VI. Management Priorities for The Adaptation Phase

With this ORMP Update, the ORMP moves into the Adaptation Phase, which is approximately scheduled from 2013 to 2018. Using experiences and lessons learned from the Demonstration Phase, this phase will implement and track actions to accomplish ten Management Priorities.

The collective mission statement of the ORMP Policy Group and Working Group is the overall guidance for the Management Priorities.

Mission Statement of the Policy and Working Groups

"In support of a healthy and thriving ocean for today and future generations, we are committed to adopting integrated approaches to manage our ocean's resources by: connecting land and sea; preserving our ocean heritage; and promoting collaboration and stewardship."

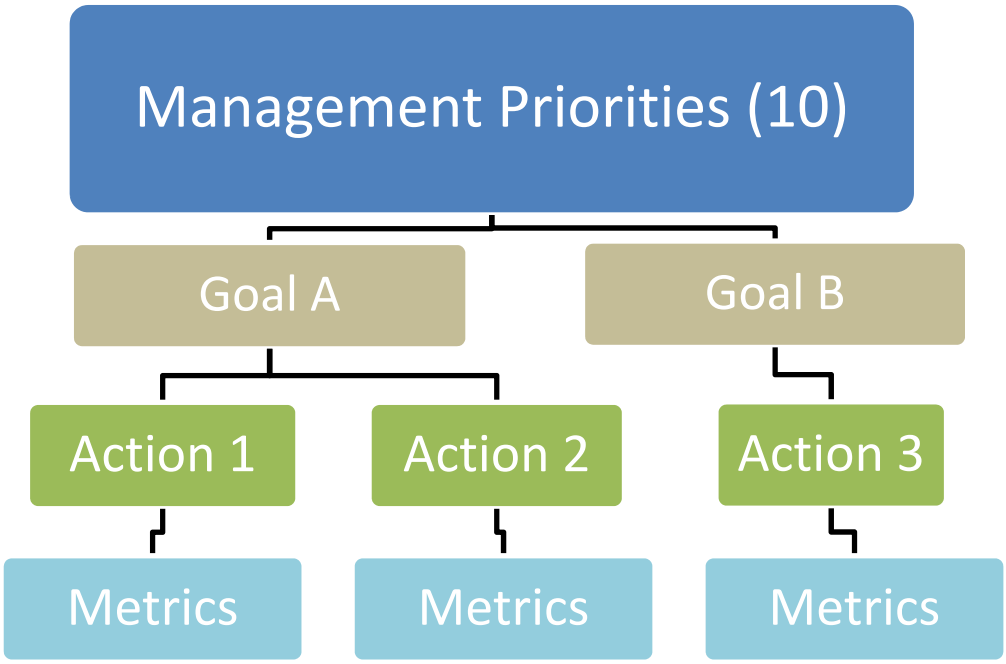
The ten ORMP Management Priorities are not listed in order of importance. Each of these Management Priorities expands upon previous work as the ORMP moves into the Adaptation Phase. The ten Management Priorities are ten coastal zone management areas the State of Hawai'i would like to address by 2018. These Management Priorities also contain a section called "Where we are now" to give a snapshot of work done in this Management Priority to date. The Management Priorities reference the ORMP Strategies listed in this ORMP Chapter II and the National Ocean Policy Objectives.

Each of the ten Management Priorities has one or more ORMP Goals. In order to accomplish the Goals, there are several Management Priority Actions. These actions are what the ORMP agencies and partners must do to make progress in that goal during the Adaptation Phase. Some of these Management Priority Actions connect with or conform to other statewide plans that have been written by other state agencies.

Management Priority Metrics are measures to track performance towards achieving goals.

Figure 6-1 on the following page shows the relationship between the Management Priorities and their goals, actions, and metrics.

Figure 6-1: Management Priorities Hierarchy



Management Priorities

Management Priority #1	Appropriate Coastal Development
Management Priority #2	Watershed Management
Management Priority #3	Marine Invasive Species
Management Priority #4	Marine Debris
Management Priority #5	Coral Reefs
Management Priority #6	Aquaculture, Fishponds, and Food Sources
Management Priority #7	Training, Education, and Awareness
Management Priority #8	Collaboration and Conflict Resolution
Management Priority #9	Community and Place-Based Ocean Management Projects
Management Priority #10	National Ocean Policy and Pacific Ocean Regional Initiatives

Management Priority # 1 Appropriate Coastal Development

Appropriate Coastal Development Goals

Goal A: Assist with adoption of county codes for Best Management Practices for coastal development to reduce risks from coastal hazards, sea level rise, and protect the shoreline.
Goal B: Use scientific methods to complete erosion risk maps for Main Hawaiian Islands

References: ORMP Strategies 1.1, 1.2, and 1.3 and National Ocean Policy Objective 5

One of the goals of the CZM Program is to ensure that appropriate setbacks and protections are put into place to avoid inappropriate development and structures along the coastal areas, which would include the objectives and policies in HRS Chapter 205A. These include but are not limited to:

- provision of coastal recreation opportunities to the public;
- protection and preservation of historic resources;
- preservation of scenic and open space;
- protection of costal ecosystems;
- promotion of protection of marine resources;
- suitable facilities for the state's economy;
- management of development; and
- stimulation of public participation.

While great strides have been made, there are many structures "grandfathered" under old codes, and continued pressure from landowners for exemptions to allow uses along the coast. This pressure can be very contentious and stressful for county and state permitting agencies.

The importance of appropriate development controls and setbacks is magnified by growing information and analysis of the effects of climate change, and in particular sea level rise, which affects all the islands, and which will impact areas already built upon. While the immediacy of this occurrence is not within the next five years, the difficulty in identifying and implementing adaptation measures indicates that work needs to begin now.

