



C. Williams



NOAA Habitat Blueprint

West Hawai'i Implementation Plan

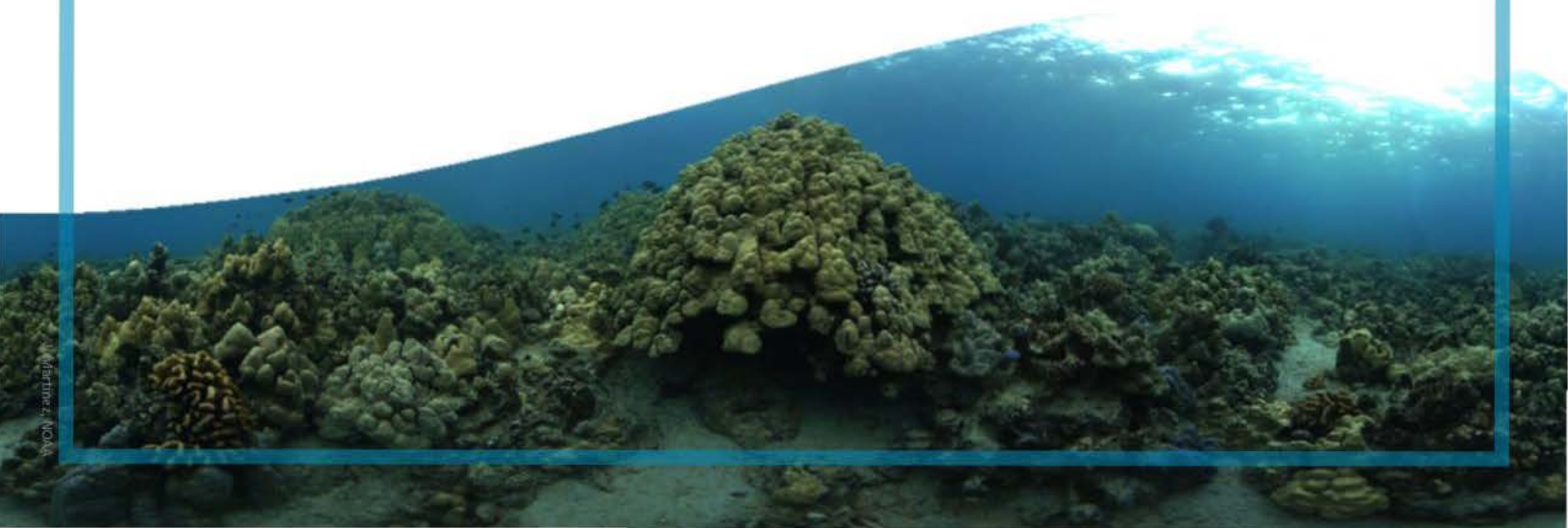


Illustration: NOAA

WEST HAWAI'I HABITAT FOCUS AREA IMPLEMENTATION PLAN

MARCH 17, 2016

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Executive Summary

National Oceanic and Atmospheric Administration (NOAA) offices and programs in the Pacific Islands Region are working with federal and state agencies, local communities, non-profit organizations and businesses to improve ocean health along West Hawai'i's coastline. Pooling resources and focusing efforts in this area can make a larger collective impact made toward creating a more resilient landscape around the shared goals of healthy reefs, abundant fisheries, and thriving communities.

West Hawai'i contains one of the state's longest contiguous coral reefs, supporting an abundance of corals and fish of which nearly a quarter are found nowhere else in the world. From its highly significant cultural sites to its thriving resort industry, West Hawai'i is important to the region's economy, history, culture, and environment. Residents depend on healthy marine life for their livelihood, food, and recreation. The waters and coast of West Hawai'i also provide habitat for spinner dolphins, false killer whales, threatened green sea turtles, humpback whales and endangered Hawaiian monk seals.

In Hawai'i, connections between mountain and sea, people and land, fish and seasons are inherent in traditional natural resource management, and many strive to incorporate this knowledge into current practices. As places and people change over time, and pressures on West Hawai'i's natural resources increase from land-based sources of pollution, fishing impacts, and climate change, the management of natural resources based on these connections becomes essential. Many people are working together in West Hawai'i's watersheds, streams and ponds, along the coast and in the ocean to better understand these natural systems in order to better manage them and ensure they can continue to sustain us for generations to come.

NOAA's role is to support the planning and work that has occurred for decades and to be a catalyst for new efforts in West Hawai'i. The ability to focus efforts in one place provides NOAA the opportunity to coordinate, collaborate and complement existing activities in West Hawai'i. The Habitat Focus Area also provides a framework to communicate with partners and communities about the many facets of science, service and stewardship that NOAA offers.

The primary goal of the West Hawai'i Habitat Focus Area is to coordinate NOAA efforts and work with local communities to restore and maintain critical marine ecosystems and their function. To accomplish these goals, the specific objectives are to:

- Improve coral health through the reduction of the delivery land-based pollutants, such as sediments and nutrients.
- Reduce vulnerability of communities and natural resources to the localized effects of climate change.
- Ensure that communities are informed and contribute to the sustainable use and restoration of natural resources.
- Provide better management tools and easily accessible information to promote informed decisions.

This plan lays out the activities that NOAA is implementing to work towards achieving these objectives and showing a positive impact to the ecosystem and communities in 5 years.

Introduction

Overview of the NOAA Habitat Blueprint

The Habitat Blueprint provides a forward looking framework for NOAA to think and act strategically across programs and with partner organizations to address the growing challenge of coastal and marine habitat loss and degradation. The purpose is to increase the effectiveness of our efforts to improve habitat conditions for fisheries, coastal and marine life, along with other economic, cultural, and environmental benefits our society needs and enjoys. The intended outcomes of the Habitat Blueprint nationally are:

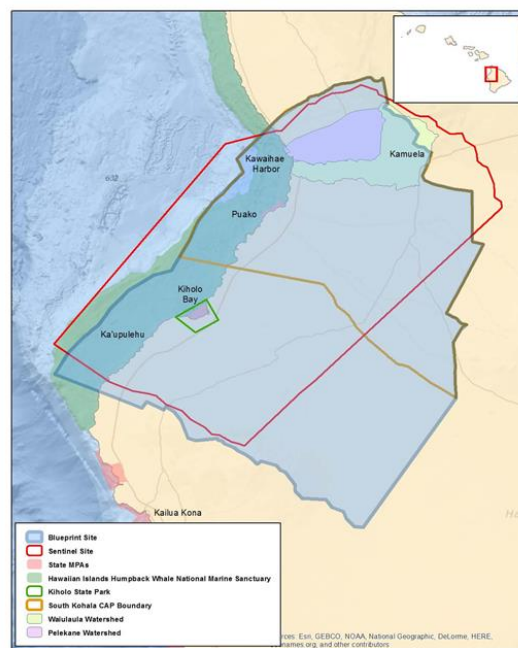
- Sustainable and abundant fish populations
- Recovered threatened and endangered species
- Protected coastal and marine areas and habitats at risk
- Resilient coastal communities
- Increased coastal/marine tourism, access, and recreation

One component of the NOAA Habitat Blueprint is to collaborate in specific areas to demonstrate the benefits of our collective habitat conservation efforts. Ten Habitat Focus Areas have been selected across the country. The purpose of the Habitat Focus Areas is for NOAA to coordinate funding and actions within NOAA and with other partners in these locations. The Habitat Focus Areas are expected to show measurable results in 3-5 years that achieve the objectives of the area.

Why and How West Hawai'i Was Selected

West Hawai'i was selected as a NOAA Habitat Focus Area because of its unique coastal ecosystems, known threats to these ecosystems, multiple on-going conservation efforts, and the strong foundation of partnerships and community involvement. The unique ecosystems include an extensive fringing coral reef supporting federally managed fish and protected species. The reef is one of the longest and healthiest contiguous reefs in the state. The area is home to hundreds of anticline pools, culturally significant fishponds, and numerous federally listed endangered and threatened species. Threats include nutrient discharge to coral reefs from cesspools, sediment run-off from large areas of bare land, overharvesting and sea level rise.

Multiple NOAA and state programs have identified the West Hawai'i area as a priority conservation site and numerous organizations are working to manage and restore it. The area includes the Hawai'i Island Sentinel Site Program, Coral Reef Conservation Program (CRCP), Hawaiian Islands Humpback Whale National Marine Sanctuary (HIHWNMS), the Pacific Island Fisheries Science Center (PIFSC) Kona Integrated Ecosystem Assessment (KIEA) and the NOAA Habitat Blueprint West Hawai'i Habitat Focus Area. The area



was also recently identified as part of the Hawai'i site for the Resilient Lands and Waters initiative. To help organize the various efforts taking place in the Focus Area, NOAA, the State of Hawai'i Department of Land and Natural Resources (HI-DLNR) and Office of Planning (HI-OP), and The Nature Conservancy (TNC) are collaborating to bring partners together with common goals and objectives, and to engage those working in the area so as to create a coordinated initiative to protect and restore the region's natural and cultural resources.

Purpose of the West Hawai'i Habitat Focus Area Implementation Plan

The West Hawai'i Habitat Focus Area Implementation Plan provides the objectives, activities, performance measures, and communication strategies needed to implement the goals of the Focus Area. The plan includes both NOAA-funded and NOAA-executed activities that support the short- and medium-term outcomes within the 5-year timeframe as well as the long-term outcomes that extend beyond the 5-year timeframe. The West Hawai'i Habitat Focus Area initiated projects in October 2014 and expects to demonstrate results by October 2019. This plan has been developed to track NOAA activities and identifies the leads, partners and measures that contribute to meeting the objectives of the West Hawai'i Habitat Focus Area. In addition, the plan includes a logic model (See Appendix I) that aligns NOAA-supported activities as well as other desirable activities to reach the long-term outcomes. The plan will be shared with partners, communities, and stakeholders to inform how NOAA is contributing to efforts in West Hawai'i. The plan is not intended to guide activities of other organizations, and is designed to be a non-binding, living document that can be adaptively managed and updated for NOAA purposes and planning.



