic. The reefs are composed of a rich biodiversity of corals, including at least 60 species of stony corals. Approximately 25 percent of Hawaii's coral species are endemic, putting them at elevated risk of extinction. The reefs support an amazing diversity of life, with over 100 sponge species, more than 1,000 species of mollusks, over 800 species of crustaceans, and over 500 species of reef and shore fish (Proposal, 2004, HCRIRP, 2004a).

Besides their vast coverage throughout the State, coral reef ecosystems are culturally, economically, and biologically critical to Hawaii's future. HCRIRP's initial assessment of Hawaii's coral reefs indicate that the reefs are in better condition than reefs in other regions. However, coral reefs in Hawaii continue to decline due to increasing human population and human activities (Gulko et al., 2002, HCRIRP, 2004a).

Impacts to Marine Resources

Since no location in Hawaii is more than 29 miles from the shore, coastal and marine resources are especially vulnerable to human activities that occur inland. Stream channelization, loss of riparian vegetation, and paving in lowland and coastal areas contribute to a higher than normal volume of freshwater being delivered to the ocean with the resulting low salinity levels , adversely effecting the

sensitive coral reef ecosystems (Proposal, 2004) Siltation is damaging the near shore waters and coral reef, degrading hundreds of ancestral native Hawaiian fishponds and compromising the potential for traditional lifestyles (Proposal, 2004).

Most estuaries in Hawaii are within embayments that generally are not subject to rapid and efficient flushing. Sediment and other pollutants in runoff can accumulate in estuaries degrading water quality. Agricultural runoff containing sediment, nutrients and pesticides threaten the health of coral reef and estuary ecosystems HIDOH, 1998, Proposal, 2004). Each of these pollutants are discussed in more detail below.

Hawaii's coral reefs support a large number of endemic fish species. Photo: James McVey, NOAA

Sediments

Suspended sediment can block sunlight that is essential for the survival of some corals. In addition, heavy sedimentation can bury coral, inhibiting their growth or killing them (EPA, 2004f). Sediment in runoff has been so extensive that mudflats rather than coral abut most of the south shore of the island, which now supports the spreading invasion of non-native mangroves (Proposal, 2004). An Hawaii Coral Reef Initiative (HCRIRP) study of anthropogenic stresses on coral reefs in Hawaii revealed that sedimentation caused a 33 percent loss of coral cover in Honolua Bay between 1992 and 2002. Erosion from pineapple fields is the main source of sediments into Honolua Bay, which is located off the west coast of Maui (HCRIRP, 2004b).

In estuaries, sediments muddy the water, preventing sunlight from reaching aquatic vegetation and making the water unappealing to swimmers. Sediments can also carry excess nutrients, pesticides, and toxic substances, causing additional water quality problems (EPA, 2004f).

Nutrients

Excess nutrients over-stimulate the growth of native and invasive aquatic plants and algae. When nutrient levels increase, the delicate ecosystem balance that exists between coral and algae is upset causing the algae to overgrow the coral. When this situation is prolonged, the coral is smothered and dies beneath the algal carpet. This, in turn, affects the fish and other aquatic organisms using the area, leading to a decrease in animal and plant diversity by preventing sunlight from penetrating the water. Fish and shellfish are deprived of oxygen, and underwater sea grasses are deprived of light and can die (EPA, 2004f). Excessive nutrients in estuaries can result in accelerated eutrophication and algal blooms. Nutrients such as nitrogen and phosphorus promote plant growth, including algae. Excessive nutrients lead to a proliferation of algal growth and algal blooms. As the algae die, they decay and rob the water of oxygen, which harms aquatic organisms. In addition, abundant amounts of algae can effect the use of the water for fishing and swimming by muddying the water, preventing sunlight from reaching aquatic vegetation and making the water unappealing to swimmers (EPA, 2004f).

Pesticides

Coral reef ecosystems are vulnerable to the introduction of pesticides and herbicides commonly associated with agricultural runoff. Some toxic substances found in these chemicals can bind to sediment and are then transported to coastal receiving waters through sedimentation. These toxic substances can cause scarring, death, or reproductive failure in fish, shellfish, and other marine organisms. In addition, they can accumulate in fish tissue, leading to fish consumption advisories. The sensitivity of corals makes them especially vulnerable to the introduction of toxic substances (EPA, 2004f).

3.6.2 Effects of Alternative A (No Action) on Marine Resources

Coastal resources would continue to decline as Hawaii's population increases. This decline would occur despite the CZMA, which requires consultation and coordination with Federal and State agencies before development is permitted.

Under Alternative A, current agricultural practices would continue to have long-term minor to moderate adverse effects on marine resources. Coral reefs, estuaries, and near-shore waters would continue to be impacted by sediments, nutrients, and other contaminants commonly found in agricultural and urban runoff. The No Action Alternative would not achieve any of the objectives listed in Section 1.4.

3.6.3 Effects of Alternative B (CREP Agreement) on Marine Resources

Implementation of Alternative B would produce a beneficial effect on all marine resources. The CPs are designed to either filter sediment and nutrients from water or prevent soil erosion, resulting in beneficial impacts to coastal areas. CP2, CP3A, CP23, and CP25 all reduce soil erosion through the establishment of vegetative cover on land that has been degraded by human activities. The remaining CPs (CP22, CP29, CP30) all provide for the removal of sediment, nutrients, and other pollutants from surface water through the establishment of buffers.

Direct beneficial effects may occur within HICZMP planning areas as acres covered under the CZMA that are in agricultural use or adjacent to agricultural use may be enrolled in CREP and taken out of production.

By reducing sediment and nutrient loads CREP is expected to have long term moderate to high beneficial effects on coral reefs, estuaries, and near-shore waters. Significant enrollment in CREP is expected to increase coral cover and diversity on targeted coral reefs, averaged across watersheds. Within individual watersheds where other sources of pollution (e.g. urban/suburban runoff, wastewater treatment) are minimal, the water quality benefits of CREP are expected to be greatest. Reductions in sediment and nutrient loading would allow sunlight to reach corals thus increasing coral cover, substrate diversity, and faunal diversity while fewer nutrients would reduce cover of invasive alien algae.

Selection of Alternative B would meet all the CREP Objectives in Section 1.4.

3.7 Protected Species

Hawaii has a rich and diverse wildlife population. Habitat degradation from population growth, invasive exotic species, and pollution continue to threaten current species populations. CREP would serve to enhance the wildlife habitats throughout the State and enhance populations of Federally listed T & E

species. This PEA will study the potential impacts to wildlife. Of particular concern and discussed below are the potential impacts to T & E species and wildlife habitat.

The ESA was enacted to protect T & E species and to provide a means to conserve their habitats. All Federal agencies are required to implement ESA by ensuring that Federal actions do not jeopardize the continued existence of listed species.

The ESA defines an endangered species as one that is in danger of extinction throughout all or a significant portion of its range. Threatened means a species is likely to become endangered within the foreseeable future. T & E designations may be applied to all species of plants and animals, except pest insects. A species may be threatened at the State level, but that same designation does not automatically apply nationwide, as species numbers may be greater in other States.

The FWS and NMFS are mandated the responsibility of ensuring that other agencies plan or modify Federal projects so that they will have minimal impact on listed species and their habitats. Section 7 of the ESA requires that project areas must be checked against FWS and State listings of critical habitat and T&E species. FSA ensures that all CREP contract meet this requirement by including T&E species in its EE.

The ESA also requires the delineation of the "critical habitat" of sensitive species. Critical habitat is defined by the ESA as areas that are "essential" to the conservation of listed species. Private, city, and State lands are generally not affected by critical habitat until the property owner needs a Federal permit or requests Federal funding. Because the Hawaii CREP is partially funded by Federal dollars, consultation with FWS would be required when critical habitat is encountered. Critical habitat designations are published in the Federal Register.

FWS has recently proposed rules that would help remove disincentives from private landowners that wish to manage their property for the benefit of listed species (64 FR 32706-32716). This would entail the development of Safe Harbor Agreements and Candidate Conservation Agreements with Assurances (CCAAs). These agreements would ensure agricultural landowners that traditional agricultural uses could continue alongside habitat improvements. They would also address the issue of "incidental take" with regard to activities such as habitat restoration.

3.7.1 Existing Conditions

Hawaii has the highest number of listed T&E species in the nation and approximately one-fourth of all Federally listed species are found in Hawaii. Of the total 1,268 Federally listed T&E species in the U.S., 317 are in the State of Hawaii. (FWS, 2004b). T&E species in Hawaii are summarized in Table 3.3 and a complete list of Federally listed T&E species in Hawaii can be found in Appendix B.

Threats to Protected Species

Threats to T&E species include competition from introduced plant species; habitat destruction by feral and domestic animals; agricultural, military, and residential development; and predation by cattle, insects, and rats have all contributed to bring these species close to extinction (FWS, 2004c).

Table 3.3. Summary of Federally listed T&E species in Hawaii. Source: FWS, 2004b.

Species Group	Number of Species
Total Animals	**44**
Mammals	3
Birds	32
Reptiles	4
Snails	2
Insects	1
Arachnids	1
Crustaceans	1
Total Plants	**273**
Flowering Plants	261
Ferns and Allies	12
Total Distinct Species	**317**

Invasive and Exotic Species

One of the major threats to Hawaii's native species and forests is the rampant spread of a large number of invasive alien plant species. The Hawaii Department of Agriculture estimates that at least 14 new species arrive and become established in the State every year (HEAR, 2004). Once established, the most serious invasive species are extremely difficult to control. These plants displace Hawaii's distinctive native flora, resulting in the loss of diverse native forests that support a large array of native animals. Of the approximately 13,000 alien species of plants that have been introduced to Hawaii, only about 1percent (130 species) have become invasive so far. Biological evidence suggests another 200-300 species already present in the State may become problems in the future (HEAR, 2004, Proposal, 2004).

These habitat-modifying invasive species spread without human aid and significantly disrupt native ecosystem processes – displacing, consuming, or otherwise changing the structure and composition of native vegetation or preying upon, displacing, or out-competing native fauna. For example, Miconia calvescens, an invasive tree species that was brought to Hawaii as a garden plant, has now spread extensively on Hawaii and Maui with scattered infestations on Oahu. The State of Hawaii and partners are spending over $600,000/year trying to control and eradicate this species because of the known risk it poses in tropical systems, such as in Tahiti where it has taken over nearly 70 percent of all forests, causing enormous and frequent landslides because of its shallow root system. The State of Hawaii is currently spending an estimated $2 million per year to control invasive species in natural habitats and prevent new introductions (Proposal, 2004).

Habitat Loss

Habitat loss from forest removal and development in the Hawaiian Islands started when large tracts of mostly lower elevation land were cleared for agriculture by the first Hawaiian colonists. After European and American settlers arrived, starting in the late 18th century, habitat loss increased dramatically as agriculture and ranching expanded. In 1990, no more than 40 percent of the land surface of Hawaii was covered with native-dominated vegetation. Some of the most significant loss of habitat has occurred below 2,000 foot elevation, where less than 10 percent of the native vegetation remains (USGS, 1999). Many lowland areas no longer support native plants. In addition to direct clearing, all remaining native plant communities are further degraded by disturbance and competition from introduced plants and animals. Feral cattle, pigs, goats, and sheep continue to destroy remaining native habitat, with the feral pig causing the greatest destruction of habitat. Feral animals disturb forest understory, providing opportunities for further spread of invasive species (Proposal, 2004, USGS, 1999)

***Miconia calvescens*. One of the most invasive plants in Hawaii. Photo credit: Betsy H. Gagne, HEAR**

3.7.2 Effects of Alternative A (No Action) on Protected Species

Under the No Action Alternative, new T&E listings or extirpations could occur as newly jeopardized species are identified. These new listings and the declining habitat conditions of the currently listed species suggest that overall impacts to T&E species reflect a slow rise as human actions conflict with and adversely affect both species and their habitat. Under Alternative A, areas that would have been enrolled in CREP would not benefit from the installation of FSA CPs. Many of the benefits that would have resulted from the implementation of CREP would not occur. The following adverse impacts might be expected from not implementing CREP:

- Restoration of rare and declining habitats would only occur under other limited State and Federal programs
- Wetlands that provide important habitat would not be restored
- No reduction in pollutant loads from agricultural runoff
- Native grasses and hardwood trees would not be planted to enhance native habitats
- Fencing to exclude feral animals that damage native plants would not be installed around important habitat
- Invasive plant species would continue to out-compete native plants

Under the No Action Alternative, long-term, minor adverse effects would continue. Terrestrial and aquatic habitat values in Hawaii would not benefit from the habitat restoration and watershed improvement CPs and these values may continue to decline.

3.7.3 Effects of Alternative B (CREP Agreement) on Protected Species

Implementation of the Proposed Action Alternative would have beneficial effects on protected species in Hawaii. Benefits would come from all of the CPs and activities associated with the CPs. CREP CPs would restore native habitats, enhance existing native habitats, improve water quality, and control nonnative species

Over the term of CREP, Alternative B is expected to result in an increase in the populations of targeted Federally listed species of rare plants and animals. These species include the koloa duck (*Anas wyvilliana*), ‘aiea (*Nothocestrum breviflorum,* and *N. peltatum*), ma’o hau hele—the State flower (*Hibiscus brackenridgei*), uhiuhi (*Caesalpinia kavaiense*), haha (*Cyanea recta*), and lo’ulu (*Pritchardia schattaueri*). CREP is also expected to benefit the State bird, the nene goose (*Branta sandvicensis*), and candidate-endangered species, including damselflies (*Megalagrion leptodemas, M. nesiotes, M. nigrohamatum, M. oceanium, M. pacificum,* and *M. xanthomelas*). The benefits that each CP will have on protected species are discussed in more detail below.

Substantial benefits are also expected through the control of nonnative invasive species. Nonnative invasive species that are would be targeted by CREP include: *Miconia calvescens, Rubus spp., Schinus terebinthifolius, Pennisetum setaceum, Leptospermum scoparium, Delairea odorata, Citharexylum spp., and Ulex europea.* These species have impacts on erosion, infiltration, and native plants. Control efforts for these invasive species would provide a benefit to rare and protected plant species by removing nonnative species that out-compete them for resources.

Special management needs created by the overwhelming invasive species problem in the State requires aggressive management to preserve the conservation value of established CRP plantings. Invasive species would likely re-invade enrollment areas after initial projects are completed and thus would require additional control efforts. To address this special concern, each enrolled property would develop an approved special maintenance plan that describes what actions would be taken over the course of the contract to deal with invasive species.

As part of the CREP enrollment process, a contract involving appropriate CPs would be developed for each individual site. Each contract would address if any T & E species or critical habitat are present or if they would be potentially affected by the proposed action. If FSA makes a finding of “may effect”, consultation with the FWS/NMFS would be initiated. In addition, any CREP activity that may result in the disturbance of non-cropped areas adjacent to a proposed project site would be coordinated with FWS/NMFS.

In general terms, direct benefits to protected species would occur by implementing the appropriate CPs and concurrent activities. Specifically:

CP2— Establishment of native grasses would create and enhance habitat for protected species. This practice is also expected to reduce soil erosion and improve water quality.

CP3A—Conversion of forest has led to high soil erosion and a decrease in ground water recharge. Hardwood tree plantings would reduce soil erosion and increase infiltration. Peak flows and sediment loads of streams would decrease and reduce the likelihood of riparian buffers being destroyed in periodic floods and stream bank erosion during flooding. Subsequent

improvement in water quality is expected to improve habitat of receiving water bodies. Restoration of forested areas would also provide important terrestrial habitat for wildlife such as birds. Hawaii has the goal of enrolling up to 20,000 acres of cropland and marginal pastureland in native and non-invasive species.

CP22—Riparian buffers create shade to lower water temperature improving habitat for aquatic organisms. They also provide a source of detritus and large woody debris for aquatic organisms. Buffers also provide important terrestrial habitat for wildlife and it is anticipated that broader buffers could provide wildlife corridors connecting native plant and animal populations. Riparian buffers also improve water quality by filtering sediment and other pollutants reducing flow of polluted runoff to near-shore waters and coral reefs. Habitat in receiving water bodies is expected to improve with the removal of these pollutants. Additionally rare, native, and T&E species could be included in the plantings contributing to the conservation of these species. Hawaii has the goal of restoring up to 10,000 acres of native forested riparian buffers. This acreage represents between 15 and 30 percent of all riparian habitat that traverses agricultural land in Hawaii.