One of the key objectives of The National Ocean Policy is to "strengthen resiliency of ocean communities and marine environments…and their abilities to adapt to climate change impacts and ocean acidification." Disaster avoidance measures would include institutional and governmental measures to reduce risks from coastal hazards. Coastal and cultural resources need protection and one method for that is to reduce building where it is not appropriate. The most difficult measures are those which eliminate building that has already occurred. The goals and objectives of this section shall be consistent with Act 286 (20120, Hawaii's climate adaptation policy.

Benchmark – Where we are now

- The ORMP Working Group in collaboration with the Center for Island Climate Adaptation and Policy (ICAP) prepared the "*Framework for Climate Change Adaptation in Hawai'i.*" In addition, the Pacific Island Climate Change Cooperative (PICCC) encourages networks of interested parties from Hawai'i and elsewhere in the Pacific region.
- Shoreline erosion studies have been completed for Kaua'i, Maui, and O'ahu.
- The County of Kaua'i Comprehensive Zoning Ordinance, Chapter 8, has fines for any violations.

Target – Where we want to be

- While much is underway, additional information is needed on the science and mapping of sea level rise, and the target is to complete sea level rise maps for every island
- Some would like a comprehensive and integrated shoreline policy that addresses the impacts of chronic and episodic coastal hazards. This may or may not involve new or amended state law.
- Identify place-based adaptation strategies, which may include retreat zones, prohibition of shoreline armoring, and assessment of impacts on underground infrastructure and utilities.
- Encourage public and private property owners to relocate structures inland, with incentives that may include tax-based incentives and third-party acquisition of threatened parcels in fee or by easement.

Figure 6-2: Sea Level Rise Map for Honolulu Harbor Showing 1 meter Sea Level Rise in 2100

Source: UH SOEST

- Evaluate proposed projects/actions during the land use entitlement process to determine the sufficiency of proposed adaptation measures and infrastructure durability over the lifetime of the project, taking into account individual and public economic impacts.

Metrics - Indicator Measure	
• Number of counties implementing planning practices to consider climate change and its potential impacts in respective county plans • Number of climate change adaptation training sessions held for agency personnel • Shoreline erosion studies completed for Hawai‘i Island, Lāna‘i, and Molokai	
Agencies Involved	**Partners**
• *OP-CZM • Counties – Planning Departments and County Councils • DLNR-OCCL *Lead Agency	• Civil Defense Agencies • DOT • National Flood Insurance Program • UH Sea Grant College • UH SOEST, Coastal Geology

Operational Plan and Actions to Accomplish This

- Shoreline erosion studies are needed for Hawai‘i Island, Lāna‘i and Moloka‘i.
- Erosion risk maps need to be created showing rates of shoreline change, volume change, and impacts on coastal parcels.
- There is also a need to reflect mapping of shoreline hazards such as wave inundation, storm surge, and beach erosion. This will require some funding.
- Review projects during land use entitlement process.

Management Priority # 2 Watershed Management

Watershed Management Goals:

Goal A: Demonstrate implementation progress of Watershed Management Plans for fifty percent (50%) or more of the watersheds that have Watershed Partnerships.
Goal B: Fence upland watersheds to promote reforestation.

References: ORMP Strategy 1.1 and National Ocean Policy Objectives 1 and 7

Benchmark – Where we are now
The *Coastal Hazards Atlas* prepared by DLNR Division of Aquatic Resources and Bishop Museum provides place-based information useful for watershed plans. This resource is available online and is a helpful tool to understand watersheds in general.

The Office of Planning, Coastal Zone Management Program prepared another useful resource, the *Hawai'i Watershed Guidance* (2010), and conducted workshops to promote the *Hawai'i Watershed Guidance* and reintroduce Hawai'i's management measures intended to protect water quality from multiple types and sources of polluted runoff.

There are approximately 580 watersheds in the state according to the *Hawai'i Watershed Guidance*, although most are small, less than 2,000 acres. Typical watersheds are steep with highly permeable volcanic rock and soil, and with streams that tend to flash flows which are active during heavy rainfall.

OP-CZM and the Department of Health (DOH) identified 50 Priority Watersheds as shown in the text box at right, and these watersheds are eligible for Clean Water Act Section 319 Nonpoint Source Management Program funding. The Polluted Runoff Control Program (PRCP) is administrated by DOH and provides funding to reduce nonpoint source pollution in OP's priority watersheds.

Department of Health's Priority Watersheds in Hawai'i

KAUA'I
Nawiliwili Bay: Puali, Huleai, Nawiliwili Stream Watersheds
Hanalei Bay: Hanalei, Waikoko, Waipa, Waioli Watersheds

O'AHU
Ala Wai: Mānoa-Palolo, Makiki, Ala Wai Watersheds
Ko'olaupoko: Windward Watersheds from Kualoa to Makapu'u
Kapakahi Stream Watershed

MOLOKA'I
South Moloka'i from Kaluape'elua to 'Ōhi'a

MAUI
West Maui – Laniupoko to Honolua

HAWAI'I ISLAND
Pelekane Bay Watershed
Hilo Bay – Wailuku, Honoli'i, Pauka'a, Maili, Pukihae, Wainaku, Wailoa

Source: Hawai'i Watershed Guidance (2010)

The DLNR Division of Forestry and Wildlife (DLNR-DOFAW) defines 11Watershed Partnerships statewide, which include combinations of identified watersheds and also include combinations of public and private land. When discussing watersheds in this section, the ORMP means the 11 Watershed Partnerships, which focus on the mauka portions of these watersheds.