NOAA, State, and partner representatives at the 2014 Focus Area Selection Team Workshop.

West Hawai'i Habitat Focus Area Objectives

The primary goal of the West Hawai'i Habitat Focus Area is to coordinate NOAA efforts and work with local communities to restore critical marine ecosystems and their function. To accomplish this goal, our specific objectives are to:

Objective 1: Improve coral health through the reduction of the delivery land-based pollutants, such as sediments and nutrients.

Objective 2: Reduce vulnerability of communities and natural resources to the localized effects of climate change.

Objective 3: Ensure that communities are informed and contribute to the sustainable use and restoration of natural resources.

Objective 4: Provide better management tools and easily accessible information to promote informed decisions.

The logic model (Appendix I) lays out activities that are needed to achieve short, mid, and long-term objectives. In order to have a more comprehensive assessment of the necessary activities to achieve the objective, the logic model includes all large projects, both on-going and needed, including those that are led by NOAA or our partners. The NOAA-funded activities were selected based on the identified needs that were of the highest priority and fit within NOAA's expertise. The remaining projects are either partner led or gaps needing funding and/or staff time.

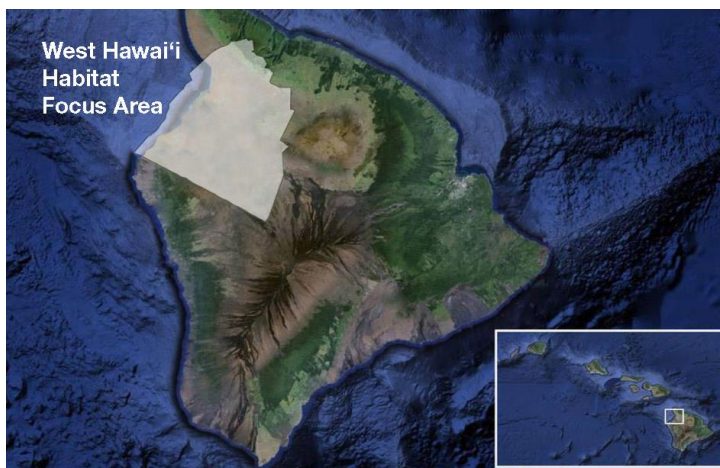
Performance Measures and Outcomes

Short-term performance measures are identified in the Key Activities section for each action. The NOAA implementation team is working on developing mid-term measures that link to the outcomes in the logic model (see Appendix I). The logic model was developed to look at the issues in West Hawai'i in a comprehensive framework and lays out activities needed to achieve short-, mid-, and long-term outcomes. The logic model includes projects, both on-going and needed, and projects led by NOAA or our partners. The NOAA-funded activities were selected based on the identified needs that were of the highest priority and fit within NOAA's expertise. The remaining projects are either partner-led or gaps needing funding and/or staff time. There are multiple NOAA performance measures that the West Hawai'i Habitat Focus Area projects can contribute to and these are listed in Appendix V.

Background Information

Description of the Area

The West Hawai'i Habitat Focus Area covers the northwestern coast of the island of Hawai'i. The Habitat Focus Area extends from Kailapa, which is just north of Kawaihae Harbor, to Makolea Point, which is just south of Kekaha Kai State Park. There are numerous ahupua'a – traditional land divisions – in the Focus Area, which combine to create separate districts, or moku. Ahupua'a generally follow the boundaries of watersheds from the mountain to the reefs and so too does the Focus Area.



The area contains one of the longest contiguous coral reefs in the state, which is also one of the healthiest and most productive. Nearly a quarter of the marine species that live along this coast are found nowhere else in the world¹. The area is also home to federally listed endangered or threatened species such as Hawaiian monk seals, humpback whales, and green sea turtles as well as many other species. Numerous bays can be found in the area with some serving as resting spots for Hawaiian spinner dolphins. Negative human-wildlife interactions are a cause for concern as both visitors and residents utilize the coastal habitat that supports these species.



Kīholo Fishpond

The coastal zone includes Hawaiian fishponds, estuaries, and the highest concentration of anchialine pools in Hawai'i². Anchialine pools are land locked brackish water habitats that have subterranean connections to the ocean and provide habitat to endemic species such as the 'ōpae'ula (Hawaiian shrimp) (*Halocaridina rubra*). There are montane dry, wet, and lowland mesic forest, shrub and grassland, and numerous wetlands throughout the watershed. The area is extremely steep, with slopes rising from sea level to in excess of 5,000 feet elevation in only

approximately 8 miles. Much of the land is covered in lava while a large part of the remaining land is exposed sediment as a result of a number of factors, including high-levels of grazing, poor land management practices and invasive species. These conditions contribute to significant water and wind erosion with transport of sediment into the coastal system. Streams are prevalent in the northern portion of the focus area but are more sparse and ephemeral in the southern portion where flow occurs subsurface. The area is considered relatively dry and wildfire is a frequent threat.

In addition to the environmental resources, there are numerous cultural resources in the Habitat Focus Area. There are several heiau in the area and the Pu'ukohola Heiau National Historic Site ("Hill of the Whale") is considered the most important one for King Kamehameha's kingdom. The Ala Kahakai National Historic Trail runs along the coastline. There are also numerous traditional fishponds.

NOAA's Efforts in the Habitat Focus Area

A major impetus for the location of the Habitat Focus Area and Sentinel Site Program was the active and robust history of work by NOAA in West Hawai'i. Multiple NOAA offices have undertaken significant work and continue to be active in the area. Some of the current activities taking place include:

National Marine Fisheries Service (NMFS) Pacific Islands Regional Office (PIRO)

Habitat Conservation (* indicates funded by CRCP):

- Regulation of impacts to Essential Fish Habitat including coral reef resources
- Working with the State of Hawai'i to improve data collection on fisheries*
- Engaged in community fish (lawai'a) camps and spearfishing tournaments that target introduced fish*
- Fisheries extension efforts*
- Senior leadership visits to engage community
- Coastal uses mapping in collaboration with HI-DLNR*

Sustainable Fisheries:

- Working actively with local fisheries council, West Hawai'i Fisheries Council, and local fishermen

- Conducting outreach and education on recreational fisheries
- Surveying and collecting data on ocean users
- Incorporating socioeconomic aspects of recreational fisheries

Protected Species:

- Working to address human/dolphin interaction issues and drafting an Environmental Impact Statement (EIS) on the potential rulemaking under the Marine Mammal Protection Act to increase protection to Hawaiian spinner dolphins
- Active grant partnership with community marine mammal response groups addressing interactions between humans and Hawaiian monk seals and sea turtles, as well as responding to injured or entangled marine mammals

NMFS Pacific Islands Fisheries Science Center (* indicates funded by CRCP)

- The PIFSC-KIEA project is a formal synthesis and quantitative analysis of information on relevant natural and socio-economic factors, specifically in relation to identified ecosystem management goals for the region
 - Development of an Ocean Health Index for West Hawai'i in collaboration with Conservation International. Dedicated research cruises have included:
 - Surveys with active and passive acoustics
 - Cetacean habitat maps for pilot and beaked whales
 - 3 week sea glider mission
 - Downscaling climate model output to predict future coral bleaching scenarios
 - Development of a high-resolution nearshore wave model
 - Development of ecosystem indicators used to track the trends and status of West Hawai'i's marine ecosystem
- Coral Reef Ecosystem Program (CREP) leads the Pacific Reef Assessment and Monitoring Program (Pacific RAMP), providing scientific information that supports ecosystem approaches to management and conservation of coral reefs. Pacific RAMP has established baseline ecosystem assessments and initiated long-term monitoring of trends throughout the Pacific Islands region, including Hawai'i, that integrate biological observations with water quality and oceanographic data. Selected activities include:
 - RAMP surveys
 - Fish abundance and life history surveys
 - Ecological surveys for resilience assessment*
 - Protected species surveys for green sea turtles, Hawaiian monk seals, and cetaceans

NMFS Office of Habitat Conservation (OHC)

- Funding and technical assistance to non-governmental organizations and community groups to support habitat restoration, including erosion and sediment control, invasive species removal, re-vegetation with native plants, and fishpond restoration

National Ocean Service (NOS) HIHWNMS

- On-going large whale disentanglement program
- Ocean Count volunteer program that collects humpback whale data along the coast annually
- Hosts Ocean Awareness Training for communities

- Technical assistance for coral reef resilience studies

NOS Office for Coastal Management (OCM)

- Working with anchialine pool management and research to address concerns related to higher sea levels
- Working with National Park Service (NPS) and Trail Association on sea level rise measurements and environmental literacy
- Assisting with the Kiholo fishpond restoration/rehabilitation work
- Conservation on opelu canoe project (funded by the NOAA Office of Education's Bay Watershed and Training Program in Hawai'i)
- Fund and mentor fellows who conduct outreach and scientific work in the area
- Funding from CRCP to State of Hawaii, Department of Land and Natural Resources (DLNR), Division of Aquatic Resources (DAR) Kona to conduct an integrated monitoring approach on the west coast of the island of Hawai'i. Monitoring encompasses fish communities, mobile invertebrates, reef benthos (corals, coral disease, algae and other sessile invertebrates) and water temperature in fully protected, partially protected and open areas
- Funding from CRCP to Hawaii DLNR to partially fund the position that coordinates the South Kohala partnership initiative, engages community members, state and federal agencies and resource managers to coordinate the activities outlined in the South Kohala Conservation Action Plan
- Funding from CRCP to TNC for coordination of coral reef resilience studies