CP23— Wetland restoration would provide important habitat for waterfowl and other wildlife. It is also anticipated that wetlands would be planted with native and rare species providing further protection and conservation of the species. Wetlands also improve water quality by filtering sediments and reducing flood flows and would contribute to enhancing habitat of downstream water bodies.

CP25— The purpose of this practice is to restore the functions of critically endangered, endangered, and threatened habitats. This is accomplished through the restoration and/or conservation of native plant communities that provide habitat for rare and declining wildlife species. This CP would most likely provide the greatest benefit to protected species. Listed and rare plants would be planted through CP-25 with different species being used as appropriate on each island. It is anticipated that these plantings would meaningfully contribute to the conservation of each species involved.

CP29— Wildlife habitat buffers would stabilize stream banks, reduce pollutants, reduce flood damage impacts, and restore and enhance habitat for protected species.

CP30— Wetland buffers provide benefits similar to the other buffer practices (CPs 22 and 29). Additionally, this practice would enhance and restore hydrology and plant communities associated with existing and/or degraded wetland complexes providing habitat for protected species.

Fencing which may be a component of conservation and maintenance plans developed for each CREP contract would exclude feral mammals from disturbing riparian vegetation and newly forested areas.

Selection of Alternative B would result in long-term moderate to high benefits to protected species. Implementation would provide additional habitat and enhance existing native terrestrial and aquatic habitat by improving water quality and restoring native plant communities. Conservation easements would also provide for the permanent protection of important habitat of protected species. All four the objectives in Section 1.4 would be met.

3.8 Cultural Resources

NHPA requires consideration of historic properties and their values in cooperation with other nations and with State and local governments. Amendments designated the State Historic Preservation Office (SHPO)

or the Tribal Historic Preservation Office (THPO) as the party responsible for administering programs in the States or reservations (ACHP, 2002).

Historic resources can include materials, properties, or locations that postdate written records. These resources can include archaeological structures, artifacts, documents, and other evidence of human behavior, and may also include locations of historical events or sites associated with the lives of historically significant persons. Resources must normally be greater than 50 years old to be considered as historic and eligible for the National Register of Historic Places. However, it is possible for a resource less than 50 years old to be eligible, such as properties that are of exceptional importance to a community, State, tribe, region, or the nation (ACHP, 2002).

American Indian and Native Hawaiian resources may include prehistoric and historic sites and artifacts, areas of occupation and events, historic and contemporary sacred areas, materials used to produce tools and other objects, hunting and gathering areas, and other resources that may be of importance to contemporary American Indians. Traditional Cultural Properties (TCPs) that may be impacted by proposed actions may be referred to but not specifically identified in compliance documents in order to avoid unintended impacts on sacred or significant sites. Consultation with Native Hawaiian groups should be pursued to determine environmental impacts, if any, to TCPs (ACHP, 2002).

Kawainui Marsh. Photo Courtesy of FWS.

The Office of Hawaiian Affairs (OHA) was established as a public trust, with the mandate to better the conditions of both Native Hawaiians and the Hawaiian community in general (OHA, 2005). One of the programs of the OHA is the Native Rights, Land and Culture (NRLC) program, which has the mission to advocate for the rights, lands, and culture of the Hawaiian community. One of the NRLC's advocacy efforts include the protection of Hawaiians' traditional and customary rights through the review of Federal, State, and county projects. NRLC participates in NHPA Section 106 consultations for Federal projects, reviewing land altering activities for their potential to affect historic, cultural, or burial sites and for their effects on Hawaiian access or traditional-practice rights (OHA, 2004).

3.8.1 Existing Conditions

Hawaii's ancient culture and European settlement has endowed the State with a remarkably diverse collection of historic and cultural resources worthy of preservation. Collectively, millions of cultural

resources are believed to be associated with this rich legacy, including Native Hawaiian sites (including agricultural fields, temporary habitations, residential complexes, fishponds, heiau, trails, petroglyphs, and burials); traditional cultural landscapes such as wetland agricultural fields and sacred summits); historic buildings, structures, objects, and sites associated with missionary activities, whaling and maritime endeavors, and sugar and pineapple cultivation (NPS, 2005a).

The State Historic Preservation Division (SHPD) maintains an inventory of all known historic properties in Hawaii. Currently, approximately 38,000 properties comprise this inventory, with around 1,000 sites added each year (SHPD, 2005a).

The National Register of Historic Places, kept by the National Park Service, includes significant properties nominated by State and Federal agencies, historic areas in the National Park System and all National Historic Landmarks (SHPD, 2005a). National Park System units listed in the National Register of Historic Places are:

- Kalaupapa National Historic Park
- Kaloko-Honokohau National Historic Park
- Puuhonua O Honaunau National Historic Park
- Puukohola Heiau National Historic Site
- USS Arizona Memorial

There are 32 National Historic Landmarks in the State, all but one are in the counties within the project area (NPS, 2005b).

Huilua Fishpond at Kahana Bay State Park on the windward coast of O'ahu. After years of alteration by tsunami and winter storms, the fishpond is currently being reconstructed by volunteers. Photo Courtesy of DLNR.

Because of Hawaii's culture and history, there are many cultural resources that are unique to the area including fishponds, taro fields, and ubiquitous burial sites. Each of these resources is discussed below.

Fishponds

Fishponds, constructed by ancient Hawaiians along island shorelines, were once a major source of protein for islanders, but fell into disuse when large scale agriculture developed in Hawaii (EPA, 2005). Prior to western contact in 1778, it is estimated that there were over 480 fishponds in the islands which now produce an estimated yield of almost 2 million pounds per year. This extensive system of fishponds is one of the premier examples of successful fish farming in the world. The walled ponds were constructed between two points along the shore next to the mouth of a stream or near freshwater springs. Different types of fish were stocked in the pond. The size of the ponds varied greatly, ranging from one acre to more than 523 acres(EPA, 1998).

To date, 13 fishponds have been restored Statewide and four ponds (three on Molokai and one on the Island of Hawaii) are currently in use (EPA, 2005). The south shore of Molokai Island has the greatest number of relatively intact ancient Hawaiian fishponds in the State (EPA, 1998).

Sacred to Native Hawaiians, Kawainui Marsh on Oahu Island is the largest remaining wetland in Hawaii, as well as the largest ancient Hawaiian freshwater fishpond. At one time, it was the center of a caldera of the Koolau shield volcano. The 1,000-acre wetland provides a primary habitat for four of Hawaii's endemic and endangered waterbirds. The marsh also contains extensive archaeological and cultural resources, including ancient walled taro gardens or lo'i, the fishpond, and religious structures, and is eligible for inclusion on the National Register of Historic Places (FWS, 2005).

Taro Fields

Taro (or kalo), *Colocasia esculenta* (or *antiquorum*), is cultivated both in the uplands as high as 4,000 feet, and in marshy land irrigated by streams. The plant is a hearty succulent perennial herb, with clusters of long heart or arrowhead-shaped leaves that point earthward. (Taro Festival, 2005)

Working taro farm. Photo Coutesy of Kipahulu ‘Ohana (2005).

Taro is a vital part of the cultural and agricultural traditions of the Hawaiian people. Prior to western contact, taro was the major food staple. Maps from 1906 indicate that taro farms dominated the land use at that time (Hawaii, 2005). Today, taro remains an important crop to the many cultures of Hawaii (USDA, 2005). There are several working taro farms in Hawaii and efforts have begun to restore ancient taro fields for cultural and educational purposes (Kipahulu ‘Ohana, 2005).

Burial Sites

Ancient Hawaiians believed that an individual’s physical remains would empower their descendants and so were buried near family residences. Some burial sites were covered by stacked stones while others were buried with no surface markers at all, frequently in sand dunes. Remains of highly honored individuals were often buried at night, concealing their location from jealous rivals who might steal and degrade or otherwise use the spiritual power of the remains for personal gain. Because of these cultural practices, ancestral bones can be found almost anywhere in Hawaii (SHPD, 2005b).

Burial sites are often accidentally disturbed either by nature (high surf or erosion) or by human activity through projects that involve excavation (SHPD, 2005b). The SHPD currently responds to approximately 2-3 inadvertent discoveries of burial sites each week and is involved in up to 250 burial cases annually. Since 1991, approximately 3,000 sets of native Hawaiian skeletal remains have been re-interred through cooperation with SHPD, various Hawaiian organizations, and property owners (SHPD, 2005c).

Any skeletal remains accidentally discovered must be reported to the SHPD and County police. The management of burial sites over 50 years old falls under the purview of the SHPD. Remains estimated to be less than 50 years old fall under the jurisdiction of the local police (SHPD, 2005c).

3.8.2 The Effects of Alternative A (No Action) on Cultural Resources

Under the No Action Alternative, minor to moderate adverse impacts on cultural resources would continue to occur. These include disturbance and destruction of prehistoric and historic sites and structures, either through ongoing land conversion for development or agricultural use. Sites and structures, if discovered on private land, may often go unreported. In some instances, destruction of a site or structure may occur before a professional is able to assess its significance. On Federal land or for actions requiring a Federal permit, potential impacts on cultural resources must be considered before the Federal agency can implement, fund, or permit a proposed action.

Additionally, because fishponds and taro fields rely on wetlands and water from streams, the quality of water is important to traditional native Hawaiian agriculture. With the No Action Alternative, land disturbing activities, chemical spraying, and other agricultural practices would continue to occur at their present levels or may increase, resulting in degradation of surface water quality and subsequently adversely impacting receiving wetlands and marine bays. This damage to wetlands, shore waters, and coral reefs can degrade ancestral native Hawaiian fishponds and taro fields and could compromise traditional lifestyles and practices.

Alternative A would not contribute to the achievement any of the objectives listed in Section 1.4.

3.8.3 The Effects of Alternative B (CREP Agreement) on Cultural Resources

There would be minimal to no adverse effects on cultural resources, with the implementation of CREP. In fact, CREP implementation would likely complement any cultural resource management and stewardship goals.

Surface water is critical to native Hawaiian fishponds and taro fields. Under Alternative B, CREP-enrolled land would be restored to native vegetation and other beneficial plant communities, decreasing agricultural runoff. Riparian buffers would also be established, filtering pollutants from surface water, and improving water quality. Improved water quality would benefit ancestral native Hawaiian fishponds and taro fields.

Adverse effects to cultural resources in the CREP project area may occur during the installation of CPs. Installation activities requiring excavation or other earth moving activities could potentially disturb buried sites or artifacts. Any impacts to cultural resources, if they occur, would be addressed as part of the NHPA Section 106 review and consultation process. FSA would conduct a site specific evaluation for each CREP contract to determine any potential effects that the proposed CPs would have on cultural resources. The inventory maintained by SHPD would be referenced when completing site specific EEs. An FSA representative would verify that no cultural resources would be adversely affected as a result of the individual CREP contract and take appropriate actions to ensure that any adverse impacts are properly mitigated. As part of this process, a cultural resource survey of the property may be required. The review will take into account that deeply buried sites may be present and that CREP CPs may affect them. In addition, consultation with Native groups may be required if TCPs are indicated.

Alternative B would assist the State in its efforts to meet the CREP objectives outlined in Section 1.4.

3.9 Human Health, Social, and Economic Issues

NEPA and its implementing regulations and guidelines require consideration of Federal actions on the human health, social, and economic issues in preparation of environmental documents. Section 1508.8 of the CEQ's "Regulations for Implementing NEPA" states that:

> Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems.
>
> Effects and impacts as used in these regulations are synonymous. Effects includes ecological (such as the effects on natural resources and on the components, structures, and functioning of affected ecosystems), aesthetic, historic, cultural, economic, social, or health, whether direct, indirect, or cumulative. Effects may also include those resulting from actions which may have both beneficial and detrimental effects, even if on balance the agency believes that the effect would be beneficial.

Flowers grown and exported directly to individuals throughout the world. Photo Courtesy of Tropical Flowers Direct.

This PEA will present regional and local information on the human health, social, and economic conditions in Hawaii that are relevant to the implementation of CREP, and the potential impacts of the proposed project on these conditions. A detailed discussion of environmental justice concerns is also included in this section.

3.9.1 Existing Conditions

State Economy

In 2002, there were 5,398 farms and the market value of agricultural production was $533.4 million, an increase of 7 percent from 1997 (NASS, 2004). Total agriculture sales, including distribution margins, amounted to 4.1 percent of the total sales for Hawaii's economy in 2000. As can be seen in Figure 3.4, agriculture's share of total sales in Hawaii has been declining. Total agricultural sales include farm production, agricultural service, forestry and fisheries, and food processing (Leung and Loke, 2002).

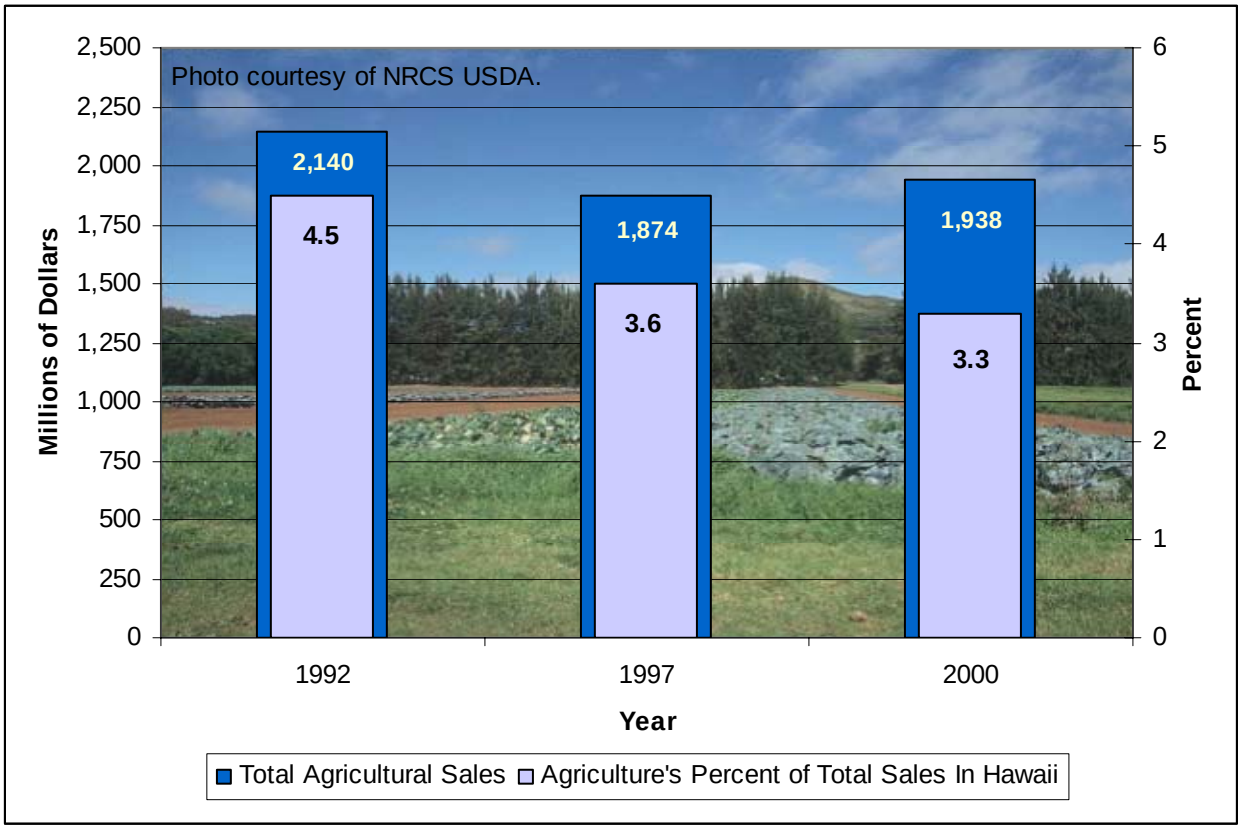


Figure 3.4. Agricultural sales trends in Hawaii for 1992-2000. Source: Leung and Loke, 2002.