DLNR-DOFAW Watershed Partnerships and ORMP Management Priority Watersheds

- Kaua‘i Watershed Alliance – 25,000 acres of wet forest on Alaka‘i Plateau, Wainiha Valley and east facing pali of northeast Kaua‘i.
- Wai‘anae Mountains Watershed Partnership – Lualualei, Wai‘anae Kai, Mākaha ahupua‘a
- Ko‘olau Mountains Watershed Partnership – 9,000 acres in rainiest parts of the Ko‘olau range that provides drinking water
- East Moloka‘i Watershed Partnership – 33,000 acres that encompasses the rainforest of East Moloka‘i, including remote valleys and sea cliffs.
- Lāna‘i Forest and Watershed Partnership – 3,100 acres in the Lāna‘i hale cloud and mesic forest which provides recharge for much of the water for Lāna‘i residents and agriculture.
- West Maui Mountains Watershed Partnership – 31,100 acres of watershed that provides surface water and groundwater for west and central Maui.
- Leeward Haleakalā Watershed Restoration Partnership – 11,000 acres on south slope of Haleakalā, restoring koa forest and stream flow.
- East Maui Watershed Partnership – 3,500 acres of native montane ‘ōhi‘a forest in upper Hana Forest Reserve, which is part of the larger 114,000 acre East Maui Watershed
- Kohala Watershed Partnership – 6,600 acres of high yield recharge zones that capture 110 million gallons of water per day
- Mauna Kea Watershed Alliance - Restore 512 acres of fenced forest, controlling invasive grasses, and re-establishing connectivity at Kanakealeonui.
- Three Mountain Alliance – 12,000 acres of koa ‘ōhi‘a forest that replenish Ka Lae, Na‘alehu, and Keaiwa aquifers, which provide water for Ka‘ū, Hawai‘i.

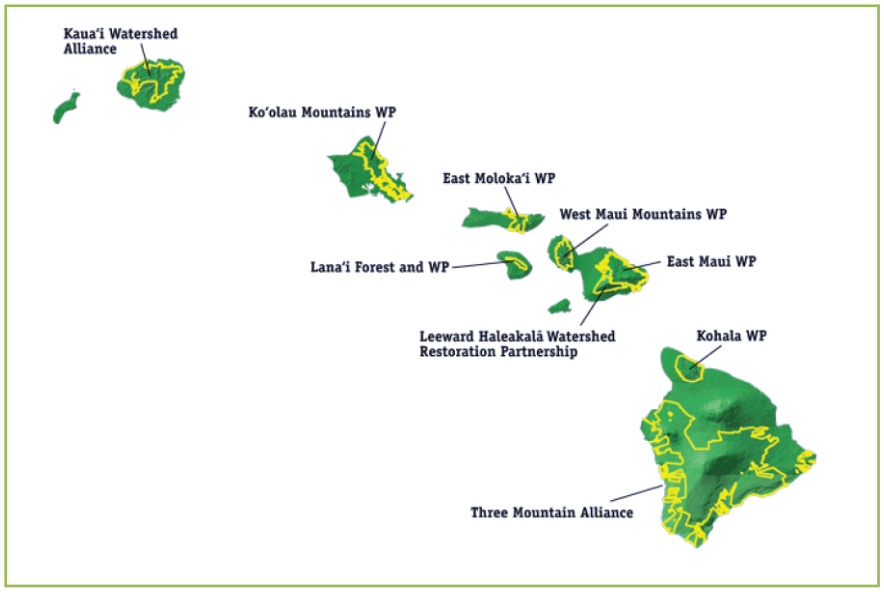
Hawai‘i Water Quality Standards define the classification system for waters, protected uses, establish numeric or narrative water quality criteria, and provide an anti-degradation policy for the defined uses in each class of water (DOH Administrative Rules, 2009).

The Department of Health Polluted Runoff Control Program is to address water quality problems (impairments) through the development and implementation of watershed plans.

The Department of Health prepared the 2006 *Water Quality Monitoring and Assessment Report* (known as the Integrated Report) to address the reporting requirements of the Federal Clean Water Act Sections 305(b) and 303(d). At that time, a total of 209 marine waters were listed as impaired, mostly for turbidity (caused by pollution runoff), nutrients, and bacteria: Kaua‘i 28 (13%), O‘ahu 74 (34%), Moloka‘i 3 (1%), Lāna‘i 6 (3%), Maui 72 (34%), and Hawai‘i 21 (15%).

Hotter, drier conditions are escalating the cost to supply water and intensifying conflicts over its use. A study by UH College of Tropical Agriculture and Human Resources (Kagawa, et al. 2009) shows that Hawaiian native forest plans conserve water use relative to invasive species present in the same forest. This means that more invasive species in a forest means more use of water. Protecting forest watersheds helps absorb rainwater and replenish ground water, and absorbs greenhouse gases. Protecting forests and watersheds helps to buffer heavy rainfall, and therefore reduces flooding, erosion, and siltation of reefs and fisheries. Muddy runoff from eroded lands is the main cause of coral reef loss surrounding the Hawaiian Islands. Many of Hawaii's estuaries and coastal areas require a supply of fresh water to maintain the ecosystem.

Figure 6-3: Watershed Partnerships in Hawai'i



Source: Watershed Management Guidance (2010)

Half of Hawaii's forests have already been lost. Alien species, such as feral pigs and goats, leave bare ground or habitat for alien plants like the strawberry guava that consume more water and increase runoff. The purpose of the *Rain Follows the Forest* initiative of the DLNR is to control these threats on a large scale basis and to protect forest and watershed natural assets. The goal is to double the percentage of watersheds protected in the next decade. The action plan contains projects in areas that receive the most rainfall and are essential to sustaining water resources and biological diversity. Climatic conditions and land cover types that provide high recharge and fog capture are considered when selecting priority projects.

This work is to proceed by DLNR working with the eleven established Watershed Partnerships made up of large public and private land owners and land managers and five island-based Invasive Species Committees made up of private, public, and nonprofit partners.

Invasive Species Committees

- O'ahu Invasive Species Committee
- Big Island Invasive Species Committee
- Maui Invasive Species Committee
- Moloka'i Invasive Species Committee
- Kaua'i Invasive Species Committee

<u>Other Actions in Addition to Watershed Partnerships</u>

County agencies are developing watershed management plans under the State of Hawai'i Water Code as part of sustainable development. On O'ahu, the Board of Water Supply (BWS) is preparing one for each of the eight planning districts. The first BWS plans completed include: Wai'anae, Ko'olau Loa, and Ko'olaupoko.