NOS National Geodetic Survey

- Lead global positioning system (GPS) elevation data collection and mapping of locations potentially impacted by sea level rise

National Environmental Satellite, Data, and Information Service (NESDIS)

- Assessing climate change impacts of sea level rise and chronic inundation on anchialine pools, and communicating results to resource managers
- Assessing climate change vulnerability projections in relation to community natural resource management priorities, and contributing to the development of alternative scenarios and strategies to assist future planning
- Evaluating sea level rise impacts on ecological health from extreme sea level events

National Weather Service (NWS)

- Storm surge model – development of bathymetry and model diagnostics
- Near shore wave prediction system – beta testing model for Hawai'i coastal waters

Office of Oceanic and Atmospheric Research (OAR)

- Waiulaula watershed restoration, Wai 2 Kai project –University of Hawai'i (UH) Sea Grant project to improve water quality at restoration sites along Waikoloa stream by reducing stormwater runoff, pollution and erosion Piliakai and Na Kilo 'Aina – A UH Sea Grant community-based science engagement program providing a pathway for local

communities to better understand local ecosystems by conducting scientific observations and data collection over time

- ReefTalk – UH Sea Grant-supported monthly community engagement events designed to educate stakeholders about marine resource conservation in West Hawai'i and on Hawai'i Island

Partners

- TNC
- Hawai'i Wildfire Management Organization
- Kohala Center
- Kohala Watershed Partnership
- UH – Mānoa
- UH – Hilo
- Hawaii Institute of Marine Biology (HIMB)
- UH – Sea Grant
- Pacific Islands Ocean Observing System (PacIOOS)
- Marine Applied Research Center
- Kailapa Community Association
- Puakō Community Association
- Hui Aloha Kīholo
- Department of Interior (DOI)
 - United States Geological Survey (USGS)
 - NPS
 - Ala Kahakai National Historic Trail
 - Pacific Islands Climate Change Cooperative (PICCC)
 - US Fish and Wildlife Service (USFWS)
 - United States Forest Service (USFS)
- Natural Resources Conservation Service (NRCS)
- Environmental Protection Agency (EPA)
- United States Army Corp of Engineers (USACE)
- County of Hawai'i – Planning Department
- HI-Office of Planning (OP)
- HI-DLNR
 - DAR
 - Division of Forestry and Wildlife (DFW)
- West Hawai'i Fisheries Council
- Western Pacific Fisheries Management Council

Factors Leading to Habitat Loss or Degradation in the Area

Climate Change

Impacts from climate change are among the most wide-reaching threats to habitat quality in most marine systems. It is predicted that sea level rise



High water temperature can cause coral bleaching.

will change the geographic extent of coastlines, impact the salinity of estuaries, create new habitat for corals and dramatically change intertidal habitats and anchialine pools. Predicted changes in the frequency and intensity of storms and precipitation³ can also affect coastal flooding, sedimentation and erosion processes. Increases in ocean temperature can induce coral bleaching, lead to increased coral disease and affect the metabolic rates of temperature sensitive species⁴. Ocean acidification resulting from carbon emissions and from non-point source pollution and nutrient eutrophication will affect the calcification processes of calcifying organisms such as coral. Many calcifying organisms create and compose coral reef habitat⁵, and other organisms (such as fish) that depend on these habitats and calcifying species will be affected. Ocean acidification will also accelerate the degradation of existing coral reef habitat, seafloor structure and coastal sediment⁶. A thorough understanding of the extent of the impacts of climate change to coastal resources and communities as well as the development of strategies to promote resilience are needed.



Sediments transport from the land to the ocean
Credit: National Park Service

Erosion and Sedimentation

The lower watersheds of West Hawai'i are arid by nature and uncontrolled grazing by feral ungulates has led to a decrease in vegetation cover of native sediment stabilizing vegetation⁷. In some cases, plant species effective in stabilizing sediments and reducing erosion have been replaced by invasive species, which do not have the same effect⁸. Further, coastal invasive plant species can contribute particulate organic matter and thus nutrients to nearby marine systems (example Kīholo Fishpond)⁹.

The cumulative processes of erosion of terrigenous soil, transport through watershed drainages and discharge into the ocean at the coastline result in the transport and accumulation of fresh water, sediments, nutrients and other pollutants to coral reefs and other nearshore habitats. When sediment is deposited onto coral reefs, it can directly smother and kill corals¹⁰ as well as prevent coral larvae from recruiting¹¹. Coral reef habitat can become significantly altered as sediment accumulates and hardbottom coral reef habitat shifts to a soft sediment seafloor habitat¹². Changes in habitat can cause changes to the species composition and abundance at a given location. Watershed restoration and sediment stabilization strategies as well as effective planning and the implementation of best management practices are needed to reduce the discharge of sediment into the ocean. Further, marine restoration strategies are needed to address sediment that has accumulated on coral reefs and threatens these systems on a daily basis through resuspension.

Eutrophication

Nutrients are transported to the ocean along with sediment at points of discharge through rivers, streams and other drainages. A major concern is that elevated nutrient levels on the reef could lead to a

macroalgal dominance phase shift or promote coral disease. In addition to surface flow discharge, other sources of eutrophication in West Hawai'i include the seepage of ground water and cesspool effluent onto the reef. While submarine discharge can be a natural process and provide the primary source of nutrients in areas of the West Hawai'i coastline^{13,14} they can also serve as conduits for eutrophication. A recent study documented that material from cesspools in Puakō reached the nearshore waters in three days¹⁵. A thorough understanding of the components of discharge into the ocean and the impacts from pollutants is needed.

Wildlife Interaction Pressures

The waters of West Hawai'i are home to several protected species of whales, dolphins, sea turtles and the endangered Hawaiian Monk Seal. In Hawai'i, many beach goers and ocean users attempt to view and interact with these animals. In addition to potentially violating regulations, human interaction can disrupt the behavior of these species¹⁶. Visitors and residents may not have a full understanding of how their actions impact these animals and their habitats and an enhanced understanding of how they can minimize interactions is



Some ocean users attempt to interact directly with protected species. *Credit MUCRU and Duke University Marine Lab*

needed.



Algae blooms can overgrow and smother corals.

Fishing Pressures

Coral reef ecosystems are dynamic and delicately balanced through complex interactions between environment and species that contribute to their overall condition and health. Changes in the abundance and behavior of species within these systems can have pronounced impacts on the overall function and health of the ecosystem. For example, a significant reduction in the abundance of herbivore species can lead to phase shifts that favor the dominance of macroalgae¹⁷. While humans are part of the ecosystem and fishing is

not inherently problematic, the removal of too many important ecological species can have significant impacts to coral reef habitats.

Links to Existing Management Plans

Multiple communities and non-governmental and governmental efforts have contributed to the development of management planning documents, which either directly informed the Habitat Focus Area planning process or are supported by the Habitat Focus Area efforts. See The Cross Walk Document in Appendix II, which contains detailed information about relevant management plans within the Habitat Focus Area.

Plan	Agency	Related Objectives
The South Kohala	South Kohala Coastal	• Active communities engaged in supporting effective

Plan	Agency	Related Objectives
Conservation Action Plan http://www.southkohalacoastalpartnership.com/south-kohala-conservation-action-plan.html	Partnership: HI-DLNR, HI-DAR, NOAA NOS CRCP, HIHWNMS, NPS, TNC, NRCS	- management of coastal resources • Implement priority projects to reduce sediment and measurably improve the condition of priority coastal targets • Manage existing non-native and invasive species to restore/maintain ecosystem function for fishponds • Understand and quantify effects of specific additional threats
Pelekane Bay Watershed Management Plan http://health.hawaii.gov/cwb/files/2013/05/PRC_Maps_PelekaneBayWatershedPlan.pdf	Mauna Kea Soil and Water Conservation District (MKSWCD)	• Reduce soil erosion in the watershed by improving land management practices and restoring vegetative ground cover ○ Increase groundcover density and quality in the watershed ○ Restore damaged groundcover and areas of bare soil in the watershed ○ Reduce sediment deposits into Pelekane Bay from upland watershed areas ○ Measure the success and effectiveness of watershed restoration and protection activities ○ Encourage responsible grazing for ranchers
Wai'ula'ula Watershed Management Plan: Mauna Kea Soil and Water Conservation District http://health.hawaii.gov/cwb/files/2013/05/PRC_319Grant_WaikoloaWatershed-Characterization.pdf	MKSWCD	• Restore 255 acres of bare land in the watershed contributing to erosion • Conduct semi-annual educational events to engage residential property owners in managing stormwater onsite • Develop written pollution prevention procedures for the operation and maintenance of existing county roads, highways, and bridges by 2019 to reduce pollutant loadings to surface waters • Increase stakeholder awareness and involvement by 15% by implementing an integrated watershed management information and education campaign
Ka Loko o Kīholo Rehabilitation Project	TNC, Hawai'i State Parks Division, Hui Aloha Kīholo, Conservation International (CI), USFWS, and USFS	• Return Kīholo fishpond to its documented former ecological health by managing threats to the habitat • Evaluate the potential for Kīholo fishpond to provide a reliable and sustainable food source for the community • Improve or return habitat for formerly documented native flora and fauna • Provide a place for researchers, students, and community members to study nature, learn about estuaries and traditional fishpond management, and to develop effective and innovative solutions to critical conservation threats at multiple scales
Kīholo Conservation Action Plan	Hui Aloha Kīholo, TNC, CI, Ala Kahakai National Historic Trail, NPS, Hawai'i State Parks Division	• Restore inland pond system • Increase compliance • Maintain groundwater flow • Build management capacity • Understand changes in the health and use of reefs, fisheries and fishponds
Ocean Resources Management Plan http://files.hawaii.gov/dbedt/op/czm/ormp/ormp_update_reports/final_ormp_2013.pdf	HI-OP	• Strengthen and integrate data management to ensure appropriate coastal development • Promote fishing practices that increase fish stocks • Improve the health and productivity of coral reef ecosystems at priority sites identified by the Hawai'i Coral Reef Program • Implement place-based projects that demonstrate effective stewardship practices that can be applied to other areas • Support restoration of Hawaiian fishponds through permitting, community projects, and technical assistance
Hawai'i Coral Reef Strategy: Priorities for Management in the Main Hawaiian Islands	NOAA NOS CRCP/ HI-DAR	• Emphasizes the South Kohala area as a priority site in the state for coral reef management and restoration and focuses funds and staff time into this site. The four main goals are: ○ Coral reefs undamaged by pollution, invasive species, marine construction and marine debris