During the period 1992–2000, sugarcane production declined drastically at an annual rate of more than 10 percent, while pineapple production remained stable at $102 million after a slight decline in 1997. The continual decrease in sugarcane sales value is largely offset by the tremendous growth in sales value of diversified agriculture (including seed crops, coffee, macadamia nuts, fruits, vegetables, flowers, and nursery products) which increased at an annual rate of 3.8 percent between 1992 and 2000. Reflecting this trend, the sales value of diversified agriculture jumped from just over 50 percent of total farm production in 1992 to almost 70 percent in 2000. Diversified agriculture posted record high sales of $357 million in 2000 (Leung and Loke, 2002).

Employment provides a good indicator in measuring the contribution of an industry to the economy. In 1992, agriculture contributed 4.2 percent of total employment in the State, but it declined slightly to 3.7 percent in 1997, before reversing the trend and rising to 3.8 percent in 2000. When distribution margins are included, agriculture in 2000 contributed over 38,000 jobs, or 5.0 percent of the total Statewide employment (Leung and Loke, 2002). Employment in agriculture, forestry, and fishing is predicted to decline slightly by 0.7 percent in 2005. This general trend is a result of the transition from large-scale plantation crops to smaller crops in diversified farming (HIDLIR, 2005).

Recreation and Tourism

Ag-tourism is increasingly becoming an important aspect of agriculture's contribution to the economy and has the potential to be impacted by CREP. Ag-tourism is a commercial enterprise on a working farm conducted for the enjoyment, education, and/or active involvement of the visitor, generating supplemental income for the farm. More farmers in Hawaii are opening up their operations to the public by producing and selling products directly from the farm, operating a bed and breakfast, conducting educational farm

tours, offering horseback riding, festivals, concerts, and many other ag-tourism activities which bring the farm experience to more people and provide additional revenue to support their farming operations (HASS, 2004a).

In Hawaii, farms of all sizes had some level of activity. Large operations account for the largest dollar value of ag-tourism activities. The value of Hawaii's ag-tourism related was $33.9 million in 2003, up 30 percent from 2000. Revenue from ag-tourism, which includes various activities, was broken down into several categories. On-farm sales direct to farm visitors was the leading category, with $13.5 million, followed by retail sales (products from other farms or souvenir items), outdoor recreation, accommodations (bed and breakfast, meeting rooms, etc.), education, entertainment, and others (HASS, 2004a).

Pomaika'i "Lucky" Farm Bed & Breakfast. Ag-tourism on a working macadamia nut and Kona coffee farm. Photo Courtesey of Pomaika-i Farm.

There were 187 farms Statewide that had ag-tourism related income during 2003, a 48 percent increase from 2000. Interest in ag-tourism appears to be strong; an additional 145 farms either started ag-tourism activities in 2004, or planned to in the future (HASS, 2004a).

Another segment of the State's economy that might be affected by CREP is tourism and recreation. In 2002, the contribution of tourism to the economy was about $8.0 billion, 17 percent of Hawaii's Gross State Product (GSP). The export of visitor services is the largest single contributor to Hawaii's annual GSP (DBET, 2004).

In 2002, Hawaii received approximately 6.5 million visitors. According to the State of Hawaii Data Book, 92.2 percent of visitors from the U.S. participated in some type of recreational activity. Some of the most popular recreational activities for U.S. visitors included sunbathing and swimming (84.5 percent), snorkeling and SCUBA diving (55.0 percent), backpacking, hiking and camping (22.0 percent), and golf (17.4 percent). The majority of U.S. visitors also participated in some form of sightseeing (92.2 percent) (DBET, 2004). All of these activities have the potential to be impacted by degradation of water quality and native habitats.

In 2001, State residents and nonresidents spent $261 million on wildlife recreation in Hawaii. Of that total, trip-related expenditures were $144 million and equipment purchases totaled $106 million. The remaining $12 million was spent on licenses, contributions, land ownership and leasing, and other items and services (USDI and UCSB 2001).

3.9.2 Environmental Justice

All Federal programs, including CREP, must comply with Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations. The EO, issued February 11, 1994, requires each Federal agency to make environmental justice a part of its mission.

Agencies are to identify and address disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority and low-income populations. The EO details that all people, regardless of race, color, national origin, or income, receive the following treatment:

> Are provided with fair treatment and meaningful involvement with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies
>
> Have the opportunity to express comments or concerns before decisions are rendered on the Federal programs, policies, procedures, or activities affecting them
>
> Share in the benefits of, are not excluded from, and are not adversely or disproportionately affected by Federal programs, procedures, policies, or activities

The President issued a Memorandum to the heads of all departments and agencies to underscore that certain provisions of the existing civil rights and environmental laws (Title VI of the Civil Rights Act, of 1964, the National Environmental Policy Act of 1969, the Clean Air Act and the Freedom of Information Act), the Government in the Sunshine Act, and the Emergency Planning and Community Right-to-Know Act help ensure that all persons in the community live in a safe and healthy environment.

Environmental justice considerations ensure that all populations are provided the opportunity to comment on issues before decisions are rendered. Environmental justice allows all people to share in the benefits of, and not be excluded from or affected in a disproportionately high and adverse manner by, government programs and activities affecting human health or the environment. Departmental Regulation 5600-2, issued December 15, 1997, provides direction to agencies for integrating environmental justice considerations into USDA programs and activities in compliance with Executive Order 12898.

Application for CREP would require the completion of an EE by FSA and NRCS. Environmental justice issues would be addressed on the EE. If the proposed action is found to cause any adverse human health or environmental effects to minority or low-income communities, a discussion of the negative impacts must be attached (NRCS, 2001).

Minority Populations

Hawaii is a racially diverse State. In 2000, the minority population was 74.1 percent of Hawaii's total population. The civilian work force of Hawaii in 2003 was 618,300 people. Of these, 459,800 (74.4 percent) are considered minorities (DBET, 2004). The composition of the civilian work force is as follows:

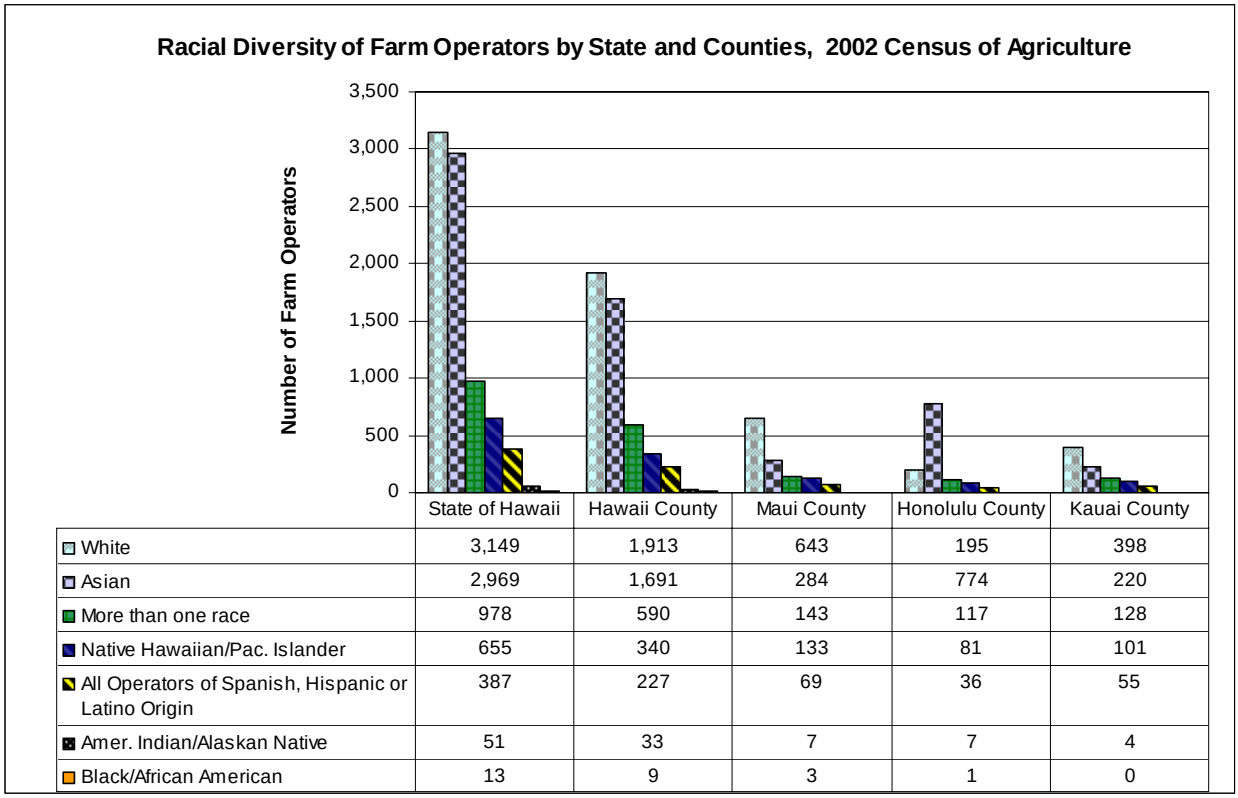
- White, 158,500 people (25.6 percent)
- Black/African American, 7,200 people (1.2 percent)
- American Indian/Alaskan Native, 1,500 people (0.2 percent)
- Asian, 276,150 people (44.7 percent)
- Native Hawaiian/Pac. Islander, 52,350 people (8.5 percent)
- Two or More Races, 116,150 people (18.8 percent)
- Some Other Race, 6,450 people (1.0 percent)
- Hispanic or Latino, 37,000 people (6.0 percent)
- All Minority Groups (does not include Hispanic or Latino), 459,800 people (74.4 percent)

In Hawaii, a large number of farms are operated by minorities. Figure 3.5 summarizes the number of minority farm operators for each county and for the State. Information included in this Figure is only applicable to the six islands (Maui, Lanai, Kauai, Hawaii, Molokai and Oahu) targeted for CREP enrollment. Information for Niihau and Kahoolawe Islands is not included because Niihau Island (located in Kauai County) is a privately owned island and Kahoolawe Island (located in Maui County) is a preserve under the jurisdiction of the State of Hawaii.

Migrant Farm Workers

It is hard to estimate the population of migrant and seasonal farm workers (MSFW) because of the mobile nature of this population. The latest estimates for the population of MSFW in Nebraska are from the 1993 Enumeration MSFW Population Study. The 1993 study estimates the population of MSFW at 18,728 people (NCFH, 2004).

The 2002 Census of Agriculture collected information on MSFW in Hawaii. Farms were asked whether any hired or contract workers were migrant workers, defined as, "a farm worker whose employment required travel that prevented the migrant worker from returning to his/her permanent place of residence the same day." In 2002, 232 farms reported employing migrant farm labor, 189 farms employed hired labor and 43 farms employed contract labor. The 2002 Census of Agriculture did not report the number of workers on those farms (NASS, 2004).



	State of Hawaii	Hawaii County	Maui County	Honolulu County	Kauai County
White	3,149	1,913	643	195	398
Asian	2,969	1,691	284	774	220
More than one race	978	590	143	117	128
Native Hawaiian/Pac. Islander	655	340	133	81	101
All Operators of Spanish, Hispanic or Latino Origin	387	227	69	36	55
Amer. Indian/Alaskan Native	51	33	7	7	4
Black/African American	13	9	3	1	0

Figure 3.5. Racial diversity of farm operators in Hawaii. Source: NASS, 2004.

Farm Worker Health

Migrant farm-working jobs are physically and emotionally demanding with hazardous working conditions from exposure to chemicals to risks for injury from accidents. Skin, eye, and respiratory problems are common occurrences. Additional occupational health hazards of farm work include tuberculosis, diabetes, and cancer (NCFH, 2005). All these conditions that require frequent medical treatment are difficult to treat due to the mobility of the population. Yet many migrant workers are fearful of the farmer causing them to lose their jobs, and therefore do not ask for the needed medical attention (Kossek et al., 2005).

The Environmental Protection Agency estimates that 300,000 farm workers in the U.S. suffer acute pesticide poisoning each year. Many of these workers do not seek treatment, or are misdiagnosed because symptoms can mimic a viral infection (NCFH 2005). Pesticide exposure can occur from a number of sources such as contaminated soil, dust, work clothing, water, and food, or through pesticide drift--the deposition of a pesticide off its target. Because of the nature of agriculture and the proximity of homes to the fields, family members could be exposed to hazardous chemicals through pesticide drift. Agricultural workers can inadvertently expose family members to hazardous materials by carrying materials home from work on their clothes, skin, hair, and tools, and in their vehicles (McCauley et al., 2000).

Many migrants' lack of education and economic desperation can also contribute to health concerns. For example, Washington State study of 460 hired farm workers found that 89 percent did not know the name of a single pesticide to which they had been exposed, and 76 percent had not received any information on appropriate protective measures (NCFH, 2005).

In addition to physical health issues, migrant farm working families have psychological and social concerns. The hassles present in their daily lives pose serious structural constraints to cultural assimilation and the family's ability to manage stress and improve long term overall social and economic well-being (Kossek et al., 2005).

Poverty

Despite the health concerns, the biggest constraint facing MSFWs is extreme poverty, with household incomes often far below U.S. Federal poverty guidelines. National data shows that one half of all farm working families earn less than $10,000 per year. This income is well below the 2002 U.S. poverty guidelines for a family of four of $18,100 (Kossek et al., 2005).

The State of Hawaii, the poverty rate in 2002 was 11 percent. Within the counties in the project area, the average poverty rate was 11.55 percent (ERS, 2005). Table 3.4 outlines the poverty rate and the total number of individuals below the poverty line in 2002.

Pay Rates

Pay rates vary whether the worker is paid an hourly wage or piece rate. Federal laws require that workers earn a minimum wage of $5.15 per hour. Workers by piece rate can earn more money based upon their individual productivity. During the July 2004 reference week, Hawaii operators paid their laborers an average wage rate of $11.46, 21 cents more than July 2003 and $2.36 more that the national average. The combined average wage for field and livestock workers was $9.90 an hour, 35 cents above a year ago and $1.40 more than the national average (HASS, 2004b).

Table 3.4. Poverty information for counties in the Hawaii CREP project area in 2002. Source: ERS 2005.

	Poverty Rate est. rate (percent)	Number in Poverty est. rate (number)
Hawaii County	14.3	22,266
Honolulu County	10.4	91,723
Kauai County	11.1	6,713
Maui County	10.4	13,981
Hawaii State	**11.0**	**134,683**

3.9.3 The Effects of Alternative A (No Action) on Human Health, Social, and Economic Issues

State Economy

Under Alternative A, agricultural practices would continue as they have for years. The degradation of water quality that currently results from agricultural practices, which leads to ancillary impact to wetlands, wildlife, tourism, etc., would continue into the future. Alternative A would not result in any State water quality improvements, unless existing programs are greatly expanded.

Implementation of Alternative A would have no direct or indirect effect on:

- The total amount of agricultural production in Hawaii. This total would continue to respond to market forces and the economy of the State.
- The rental rates and land value of Hawaii acreage. These rates would continue to be affected by development values and population density.
- The total number of Hawaii ranches/farms. This total would continue to respond to market forces and the economy of the State.
- The overall economy of Hawaii. Hawaii's economy would continue to be affected by market forces. Agriculture would continue to contribute roughly the same value to the overall economy.
- The labor markets of Hawaii. The agricultural labor market would continue to provide the same number of jobs, with fluctuations due to market conditions.

Any ongoing environmental justice compliance problems are likely to continue under the No Action alternative. Exposure to pesticides and other harmful chemicals by farm workers and their families will continue to occur at current levels.

Under this alternative, there would be no CREP funds available for any producers (including minorities). No FSA actions are required or necessary under the No Action alternative to address existing or ongoing issues with environmental justice.

Implementation of Alternative A has the potential to marginally affect:

- The recreation and tourism industry of Hawaii. Alternative A would not offer mechanisms to improve the water quality of Hawaii. This continued degradation has the potential to negatively impact the State's protected/unique lands which may translate into negative

impacts to the State's recreation and tourism economy. Because of the significant income provided by tourism, recreation, fishing, boating, and other water-related businesses, the continued degradation of Hawaii waterbodies is a threat to the overall economical viability of Hawaii.