In addition, the U.S. Army Corps of Engineers (USACE) has undertaken watershed studies and restoration projects with state and county agencies. These include:

- West Honolulu Watershed Study: to define potential restoration projects and actions
- Pelekane Bay Ecosystem Restoration Project: to reverse degradation of the coral reef ecosystem
- Central O'ahu Watershed Study: problems and issues; potential projects to remedy

- Ala Wai Canal Project (with DLNR): Feasibility study of flood hazard reduction and ecosystem restoration
- West Maui Watershed Project: reconnaissance study to use the ahupuaʻa concept to solve aquatic, marine, and terrestrial ecosystem degradation and threats to water supply and quality, and storm damage

Target – Where we would like to be

All Watershed Partnerships have a watershed plan developed collaboratively with government agencies, private landowners, stakeholder partners, and community groups, with at least half of them moving towards implementation.

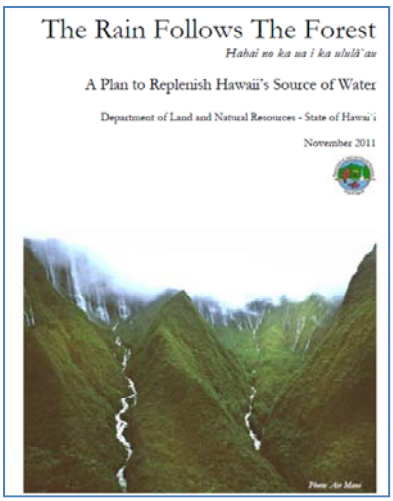
For Watershed Partnerships, the target is to restore and maintain *ahupuaʻa* ecosystems, including stream flows to restore native species habitats in wetlands, estuaries, and the ocean. Steps include:

1. Identify streams that need to be restored;
2. Prioritize these;
3. Develop implementation plan with timelines and funding; and
4. Begin restoration.
5. Effectively manage introduced hoofed animals in priority portions of Watershed Partnership areas. Improve access and hunting opportunities to assist with animal control in certain areas and increased recreational and subsistence hunting in other locations.
6. Reduce or contain damaging invasive weeds.
7. Monitor and control other forest threats including fires, predators, and plant diseases.
8. Restore and plant native species in priority areas and buffer zones.

Metrics - Indicator Measure:	
• Number of watershed plans completed in Watershed Partnerships • Acreage covered by these plans • Number of invasive species eradicated or controlled • Number of streams with a restoration plan identified and underway • EPA acceptance of Coastal Nonpoint Pollution Control Plan (CNPCP) • Number of acres where native species have been restored in Watershed Partnership Areas • Number of acres where introduced hoofed animals are effectively controlled • Number of acres of restored forest • Number of invasive plant species and individuals controlled	
Agencies Involved	**Partners**
• *DLNR-DOFAW • DLNR Commission on Water Resource Management • County water departments and county planning departments • Watershed Partnerships on Kauaʻi, Oʻahu, Lānaʻi, Molokaʻi, Maui (3), and Hawaiʻi (2) • DOH-Polluted Runoff Control Program-Section 319 *Lead Agency	• DLNR-DAR • The Nature Conservancy • EPA • NOAA

Operational Plan and Actions to Accomplish This

- Support community stewardship through promoting accomplishments and sharing lessons learned.
- Prepare stream restoration plans in priority watersheds.
- Develop collaborative arrangements among stakeholders, such as the volunteer watershed partnerships and invasive species committees which include large landowners and other partners working to protect forest lands, water recharge, and conservation, and habitat.
- Work with EPA and NOAA to resolve issues and procure final acceptance of CNPCP.
- Pursue funding to support continued community stewardship in partnership with government agencies. As provided in the *Rain Follows the Forest Plan*. The plan describes the continuing need for a stable funding source.
- Continue partnerships with other government agencies, non-profits, and private landowners.
- Implement priority recommendations in watershed plans



Management Priority # 3 Marine Invasive Species

Marine Invasive Species Goal:
Manage the spread of Aquatic Invasive Species from bays where there is coral or water quality degradation.

References: ORMP Strategies 2.1 and 2.2 and National Ocean Policy Objective 1

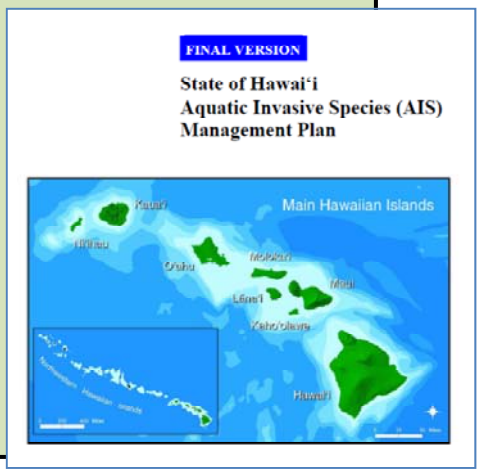
Benchmark – Where we are now:

- Aquatic invasive species pose significant threat to Hawaii's native plants, animals, ecosystems as well as the human population. While most island ecosystems in the world are highly vulnerable, Hawaii's isolation magnifies their susceptibility.
- Hawai'i contains 40% of the threatened and endangered species in the U.S. (Cox, 1999). But as a major transportation hub and tourist destination, the threat of invasion is acutely magnified.
- Establishment of a permanent statewide position for an AIS Coordinator
- The *Hawai'i Aquatic Invasive Species Management Plan* (AISMP) was prepared in 2003 as a tool to enhance coordination of management efforts and to identify problem areas. This plan is required under the Federal Nonindigenous Aquatic Nuisance Prevention Control Act of 1990 and the National Invasive Species Act of 1996.