Plan	Agency	Related Objectives
http://coralreef.noaa.gov/aboutcrp/strategy/reprioritization/managementpriorities/resources/hawaii_ap1_mhi_strategy.pdf		○ Productive and sustainable coral reef fisheries and habitat ○ Coral reef ecosystems resilient to climate change, invasive species and marine disease ○ Increased public stewards of coral reef ecosystems

Key Activities

The implementation plan outlines key activities that NOAA intends to undertake and/or fund to yield clear and measureable progress toward the four West Hawai'i Focus Area objectives. The logic model shows how these activities feed into short, mid and long-term outcomes. These NOAA activities were selected because they, 1) build on existing NOAA efforts, 2) are identified activity areas where NOAA expertise could be provided to the Focus Area, or 3) support the needs identified in local management plans and by partners and community members.

Objective 1: Improved Coral Health Through the Reduction of Land-based Pollutants, Such as Sediments and Nutrients.

Overview of Objective and Activities:

The following activities were determined as the highest priority for NOAA to contribute to the goals of multiple conservation plans in West Hawai'i that call out the need to manage the sediment and nutrient runoff into the ocean. Building on previous and on-going efforts, two locations were chosen to focus on sediment and nutrient impacts. The results from the terrestrial erosion and marine water quality surveys (Activities 1.1 and 1.2 below) will be synthesized to inform the potential mitigation and restoration actions (see Activity 1.3 below). In all, this is recognized as a long-term objective with tangible results expected after 3 to 5 years.

Sedimentation in Pelekane Bay

Pelekane Bay has long been recognized as an area with elevated turbidity and sediment accumulation. These problems appear to be caused by sediment discharge to the bay from the denuded Kohala mountains¹⁸ and to reduced circulation following the construction of Kawaihae harbor in the 1950s and the small boat harbor in the 1990s¹⁹. Studies conducted in the 1970s^{20,21}, 1990s¹⁹ and 2000s^{22,23} describe a marine community that is heavily impacted by high sediment loads.

In an effort to reduce runoff and associated sediment load, the Kohala Watershed Partnership, in cooperation with the Mauna Kea Soil and Water Conservation District and other local groups, is conducting an extensive erosion control and re-vegetation project in Pelekane Bay (funding from 2009-2012 included \$3 million from NOAA through the American Recovery and Reinvestment Act of 2009 (ARRA). The goal is that rehabilitating the watershed through erosion control, ungulate eradication, and native vegetation restoration will not only restore watershed function, but will also contribute to the recovery of coral reefs at the bottom of the catchment.

In order to determine how *mauka* (upland) restoration efforts affect coral reefs, researchers from TNC, Cornell University, and Scripps Institution of Oceanography conducted an initial baseline biological assessment of the marine environment of Pelekane Bay in 2010. Data were collected on: 1) water quality and sediments; 2) the microbial community; 3) the benthic community including species composition, abundance and the size of coral colonies, and prevalence of coral disease; and 4) the fish community including species composition, abundance, and size (to estimate biomass). The following year, scientists from the UH and the USGS collected additional oceanographic and biological information to expand this baseline knowledge^{23,24}, and repeated earlier surveys in an attempt to document positive effects of the restoration activities²³.

Given the investment from 2009 to 2012 by NOAA, it was determined that the ecological surveys of Pelekane Bay coral reefs should be repeated, four years after the completion of watershed restoration actions. The goal of the surveys is to use biological and water quality datasets compiled five years apart to assess the effect of the Pelekane watershed restoration work on the marine environment. In addition to change over time, the ecological surveys will produce data that can be used to compare coral reefs in Pelekane Bay with other reef ecosystems across the Hawaiian Islands, especially those designated as Sentinel Sites.

In addition to the marine surveys, surveys in the upper watershed are needed to assess the localized effectiveness of restoration actions. In order to determine if the restoration actions are keeping sediment in the watershed, NOAA is partnering with TNC, The Kohala Center and looking to partner with USGS to install erosion pins and gauges. One of the products that USGS can provide expertise is in mapping erosion hotspots. NOAA, TNC and HI-DLNR determined that this would be a high priority to help target areas for future restoration activities. The maps will identify where the erosion is taking place, create a sedimentation budget for the watershed, and identify mitigation techniques. A major gap to conduct the analysis is adequate elevation data that can be provided by light detection and ranging (LIDAR). The NOAA OCM provided funds in FY15 to obtain LIDAR in the Pelekane Bay Watershed.

Nutrient runoff in Puakō

A 40-year meta-analysis of data collected from the Puakō reef from 1970-2010 has been conducted by TNC and shows an approximately 50% decline in coral cover²⁵. The causes of these declines are poorly documented, but land-based pollutants (LBP) are thought to be a major contributor to the loss of coral cover on the reefs of South Kohala generally and Puakō in particular. The South Kohala Conservation Action Plan identified the need to acquire better information on the links between LBPs and coral health as a key step towards developing strategies to improve coral reef health at priority sites by 2015²⁶.

Puakō is a residential community encompassing a 3.5 km stretch of coastline with 163 houses, condominiums, and a small residential hotel. Due to its distance from municipal sewage systems, the area has relied primarily on septic and cesspool systems. In Puakō, elevated nitrogen isotope ratios ($\delta^{15}\text{N}$)²⁷ and *Enterococci* abundance²⁸ have been detected along the coastline, suggesting that submarine groundwater discharge (SGD) is transporting human sewage into the marine environment. Due to the human health and coral health concerns from sewage inputs, the Puakō community is seeking solutions that will improve nearshore water

quality, is raising funds and has partnered with the Coral Reef Alliance to upgrade existing cesspool systems to reduce nutrient and LBP sources into the coastal ecosystems.

In October 2013, TNC initiated a 1-year project aimed to increase the understanding of the impacts of LBP inputs on coral reef health in Puakō (funded by NOAA CRCP). In this study, TNC is measuring coral disease and water quality at sites corresponding to a range of SGD inputs. This study is still underway, but preliminary results indicate that coral health and water quality is highly variable across the study sites and that *Enterococci* concentrations can exceed the Department of Health standards for coastal marine waters in the state of Hawai'i.

NOAA determined it was a priority to build on this on-going work with TNC and conduct quarterly sampling at 12 reef sites in the surface and benthic zones, and along the shoreline inshore of each site to identify sources of LBP. This expanded dataset will enhance the ability to detect changes associated with sewage remediation.

In light of the Puakō community's concerns about coral and human health and the strong interest in remediating sewage treatment, this project provides an excellent opportunity to establish baselines of water quality indicators that are both directly associated with human input and whose levels are likely to change on short time scales. This study will help us understand potential links between water quality and coral and human health concerns. This project, together with the current research by TNC and the University of Hawai'i at Hilo (funded by NOAA CRCP), will provide the dataset necessary to determine the efficacy of upgrades to sewage treatment on improving Puakō's water quality and coral reef health. The Coral Reef Alliance is currently developing a plan to replace the cesspools and seeking funding (for example through the NOAA resilience grants).

Activity 1.1: Identification of geographic areas of land contributing to water quality impacts in Pelekane Bay Watershed.

- NOAA Lead: NOS OCM, OHC
- Partners: TNC, Kohala Center, USGS, NPS
- Start/end date: August 2015-January 2017
- Performance measure: By 2017, high volume erosion locations and proper mitigation steps are identified
- Outputs:
 - LIDAR
 - Hotspot Map
 - Mitigation steps

Activity 1.2: Collection of reference points of sediment, nutrient, and pollutant conditions to be used in the development of water quality indicators and management goals

- NOAA Lead: Office of National Marine Sanctuaries, OHC, NMFS PIRO, CRCP
- Partners: TNC, UH Hilo, Hawai'i Institute of Marine Biology (HIMB), HI-DAR
- Start/end date: October 2014 – September 2019
- Performance measure: By 2019, a reference state of nutrients in the Pelekane Bay and Puakō reef flats will be established for the 5 best fit water quality indicator variables to support resilience and coral ecosystem management beyond what is currently known

- Outputs:
 - Pelekane bay sediment state and pathway study
 - Puakō nutrient state and pathway study

Activity 1.3: Synthesis of results from activities 1.1 and 1.2 to inform potential terrestrial erosion mitigation and marine and terrestrial habitat restoration actions

- NOAA and partners will propose revegetation and sediment control activities to NOAA programs for future funding.
- NOAA Lead: to be determined
- Partners: to be determined

Objective 2: Reduced Vulnerability of Communities (Human and Natural) to Localized Effects of Climate Change

Overview of Objective and Activities:

The following activities were determined as the highest priority for NOAA to contribute to the goals of multiple conservation plans in West Hawai'i that call out the need to manage for climate change and build resiliency.