- Land use in Hawaii. Alternative A offers no additional land preservation than the current programs offer. This may result in land-use changes in the State and the socioeconomic impacts associated with these changes may continue.
- Population growth and density in Hawaii. While implementation of Alternative A would not directly affect population and density, there is the possibility for future indirect impacts associated with its implementation. Human population and density in Hawaii would continue to increase, assuming the expected future expansion and growth of Hawaii's population occurs. These values operate independently of agricultural practices. However, with additional population growth in the future comes the need to provide additional clean drinking water, a need that Alternative A would not help fulfill. This may limit population growth, encourage population density, strain natural resources, and compound the nonpoint source pollution problem in Hawaii.

The No Action Alternative would not meet any of the CREP Objectives outlined in Section 1.4.

3.9.4 The Effects of Alternative B (CREP Agreement) on Human Health, Social, and Economic Issues

State Economy

Though ultimately beneficial, long-term statewide economic effects from CREP implementation would be minimal. There is a potential for minor changes in some health, social and economic factors, but this would occur only on a very limited and disparate basis. The Hawaii CREP proposes the potential enrollment of up to 30,000 acres across the State. These 30,000 acres represents 0.73 percent of the entire State of Hawaii and 2.3 percent of the State's agricultural land.

Implementation of Alternative B would result in general improvement to the water quality of Hawaii. The degradation of water quality that currently results from agricultural practices, which leads to ancillary impact to wetlands, wildlife, and tourism, would be reduced as a result of implementing Alternative B.

Implementation of Alternative B would have no direct or indirect effect on:

- The rental rates and land values of Hawaii acreage. If Alternative B were intensively implemented in a small geographic region, it could create a localized and artificial shift in rental rates and land values. CREP contains safeguards to prevent this from happening. For instance, there is a 25 percent acreage cap on CREP enrollments within a county, limiting the amount of cropland enrolled in CREP in a certain geographical region. In addition, the acres enrolled in CREP would likely be spread across the State, since participating landowners typically enroll partial farms or fields or lands immediately adjacent to streambanks.

  CREP could also create a situation where land enrolled in CREP has a greater value than surrounding lands. This is unlikely to happen in Hawaii as income earned through CREP would remain less than the average development value of nearby land. CREP-enrolled lands are typically lands that are marginally productive agricultural lands that are non-developable so enrollees are not foregoing development income to enroll in CREP. All of these factors would limit the acres of cropland taken out of production in a given area and, consequently,

the local economic impact due to implementation of CREP would be minimal to non-existent. These rental rates and land values of Hawaii acreage would continue to be affected by development values and population density and would not be impacted by Alternative B.

- The total number of Hawaii ranches/farms. Alternative B would not result in changes to total number of Hawaii ranches/farms. The 25 percent acreage cap on CREP and the practice of participating landowners to enroll partial farms or fields means that entire ranches and farms would not be enrolled in CREP. This total would continue to respond to market forces and the economy of the State and not be impacted by Alternative B.
- The overall economy of Hawaii. Alternative B would not substantially impact the economy of Hawaii. Agriculture would continue to contribute roughly the same value to the overall economy. CREP enrolled lands would continue to provide residual income to enrollees, supporting the overall economy although possibly at a slightly reduced rate. However, this slight reduction, spread across the entire State, would have very limited impact on the overall economy of Hawaii. Hawaii's economy would continue to be affected by market forces and would not be impacted by Alternative B.
- The labor markets of Hawaii. The agricultural labor market would continue to provide roughly the same number of jobs, with fluctuations due to market conditions, and would not be impacted by Alternative B. As discussed above, CREP would not have a significant effect resulting in large numbers of farms stopping production. Additionally, enrollment would be spread across the entire State and have only marginal impacts to individual farms. The limited potential impacts would not result in extraordinary effects on the agricultural labor markets.

Implementation of Alternative B has the potential to marginally affect:

- The total amount of agricultural production in Hawaii. Implementation of Alternative B has the potential to slightly reduce total agricultural acreage across the State because the CREP-enrolled land is removed from production. However, at full enrollment, CREP would only affect 2.3 percent of the State's agricultural land. Additionally, producers are likely to enroll only marginal lands. The areas (partial fields, strips, or buffers) enrolled in CREP would most likely be less productive areas of a given farm. By enrolling these areas, the landowner may be able to reduce the overall input costs of farming operations, and in some cases, actually maintain or increase production by being able to concentrate resources on the remaining farmland. These two factors would likely result in limited effects across the State. Agricultural production would continue to respond to market forces and the economy of the State and not be significantly impacted by Alternative B.
- Farm incomes in Hawaii. There is a possibility for a slight beneficial effect to farm incomes from the steady and guaranteed receipt of CREP funds by enrolled producers. As discussed above, producers are more likely to enroll marginally productive lands and the residual income from CREP might result in slightly more income than the acreage was capable of producing as farmland. These values, if they occur, would not have a significant impact across the State.
- Economic damages caused by pest species. Implementation of Alternative B may increase the available habitat of pest species (e.g. feral goats and pigs). This may result in increased economic costs from crop and garden damage. The likelihood of significant increases in pest species populations as a result of CREP is minimal since CREP lands would be designed to provide habitat for other types of species (e.g., sensitive species and grassland birds). In addition, fencing would be installed to exclude feral animals from many of the CPs (e.g. restored wetlands). Many of the CREP acres would not be accessible to pest species and therefore would not result in an increase in the population of these species. Should CREP

result in an increase in the number of pest species, their numbers would be managed appropriately by existing Division of Fish, Game, and Wildlife programs.

- The recreation and tourism economy of Hawaii. With the improved water quality that would result from the implementation of Alternative B, natural conditions in Hawaii's unique/protected lands can be expected to improve. This would translate into continued stability, and even the potential for incremental growth, in the recreation and tourism economy of Hawaii.
- Land use in Hawaii. Alternative B offer an additional land preservation program, the benefits of which can be added to those provided by the current programs. This may slow the future rate of large-scale land-use changes in the State and the socioeconomic impacts associated with these changes.
- Population growth and density in Hawaii. While implementation of Alternative B would not directly affect population and density, there is the possibility for future indirect impacts associated with its implementation. Human population and density in Hawaii would continue to increase assuming the expected future expansion and growth of Hawaii's population occurs. These values operate independently of agricultural practices and would not be directly impacted by Alternative B. However, additional population necessitates additional clean drinking water, a need that Alternative B would help the State fulfill.

Environmental Justice

If Alternative B were implemented, disproportionate negative environmental justice effects are unlikely. No minority populations would be disproportionately affected by implementation of Alternative B. In fact, all residents of Hawaii would be beneficially impacted from CREP as water quality improves. No negative environmental justice impacts are expected since most CREP agreements are likely to be widely separated by intervening non-CREP land holdings. This separation means that no single, focused minority or low-income population is likely to receive all or most of the direct impacts of the CREP agreements, which are designed to be implemented across the entire State of Hawaii.

Native Hawaiians/Pacific Islanders would also not be excluded from the beneficial monetary impacts of CREP. Native Hawaiians/Pacific Islander farmers/ranchers would be able to apply for CREP and have the same opportunity to enroll their lands in CREP.

One possibility of a direct impact to a small portion of the low income or minority population may be the inability of a low-income farmer or rancher to participate in CREP because of limited personal funds to provide his or her percentage of the costs to implement the CPs. While CREP does not address this potential occurrence, other opportunities for additional funds may be available to assist the farmer or rancher to meet the required percentage. However, the possibility of this occurrence is remote.

A possible indirect effect is that CREP might take acres out of agricultural production, thus removing some economic opportunities from traditional farm workers, often migrant workers. This indirect effect would be negligible given the fact that only 30,000 acres, or 2.3 percent of the State's agricultural land, is eligible to be enrolled in CREP. Also, it is unlikely that a farmer or rancher would enroll all of the particular farm or ranch in CREP, but would rather enroll small border acres adjacent to waterways or waterbodies. Therefore, the potential impact of removing enough acreage from agricultural production and negatively impact economic opportunities for migrant farm workers is anticipated to be negligible.

Because of the decrease of harmful chemicals applied to CREP-enrolled land, human exposure to these chemicals will likely decrease. Therefore, the health of farm workers (including MSFWs) and their families could marginally improve.

Alternative B would assist the State in their efforts to meet the CREP objectives outlined in Section 1.4.

3.10 Cumulative Effects

3.10.1 Introduction

CEQ regulations require that the cumulative effects of a program be considered when evaluating potential environmental impacts for an EA or EIS. CEQ defines cumulative effects as:

> *the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions (40 CFR § 1508.7).*

Cumulative effects most likely arise when a relationship exists between a proposed action and other actions expected to occur in a similar location during a similar time period. The geographic boundaries considered in the cumulative effects analysis will be limited to the counties where lands are eligible for enrollment in CREP as well as water resources that are located downstream of eligible CREP land. The time frame to be considered in the cumulative effects analysis will be 15 years which is the maximum term of a CREP contract.

3.10.2 Past, Present, and Reasonably Foreseeable Actions

Actions overlapping with, or in proximity to, the proposed action are most likely to have the potential to result in cumulative effects. In addition, programs similar to CREP are also likely to have a cumulative effect. For these reasons and for consideration at the programmatic level, only conservation programs that provide financial or technical assistance to private landowners and are designed to mitigate impacts to natural resources are analyzed for cumulative effects. These programs include NRCS conservation programs (including the proposed CCP), FWS programs, and landowner assistance programs administered by the State of Hawaii. The cumulative impacts of ongoing agricultural practices will also be analyzed for each resource issue.

NRCS Programs

Environmental Quality Incentive Program: EQIP is a voluntary conservation program that supports production agriculture and environmental quality as compatible goals. It provides financial and technical assistance to farmers and ranchers who install conservation practices that address natural resource concerns on agricultural lands (NRCS, 2005a).

In 2004, $4,659,937 was provided for conservation planning, design and installation on cropland, grazing land, and animal feeding operations for 70 contracts. Projects include noxious weed control, brush management, pasture hayland planting, terraces, and groundcover installation. In fiscal year 2005, Hawaii received $5,244,000 for this program (NRCS, 2005a).

Ground and Surface Water Conservation: Ground and Surface Water Conservation (GSWC) was established as a part of EQIP under the 2002 Farm Bill. Agricultural producers may install irrigation-related conservation practices that conserve ground and surface water resources. In 2004, Hawaii had $805,470 for this program. Practices included water catchment basins, micro-irrigation, roof runoff controls, and irrigation water management. In fiscal year 2005, Hawaii received $1,184,000 (NRCS, 2005a).

Grassland Reserve Program: GRP helps landowners and operators restore and protect grassland including rangeland and pastureland and certain other lands, while maintaining the areas as grazing lands. In 2004, $1,321,300 was allocated for rental payments and grassland restoration for four contracts. In fiscal year 2005, Hawaii received $1,295,000 for this program (NRCS, 2005a).

Wildlife Habitat Incentives Program: This program is used to develop or improve fish and wildlife habitat on private land. In 2004, $512,022 was provided for 12 contracts to treat wetland, riparian, and upland areas. In fiscal year 2005, Hawaii received $1,084,000 for this program (NRCS, 2005a).

Wetlands Reserve Program: This program is used for wetland restoration, enhancement, or creation on private land. In 2004, $700,000 was provided for one contract for permanent easement of critical wetland and riparian areas on 192 acres. In fiscal year 2005, Hawaii received $770,000 for this program (NRCS, 2005a).

Farm and Ranchland Protection Program: This program is used to help State, Tribal, or local government entities purchase the development rights to keep productive farm and ranch land in agricultural use. FRPP protects agricultural land that is at high risk from development. Development for residential uses could result in much greater nutrient runoff into near-shore waters. In fiscal year 2005, Hawaii received $1,917,000 for this program (NRCS, 2005a).

Conservation Security Program: The Conservation Security Program (CSP) is a voluntary program that provides financial and technical assistance to promote the conservation and improvement of soil, water, air, energy, plant and animal life, and other conservation purposes on Tribal and private working lands. Working lands include cropland, grassland, prairie land, improved pasture, and range land, as well as forested land that is an incidental part of an agriculture operation. NRCS held the first CSP sign-up in 2004, with Kauai and Maui being approved for selected watersheds. In 2005, all 7 of the Hawaii applicants were approved for contracts totaling $90,540 on 6,519 acres of private land on Kauai and Maui. For 2006, the authorized CSP watersheds in Hawaii are on the islands of Oahu (North Shore) and Hawaii (Hilo) (NRCS, 2005a).

Coral Reef Initiative: Coral reefs in the Hawaiian archipelago constitute nearly 85 percent of the nation's reefs. NRCS in Hawaii has reaffirmed the national agreement to help lead efforts to address land-based pollution threats to coral reefs. NRCS in Hawaii has been an active participant in the State's steering committee, which has assisted in the development and implementation of *Hawaii's Local Action Strategy to Address Land-Based Pollution Threats to Coral Reefs* (NRCS, 2005a).

Coordinated Conservation Plan: The CCP is a management plan proposed by NRCS in Hawaii that would supplement CREP. The purpose of the CCP is for NRCS to use certain special procedures and authorities to use funds available through EQIP, WRP, GRP, FRPP, and WHIP. All of these programs are currently available to landowners and operators through NRCS. However, the CCP would create expanded opportunities to apply for additional funds to maximize the environment benefits of NRCS programs in conjunction with CREP (Proposal, 2004).

Other Landowner Assistance Programs

There are several landowner assistance programs available in Hawaii through DOFAW to assist landowners in protecting their forest, wildlife, and watershed resources.

The Landowner Incentive Program: The LIP is a FWS program that provides funding and technical support to enhance, restore, or preserve natural habitats for at-risk and T&E species. Currently, there are 15 LIP projects in Hawaii (DOFAW, 2004).

Watershed Partnership Program (WPP): Watershed Partnership Program (WPP) provides State funds to voluntary alliances of public and private landowners committed to protecting large areas of forested watersheds for water recharge and other values. Funds benefit co-operative projects that protect land for watershed conservation. Projects funded include monitoring and management plans, hunting programs, invasive species control, and fencing. More than 750,000 acres of important watershed areas in Maui, Oahu, Lanai, Molokai, Kauai, and Hawaii have been placed within these unique public-private partnerships (DOFAW, 2004).

Natural Area Partnership Program: NAPP provides State funds for the management of private lands dedicated to conservation. This program supports a full range of management activities to protect, restore or enhance significant native resources or geological features. The program also provides funding for the development of long-range management plans. Lands and waters that might qualify include areas with intact native Hawaiian ecosystems, essential habitat for endangered species, and areas within the protective subzone within the Conservation District (DOFAW, 2004). Currently seven preserves encompass approximately 25,000 acres on the islands of Maui, Hawaii, Lanai, Molokai, and Kahoolawe (DOFAW, 2004).

Location of Conservation Programs

Table 3.5 is a summary of the conservation and landowner assistance programs for each island that is targeted for CREP enrollment. For many of the NRCS programs, acreage information is not available by county (or by island) because of privacy restrictions required by the Farm Security and Rural Investment Act of 2002. Also, many of the NRCS programs are ongoing and since these programs, like CREP, target agricultural land, it is anticipated that enrollment in these programs will most likely occur in CREP counties.

Table 3.5. Location of conservation programs on CREP targeted islands. Sources: DOFAW, 2004, NRCS, 2005a.

Island	Conservation Program[1]
Hawaii	NAPP, WPP, CSP, LIP
Maui	CSP, NAPP, LIP, WPP
Lanai	WPP, NAPP
Molokai	LIP, WPP, NAPP
Oahu	CSP, LIP, WPP
Kauai	CSP, LIP, WPP

[1] CSP = Conservation Security Program; LIP = Landowner Incentive Program; NAPP = Natural Area Partnership Program; WPP = Watershed Partnership Program.

Ongoing Agricultural Activities

Ongoing agricultural practices are discussed in detail in Chapter 2 and impacts to resources from ongoing agricultural practices are discussed in more detail in Chapter 3. These impacts are summarized briefly for each resource below.

Surface Water Quality: Runoff from agricultural areas contributes sediment and nutrients to receiving water bodies (HICZMP, 1996).

Drinking Waters: Contamination of groundwater has occurred from agricultural and industrial activity in areas of Central Oahu, North Maui, East Kauai, and East Hawaii (EPA, 2004a, GWPC, 1999, USGS, 2000).