Goal for AIS: To minimize the harmful ecological, economic, and human health impacts of AIS through the prevention and management of their introduction, expansion, and dispersal into, within, and from Hawai'i.

Objectives:

- Coordination and Collaboration
- Prevention
- Monitoring and early detection
- Response, Control, and Eradication
- Education and Outreach
- Research
- Policy



Examples of aquatic invasive species of concern are:

- Marine algae -- including five species which have become dominant and/or form extensive destructive blooms in areas such as at Kāne'ohe Bay, Maunalua Bay, and Waikīkī on O'ahu; harbor areas on the Island of Hawai'i; and the south shore of Moloka'i; as well as native green algal blooms in Kihei and other coastal areas on Maui.
- Marine fish -- 34 species have been introduced and at least 20 established, according to the AISMP. Many were introduced for planned purposes such as enhancement or bait. Ta'ape and Roi were introduced as food fish in the 1950s, and there are strong differences of opinions as to their impact on native fish: some feel they are to blame for a decrease in fish abundance. Other non-native fish species become introduced most likely through shipping activity, including mangrove blenny, tasseled blenny, and fang blenny found in various estuaries on O'ahu.
- Marine invertebrates -- according to the AISMP, surveys by Bishop Museum indicate 201 marine and brackish invertebrate species and 86 cryptogenic species have been introduced, typically arriving through hull fouling or ballast water. Examples are the snowflake coral, Caribbean barnacle, and Philippine mantis shrimp. Purposeful introductions of shellfish include the mangrove crab from Samoa, oysters from San Francisco, and littleneck clams from Japan. Offshore cage aquaculture is a possible new source of marine fish introduction.

Target – Where we would like to be

- Through implementation of strategic actions in the *Hawai'i Aquatic Invasive Species Plan* there can be reduction of existing invasive species accumulations.
- Through implementing prevention, aggressive monitoring and reporting programs, further introductions and accumulations can be avoided or eliminated shortly after they are discovered.
- Some actions, especially those that are land based activities, involve government permits and/or enforcement.
- Education and awareness are a major management strategy to more effectively control and prevent degradation of the ocean and coastal resources.

Metrics - Indicator Measure	
• Ongoing funding for the Ballast Water and Hull Fouling Prevention Program • Development of a risk assessment system with a prioritization element • Number of bays where problem invasive species are eradicated or effectively controlled	
Agencies Involved	**Partners**
• *DLNR, Division of Aquatic Resources • *Lead Agency	• U.S. Fish & Wildlife Service • The Nature Conservancy • Bishop Museum • Hawai'i Aquaculture Association • U.S. Coast Guard • NOAA • UH

Operational Plan and Actions to Accomplish This

As contained in the *Hawai'i Aquatic Invasive Species Plan (2003)*

Management Priority # 4 Marine Debris

Marine Debris Goal:
Reduce accumulated marine debris from all islands and shores.

References: ORMP Strategies 2.1 and 2.2 and National Ocean Policy Objective 1

Benchmark – Where we are now:
Marine debris is defined as any solid material disposed of or abandoned in the marine environment. It is a chronic problem for Hawai'i, and may enter from ships, or arrive as wash from rivers, streams, or storm drains. Depending on its origin, marine debris also has the potential to introduce invasive species. Examples vary greatly, but include plastic bags, bottles, rubber slippers, derelict fishing gear, and abandoned or derelict vessels. Causes may be accidental, illegal dumping, or abandonment of vessels. Land activities that can end up in the ocean include littering, dumping, improper waste management, and industrial losses. Also included are stormwater runoff, materials washed down storm drains, or trash deposited during storms, high winds, or waves.

Hawaii's position in the North Pacific Gyre makes it a hotspot for the aggregation of marine debris. Large floating debris impact marine life ("Ghost fishing") such as seabirds, Hawaiian monk seals, green sea turtles, and other species which digest the debris or become entangled. Concern over marine debris has received heightened attention recently as the world begins to track Japan Tsunami Marine Debris (JTMD). The Governor has appointed DLNR as the lead agency for JTMD, and marine alien and invasive species risks will be incorporated into the response plan.

The *Hawai'i Marine Debris Action Plan* (HI-MDAP) was facilitated by NOAA and U.S. EPA with the active participation of the marine debris community, government agencies, NGO, academic, and private interests. The four goals of the HI-MDAP are to:

- Reduce the Backlog of Accumulated Marine Debris;
- Decrease the introduction of solid waste and fishing gear at sea and coastal areas;
- Decrease the number of abandoned and derelict vessels; and
- Reduce land-based debris in waterways

Target – Where we would like to be
Through implementation of strategic actions in the *Hawai'i Marine Debris Action Plan, which will be updated in October 2012*, the state can reduce marine debris accumulations. Through aggressive monitoring and reporting programs, further introductions and accumulations can be avoided or eliminated shortly after they are discovered. Some actions, especially those that are land-based activities, involve government permits and/or enforcement. Education and awareness are a major management strategy to more effectively control and prevent degradation of the ocean and coastal resources.

Metrics - Indicator Measure	
• Tons of debris removed by volunteers and/or government actions	
Agencies Involved	**Partner:**
• DLNR (DOFAW or DAR) *DLNR Lead Agency • While the Strategic Activities under these goals are primarily assigned to NOAA, there is to be State agency involvement by DLNR (DOBOR), DOT (Harbors), and DOH, as well as the Counties.	• PacIOOS

Operational Plan and Actions to Accomplish This

As contained in the *Hawai'i Marine Debris Action Plan (2010) and (2013).*

Management Priority # 5 Coral Reefs

Coral Reefs Goals:

Goal A: Coordinate with the Division of Aquatic Resources (DAR) in DLNR to improve the health of coral reefs
Goal B: Work with Division of Boating and Ocean Recreation (DOBOR) in DLNR to increase the number of day use pin moorings for commercial and recreational vessels

References: ORMP Strategy 2.2 and National Ocean Policy Objective 6

The Main Hawaiian Islands are high volcanic islands with non-structural reef communities and fringing reefs abutting the shore. Coral reefs played an important role in Hawaiian culture and subsistence agriculture (Friedlander, et al., 2008). Native Hawaiians, who had intimate knowledge of their ocean resources, practiced species restrictions. Reefs are important habitats, natural buffers, and are part of the marine economy, providing food for sustenance and commerce as well as biotechnology. The *Hawai'i Coral Reef Strategy* quotes a study that estimates the state's coral reefs generate approximately $800 million annually in added value from marine tourism alone. (Friedlander, 2008).