Climate change is a significant threat to the Hawaiian Islands, and in particular to coral and community health in West Hawai'i. Critical community resources such as coral reefs, fishponds, and anchialine pools are extremely vulnerable to even minor changes in sea levels, sea surface temperatures, and acidification. In addition, the leeward side of Hawai'i Island is projected to receive less rainfall but receive that rainfall in more intense bursts. Combined with the projected increase in drought and wildfire, the potential for significant and devastating erosion and sedimentation is high, and therefore it is critical that actions be taken now to prepare.

With the merger of the Habitat Focus Area and the Sentinel Site Program in West Hawai'i and the area's most recent designation as a Resilient Lands and Waters area, it is important for NOAA to contribute to the on-going effort to prepare for and adapt to climate change. NOAA's initial focus is to complement and enhance work already being undertaken on at-risk communities and ecosystems. Both coral reefs and anchialine pools are especially vulnerable to climate change and are receiving significant local attention. With high species endemism and cultural, economic, and recreational importance, state and local stakeholders have already focused significantly on attaining a better understanding of their health. Despite these efforts, there are numerous areas identified as needing greater effort.

For coral reefs, a key gap identified is the relative resilience of the reefs in order to inform future management decisions on specific stretches of reef. The NOAA PIFSC CREP assessed spatial variation in resilience potential across the State of Hawai'i. As this was at an island scale, NOAA programs and partners determined the need to downscale the output to further provide information to local managers to make more effective management decisions.

Anchialine pools and fishponds are also vulnerable to climate change with distribution and community structure expected to change due to flooding, erosion, saltwater intrusion, or a

combination of these phenomena. While several sea level rise models exist, and studies on fishponds and anchialine pools are on-going, few incorporate groundwater and none effectively assess expected ecological changes and habitat migration. NOAA has identified this gap and aims to provide an understanding of what can be expected which is critical in planning for and maintaining the viability of these habitats.

The Habitat Focus Area team is interested in identifying how sea level rise and groundwater levels will effect critical infrastructure and what communities can reasonably expect. Needing similar work to the studies of anchialine pools and fishponds, NOAA has leveraged the two projects to enhance both and thus get a more comprehensive and detailed look at how sea level rise will impact the focus area.

Activity 2.1: Collection of GPS elevation data points and extreme probability analysis for multiple sites

- NOAA Lead: NESDIS, OCM, National Geodetic Survey
- Partners: NPS, Ala Kahai Historic Trail, TNC, County of Hawai'i, Puakō community
- Start/end date: September 2015-September 2017
- Performance measure: By 2018, researchers and managers will be informed of the potential ecological and infrastructural impacts of sea level rise, and what can be done to minimize those impacts, thus reducing vulnerability
- Outputs:
 - GPS elevation at selected points
 - Extreme probability predictions
 - Expected ecological impacts

Activity 2.2: Implementation of coral reef resilience studies to determine the relative resilience levels of coral reefs

- NOAA Lead: NMFS OHC, PIFSC CREP; NOS Office of National Marine Sanctuaries, OCM, CRCP
- Partners: TNC, HI-DLNR, Marine Applied Research Center
- Start/end date: September 2015 – September 2017
- Performance measure: By 2017, 30 reef sites in the Habitat Focus Area will be analyzed for resilience potential, establishing a baseline in 2015 from previously unknown resilience potential by conducting a reef resilience assessment
- Outputs:
 - Field ecological surveys
 - Desktop modeling analyses
 - Maps and an archived database

Objective 3: West Hawai'i Communities are Informed and Contribute to the Sustainable Use and Restoration of Natural Resources.

Overview of Objective and Activities:

The following activities were determined as the highest priority for NOAA to contribute to the goals of multiple conservation plans in West Hawai'i that call out the need to support

communities in managing their resources. Building on previous and on-going efforts, four activities were selected where NOAA, in partnership with TNC and the HI-DLNR, can support community efforts.

Strategy to minimize human interactions with protected species

Among local communities and island visitors, there is a need to promote responsibility, ownership, and stewardship of West Hawai'i's unique marine resources, especially the more charismatic, yet protected, species that people like to engage with. Ideally, local communities and island residents should set the example for visitors. This may require creating a better understanding regarding the key roles that these species have in our ecosystems. This project will work with local community members, tour operators, and other interested stakeholders to develop and relay key messages about Hawai'i's sensitive and protected wildlife. These messages may promote wildlife-friendly viewing, respect for our natural resources, and understanding about the key roles these species have in our ecosystems. NOAA and the HI-DLNR interact with many of these stakeholders regarding wildlife, and the purpose of this project is to build on existing materials and deliver clear guidelines and messages in collaborative effort between agencies. The first phase will be to identify the audience, the desired behavior changes, how to change that behavior, the messages that resonate with the specific audience, and how to deliver those messages effectively. A strategic communications plan will be developed and provide a list of activities to implement the plan in phase two.

Best practices for reef fishing

NOAA has invested efforts in working with recreational fisheries. NOAA, TNC and other partners will work with fishers and scientists to develop and distribute information and outreach materials to promote best practices for sustainable and responsible recreational (non-commercial) fishing and fish viewing opportunities including snorkeling and diving in west Hawai'i. These best practices will be derived both from actions perceived by many fishers to be common sense (e.g., letting immature fish grow to spawning size and avoiding spawning aggregations), and recent research findings (e.g. removing the larger fish from a population has a disproportionate impact on reproduction and recruitment). Engagement of both groups in a mutually respectful and neutral environment is vital to ensuring that these practices make sense and are supported locally and broadly. The target audience for these materials will be the local fishing community and visitors, and the content will be designed to help both groups avoid potential conflicts of use and overharvest of marine resources, and promote their shared and mutually respectful enjoyment of west Hawai'i marine areas.

Fishpond restoration

The cultural and socio-economic benefits of restoring and operating historic fishponds are widely acknowledged. There are also clear environmental benefits, which may include improved bird and turtle habitat, a supplemental source of fish protein that could relieve some fishing pressure on wild stocks, relatively safe juvenile fish habitat, a refuge for fish to grow large and reproduce in a managed environment, and the reduction of sediment flowing from land to the sea. Many groups and communities across Hawai'i are working to restore fishponds for these multiple benefits. The state is looking to streamline the permitting process for fishpond restoration.

NOAA has determined that focusing on fishpond restoration as a way to support communities in managing natural resources would not only support activities in West Hawai'i, but across the state. As more fishponds get closer to being restored and begin to function, there are many best practices and lessons learned that are being shared. The five project components that are included in the fishpond restoration activity include: (1) habitat restoration, (2) assessing the effectiveness of fishpond restoration, (3) restoring a sustainable fishery, (4) assessing water quality and the design and implementation of water quality monitoring, and (5) education and outreach.

Kīholo Fishpond is currently impacted by invasive vegetation growing along the entire pond perimeter. Leaf litter from non-native trees accumulates on the bottom of the fishpond and decays to form a fine layer of sediment, introducing excess nutrients into the system and degrading habitat for fish and invertebrates. The goal is to remove all invasive vegetation from the fishpond perimeter by 2017. Following fence construction to reduce the intrusion of these invasives, TNC will work with partners to propagate and outplant appropriate native vegetation based on historical research, oral accounts, and pollen-core research conducted previously in the north Kona region. While this work is underway, TNC will pursue the necessary permits to restore fishpond perimeter walls and remove sediment to improve habitat for invertebrates. Sediment removal will likely be the final phase of rehabilitation.

In order to understand the effectiveness of the fishpond restoration actions, and whether or not they provide measureable results within five years, monitoring will be conducted for fish recovery and water quality in Kīholo fishponds. The potential for Kīholo Fishpond to yield a sustainable fishery will be evaluated. TNC monitoring data indicate that the āholehole population in the fishpond may be sufficiently robust to support limited take. TNC will work with the community to identify the most desirable āholehole size for harvest and compile life history research on this and other fishpond species to determine a slot size for harvest. Concern about coastal water quality is growing among local communities, and community-based monitoring programs are growing in response. This project will build a water quality database for Kīholo fishpond, which can be used to develop water quality guidelines for other groundwater-dominated fishponds. The monitoring program will also be used to train community volunteers in water quality monitoring procedures, and for developing user-friendly monitoring methods. In all, a goal is that Kīholo Fishpond will become an outdoor laboratory for training and modifying methods with our community partners.

The project also includes an education and outreach component. Kīholo Fishpond can serve as a living classroom where students of all ages learn about ecology, culture, biology, and natural resource management. Engaging local community members, visitors, and students builds their understanding of the work taking place at Kīholo, and provides opportunities for them to engage in science thereby increasing their familiarity with scientific methods that can be applied beyond Kīholo and Hawai'i.

Community network and natural resource management plans

In order to ensure the cultural foundation and long-term sustainability of management initiatives in West Hawai'i, it is vital for community members to be meaningfully engaged in the process. Conservation organizations, management agencies, and community groups have a great deal to learn from one another. By linking multiple sites in community management

networks, there can be more effective communication and cooperation on joint management priorities. These networks also provide a way for non-governmental organizations (NGOs) and government officials to communicate and work more effectively with local communities. A network of 8 communities in West Hawai'i is being supported, five of which are located in the Habitat Focus Area, and the expanded network includes a natural grouping of communities along the coast and begins to exchange information across a greater area. Over the next three years, communities will be engaged in quarterly workshops to build their capacity to effectively participate in natural resource management. Training will be provided in meeting facilitation, data collection and analysis, strategic communications, management plan development, and co-management regimes. Communities will be engaged directly in science, research, and monitoring projects. Integrating community members into this work helps to build strong relationships, and provides valuable information for community members, researchers, and managers. The first phase will engage communities to help them bring stakeholders together to decide what actions to take for a particular geography. This will be done through conservation action planning (CAP), which offers an opportunity for careful and deliberative development of strategies at an appropriate scale for success.