Wetlands: The main threats to wetlands from agriculture include diminishing water supply from irrigation diversions, agricultural development, increased sediment and nutrient loads from agricultural lands, and grazing. Wetlands degraded by grazing practices are also more vulnerable to invasive species (HICZMP, 1996).

Floodplains: Floodplains are used for agricultural purposes throughout Hawaii. Agriculture activity in floodplains can diminish floodplain functions, resulting in higher flood volumes and more damage from flooding downstream.

Marine Resources: No point in Hawaii is more than 29 miles from the shore. Any activity that occurs inland has the potential to impact marine resources. Sediments, nutrients and pesticides from agricultural runoff adversely impact coral reefs, estuaries, and other marine resources (NOAA, 2004a).

Protected Species: Habitat degradation from agricultural development, invasive and exotic species, and polluted waterways continue to impact T&E species.

Cultural Resources: Sediments in agricultural runoff contributes to siltation and damages near-shore waters and coral reefs. It also degrades hundreds of ancestral native Hawaiian fishponds compromising the potential for traditional lifestyles. Earth moving activities associated with agriculture has the potential to disturb archaeological sites or Native Hawaiian burials.

Human Health, Social and Economic Issues: Agriculture contributes to the State economy by providing jobs and through the sale of agricultural products. Exposure of farm workers to agricultural chemicals can result in human health issues.

3.10.3 Cumulative Effects Summary Table

Existing State and Federal conservation programs would continue to strive to collectively improve water quality and wildlife habitat. However, without CREP, a powerful tool in improving water quality and wildlife habitat, the current iterations of these programs would continue to be only as effective as they have in the past. Implementation of Alternative A would result in the continuation of current observable trends in nonpoint source pollution and resource degradation and the cumulative effects that accompany these problems.

Working in conjunction with existing State programs (see Section 1.5.4), CREP implementation would contribute to the cumulative improvement of the State's water quality. Likewise, the enhancement of wildlife habitat across CREP watersheds would add to the State's resources and provide additional

protection for listed State and Federal species. Wetlands, groundwater, marine resources, wildlife, and cultural resources would all benefit from the cumulative effects of protection and enhancement that CREP would provide. CREP is designed to augment and enhance conservation of resources and to promote water quality improvement. It would work in conjunction with other conservation efforts being implemented at both the State and Federal level and result in statewide cumulative improvements to Hawaii's natural conditions. Cumulative effects for each resource are summarized in Table 3.6.

Table 3.6 Summary of cumulative effects by resource.

Resource Issue	NRCS Programs	Other Federal and State Programs	Ongoing Agricultural Practices	Cumulative Effects of Alternative A: No CREP	Cumulative Effects of Alternative B: CREP
Surface Water Quality	NRCS conservation programs remove land from active agriculture, reducing soil erosion, and nutrient and chemical applications. CPs associated with these programs improve water quality by filtering sediments and nutrients from agricultural runoff.	While these conservation programs are not specifically designed to improve water quality, the preservation of natural habitats would have indirect benefits on water quality including reducing soil erosion and decreasing sediments in surface water.	Ongoing agricultural practices add nutrients, sediment, and chemicals to surface water runoff, degrading water quality of receiving waterbodies and resulting in non-attainment of beneficial use designations.	State and Federal conservation programs would collectively strive to mitigate the adverse impacts of land use practices on water quality.	CREP is designed to complement existing Federal and State conservation programs. Combined with these programs, CREP would result in cumulative benefits to water quality. Over the course of CREP (10-15 years), sediment and nutrient loads would be expected to decrease as more land is enrolled in CREP and other conservation programs. In addition, Alternative B specifically targets water quality as an issue and would help accelerate improvements to water quality.

Resource Issue	NRCS Programs	Other Federal and State Programs	Ongoing Agricultural Practices	Cumulative Effects of Alternative A: No CREP	Cumulative Effects of Alternative B: CREP
Drinking Water	NRCS conservation programs would improve surface water quality, improving the quality of water recharging groundwater and reducing groundwater contamination. GSWC is a NRCS program designed to conserve groundwater through better irrigation practices and would help protect drinking water supply systems that depend on groundwater as their source.	These programs are not specifically designed to improve water quality, however indirect benefits to water quality would result in improving groundwater recharge and reducing groundwater contamination.	Agricultural practices can contaminate water that recharges aquifers and deplete the amount of groundwater available through groundwater pumping for irrigation.	NRCS and other State and Federal conservation programs improve the quality of water used for drinking water sources. These programs are limited and ongoing agricultural activities continue to have negative impact on groundwater quality and quantity.	CREP combined with other NRCS, Federal, and State conservation programs would cumulatively have a greater impact on water quality. If implemented in the same watershed, these programs could complement each other and potentially improve the effectiveness of each program.
Wetlands	Specifically, WRP restores, enhances, and protects wetlands. Additional CPs implemented through the different NRCS programs may include restoration of wetlands. NRCS programs also include improvement of wildlife habitat including wetlands.	Ongoing State and Federal conservation programs maintain and preserve natural areas and native habitat including wetlands.	Conversion of wetlands to agricultural land leads to loss of wetlands; soil erosion on agricultural land adds sediment to runoff and can lead to sedimentation of downstream wetlands and reduce wetland functions.	Conversion of wetlands to agricultural land and other land uses continues to threaten wetlands in Hawaii. Ongoing State and Federal programs collectively strive to protect, enhance, and restore wetlands.	Wetlands restored and enhanced through CREP would increase the overall acreage of wetlands in Hawaii watersheds protected by State and Federal programs.

Resource Issue	NRCS Programs	Other Federal and State Programs	Ongoing Agricultural Practices	Cumulative Effects of Alternative A: No CREP	Cumulative Effects of Alternative B: CREP
Floodplains	NRCS programs restore native vegetation, install riparian buffers, and protect natural habitats, all of which serve to maintain or enhance floodplain functions.	Maintain and preserve native habitat and vegetation, reducing impacts that occur from degradation of natural resources.	Grazing in floodplains can compact soil and negatively impact floodplain functions. Agriculture in floodplains may alter floodplain functions.	Ongoing conservation programs protect and enhance natural habitats in floodplains, helping to preserve a functioning floodplain. However, these benefits are offset by land uses that occur in floodplains. Agricultural and urban land use in floodplains compact soil and channelize streams, resulting in higher flood volumes and more flood damage downstream.	CREP would complement ongoing conservation efforts in floodplains. Together, these programs would lessen impacts to floodplains. CREP would add additional acres to land already protected or enhanced by conservation programs.
Marine Resources (Estuaries, Coral Reefs)	Improvements to water quality from NRCS conservation programs lessen the impacts of agricultural practices on marine resources. The Coral Reef Initiative specifically addresses effects of land based practices on coral reefs and utilizes strategies to decrease these impacts.	Indirect effects include improvement of water quality through restoration of native habitats, resulting in less sedimentation of estuaries and coral reefs.	Sediment and nutrients adversely affect estuaries and coral reefs. Sedimentation blocks sunlight and leads to decline of coral. Excessive nutrients result in growth of invasive non-native algal species and decreases dissolved oxygen, adversely impacting aquatic wildlife.	Several State and Federal programs strive to improve water quality of surface water entering coastal resources; however, sedimentation and eutrophication resulting from pollutants introduced into surface water by urban and agricultural land use practices continue to be an issue.	As CPs become established on CREP enrolled land, benefits to coral reefs and estuaries would become more evident as runoff from land enrolled in CREP and other conservation programs improves in quality. In addition, CREP would complement NRCS's Coral Reef Initiative and together with other land enrolled in conservation programs would lessen the impacts of land based activities on marine resources.

Resource Issue	NRCS Programs	Other Federal and State Programs	Ongoing Agricultural Practices	Cumulative Effects of Alternative A: No CREP	Cumulative Effects of Alternative B: CREP
Protected Species	Protection and restoration of natural habitats through NRCS programs provides benefits to Hawaii's protected species. Specifically, WHIP is designed to improve wildlife habitat on private land.	Existing State and Federal conservation programs protect and enhance natural habitats that are important for T&E species and other at-risk species. LIP, a FWS program, specifically targets habitat of T&E species on private land for protection and restoration.	Conversion of land for agricultural purposes has resulted in a decrease in the amount of quality habitat available to T&E species. Sediment and nutrient loads in agricultural runoff impact aquatic species. Land disturbance or fallow agricultural land encourages the establishment of invasive species that out-compete native species and degrade native habitats.	Existing Federal and State programs strive to preserve and restore native habitat and control invasive species.	CREP would complement other conservation programs that are designed to preserve and protect habitat of T&E species. Through CREP, additional acres would be added to those already protected by existing State and Federal programs, increasing the amount of quality habitat available to T&E species. Some of the CPs also are specifically designed to restore and/or enhance wildlife habitat.
Cultural Resources	Consultation with SHPO concerning NRCS programs ensures the protection of cultural resources and historic properties on private land enrolled in these programs.	Programs receiving Federal funds need to comply with Section 106 of the NHPA. Compliance with NHPA protects cultural resources located on private land that participates in these programs, protecting cultural resources that might not otherwise be protected.	Earth moving activities associated with agricultural activities has the potential to disturb burial sites and other Native Hawaiian cultural properties. Discovery and/or disturbance of cultural resources may go unreported by private landowners.	Participation in NRCS and other State and Federal programs provides protection and preservation of cultural properties. Private landowners not participating in these programs may not conduct site surveys or otherwise protect cultural properties.	Under CREP, private land enrolled in contracts would be surveyed for cultural properties increasing the number of historic and cultural properties protected or preserved on private land.

Resource Issue	NRCS Programs	Other Federal and State Programs	Ongoing Agricultural Practices	Cumulative Effects of Alternative A: No CREP	Cumulative Effects of Alternative B: CREP
Human Health, Social and Economic Issues	Rental rates from NRCS programs would offset the cost of implementation of CPs and the removal of land from active agricultural production. In addition, removal of land from active agriculture would minimally reduce farm worker exposure to agricultural chemicals.	Existing State and Federal programs offer private landowners some monetary compensation for implementing conservation programs. Additional benefits may come from recreational use (e.g., hunting, bird watching, hiking) of restored or conserved natural habitats.	Agriculture provides jobs and adds to the overall economy through the sale of agricultural products. Application of agricultural chemicals may adversely impact farm worker health.	Existing State and Federal conservation programs may increase local income derived from recreational use of land that has been preserved or restored. Monetary compensation would available to private landowners for conservation efforts. Removal of agricultural land from active production may lessen farm worker exposure to agricultural chemicals.	Through CREP, additional funds would be available to landowners to implement CPs. Rental rates would be available to producers for marginal farmland that has limited agricultural productivity. Additional acres placed into conservation programs could enhance recreational value of the land and could increase local income derived from recreation use. Marginal farmland typically requires greater application of fertilizers and pesticides, enrolling this land into CREP and other conservation programs would reduce application of these chemicals, decreasing farmworker exposure.

3.11 Unavoidable Adverse Impacts

The following sections describe those effects which are adverse and cannot be avoided without mitigation.

3.11.1 Alternative A (No Action)

Under Alternative A, nonpoint source pollution attributed to agriculture can be expected to continue at roughly the current rates. Continued agricultural practices would likely contribute to long-term water quality degradation in watersheds across the State. There is the probability of increased erosion accompanied by increased sedimentation in receiving water bodies following storms and flash flood events. Nutrient loading and waterborne pathogens would continue to impact downstream ecosystems and human populations.

3.11.2 Alternative B (CREP Agreement)

Alternative B would reduce the likelihood of all of the unavoidable adverse impacts listed under Alternative A above. Implementation of the CREP CPs and Hawaii's additional concurrent activities such as the CCP, would reduce nonpoint source pollution produced by agriculture, contribute to long-term water quality improvement in watersheds across the State, decrease the adverse impacts associated with erosion and sedimentation, and reduce nutrient loading and waterborne pathogens and their impacts on downstream ecosystems and human populations

3.12 Relationship of Short-Term Uses and Long-Term Productivity

3.12.1 Alternative A (No Action)

This alternative would maximize the short-term uses of the environment, but would not enhance the long-term productivity of eligible lands and the cleanliness of Hawaii's natural environment. Marginal croplands and pasturelands that might otherwise be enrolled in CREP would stay in production and efforts to increase the short-term productivity of these lands (by applying additional fertilizer and pesticides) may cause further degradation to water quality and other resources.

3.12.2 Alternative B (CREP Agreement)

Under Alternative B, the short-term uses of the human environment would be maximized and long-term productivity would be simultaneously enhanced. Marginal croplands would be enrolled in CREP and would provide leveraged benefits to other lands and waterbodies in affected watersheds. Resources used to sustain the marginal lands would be diverted to help maximize the productivity of prime croplands. Potential overuse of fertilizers to increase productivity on marginal lands would be reduced.

3.13 Irreversible and Irretrievable Commitments of Resources

3.13.1 Alternative A (No Action)

Irreversible and irretrievable commitments of resources include fuel and time spent conducting agricultural practices. Under Alternative A, inefficient production on marginal land would continue to

waste resources that could have been better used on different farmland. The irreversible loss of soil resources from the State's agricultural lands would continue at the current, or perhaps accelerated, rates due to splash, rill, and stream bank erosion.

3.13.2 Alternative B (CREP Agreement)

As with Alternative A, the irreversible and irretrievable commitments of resources including fuel and time spent conducting agricultural practices would continue, though perhaps at a decreased rate as inefficient production on marginal land decreases. Agricultural soil loss would likely continue, but at a much reduced rate as appropriate CPs are implemented.

Chapter 4.0 List of Preparers

This table identifies by name, education, and years experience those who contributed as part of the interdisciplinary team

Table 4.1. List of Preparers.

Name	Area of Expertise	Education	Experience
James Fortner FSA	Environmental Compliance Manager	B.S., Agricultural and Extension education	18 years
Kathleen Schamel FSA	Federal Preservation Officer	B.A.; M.A., Anthropology	19 years
Jeremy Ferrin The Shipley Group	Writer	B.S., Environmental Studies	2 years
Kelson Forsgren The Shipley Group	Project Manager Writer/Editor	M.S., Technical Communication	11 years
Thomas Hale The Shipley Group	Writer/Editor, Environmental Planner	B.L.A., M.L.A., Landscape Architecture; M.S. Natural Resource Management	13 years
Suzanne Hill The Shipley Group	Writer	B.S., Watershed Science; M.A. Science Education	3 years
Kim Richardson Barker The Shipley Group	Writer	B.S., Environmental Science, M.S. Range Science	2 years

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Chapter 5.0 List of Agencies and Persons Consulted and/or Provided Copies of This Environmental Assessment

Table 5.1. List of agencies and persons consulted during the course of the analysis.