Declining reef fisheries are shown through comparisons with numerical density, size, and biomass of fish in the shallow reefs of the main islands.

The effects of increased fishing pressure over time and, in some cases, overfishing or other irresponsible practices, are evident across the main Hawaiian Islands. Though many people fish responsibly, enforcement and prosecution of violations of existing fishing regulations are lacking, and regulations often fail to protect some species from harvest before first reproduction.

Recreational uses such as snorkeling, diving, and boating can affect the reefs by breaking skeletons and tissue, altering marine life behavior through feeding, pollution from grey water, and introduction of aquatic invasive species.

One of the greatest threats to the reefs comes from land-based sources of pollution, including sediment, nutrients, cesspools, sewer treatment plant overflow, and road run-off. Excess nutrients promote the growth of algae that compete for space on the benthic reef surfaces and affect the ability of coral to establish and grow.

Climate change impacts on coral include effects from ocean warming, coral bleaching, and ocean acidification. The first large-scale coral bleaching is believed to have occurred in Kāne'ohe Bay (O'ahu) around 1996 and was due to increases in sea-surface temperature and high light.

Benchmark – Where we are now

- DLNR Division of Aquatic Resources has specific information on coral that will sharpen the ORMP.
- The DLNR Division of Aquatic Resources has specific information in its *Hawai'i Day-Use Mooring Buoy 10-Year Strategic Plan* regarding the installation of day-use pin moorings for recreational and commercial boaters.

Target – Where we would like to be

- Many people, residents, and visitors are not aware of the significance of the coral reefs and how easily they can be damaged. Therefore, education is a key strategy to address coral threats.
- Day use pin moorings could be increased across the state. They are all sub-surface and boaters need local knowledge

Metrics - Indicator Measure	
• age-size-growth form parameters for coral health • Species richness and abundance • Habitat • Species diversity • # of day use pin moorings installed	
Agencies Involved	**Partners**
• *DLNR-DAR Coral Program • DLNR-DOCARE for enforcement • Coral Reef Working Group • DLNR-DOBOR	• The Nature Conservancy • USACE for permitting • DLNR-DOCARE for enforcement

Operational Plan and Actions to Accomplish This

Coordination with DLNR-DAR will help to develop an operational plan to increase the health of Hawaii's reefs.

Coordination with DLNR-DOBOR will increase the number of day use pin moorings for commercial and recreational vessels

Management Priority # 6 Aquaculture, Fishponds, and Food Sources

Aquaculture, Fishponds, and Food Sources Goal:
Develop aquaculture and mariculture standards, based on current scientific data, to support culturally, environmentally, and economically sustainable operations with the goal to increase local food production.

References: ORMP Strategies 2.2 and 2.6 and National Ocean Policy Objective 1

Figure 6-4: Keawanui Fishpond, Molokaʻi

Source: EPA Project Loko Iʻa

Benchmark – Where we are now
Fisheries – Declining reef fisheries are shown through comparisons with numerical density, size, and biomass of fish in the shallow reefs of the main islands compared to the composition in the Northwestern Hawaiian Islands, where there are 260% greater fish stock and a wider array of dominant species. This evidence is corroborated by oral histories and interviews with fishermen locally.

The effects of increased fishing pressure over time and, in some cases, overfishing or other irresponsible practices, are evident across the main Hawaiian Islands. Though many people fish responsibly, enforcement and prosecution of violations of existing fishing regulations are lacking, and regulations often fail to protect some species from harvest before first reproduction.

Fishponds – Hawaiians built rock-walled enclosures in near shore waters to raise fish, an integral part of the ahupuaʻa. Fish entered through a wooden gate or sluice in the stone wall on the seaward side and as they grew, they became too large to return to the open ocean. In ancient Hawaiʻi, it was estimated that there were 488 fishponds statewide, and more than 75 fishponds were in production on Molokaʻi alone. Yet the fishponds went out of use, became contaminated, and most disappeared.

A revival of fishponds has occurred in recent years, and thirteen have been restored. Six are in use, including three on Molokaʻi, one on Maui (Aoʻao Na Loko Iʻa o Maui at Koʻieʻie Fishpond), one on Hawaiʻi Island, and two on Oʻahu (Heʻeia and Kahana's Huilua Fishpond, which is under restoration). Project Loko I'a at the Keawanui fishpond on Molokaʻi provides learning and demonstration lessons. Restoration is very labor intensive and difficult work. The *Koʻolauloa Watershed Management Plan* estimates a restoration cost of $100,000 and annual management costs of $30,000-40,000 for each fishpond within the Koʻolauloa district.

Agencies involved in restoration include OP-CZM, DLNR, DOH, UH (Sea Grant), EPA, OHA, and others. In addition, there are several community efforts to restore fishponds underway including: Hāʻena and Hanalei on Kauaʻi, Moʻomomi on Molokaʻi, Pupukea and Maunalua on Oʻahu, Kahekili on Maui, and Miloliʻi and West Hawaiʻi on Hawaiʻi Island.

Aquaculture – Many believe that aquaculture is one of the major potential sources for achieving food security and sustainability in the State of Hawaiʻi. Demonstration fish farm projects exist, mostly off the Kona coast. Some are concerned with what happens to the wastewater, and whether these farms will attract sharks. The Hawaiʻi Department of Agriculture has prepared an Aquaculture Guidebook, *Permits and Regulatory Requirements for Aquaculture in Hawaiʻi* (2011).