Developing future conservation leaders

NOAA has an opportunity to support the Marine Conservation Fellowship Program with TNC to not only build the next generation of conservation leaders, but to provide additional capacity for the NOAA-TNC partnership to implement activities for the West Hawai'i Habitat Focus Area. The first year learning activities will focus on priorities in West Hawai'i that support the Habitat Focus Area. For example, to learn Conservation Action Planning, the marine fellows will analyze existing West Hawai'i plans, and participate in the development of new planning initiatives. For their geographic information system (GIS) training with the NOAA OCM, the fellows will use West Hawai'i sites as focus projects. For example, they may work with OCM to produce sea level rise maps or incorporate new LIDAR data into existing plans. For their fieldwork, marine fellows will work with the Kīholo community on restoration activities, fish and water quality monitoring, and education and outreach activities. They will help develop and implement a communications strategy for protected species, using social media and other new media to reach a younger audience. The fellows will participate in monitoring of fish and coral in Pelekane, Kīholo, Puakō, and the larger West Hawai'i area. In the second year of the program, fellows will complete a capstone project that will focus on priorities in West Hawai'i that support the Habitat Focus Area.

Activity 3.1: Development of a strategic communications plan on minimizing human interactions with protected species

- NOAA Lead: Office of National Marine Sanctuaries, NMFS PIRO, OHC
- Partners: TNC, HI-DLNR, HI-DAR
- Start/end date: October 2014-September 2015
- Performance measure: West Hawai'i residents and visitors are aware of actions they can take to minimize interactions with protected species and are motivated to act
- Outputs:
 - Market research (year 1)
 - Communications plan (year 1)

- Implement strategies (Outreach materials; Community projects (e.g. citizen science) (year 2)

Activity 3.2: Recruitment of fishers and community members to develop pono fishing practices

- NOAA Lead: NMFS PIRO
- Partners: TNC, Hui Aloha Kīholo
- Start/end date: October 2014-September 2015
- Performance measure: 10 West Hawai'i people engaged in developing and practicing pono fishing practices
- Outputs:
 - Pono fishing practices developed with fishers and community members (year 1)
 - Pono fishing practices implemented (year 2)

Activity 3.3: Sustainable use and restoration of fishponds

- NOAA Lead: OHC
- Partners: TNC, Hui Aloha Kīholo
- Start/end date: October 2014-September 2018
- Performance measure:
 - 3 acres of invasive species cleared
 - 300 student/community member volunteers in Kīholo fishpond
 - Establish sustainable harvest needs within Kīholo fishpond
 - Community management informed by fish surveys
 - Improved water quality at Kīholo
 - Fishpond hui established with at least three different fishpond site members, hui implementing priority needs
- Outputs:
 - Monthly/quarterly community events with volunteers to remove invasive species in Kīholo fishpond
 - Biological assessment of aholehole fishery
 - Local knowledge of aholehole fishery informs sustainable harvest levels
 - Fishpond managers access applicability of water quality monitoring protocols across sites
 - Organize hui meetings to identify and assess priority needs
 -

Activity 3.4: Establish community network and complete natural resource management plans

- NOAA Lead: OHC
- Partners: TNC, communities
- Start/end date: October 2014-September 2018
- Performance measure:
 - At least eight communities are supporting each other's work
 - Two community conservation action plans completed
- Outputs:
 - Organize quarterly meetings

- Support three communities in developing a community action plan (one in each year)

Activity 3.5: Providing additional assistance and resources for locally relevant research while improving local capacity through a fellowship program

- NOAA Lead: OCM
- Partners: TNC, communities
- Start/end date: May 2014-April 2016
- Performance measure: The hiring and mentoring of 6 fellows to work on locally relevant projects
- Outputs:
 - Conduct studies and provide outreach on existing studies
 - Support the needs of NOAA and TNC in working in the Habitat Focus Area

Objective 4: Better Tools and Information to Improve Management Decisions

Overview of Objective and Activities:

The intention of this effort is to support and enhance existing NOAA and partner projects and collaborations. Effective management decisions rely on the best available and up to date information. As a science, technology and management based agency, NOAA fosters the improved development and implementation of tools to gather management relevant information. To be effectively managed, a foundational understanding of the natural resources is needed including the characterization and mapping of habitats; evaluation of physical and ecological reference states through targeted monitoring and assessments; monitoring and prediction of weather patterns; and prediction and preparation for the impacts of climate change. There is also an integral need to coordinate amongst managers and stakeholder partners on management activities and projects. Efforts are needed to support foundational communications and to develop and facilitate the use of support tools for collaboration.

Activity 4.1: Conduct optical and acoustic seafloor surveying from shoreline to 150m depth isobath for validation of benthic mapping

- NOAA Lead: NMFS: PIFSC CREP
- Partners: HI-DAR, TNC, HIHWNMS, UH, USGS
- Start/end date (years): May 2014- May 2016
- Performance measure: updated high-resolution bathymetry of the West Hawai'i Focus Area
- Outputs (steps to achieve activity/outcome)
 - Map of high resolution bathymetry of entire Habitat Focus Area, incorporating existing and new multibeam bathymetry and bathymetric LIDAR data (http://www.soest.hawaii.edu/pibhmc/pibhmc_mhi_haw_bathy.htm)
 - Map of locations of seafloor surveys showing coral abundance (http://www.soest.hawaii.edu/pibhmc/pibhmc_mhi_haw_optical.htm)

- Series of map layers of benthic features (e.g. hard bottom, sand, coral and algae), geomorphology (e.g., rugosity, slope, bathymetric position index, habitat complexity): Benthic features and geomorphology map layers are currently being processed (May 2016)
- Summary report of methods and findings

Activity 4.2: Develop maps of existing boundaries and projects. Create web-based mapping portal for sharing information with agency partners and the public.

- NOAA Lead: PIRO, HIHWNMS, OCM
- Partners: PacIOOS
- Start/end date (years): 2015-2016
- Performance measure: GIS layers text web content provided to PacIOOS
- Outputs:
 - GIS layers and web-based mapping portal: GIS layers provided to PacIOOS in Feb/Mar 2016; mapping portal under construction for anticipated summer 2016 launch
 - Text web content: Final text web content provided to PacIOOS in Jan 2016 for anticipated summer 2016 launch

Existing/Supporting NOAA Activities:

West Hawai'i Integrated Ecosystem Assessment

- NOAA Lead: NMFS: PIFSC Ecosystems and Oceanography Division
- Partners: HI-DAR, HI Department of Health - Clean Water Branch, Marine Applied Research Center, CI – Hawai'i, TNC, HIHWNMS, UH, Scripps Institution of Oceanography, Bangor University, Woods Hole Oceanographic Institute, University of California Santa Barbara, Stockholm Resilience Center, Stanford's Center for Ocean Solutions
- Start/end date: June 2014 - ongoing
- Outputs:
 - Develop time series and climatological data sets of key climate and oceanographic indicators for the Kona Integrated Ecosystem Assessment
 - Develop ecosystem indicators used to track the status and trends in marine ecosystem state in West Hawai'i
 - West Hawai'i Ecosystem Trends and Status Report
 - Downscaled climate model output for future coral bleaching scenarios
 - Ocean Health Index for West Hawai'i
 - High resolution wave model of historical wave forcing
 - Risk assessment for key habitats to current and future anthropogenic and environmental stressors
 - Ecosystem modeling to evaluate management strategies and potential effects to future changes of key ecosystem indicators

Reef Assessment and Monitoring Program

- NOAA Lead: NMFS: PIFSC CREP

- Partners: HI-DAR, NOAA Ocean Acidification Program (OAP), NOAA Atlantic Oceanographic and Meteorological Laboratory (AOML), San Diego State University, Woods Hole Oceanographic Institution, Smithsonian
- Start/end date (on-going)
- Outputs (steps to achieve activity/outcome)
 - (2013) To conduct fish, benthic, and oceanographic surveys and deploy biological monitoring installations and oceanographic instruments to provide a consistent, comparable flow of information to document and report the status and trends of the environmental conditions and living resources of the nation's coral reef ecosystems.

West Hawai'i Monitoring Program

- NOAA Lead: CRCP
- Implementing Partner: HI-DAR, Kona
- Start/End Dates: 2005, ongoing
- Outputs:
 - Coral cover, health, and fish stock studies and trends
 - Detailed records of the coral reef ecosystem community baseline and trends
 - Important community outreach to local management of marine resources

South Kohala Coastal Partnership Coordination

- NOAA Leads: CRCP and TNC
- Implementing Partner: HI-DAR
- Start date: 2014; ongoing
- Outputs:
 - Projects implemented that were identified by the Partnership
 - Upland areas protected and fenced
 - Areas under active ungulate management
 - Coordination and funding opportunities for the many local stakeholder groups in the South Kohala region
 - Lead the development of management plans for local implementation

Plan for Baseline Monitoring and Measuring Progress

Monitoring and measuring is essential for ensuring the effective implementation of this plan as well as for tracking the progress of activities and projects in achieving the desired outcomes and objectives. Project metrics achieve outputs, NOAA mandates and objectives (See Appendix V). Monitoring will occur in a three-tiered framework.