Organization	Name
US Fish and Wildlife Service, Hawaii Field Office	
National Marine Fisheries	
State Historic Preservation Office	

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Chapter 6.0 References

Advisory Council on Historic Preservation. 2002. The National Historic Preservation Program: Overview. *http://www.achp.gov/overview.html.*

Environmental Protection Agency. 2002. The National Water Quality Inventory: 2000 Report. *http://www.epa.gov/305b/2000report/*

Environmental Protection Agency. 2004a. Designated Sole Source Aquifiers [sic] in EPA Region IX. *http://www.epa.gov/safewater/swp/ssa/reg9.html*

Environmental Protection Agency. 2004b. Sole Source Aquifer Protection Program. *http://www.epa.gov/safewater/ssanp.html*

Environmental Protection Agency. 2004c. American Heritage Rivers: Hanalei River. *http://www.epa.gov/rivers/98rivers/fshanale.html*

Environmental Protection Agency. 2004d. Wetlands. *http://www.epa.gov/owow/wetlands/*

Environmental Protection Agency. 2004e.National Coastal Condition Report II, *Draft*. *http://www.epa.gov/owow/oceans/nccr2/*

Environmental Protection Agency. 2004f. Coastal Watershed Factsheets. *http://www.epa.gov/owow/oceans/factsheets/*

Federal Emergency Management Agency. 2004. Flood Insurance Loss Statistics. *http://www.fema.gov/nfip/10400312.shtm*

Ground Water Protection Council. 1999. Ground Water Report to Congress: Summaries of State Ground Water Conditions. *http://www.gwpc.org/gwreport/Acrobat/hawaii.pdf*

Gulko, D., Maragos J., Friedlander A., Hunter C., and R. Brainard. 2002. Status Of Coral Reefs In The Hawaiian Archipelago. *In* The State of Coral Reef Ecosystems of the United States and Pacific Freely Associated States: 2002. *http://www.nccos.noaa.gov/publications/notables.html#nwhi*

Hawaii Agricultural Statistics Service. 2004a. Hawaii Ag-tourism. *http://www.nass.usda.gov/hi/speccrop/agtour.htm*

Hawaii Agricultural Statistics Service. 2004b. Hawaii Agricultural Labor. *http://www.nass.usda.gov/hi/speccrop/aglabor.htm*

Hawaii Coastal Zone Management Program, Hawaii Office of State Planning. 1996. Hawaii's Coastal Nonpoint Pollution Control Program Management Plan. Honolulu, HI. *http://www.hawaii.gov/dbedt/czm/czm_initiatives/6217.html*

Hawaii Coastal Zone Management Program, Office of Planning. 2004. Hawaii Coastal Zone Management Program. *http://www.hawaii.gov/dbedt/czm/program.html*

Hawaii Coral Reef Initiative Research Program. 2004a. Hawaii Coral Reef Initiative Research Program. *http://www.coralreefnetwork.com/network/hcri.htm*

Hawaii Coral Reef Initiative Research Program. 2004b. Anthropogenic and Natural Stresses on Coral Reefs (2001-2002). *http://www.hawaii.edu/ssri/hcri/t/water_pollution-04.htm*

Hawaii Department of Business, Economic Development & Tourism. 2004. State of Hawaii Data Book 2003. *http://www2.hawaii.gov/DBEDT/index.cfm?section=READ_Databook1075*

Hawaii State Department of Health, Environmental Planning Office. 2004. Final 2004 List Of Impaired Waters In Hawaii Prepared Under Clean Water Act §303(d). *http://www.hawaii.gov/health/environmental/env-planning/wqm/303dpcfinal.pdf*

Hawaii Department of Health, Clean Water Branch. 1998. 1998 Hawaii Water Quality Assessment (305(b) Report). *http://www.hawaii.gov/health/environmental/water/cleanwater/reports/98-305b/index.html*

Hawaii Department of Health, Clean Water Branch. 2000. Excerpts from 2000 305(b) Report. *http://www.hawaii.gov/health/environmental/water/cleanwater/reports/2000-305b/index.html#Table%20of%20Contents*

Hawaii Department of Health, Safe Drinking Water Branch. 2002. 2002 Groundwater Contamination Maps for the State of Hawaii. *http://www.hawaii.gov/health/environmental/water/sdwb/conmaps/pdf/conmaps02.pdf*

Hawaii Department of Labor and Industrial Relations, Research & Statistics Office. 2005. Occupational Forecast For Hawaii 2003-2005. *http://www.hiwi.org/admin/uploadedPublications/1261_STIP03-05.pdf*

Hawaii Division of Forestry and Wildlife. 2004. Landowner Assistance Programs. *http://www.state.hi.us/dlnr/dofaw/LAP/index.html*

Hawaii Office of Environmental Quality Control, Environmental Council. 2003. Environmental Report Card 2003. *http://www.state.hi.us/health/oeqc/annualrpts/anrpt03.pdf*

Hawaiian Ecosystems at Risk Project. 2004. Alien Species in Hawaii Information Index. *http://www.hear.org/AlienSpeciesInHawaii/index.html*

Kamehameha Schools. 2005. Kamehameha Schools Annual Report July 1, 2003-June 30, 2004. *http://www.ksbe.edu/allpdfs/annualreport04/1_cover_tablecontent.pdf*

Leung, P. and M.K. Loke. 2002. CTAHR publication EI-3, Agriculture's Contribution to Hawaii's Economy--An Update. *http://www.ctahr.hawaii.edu/oc/freepubs/pdf/EI-3.pdf*

National Agricultural Statistics Service. 2004. 2002 Census of Agriculture: State and County Data, Hawaii. http://www.nass.usda.gov/hi/homepage.htm

National Oceanic and Atmospheric Administration. 2004a. National Hawaii Coastal Management Program. *http://coastalmanagement.noaa.gov/czm/czmhawaii.html*

National Oceanic and Atmospheric Administration. 2004b. Coastal Zone Management Program. *http://www.ocrm.nos.noaa.gov/czm/national.html*

Office of Hawaiian Affairs. 2004. Office of Hawaiian Affairs 2004 Annual Report. *http://www.oha.org/cat_content.asp?contentid=369&catid=52*

Office of Hawaiian Affairs. 2005. Establishment of OHA. *http://www.oha.org/cat_content.asp?contentid=18&catid=98*

Oki, D.S.. 2003. Surface Water in Hawaii: U.S. Geological Survey Fact Sheet 045-03. *http://water.usgs.gov/pubs/fs/fs04503/*

Peterson, S. 2005. Email communication to Kent Matsutani and Paul Conry regarding CREP questions from Shipley Group, November 2, 2005.

Proposal by the Hawaii State and Pacific Basin Farm Service Agency concerning implementation of the Hawaii Conservation Reserve Enhancement Program and Coordinated Conservation Plan. July 2004, *Final*.

Protect Kaho`olawe `Ohana. 2004. *http://www.kahoolawe.org/*

State Council of Hawaiian Homestead Associations. 2005. Department Of Hawaiian Home Lands. *http://www.schha.com/dhhl.html*

United State Geological Survey, Biological Resources Division. 1999. Hawaii and the Pacific Islands. *In* Status and Trends of the Nations Biological Resources. *http://biology.usgs.gov/s+t/SNT/noframe/pi179.htm*

United States Department of Agriculture, Economic Research Service. 2004. Hawaii State Fact Sheet. *http://www.ers.usda.gov/statefacts/HI.htm*

United States Department of Agriculture, Farm Services Agency. 2003. Conservation Reserve Program Final Programmatic Environmental Impact Statement.

United States Department of Agriculture, Natural Resources Conservation Service. 2001. Environmental Justice Fact Sheet. *http://www.nrcs.usda.gov/programs/EJ/ejfact.html*

United States Department of Agriculture, Natural Resources Conservation Service. 2002. Wetland Functions and Values Fact Sheet. *http://www.nrcs.usda.gov/programs/farmbill/2002/funcfact.html*

United States Department of Agriculture, Natural Resources Conservation Service. 2003. NRCS Issue Paper: Clarification of Stream Definition in Hawaii. Honolulu, HI.

United States Department of Agriculture, Natural Resources Conservation Service. 2005a. Hawaii and American Samoa NRCS Programs: Farm Bill Programs, Fiscal Year 2005 Allowances. *ftp://ftp-fc.sc.egov.usda.gov/HI/pub/programs/Programs05.pdf*

United States Department of Agriculture, Natural Resources Conservation Service. 2005b. NRCS Photo Gallery. Source for all USDA photos in the PEA. *http://photogallery.nrcs.usda.gov/*

United States Fish and Wildlife Service. 2004a. National Coastal Wetlands Conservation Grant Program. *http://www.fws.gov/cep/cwgcover.html*

United States Fish and Wildlife Service. 2004b. Threatened and Endangered Species System: Listings by State and Territory. *http://ecos.fws.gov/tess_public/TESSWebpageUsaLists?state=HI*

United States Fish and Wildlife Service. 2004c. Threatened and Endangered Plants In the Hawaiian and Pacific Islands. *http://pacificislands.fws.gov/wesa/hawislesplantindex.html#Hawaiian*

United States Geological Survey. 2000. Ground Water in Hawaii Fact Sheet. *http://hi.water.usgs.gov/pubs/index.html*

Water Resources Research Center. 2004. WRRC Team Tackles Hawaii's Source Water Assessment Program Work. *http://www.wrrc.hawaii.edu/research/project_elkadi/SWAP.html*

Appendix A: FSA Handbook CPs

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Appendix B: Threatened and Endangered Species

The following tables represent the "Endangered and Threatened Wildlife of Hawaii" as listed on the Hawaii Division of Fish and Wildlife website found at *http://ecos.fws.gov/tess_public/TESSWebpageUsaLists?state=HI*. For the purposes of this list the following definitions apply:

Endangered Species are those whose prospects for survival in Hawaii are in immediate danger because of a loss or change in habitat, over-exploitation, predation, competition, disease, disturbance or contamination. Assistance is needed to prevent future extinction in Hawaii.

Threatened Species are those who may become endangered if conditions surrounding them begin to or continue to deteriorate.

Hawaii -- 317 listings

Animals -- 44	
Status	*Listing*
E	Akepa, Hawaii (honeycreeper) (*Loxops coccineus coccineus*)
E	Akepa, Maui (honeycreeper) (*Loxops coccineus ochraceus*)
E	Akialoa, Kauai (honeycreeper) (*Hemignathus procerus*)
E	Akiapola`au (honeycreeper) (*Hemignathus munroi*)
E	Albatross, short-tailed (*Phoebastria (=Diomedea) albatrus*)
E	Amphipod, Kauai cave (*Spelaeorchestia koloana*)
E	Bat, Hawaiian hoary (*Lasiurus cinereus semotus*)
E	Coot, Hawaiian (*Fulica americana alai*)
E	Creeper, Hawaii (*Oreomystis mana*)
E	Creeper, Molokai (*Paroreomyza flammea*)
E	Creeper, Oahu (*Paroreomyza maculata*)
E	Crow, Hawaiian (='alala) (*Corvus hawaiiensis*)
E	Duck, Hawaiian (=koloa) (*Anas wyvilliana*)

Animals -- 44	
E	Duck, Laysan (*Anas laysanensis*)
E	Elepaio, Oahu (*Chasiempis sandwichensis ibidis*)
E	Finch, Laysan (honeycreeper) (*Telespyza cantans*)
E	Finch, Nihoa (honeycreeper) (*Telespyza ultima*)
E	Goose, Hawaiian (*Branta (=Nesochen) sandvicensis*)
E	Hawk, Hawaiian (='Io) (*Buteo solitarius*)
E	Honeycreeper, crested (*Palmeria dolei*)
E	Millerbird, Nihoa (old world warbler) (*Acrocephalus familiaris kingi*)
E	Moorhen, Hawaiian common (*Gallinula chloropus sandvicensis*)
E	Moth, Blackburn's sphinx (*Manduca blackburni*)
E	Nukupu`u (honeycreeper) (*Hemignathus lucidus*)
E	`O`o, Kauai (honeyeater) (*Moho braccatus*)
E	`O`u (honeycreeper) (*Psittirostra psittacea*)
E	Palila (honeycreeper) (*Loxioides bailleui*)
E	Parrotbill, Maui (honeycreeper) (*Pseudonestor xanthophrys*)
E	Petrel, Hawaiian dark-rumped (*Pterodroma phaeopygia sandwichensis*)
E	Po`ouli (honeycreeper) (*Melamprosops phaeosoma*)
T	Sea turtle, green (except where endangered) (*Chelonia mydas*)
E	Sea turtle, hawksbill (*Eretmochelys imbricata*)
E	Sea turtle, leatherback (*Dermochelys coriacea*)
T	Sea turtle, loggerhead (*Caretta caretta*)
E	Seal, Hawaiian monk (*Monachus schauinslandi*)

Animals -- 44	
T	Shearwater, Newell's Townsend's (*Puffinus auricularis newelli*)
T	Snail, Newcomb's (*Erinna newcombi*)
E	Snails, Oahu tree (*Achatinella spp.*)
E	Spider, Kauai cave wolf or pe'e pe'e maka 'ole (*Adelocosa anops*)
E	Stilt, Hawaiian (*Himantopus mexicanus knudseni*)
E	Thrush, large Kauai (=kamao) (*Myadestes myadestinus*)
E	Thrush, Molokai (*Myadestes lanaiensis rutha*)
E	Thrush, small Kauai (=puaiohi) (*Myadestes palmeri*)
E	Whale, humpback (*Megaptera novaeangliae*)

Plants -- 273	
Status	*Listing*
E	*Abutilon eremitopetalum* (No common name)
E	Ko`oloa`ula (*Abutilon menziesii*)
E	*Abutilon sandwicense* (No common name)
E	Liliwai (*Acaena exigua*)
E	*Achyranthes mutica* (No common name)
E	Chaff-flower, round-leaved (*Achyranthes splendens* var. *rotundata*)
E	Fern, pendant kihi (*Adenophorus periens*)
E	Mahoe (*Alectryon macrococcus*)
E	Kuawawaenohu (*Alsinidendron lychnoides*)
E	*Alsinidendron obovatum* (No common name)

Plants -- 273	
E	*Alsinidendron trinerve* (No common name)
E	*Alsinidendron viscosum* (No common name)
E	*Amaranthus brownii* (No common name)
E	Silversword, Mauna Loa (=Ka'u) (*Argyroxiphium kauense*)
T	`Ahinahina (*Argyroxiphium sandwicense* ssp. *macrocephalum*)
E	`Ahinahina (*Argyroxiphium sandwicense* ssp. *sandwicense*)
E	*Asplenium fragile* var. *insulare* (No common name)
E	Ko`oko`olau (*Bidens micrantha* ssp. *kalealaha*)
E	Ko`oko`olau (*Bidens wiebkei*)
E	*Bonamia menziesii* (No common name)
E	Olulu (*Brighamia insignis*)
E	Pua `ala (*Brighamia rockii*)
E	Uhiuhi (*Caesalpinia kavaiense*)
E	`Awikiwiki (*Canavalia molokaiensis*)
E	Kamanomano (*Cenchrus agrimonioides*)
E	Awiwi (*Centaurium sebaeoides*)
E	`Akoko (*Chamaesyce celastroides* var. *kaenana*)
E	`Akoko (*Chamaesyce deppeana*)
E	*Chamaesyce halemanui* (No common name)
E	`Akoko (*Chamaesyce herbstii*)
E	`Akoko (*Chamaesyce kuwaleana*)
E	`Akoko (*Chamaesyce rockii*)

Plants -- 273	
E	`Akoko, Ewa Plains (*Chamaesyce skottsbergii* var. *kalaeloana*)
E	`Oha wai (*Clermontia drepanomorpha*)
E	`Oha wai (*Clermontia lindseyana*)
E	`Oha wai (*Clermontia oblongifolia* ssp. *brevipes*)
E	`Oha wai (*Clermontia oblongifolia* ssp. *mauiensis*)
E	`Oha wai (*Clermontia peleana*)
E	`Oha wai (*Clermontia pyrularia*)
E	`Oha wai (*Clermontia samuelii*)
E	Kauila (*Colubrina oppositifolia*)
E	Pauoa (*Ctenitis squamigera*)
E	Haha (*Cyanea acuminata*)
E	Haha (*Cyanea asarifolia*)
E	Haha (*Cyanea copelandii* ssp. *copelandii*)
E	Haha (*Cyanea copelandii* ssp. *haleakalaensis*)
E	Haha (*Cyanea dunbarii*)
E	Haha (*Cyanea glabra*)
E	Haha (*Cyanea grimesiana* ssp. *grimesiana*)
E	Haha (*Cyanea grimesiana* ssp. *obatae*)
E	Haha (*Cyanea hamatiflora carlsonii*)
E	Haha (*Cyanea hamatiflora* ssp. *hamatiflora*)
E	Haha (*Cyanea humboldtiana*)
E	Haha (*Cyanea koolauensis*)

Plants -- 273	
E	Haha (*Cyanea lobata*)
E	Haha (*Cyanea longiflora*)
E	Haha (*Cyanea macrostegia* ssp. *gibsonii*)
E	Haha (*Cyanea mannii*)
E	Haha (*Cyanea mceldowneyi*)
E	Haha (*Cyanea pinnatifida*)
E	Haha (*Cyanea platyphylla*)
E	Haha (*Cyanea procera*)
T	Haha (*Cyanea recta*)
E	Haha (*Cyanea remyi*)
E	*Cyanea (=Rollandia) crispa* (No common name)
E	Haha (*Cyanea shipmannii*)
E	Haha (*Cyanea stictophylla*)
E	Haha (*Cyanea st-johnii*)
E	Haha (*Cyanea superba*)
E	Haha (*Cyanea truncata*)
E	Haha (*Cyanea undulata*)
E	Pu`uka`a (*Cyperus trachysanthos*)
E	Ha`iwale (*Cyrtandra crenata*)
E	Mapele (*Cyrtandra cyaneoides*)
E	Ha`iwale (*Cyrtandra dentata*)
E	Ha`iwale (*Cyrtandra giffardii*)