Target – Where we would like to be

- Work with involved agencies to develop aquaculture and mariculture standards, based on current scientific data, to support culturally, environmentally, and economically sustainable operations with the goal to increase local food production.

Metrics - Indicator Measure	
• Number of restored fishponds • Pounds of food gathered • Number of fish species raised commercially • Pounds of commercially raised fish sold and dollar value • Stock assessments increasing for coral reef fisheries harvested for food	
Agencies Involved	**Partners**
• *DLNR--DAR • DOA, Aquaculture Development Program *Lead Agency	• USACE (for permits) • NELHA

Operational Plan and Actions to Accomplish This

Work with DLNR-DAR to develop an operational plan.

Management Priority # 7 Training, Education, and Awareness

Training, Education, and Awareness Goals

Goal A: Work in partnership to develop curriculum for training and cross-training state and county agency staff on ocean and coastal protection and begin annual training programs.
Goal B: Develop a citizen stewardship awareness and active engagement curriculum for widespread dissemination through various community outlets.

References: ORMP Strategy 3.2 and National Ocean Policy Objectives 3 and 4

Benchmark – Where we are now

1) The science and information on the ocean ecosystems and climate change are rapidly changing. Data collection and monitoring yields new information. Institutional responsibilities, rules, and regulations must be understood by State and County agency staff so that they can make informed decisions. While networking, such as in the ORMP Working Group, provides a valuable exchange of knowledge, there is a dire need for a more systematic way for new staff to receive basic training while allowing all staff to be regularly updated.
2) Strong community partnerships in place, for example with the Hawai‘i Conservation Alliance, Malama Maunalua, Kokee Resource Conservation Program, Hanalei Bay Watershed Alliance, and others form an excellent foundation for citizen stewardship. Many of these have public awareness and education as a core function. A regulatory and science-based curriculum, that mirrors that of the staff agencies, would enhance communication between government and the public. Develop curriculum for staff training through public-private-non-profit partnerships.
3) State and county planners and officials wish to have training in the science, law, and good management practices for climate change. As government agencies are trained, public education and outreach materials and programs need to be developed and implemented. These outreach materials will reduce the number of requests that have to be denied while propagating a wider understanding and appreciation for new regulations, which will appear onerous to some.

Target – Where we would like to be

1) For state agencies, staff should be given a class in environmental literacy and a class in advanced environmental science
2) For community outreach:
    - Involve large landowners
    - Develop an app-based system for ocean water quality monitoring and alert system

Metrics - Indicator Measure	
• Development of curricula • Assignment of faculty and presentation of first year curricula • Number of attendees by agency	
Agencies Involved	**Partners**
1. For State Agency Training: o DLNR o DOH o *Office of Planning, CZM Program 2. MACZAC for Citizen Stewardship and Awareness *Lead Agency	• PacIOOS • UH Sea Grant

Operational Plan and Actions to Accomplish This

Needs to be developed.

Management Priority # 8 Collaboration and Conflict Resolution

Collaboration and Conflict Resolution Goal:
Establish the ORMP Policy Group as a forum for discussion, raising and resolving issues, including conflict Resolution when appropriate.

References: ORMP Strategy 3.2 and National Ocean Policy Objective 3

Benchmark – Where we are now
The ORMP Policy Group and Working Group were established in 2007 and have been meeting regularly since then. They provide a forum for state agencies with county and federal partners as well as academia to share information, improve coordination, and prevent duplication. They offer an opportunity to increase partnerships and collaborations for effective and efficient conservation efforts in the Hawaiian Islands.
Coordinated efforts have the potential to yield better results than would have resulted from a single agency approach. The ORMP groups and sub-groups provide a direct network for agencies and professionals engaged in similar efforts. Knowledge sharing, capacity building and interfacing through participation in the Policy Group and Working Group s enable regular communication and cooperation on mutual interests. While coordination is difficult to measure in a quantitative manner, success in this regard has been noteworthy, as remarked during participant interviews.
Participants note the following benefits they have received from collaboration through the ORMP Groups:

- Creation of a network that they are able to use collectively and in their own work;
- Expanded knowledge of the operations of state and county governments as well as federal activities that may affect state waters;
- Discovering the programs operated by various agencies and learning about the challenges they face and how they are dealing with them; and
- Sharing different perspectives on issues that might not have been otherwise heard.

Target – Where we would like to be
While collaborative implementation of the ORMP has occurred and it is significant, challenges remain that cannot be fully overcome just by collaboration. Budget restricting and staffing changes demonstrate that collaborative governance is essential to carrying out the goals and objectives of the ORMP. What would be a helpful addition is creation of a guiding framework that continues to address collaboration while adding methods for raising complex and overlapping issues, as well as conflict resolution. Staffing for the Policy Group, which is provided by OP, would likely require additional issues to track and vet issues.

Metrics - Indicator Measure	
• Number and range of issues addressed by ORMP Policy Group • Number of Management Priority issues that receive state funding and where needed, legislative attention	
Agencies Involved	**Partners**
• *OP • State agency members: DLNR, DOH, DOA, DOT, SCD, and OHA • County Planning Departments *Lead Agency	• The Sanctuary • USACE • U.S. Navy • USCG • NOAA • EPA • UH SOEST • UH Sea Grant • ICAP • BWS • MACZAC • The Nature Conservancy • PacIOOS

Operational Plan and Actions to Accomplish This

Following completion of the 2013 ORMP, the Policy Group would start to meet more regularly, bi-monthly or quarterly, to work toward implementation of the Adaptation Phase Management Priorities. The agenda could be divided between those issues requiring state or county agency attention, and those broader issues affecting Hawaiian waters and the Pacific Ocean.