- a) NOAA leads will work directly with the project leads to track and support the projects on at least a monthly basis.
- b) Quarterly, the Regional Habitat Blueprint Implementation Team will assess the progress of implementation and evaluate the completion of performance measures and outcomes. NOAA staff leads will report to the Regional Habitat Blueprint

Implementation Team on project progress. Additionally, milestones will be reported through HQ/HNCT.

- c) Biannually, TNC will report on the progress of projects funded through TNC to the NOAA team.

Partner and Stakeholder Engagement Strategy

Partners and stakeholders are key to the success of the Habitat Focus Area. NOAA, HI-DAR, TNC, and the HI-OP established a partnership for the development of the implementation plan and for the implementation of projects. This partnership has been engaged in developing the objectives, short-, mid-, and long-term outcomes, and activities/outputs for the Habitat Focus Area. Additionally, appropriate partners to engage and collaborate with for each project are determined. This partnership meets bi-annually to provide input and feedback to guide the continual development of the Habitat Focus Area. Through respective projects, the status and results of activities will be shared with community members to solicit input and feedback.

Multiple initiatives exist in the West Hawai'i Focus Area, creating the opportunity for engaging with multiple partners and stakeholders. Federal and state agencies, non-profit organizations,



Habitat Blueprint Supports Community Networks and Collaborations Credit: UH Seagrant

and community groups are collaborating to improve habitat and community resilience. These partners are regularly engaged within the respective collaborative projects. A cooperative agreement was established with NOAA (NMFS/OHC) and TNC to implement projects for building community capacity, fishpond restoration, and watershed and coastal assessment and restoration.

Communications Strategy

Multiple communication tools will be used to share information with both internal and external audiences.

- a) Website page to be hosted by the PacIOOS: A project page will be set-up on the PacIOOS website to disseminate information about the West Hawai'i Focus Area. Website pages will include information on background, projects, partners, and a map of the focus area. In addition, there will be an interactive mapping application, which will allow users to explore available data layers in the focus area.
- b) Story map/website page on the NOAA Habitat Blueprint: The existing page on the national website will be updated regularly and will provide a link to the PacIOOS website which will contain more details about the West Hawai'i Focus Area.
- c) Brochure: A brochure and map developed by TNC, with NOAA and HI-DLNR, to showcase activities currently underway in West Hawai'i. This will be a visual tool to communicate the importance of the region, current projects, and to highlight the collaboration and partnerships involved in the Habitat Blueprint initiative.
- d) Factsheet: A one-page factsheet was developed in conjunction with the announcement of the West Hawai'i designation. This factsheet will be updated and disseminated to communicate general information about the project.
- e) Presentations: Staff will give presentations about Habitat Blueprint at outreach opportunities.
- f) Conferences: Hawai'i Conservation Congress, PIFSC KIEA, International Coral Reef Symposium, International Union for Conservation of Nature/World Conservation Congress
- g) Public engagement opportunities: Ocean Awareness Training
- h) Meetings with partners: South Kohala Coastal Partnership, USGS, Western Pacific Regional Fishery Management Council
- i) Short film: NMFS captured footage of the Habitat Focus Area and will develop a short film highlighting the efforts and people that are working within the Focus Area.
- j) Outreach to media, congressional offices and State and Local officials.

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Appendices

External NOAA document

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 Appendix I: Logic Model 2

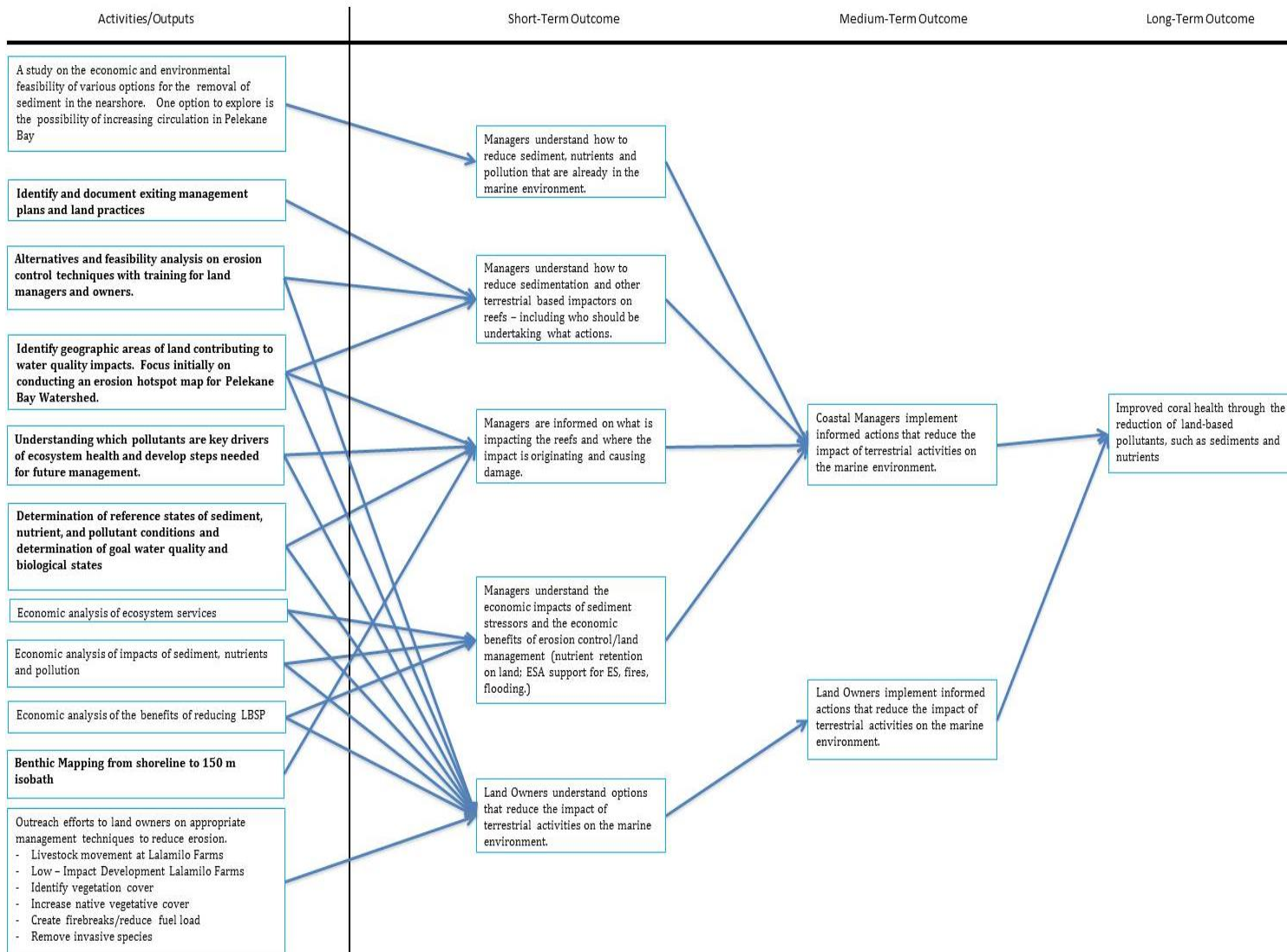
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Appendix I: Logic Model

Project Title: Habitat Blueprint Hawai'i Focus Area

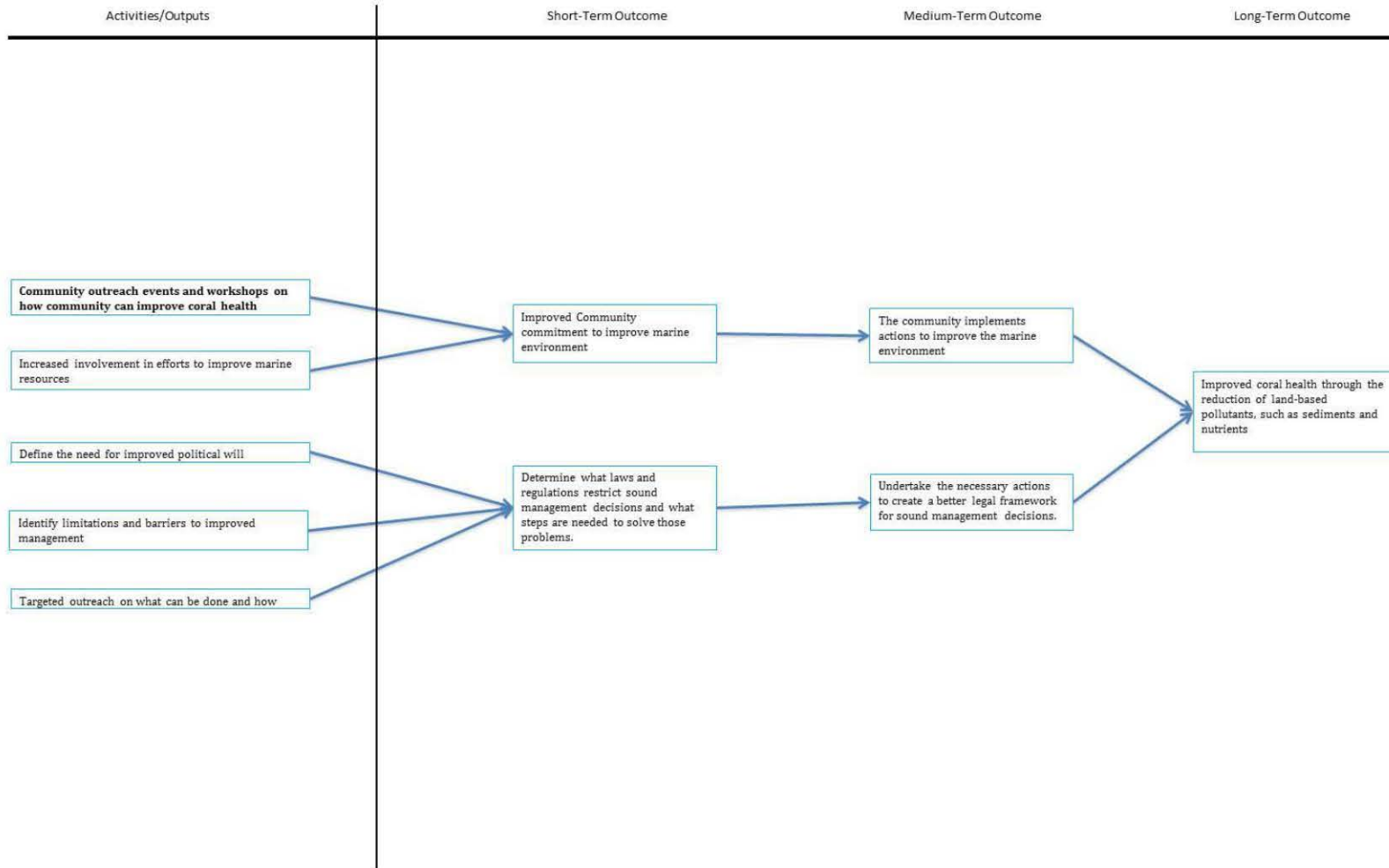
Objective: Improved coral health through the reduction of land-based pollutants such as sediments and nutrients.