Plants -- 273	
T	Ha`iwale (*Cyrtandra limahuliensis*)
E	Ha`iwale (*Cyrtandra munroi*)
E	Ha`iwale (*Cyrtandra polyantha*)
E	Ha`iwale (*Cyrtandra subumbellata*)
E	Ha`iwale (*Cyrtandra tintinnabula*)
E	Ha`iwale (*Cyrtandra viridiflora*)
E	*Delissea rhytidosperma* (No common name)
E	Oha (*Delissea rivularis*)
E	Oha (*Delissea subcordata*)
E	*Delissea undulata* (No common name)
E	Diellia, asplenium-leaved (*Diellia erecta*)
E	*Diellia falcata* (No common name)
E	*Diellia pallida* (No common name)
E	*Diellia unisora* (No common name)
E	*Diplazium molokaiense* (No common name)
E	Na`ena`e (*Dubautia herbstobatae*)
E	Na`ena`e (*Dubautia latifolia*)
E	Na`ena`e (*Dubautia pauciflorula*)
E	Na`ena`e (*Dubautia plantaginea* ssp. *humilis*)
E	Love grass, Fosberg's (*Eragrostis fosbergii*)
E	Nioi (*Eugenia koolauensis*)
E	`Akoko (*Euphorbia haeleeleana*)

Plants -- 273	
E	Heau (*Exocarpos luteolus*)
E	Mehamehame (*Flueggea neowawraea*)
E	*Gahnia lanaiensis* (No common name)
E	Gardenia (=Na`u), Hawaiian (*Gardenia brighamii*)
E	Nanu (*Gardenia mannii*)
E	Geranium, Hawaiian red-flowered (*Geranium arboreum*)
E	Nohoanu (*Geranium multiflorum*)
E	*Gouania hillebrandii* (No common name)
E	*Gouania meyenii* (No common name)
E	*Gouania vitifolia* (No common name)
E	Honohono (*Haplostachys haplostachya*)
E	Awiwi (*Hedyotis cookiana*)
E	Kio`ele (*Hedyotis coriacea*)
E	*Hedyotis degeneri* (No common name)
E	Pilo (*Hedyotis mannii*)
E	*Hedyotis parvula* (No common name)
E	Kopa (*Hedyotis schlechtendahliana* var. *remyi*)
E	Hedyotis, Na Pali beach (*Hedyotis st.-johnii*)
E	*Hesperomannia arborescens* (No common name)
E	*Hesperomannia arbuscula* (No common name)
E	*Hesperomannia lydgatei* (No common name)
E	Kauai hau kuahiwi (*Hibiscadelphus distans*)

Plants -- 273	
E	Hau kuahiwi (*Hibiscadelphus giffardianus*)
E	Hau kuahiwi (*Hibiscadelphus hualalaiensis*)
E	Hau kuahiwi (*Hibiscadelphus woodii*)
E	Koki`o ke`oke`o (*Hibiscus arnottianus* ssp. *immaculatus*)
E	Ma`o hau hele, (=native yellow hibiscus) (*Hibiscus brackenridgei*)
E	Hibiscus, Clay's (*Hibiscus clayi*)
E	Koki`o ke`oke`o (*Hibiscus waimeae* ssp. *hannerae*)
E	Wawae`iole (*Huperzia mannii*)
E	Ischaemum, Hilo (*Ischaemum byrone*)
E	Aupaka (*Isodendrion hosakae*)
E	Aupaka (*Isodendrion laurifolium*)
T	Aupaka (*Isodendrion longifolium*)
E	Kula wahine noho (*Isodendrion pyrifolium*)
E	Kohe malama malama o kanaloa (*Kanaloa kahoolawensis*)
E	Koki`o, Cooke's (*Kokia cookei*)
E	Koki`o (*Kokia drynarioides*)
E	Koki`o (*Kokia kauaiensis*)
E	Kamakahala (*Labordia cyrtandrae*)
E	Kamakahala (*Labordia lydgatei*)
E	Kamakahala (*Labordia tinifolia* var. *lanaiensis*)
E	Kamakahala (*Labordia tinifolia* var. *wahiawaensis*)
E	Kamakahala (*Labordia triflora*)

Plants -- 273	
E	`Anaunau (*Lepidium arbuscula*)
E	Nehe (*Lipochaeta fauriei*)
E	Nehe (*Lipochaeta kamolensis*)
E	Nehe (*Lipochaeta lobata* var. *leptophylla*)
E	Nehe (*Lipochaeta micrantha*)
E	Nehe (*Lipochaeta tenuifolia*)
E	*Lipochaeta venosa* (No common name)
E	Nehe (*Lipochaeta waimeaensis*)
E	*Lobelia gaudichaudii* ssp. *koolauensis* (No common name)
E	*Lobelia monostachya* (No common name)
E	*Lobelia niihauensis* (No common name)
E	*Lobelia oahuensis* (No common name)
E	Wawae`iole (*Lycopodium (=Phlegmariurus) nutans*)
E	*Lysimachia filifolia* (No common name)
E	*Lysimachia lydgatei* (No common name)
E	*Lysimachia maxima* (No common name)
E	*Mariscus fauriei* (No common name)
E	*Mariscus pennatiformis* (No common name)
E	Ihi`ihi (*Marsilea villosa*)
E	Alani (*Melicope adscendens*)
E	Alani (*Melicope balloui*)
E	Alani (*Melicope haupuensis*)

Plants -- 273	
E	Alani (*Melicope knudsenii*)
E	Alani (*Melicope lydgatei*)
E	Alani (*Melicope mucronulata*)
E	Alani (*Melicope munroi*)
E	Alani (*Melicope ovalis*)
E	Alani (*Melicope pallida*)
E	Alani (*Melicope quadrangularis*)
E	Alani (*Melicope reflexa*)
E	Alani (*Melicope saint-johnii*)
E	Alani (*Melicope zahlbruckneri*)
E	*Munroidendron racemosum* (No common name)
E	Kolea (*Myrsine juddii*)
T	Kolea (*Myrsine linearifolia*)
E	*Neraudia angulata* (No common name)
E	*Neraudia ovata* (No common name)
E	*Neraudia sericea* (No common name)
E	`Aiea (*Nothocestrum breviflorum*)
E	`Aiea (*Nothocestrum peltatum*)
E	Kulu`i (*Nototrichium humile*)
E	Holei (*Ochrosia kilaueaensis*)
E	Panicgrass, Carter's (*Panicum fauriei* var. *carteri*)
E	Lau `ehu (*Panicum niihauense*)

Plants -- 273	
T	Makou (*Peucedanum sandwicense*)
E	*Phyllostegia glabra* var. *lanaiensis* (No common name)
E	*Phyllostegia hirsuta* (No common name)
E	*Phyllostegia kaalaensis* (No common name)
E	*Phyllostegia knudsenii* (No common name)
E	*Phyllostegia mannii* (No common name)
E	*Phyllostegia mollis* (No common name)
E	*Phyllostegia parviflora* (No common name)
E	Kiponapona (*Phyllostegia racemosa*)
E	*Phyllostegia velutina* (No common name)
E	*Phyllostegia waimeae* (No common name)
E	*Phyllostegia warshaueri* (No common name)
E	*Phyllostegia wawrana* (No common name)
E	Kuahiwi laukahi (*Plantago hawaiensis*)
E	Kuahiwi laukahi (*Plantago princeps*)
E	*Platanthera holochila* (No common name)
E	Hala pepe (*Pleomele hawaiiensis*)
E	Bluegrass, Mann's (*Poa mannii*)
E	Bluegrass, Hawaiian (*Poa sandvicensis*)
E	*Poa siphonoglossa* (No common name)
E	Po`e (*Portulaca sclerocarpa*)
E	Lo`ulu (*Pritchardia affinis*)

Plants -- 273	
E	Wahane (*Pritchardia aylmer-robinsonii*)
E	Lo`ulu (*Pritchardia kaalae*)
E	Lo`ulu (*Pritchardia munroi*)
E	Lo`ulu (*Pritchardia napaliensis*)
E	Lo`ulu (*Pritchardia remota*)
E	Lo`ulu (*Pritchardia schattaueri*)
E	Lo`ulu (*Pritchardia viscosa*)
E	Kaulu (*Pteralyxia kauaiensis*)
E	*Pteris lidgatei* (No common name)
E	*Remya kauaiensis* (No common name)
E	Remya, Maui (*Remya mauiensis*)
E	*Remya montgomeryi* (No common name)
E	*Sanicula mariversa* (No common name)
E	*Sanicula purpurea* (No common name)
E	Sandalwood, Lanai (=`iliahi) (*Santalum freycinetianum* var. *lanaiense*)
E	Naupaka, dwarf (*Scaevola coriacea*)
E	Schiedea, Diamond Head (*Schiedea adamantis*)
E	Ma`oli`oli (*Schiedea apokremnos*)
E	*Schiedea haleakalensis* (No common name)
E	*Schiedea helleri* (No common name)
E	*Schiedea hookeri* (No common name)
E	*Schiedea kaalae* (No common name)

Plants -- 273	
E	*Schiedea kauaiensis* (No common name)
E	Ma`oli`oli (*Schiedea kealiae*)
E	*Schiedea lydgatei* (No common name)
E	*Schiedea membranacea* (No common name)
E	*Schiedea nuttallii* (No common name)
E	*Schiedea sarmentosa* (No common name)
E	*Schiedea spergulina* var. *leiopoda* (No common name)
T	*Schiedea spergulina* var. *spergulina* (No common name)
E	Laulihilihi (*Schiedea stellarioides*)
E	*Schiedea verticillata* (No common name)
E	Ohai (*Sesbania tomentosa*)
E	`Anunu (*Sicyos alba*)
E	*Silene alexandri* (No common name)
T	*Silene hawaiiensis* (No common name)
E	*Silene lanceolata* (No common name)
E	*Silene perlmanii* (No common name)
E	Popolo ku mai (*Solanum incompletum*)
E	`Aiakeakua, popolo (*Solanum sandwicense*)
E	*Spermolepis hawaiiensis* (No common name)
E	*Stenogyne angustifolia* var. *angustifolia* (No common name)
E	*Stenogyne bifida* (No common name)
E	*Stenogyne campanulata* (No common name)

Plants -- 273	
E	*Stenogyne kanehoana* (No common name)
E	*Tetramolopium arenarium* (No common name)
E	Pamakani (*Tetramolopium capillare*)
E	*Tetramolopium filiforme* (No common name)
E	*Tetramolopium lepidotum* ssp. *lepidotum* (No common name)
E	*Tetramolopium remyi* (No common name)
T	*Tetramolopium rockii* (No common name)
E	`Ohe`ohe (*Tetraplasandra gymnocarpa*)
E	*Trematolobelia singularis* (No common name)
E	Opuhe (*Urera kaalae*)
E	Vetch, Hawaiian (*Vicia menziesii*)
E	*Vigna o-wahuensis* (No common name)
E	Pamakani (*Viola chamissoniana* ssp. *chamissoniana*)
E	*Viola helenae* (No common name)
E	Nani wai`ale`ale (*Viola kauaiensis* var. *wahiawaensis*)
E	*Viola lanaiensis* (No common name)
E	*Viola oahuensis* (No common name)
E	Iliau, dwarf (*Wilkesia hobdyi*)
E	*Xylosma crenatum* (No common name)
E	A`e (*Zanthoxylum dipetalum* var. *tomentosum*)
E	A`e (*Zanthoxylum hawaiiense*)

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Appendix C: Federal Laws and Regulation

Clean Water Act of 1972

The Clean Water Act (CWA) was passed in 1972, with a goal to "restore and maintain the chemical, physical, and biological integrity of the nation's waters." The Act contains a number of provisions that affect agriculture:

Clean Lakes Program is authorized by Section 314 of the CWA. It authorizes EPA grants to States for lake classification surveys, diagnostic/feasibility studies, and for projects to restore and protect lakes.

Nonpoint Source Pollution Program is established by Section 319 of the CWA. It requires States and U.S. territories to identify navigable waters that cannot attain water quality standards without reducing nonpoint source pollution, and then develop management plans to reduce such nonpoint source pollution.

National Estuary Program is established by Section 320 of the CWA. It provides for the identification of nationally significant estuaries that are threatened by pollution for the preparation of conservation and management plans and calls for Federal grants to States, interstate, and regional water pollution control agencies to implement such plans.

National Pollutant Discharge Elimination System Permit Program is established by Section 402 of the CWA. This program controls point source discharge from treatment plants and industrial facilities (including large animal and poultry confinement operations).

Dredge and Fill Permit Program was established by Section 404 of the CWA. Administered by the U.S. Army Corps of Engineers, it regulates dredging, filling, and other alterations of waters and wetlands jointly with EPA, including wetlands owned by farmers. Under administrative agreement, Natural Resources Conservation Service (NRCS) has authority to make wetland determinations pertaining to agricultural land.

Coastal Wetlands Planning, Protection, and Restoration Act

The Coastal Wetlands Planning, Protection, and Restoration Act (Title III of P.L. 101-646) established the National Coastal Wetlands Conservation Grant Program to acquire, restore, and enhance wetlands of coastal States and the Trust Territories. The Act requires the FWS to make matching grants of 50 to 75 percent of project costs to any coastal State to carry out coastal wetlands conservation projects that would be administered for the long-term conservation of the lands, waters and dependent fish and wildlife.

Under a competitive application program, Coastal Wetlands Conservation Grants are awarded each year to coastal States for the acquisition, restoration, or enhancement of coastal wetlands and tidelands. Since enactment of the law in 1990, the Service has been working with the States to acquire, restore, manage, or enhance coastal wetlands through a matching grants program. To date, about $139 million in grant monies have been awarded to 25 coastal States and one U.S. Territory and to acquire, protect or restore over 167,000 acres of coastal wetland ecosystems.

Hawaii was awarded a grant in 2003 for the Waihe'e Coastal Dunes and Wetlands Preserve Acquisition. Hawaii's Department of Natural Resources acquired 249 acres in Maui County, protecting coastal and spring-fed wetlands, dunes, riparian habitat, and 12 miles of marine shoreline (FWS, 2004a)

Coastal Zone Management Act of 1972

In response to intense pressure on coastal resources and because of the importance of coastal areas of the U.S., Congress passed the Coastal Zone Management Act of 1972 (CZMA). The CZMA defines the coastal zone as the coastal waters and the adjacent shorelands, strongly influenced by each other and in proximity to the shoreline, and includes islands, transitional and intertidal areas, salt marshes, wetlands, and beaches The coastal zone extends inland from the shorelines only to the extent necessary to control shorelands, and to control those geographical areas which are likely to be affected by or vulnerable to sea level rise.

The CZMA authorizes a State-Federal program to encourage coastal States and territories to develop comprehensive coastal management programs. The CZMA requires that, to the maximum extent practicable, any Federal action that affects any land/water use or coastal zone natural resource be consistent with the enforceable policies of an approved State coastal management program.

Endangered Species Act of 1973

The Endangered Species Act (ESA) was enacted to conserve threatened or endangered species and the critical habitats in which they exist. When a species is designated as threatened with extinction, a recovery plan that includes restrictions on cropping practices, water use, and pesticide use is developed to protect the species from further population declines. All Federal agencies are required to implement ESA by ensuring that Federal actions do not jeopardize the continued existence of listed species.

The ESA defines an endangered species as one that is in danger of extinction throughout all or a significant portion of its range. Threatened means a species is likely to become endangered within the foreseeable future. T & E designations may be applied to all species of plants and animals, except pest insects. A species may be threatened at the State level, but that same designation does not automatically apply nationwide, as species numbers may be greater in other States.

The US Fish and Wildlife Service (FWS) and the National Marine Fisheries Service (NMFS) are mandated the responsibility of ensuring that other agencies plan or modify Federal projects so that they will have minimal impact on listed species and their habitats. Section 7 of the ESA requires that project areas must be checked against FWS and State listings of critical habitat and T&E species. FSA ensures that all CREP contract meet this requirement by including T&E species in its EE.