Management Priority #9: Community and Place-Based Ocean Management Projects

Community and Place-Based Ocean Management Projects Goals:

Goal A: Support existing community level eco-based, place-based ocean management projects
Goal B: When funding becomes available, assist in the creation of additional community level eco-based, place-based ocean management projects.

References: ORMP Strategies 3.1, 3.3, and 3.5 and National Ocean Policy Objective 6

Place-based initiatives during the Demonstration Period proved effective and flexible. A variety of models for integrated government and community engagement emerged as appropriate for each place. Many projects involve active involvement of community who work to restore part of an ecosystem and began to monitor and watch that ecosystem. As projects move forward and results start to be seen, they attract additional interest and resources, creating still further results.

Benchmark – Where we are now
Demonstration period yielded over a dozen examples of place-based community engagement and stewardship. Places where this occurred during the Demonstration period include: He‘eia Kea (O‘ahu), Ala Wai Watershed Project (O‘ahu), Hanalei (Kaua‘i), Honu‘apo Estuary (Hawai‘i Island), Hilo Bay (Hawai‘i Island), Pu‘u O Umi Natural Reserve and Kohala Natural Reserve (Hawai‘i Island), Maunalua Bay (O‘ahu), and West Maui Watershed (Maui). The West Maui Watershed is now called the West Maui Ridge to Reef Initiative. Lessons learned from communities need to be posted as references for others.

Target – Where we would like to be
- Help community groups establish themselves and continue their work. Where applicable, assist them to navigate the permit process associated with their restoration efforts, and develop BMPs for restoration work through information and expertise sharing.
- Identify other projects working with the community

Metrics - Indicator Measure	Agencies Involved
• Number of projects already underway and expanded • Number of new community projects started • The Hawai‘i Annual Report on NOAA National Performance Standards (NPS) on the OP-CZM webpage is posted • National Estuarine Research Reserve Site (NERRS) is designated • A Coastal and Marine Spatial Plan for Hawai‘i Territorial Sea is established	• *OP-CZM • DLNR in partnership with US Army Corps of Engineers, Kā‘anapali Makai Watch, DOH, NOAA and others for West Maui Ridge to Reef Initiative *Lead Agency

Operational Plan and Actions to Accomplish This

- OP Annual Reports
- OP updates its website with community-based efforts and outcomes
- OP develops coastal and marine spatial mapping (CMSP) capability

Management Priority # 10: National Ocean Policy and Pacific Ocean Regional Initiatives

National Ocean Policy and Pacific Ocean Regional Initiatives Goals:

Goal A: Identify Pacific Regional Priorities for Pacific Regional Ocean Partnership (PROP).
Goal B: Establish a Coastal and Marine Spatial Plan for the Hawaiian Archipelago.

References: ORMP Strategy 3.4 and National Ocean Policy Objective 4

The National Ocean Policy was formulated in 2010 by a Task Force of Federal Agencies to create a framework for collaboration that would enhance the country's ability to maintain healthy, resilient, and sustainable oceans, coast and Great Lake resources. The framework developed called for nine regional planning areas, which are now in formation.

One objective of the regional initiatives is to create graphic information on the condition of the oceans as an aid in the development of public policy and decision making. This coastal and marine spatial mapping (CMSP) would be a tool tied to the State's GIS capabilities. The goal is to complete a CMSP Plan for the Hawaiian Archipelago.

Benchmark – Where we are now
The Pacific Regional Ocean Partnership (PROP) was formed in 2012. A Memorandum of Agreement to formalize working relationships was circulated and the last signatory made in August 2012. The members include: State of Hawai‘i, Commonwealth of the Northern Mariana Islands (CNMI), Guam, and American Samoa. The PROP highlights the importance of gathering rights, cultural sensitivities, and unique island geographies in the management of ocean resources.

The State of Hawai‘i decided to form a Sub-Regional Ocean Partnership (Hawai‘i Sub-ROP). The area is co-managed by the State of Hawai‘i Department of Land and Natural Resources and the Office of Planning. It spans 1,523 miles of the main Hawaiian Islands as well as the Northwestern Hawaiian Islands (Papahānaumokuākea Marine National Monument (co-managed by NOAA, US Fish & Wildlife, and DLNR). This area also includes the 12-nautical mile Territorial Sea and the 200-nautical mile Exclusive Economic Zone. The purpose of the Sub-ROP is to formalize partnerships among governments along with coastal communities, cultural practitioners, economic (commercial fishing and tourist) interests, and other stakeholders to work together and to ensure consistency with national ocean objectives.

Target – Where we would like to be
While the PROP (signed in August 2012) is a living document, the ten regional objectives are to:

- Promote regional sustainability of resources that supports individual state requirements;
- Facilitate the implementation of the priority objectives of the President's Executive Order 13547 of July 19, 2010, which established the National Ocean Policy;
- Foster cooperation and collaboration on all aspects of ocean and coastal-related research and development, education, exploration and observation, and oceans management;
- Coordinate and communicate regional priorities;
- Facilitate the exchange of information, including reports, discussions, initiatives and plans that may be developed or considered;

- Facilitate preservation of the historical, cultural and social heritage of each state and the region;
- Identify opportunities for collaborative work in the ocean and coastal environment;
- Enhance current state, multi-state, and federal governance and institutional mechanisms to manage ocean and coastal resources;
- Seek additional resources and funding opportunities to further the PROP's objectives; and
- Address related environmental issues.

Metrics - Indicator Measure	
• Number of meetings (gatherings of the PROP each year) • Number of issues raised and information exchanged at the PROP • Number of collaborative initiatives undertaken at the PROP	
Lead Agency	Partner Agencies
• OP-CZM	• U.S. Coast Guard • Bureau of Ocean Management, U.S. Department of the Interior

Operational Plan and Actions to Accomplish This

The PROP has been formed. Meetings scheduled and topic will be developed in 2013.
The Hawai‘i Sub-ROP has been formed. Meetings scheduled and topic will be developed in 2013.