The ESA also requires the delineation of the “critical habitat” of sensitive species. Critical habitat is defined by the ESA as areas that are “essential” to the conservation of listed species. Private, city, and State lands are generally not affected by critical habitat until the property owner needs a Federal permit or requests Federal funding. Because the Hawaii CREP is partially funded by Federal dollars, consultation with FWS would be required when critical habitat is encountered. Critical habitat designations are published in the Federal Register and can be located at the FWS website—http://endangered.fws.gov/.

Farmland Protection Policy Act (FPPA) of 1981

The aim of the FPPA is to minimize Federal programs (including technical or financial assistance) contribution to the conversion of important farmland to non-agricultural uses. The act seeks to encourage alternative, if possible, that would lessen the adverse effects to important farmlands. For the purpose of FPPA, farmland includes prime farmland, unique farmland, and land of Statewide or local importance. Farmland subject to FPPA requirements does not have to be currently used for cropland. It can be forest land, pastureland, cropland, or other land, but not water or urban built-up land.

NRCS uses a land evaluation and site assessment (LESA) system to establish a farmland conversion impact rating score on proposed sites of Federally funded and assisted projects. This score is used as an indicator for the project sponsor to consider alternative sites if the potential adverse impacts on the farmland exceed the recommended allowable level. The assessment is completed on form AD-1006, Farmland Conversion Impact Rating.

Federal Insecticide, Fungicide, and Rodenticide Act of 1947

The Federal Insecticide, Fungicide, and Rodenticide Act provides the legal basis under which pesticides are regulated. A pesticide can be restricted or banned if it poses unacceptable risks to human health or the environment. The re-registration process, mandated in 1988 for all active ingredients then on the market, has resulted in manufacturers dropping many less profitable products rather than paying the registration fees.

Food Security Act of 1985

FSA is authorized under this Act, as amended, and 7 CFR 1410 to institute the actions contemplated in this PEA (i.e. the proposed implementation of CREP). The FSA is authorized to enroll land into CREP through December 2007. Sections 1230, 1234, 1242 of the Act and 7 CFR 1410.50 authorize FSA to enter into agreements with States to use the CRP in a cost-effective manner to further specific conservation and environmental objectives of a given State and the nation. The following provisions are especially applicable to the implementation of CREP:

Highly Erodible Land Conservation Compliance Provisions require that producers of agriculture commodities must protect all cropland classified as being highly erodible land (HEL)from excessive erosion. The provisions were amended in the 1990, 1996, and 2002 Farm Bills. The purpose of these provisions is to remove the incentive to produce annually tilled agricultural commodity crops on HEL unless it is protected from excessive soil erosion.

Wetland Conservation Provisions (Swampbuster) help preserve the environmental functions and values of wetlands, including flood control, sediment control, groundwater recharge, water quality, wildlife habitat, recreation, and aesthetics. The 1996 Farm Bill modified Swampbuster to give USDA participants greater flexibility to comply with wetland conservation requirements and to make wetlands more valuable and functional. The 2002 Farm Bill changed the other Swampbuster provisions, including those associated with wetland determinations, mitigation (offsetting losses), "Minimal Effect" determinations, abandonment, and program eligibility.

National Environmental Policy Act of 1969 and Regulations

NEPA is intended to help Federal officials make decisions that are based on consideration of the environmental consequences of their actions, and to take actions that protect, restore, and enhance the

environment. NEPA mandates that the FSA consider and document the impacts that major projects and programs would have on the environment.

CEQ Implementation Regulations

The NEPA implementation regulations found at 40 CFR 1500.

National Historic Preservation Act of 1966 and Regulations

This National Historic Preservation Act (NHPA) as amended (16 USC 470, P.L. 95-515), establishes as Federal policy the protection of historic properties and their values in cooperation with other nations and with State and local governments. Amendments designated the State Historic Preservation Office (SHPO) or the Tribal Historic Preservation Office (THPO) as the party responsible for administering programs in the States or reservations.

The Act also creates the Advisory Council on Historic Preservation (ACHP). Federal agencies are required to consider the effects of their undertakings on historic resources, and to give the SHPO/THPO and, if necessary, the ACHP a reasonable opportunity to comment on those undertakings.

NHPA Implementation Regulations

The NHPA implementation regulations found at 36 CFR 800, Protection of Historic Properties. This regulation, governing compliance with Section 106 of NHPA must be followed in planning any agency activity and in the ongoing management of agency resources.

Safe Drinking Water Act of 1974

The Safe Drinking Water Act (SDWA) requires EPA to set standards for drinking water quality and requirements for water treatment of public water systems while also requiring States to establish a wellhead protection program to protect public water system wells from contamination by chemicals, including pesticides, nutrients, and other agricultural contaminants.

Sustainable Fisheries Act of 1996

The Sustainable Fisheries Act amended the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) to establish new requirements for “essential fish habitat” (EFH) descriptions in Federal fishery management plans, it also requires Federal agencies to consult with National Marine Fisheries Service (NMFS) on activities that may adversely affect EFH. Under the Magnuson-Stevens Act, NMFS must be consulted by any Federal agency undertaking, permitting, or funding activities that may adversely affect EFH, regardless of its location.

Wild and Scenic Rivers Act of 1968

The purpose of the Wild and Scenic Rivers Act (WSRA) is to preserve the free-flowing State of rivers that are listed in the National Wild and Scenic Rivers System or under study for inclusion in the System because of their outstanding scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values. Rivers in the System are classified as wild river areas, scenic river areas, or recreational river areas. The WSRA establishes requirements applicable to water resource projects and protects both the river, or river segments, and the land immediately surrounding them. Section 7 of the WSRA specifically prohibits Federal agencies from providing assistance for the construction of any water resources projects that would adversely affect Wild and Scenic Rivers.

Section 5 (d) of WSRA requires the National Park Service to compile and maintain a Nationwide Rivers Inventory (NRI), a register of river segments that potentially qualify as national wild, scenic or recreational river areas. A river segment may be listed on the NRI if it is free-flowing and has one or more "outstandingly remarkable values." All agencies are required to consult with the National Park Service prior to taking actions which could effectively foreclose wild, scenic or recreational status for rivers on the NRI.

Executive Order 11514: Protection and Enhancement of Environmental Quality

This EO directed the Federal government to provide leadership in protecting and enhancing the quality of the nation's environment to sustain and enrich human life. Federal agencies were directed to initiate measures needed to direct their policies, plans, and programs so as to meet national environmental goals. In order to achieve these goals agencies were directed to:

Monitor, evaluate, and control on a continuing basis their activities so as to protect and enhance the quality of the environment;

Encourage timely public information processes to foster understanding of Federal plans and programs with environmental impact;

Insure that information regarding existing or potential environmental issues be shared and coordinated with other; and

Comply with the regulations issued by the CEQ.

Executive Order 11988: Floodplain Management—Floodplains and Wetlands

Executive Order 11988 requires Federal agencies to avoid to the extent possible the long and short-term adverse impacts associated with the occupancy and modification of flood plains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative. In accomplishing this objective, "each agency shall provide leadership and shall take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health, and welfare, and to restore and preserve the natural and beneficial values served by flood plains in carrying out its responsibilities" for the following actions:

Acquiring, managing, and disposing of Federal lands and facilities;

Providing Federally-undertaken, financed, or assisted construction and improvements;

Conducting Federal activities and programs affecting land use, including but not limited to water and related land resources planning, regulation, and licensing activities

Each Federal agency is responsible for preparing implementing procedures for carrying out the provisions of the Order. Federal Agencies consult with FEMA concerning implementation of this EO.

Executive Order 11990: Protection of Wetlands

In order to protect wetlands, EO 11990 was signed. EO 11990 sought to "minimize the destruction, loss or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands" and minimize “to the extent possible the long and short term adverse impacts associated with the destruction or modification of wetlands and to avoid direct or indirect support of new construction in wetlands wherever there is a practicable alternative.” To meet these objectives, the EO requires Federal agencies, in planning their actions, to:

Avoid and minimize direct or indirect loss of wetlands whenever there is a practicable alternative

Achieve a no net loss of wetland quantity and quality through wetland replacement

Preserve and enhance the natural and beneficial values of wetlands

Executive Order 12898, Environmental Justice for Minority and Low Income Populations

EO 12898 directs Federal agencies "to make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations in the United States." Each Federal agency must make achieving environmental justice one of their goals particularly when such analysis is required by NEPA. The EO and guidance emphasize the importance of NEPA's public participation process, directing each Federal agency to provide opportunities for community input in the NEPA process by providing access to public documents and providing notices and hearings

Executive Order 13061, Federal Support of Community Efforts along American Heritage Rivers

EO 13061 established the American Heritage Rivers Initiative. The Initiative has three objectives: natural resource and environmental protection, economic revitalization, and historic and cultural preservation. Executive agencies, to the extent permitted by law and consistent with their missions and resources, shall coordinate Federal plans, functions, programs, and resources to preserve, protect, and restore rivers and their associated resources important to our history, culture, and natural heritage. Agencies are encouraged, to the extent permitted by law, to develop partnerships with State, local, and Tribal governments, community and non-governmental organizations.

Executive Order 13089, Coral Reef Protection

The purpose of Executive Order 13089, signed on June 11, 1998, is to increase protection of U.S. coral reef ecosystems. This Executive Order mandates that all Federal agencies whose actions may affect U.S. coral reef ecosystems shall: (a) identify their actions that may affect U.S. coral reef ecosystems; (b) utilize their programs and authorities to protect and enhance the conditions of such ecosystems; and (c) to the extent permitted by law, ensure that any actions they authorize, fund, or carry out will not degrade the conditions of such ecosystems. In addition, these Federal agencies shall, subject to the availability of appropriations, provide for the implementation of measures needed to research, monitor, manage, and restore affected ecosystems, including measures reducing impacts from pollution, sedimentation, and fishing. These measures shall be developed in cooperation with the U.S. Coral Reef Task Force and fishery management councils and in consultation with affected States, territorial, commonwealth, Tribal, and local government agencies, non-governmental organizations, the scientific community, and commercial interests.

The Secretary of the Interior and the Secretary of Commerce, through the Administrator of the National Oceanic and Atmospheric Administration, shall co-chair the U.S. Coral Reef Task Force. The Task Force shall oversee implementation of the policy and Federal agency responsibilities set forth in this order, and shall guide and support activities under the U.S. Coral Reef Initiative. Among other duties, the Coral Reef Task Force, in cooperation with State, territory, commonwealth, local governments, and other organizations, coordinate a comprehensive program to map and monitor U.S. coral reefs, perform research aimed at identifying the major causes and consequences of degradation of coral reef ecosystems,

and shall develop, recommend, and seek or secure implementation of measures necessary to reduce and mitigate coral reef ecosystem degradation and to restore damaged coral reefs.

Comprehensive State Groundwater Protection Program

The program was initiated by EPA in 1991. It coordinates the operation of all Federal, State, Tribal, and local programs that address groundwater quality. States have the primary role in designing and implementing the program based on distinctive local needs and conditions.

CRP Programmatic Environmental Impact Statement

The Federal Register dated April 24, 2002 announced the Notice of Intent of FSA to prepare a PEIS for the CRP and its counterpart the CREP. The Final PEIS was published in January 2003 and provides FSA decision makers with programmatic level analyses that provides context for State-specific EAs. The ROD was published in the Federal Register on May 8, 2003 (68 FR 24847-24854).

USDA Departmental Regulation 9500-3

Section 1540 (c) of the Farmland Protection Policy Act and DR 9500-3 established four general categories of farmlands meriting Federal protection. They are cumulatively referred to as “important farmland.” Important farmland categories are:

- Prime
- Unique
- Farmland of Statewide importance
- Farmland of local importance

DR 9500-3 also made it USDA policy to promote land use objectives responsive to current and long-term economic, social, and environmental needs.

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Appendix D: Glossary

Airshed: A geographic area or region defined by settlement patterns or topography that shares the same air mass and results in discrete atmospheric conditions.

Aquifer: A geologic formation that is water bearing. A geological formation or structure that stores and/or transmits water, such as to wells and springs. Use of the term is usually restricted to those water-bearing formations capable of yielding water in sufficient quantity to constitute a usable supply for people's uses.

Categorical Exclusions: An agency-defined category of actions that do not individually or cumulatively have a significant effect on the human environment and have been found to have no such effect in procedures adopted by the agency pursuant to NEPA. Projects qualifying for a “categorical exclusion” are not required to undergo additional NEPA analysis or documentation.

Conservation Practices: A series of NRCS approved agricultural practices and management techniques designed to control nonpoint pollution.

Environmental Assessment: A concise public document, prepared in compliance with NEPA, that briefly discusses the purpose and need for an action, alternatives to such action, and provides sufficient evidence and analysis of impacts to determine whether to prepare an environmental impact statement or finding of no significant impact (FONSI).

Environmental Impact Statement: A detailed written statement required by section 102(2)(C) of NEPA, analyzing the environmental impacts of a proposed action, adverse effects of the project that cannot be avoided, alternative courses of action, short-term uses of the environment versus the maintenance and enhancement of long-term productivity, and any irreversible and irretrievable commitment of resources. A *programmatic* EIS or EA: covers general matters in broader terms and analyzes conceptual or planning alternatives. In such cases, at least one more level of site-specific NEPA analysis is necessary before implementation can proceed.

Erosion: A geomorphic process that describes the wearing away of the land surface by wind, water, ice or other geologic agents. Erosion occurs naturally from weather or runoff but is often intensified by human land use practices.

Eutrophication: The natural and artificial addition of nitrogen and phosphorous (nutrients) to bodies of water, increasing algal growth. As the algae die, the decomposing microorganisms consume dissolved oxygen in the water, reducing the amount available to fish and other aquatic organisms. Ultimately, this can result in a dead lake or pond: a system where no larger aquatic organisms can survive.

Exotic species: A species occurring in an area outside of its historically known natural range as a result of intentional or accidental dispersal by human activities. Also known as an *introduced species*.

Groundwater: The supply of fresh water found beneath the Earth's surface, usually in aquifers, which supply wells and springs. Because ground water is a major source of drinking water, there is growing concern over contamination from leaching agricultural or industrial pollutants or leaking underground storage tanks.

Groundwater Recharge: Refers to water entering and replenishing an underground aquifer through faults, fractures, or direct absorption.

Hydric soils: Soil that, in its undrained state, is flooded long enough during a growing season to develop anaerobic (lacking air – saturated) conditions that support the growth and regeneration of hydrophytic vegetation.

Hydrophytic vegetation: Plants specialized to grow in water or in soil too waterlogged for most plants to survive.

Listed species: Under the Endangered Species Act, or similar State statute, those species officially designated as threatened or endangered through all or a significant portion of their range. See also: *Threatened and endangered species*.

Nonpoint source (pollution): Cause of water pollution that is not associated with point (fixed) sources. Nonpoint sources include runoff from agricultural, urban, construction, and mining sites, as well as septic systems and landfills.

Nutrients: Chemical compounds in a usable form and have nutritive value for plants and/or animals.

Riparian: Refers to a stream and all the vegetation on its banks.

Sediment loading: Describes the excessive inputs of sediment into a waterbody.

Siltation: The deposition of finely divided soil and rock particles upon the bottom of stream and river beds and reservoirs.

Soundscape: The natural sound environment of a place. Also, the amalgam of natural ambient sounds created by more or less continuous processes in the natural environment.

Stormwater runoff: Water from precipitation that runs straight off the ground without first soaking into it. It does not infiltrate into the ground or evaporate due to impervious land surfaces, but instead flows onto adjacent land or water areas.

Threatened and endangered species: Under the Endangered Species Act, those species officially designated by the National Marine Fisheries Service or U.S. Fish and Wildlife Service as being in danger of extinction (i.e., endangered) or likely to become endangered (i.e., threatened) within the foreseeable future through all or a significant portion of their range. Threatened and endangered species are protected by law. See also: *Listed species*.

Traditional Cultural Properties: Places that are eligible for inclusion in the National Register of Historic Places because of their "association with cultural practices or beliefs of a living community that are rooted in that community's history and are important in maintaining the continuing cultural identity of the community."

Watershed: 1.) Describes a cohesive, hydrologically-linked landscape that is drained by a waterway leading to a lake or reservoir. 2.) A geographic area delineated by its peaks and ridgelines, which divide surface water flow into two or more directions.