NOAA Habitat Blueprint: West Hawai'i Implementation Plan

Project Title: Habitat Blueprint Hawai'i Focus Area

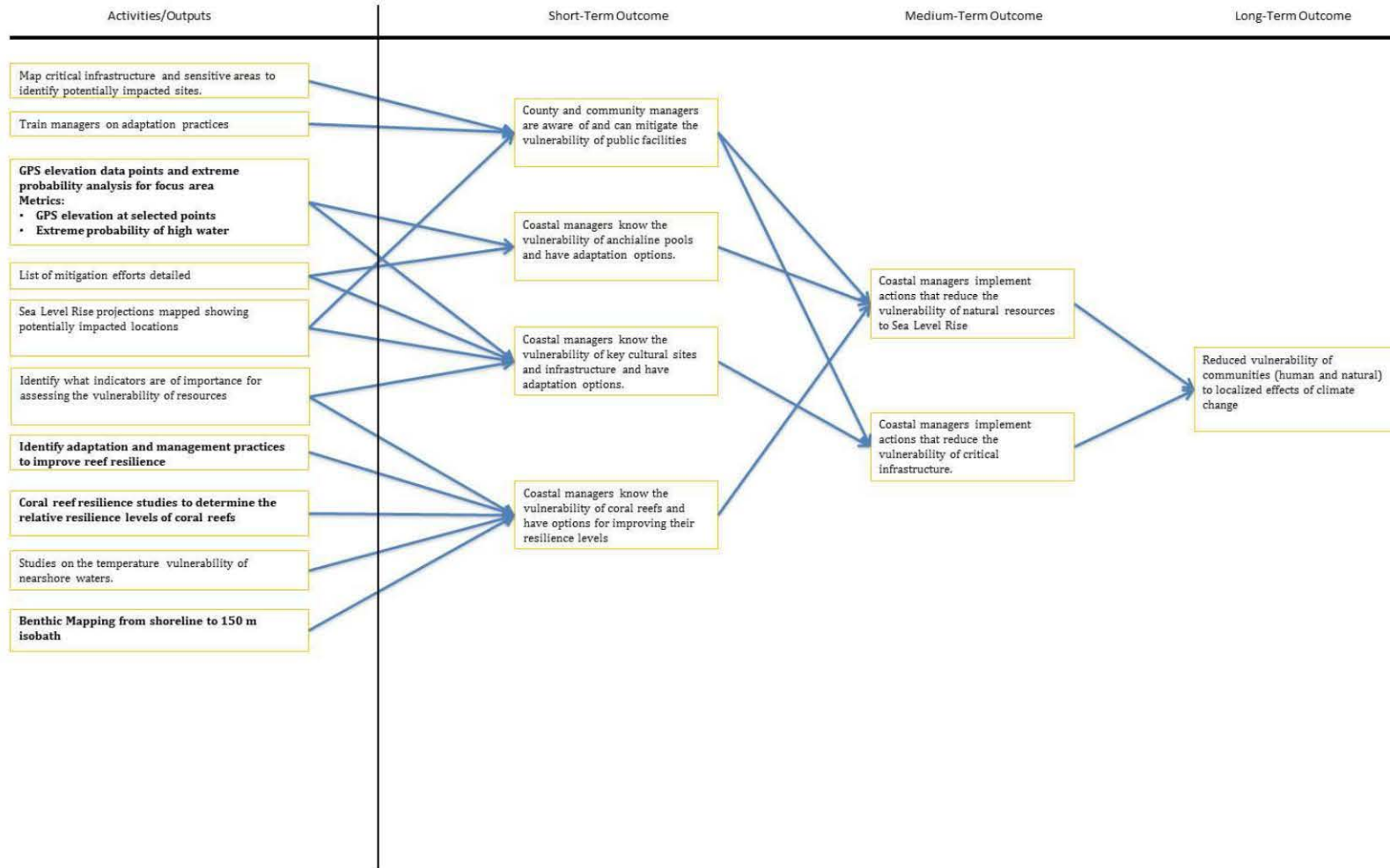
Objective: Improved coral health through the reduction of land-based pollutants such as sediments and nutrients.



NOAA Habitat Blueprint: West Hawai'i Implementation Plan

Project Title: Habitat Blueprint Hawai'i Focus Area

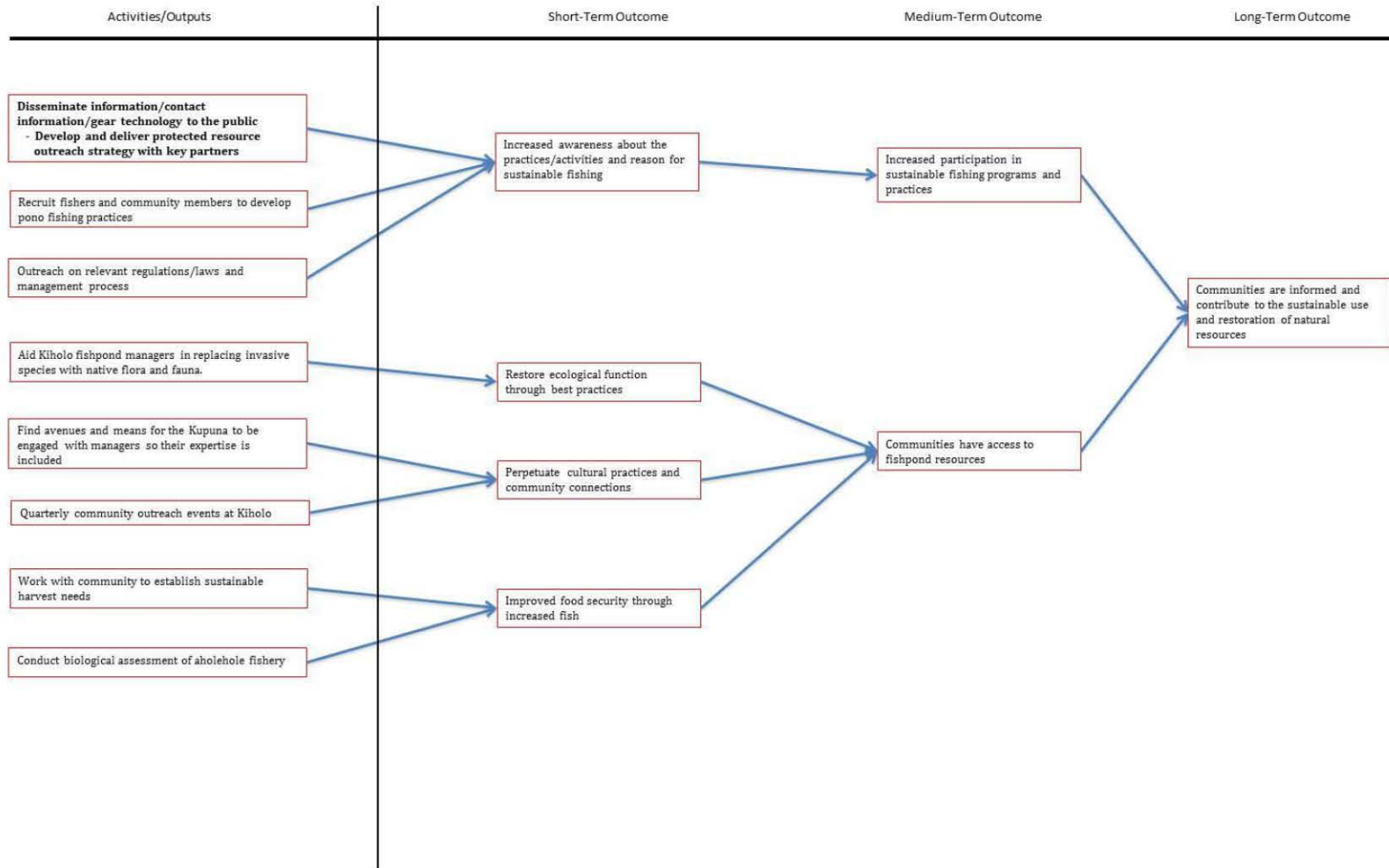
Objective: Reduced vulnerability of communities (human and natural) to the localized effects of climate change.



NOAA Habitat Blueprint: West Hawai'i Implementation Plan

Project Title: Habitat Blueprint Hawai'i Focus Area

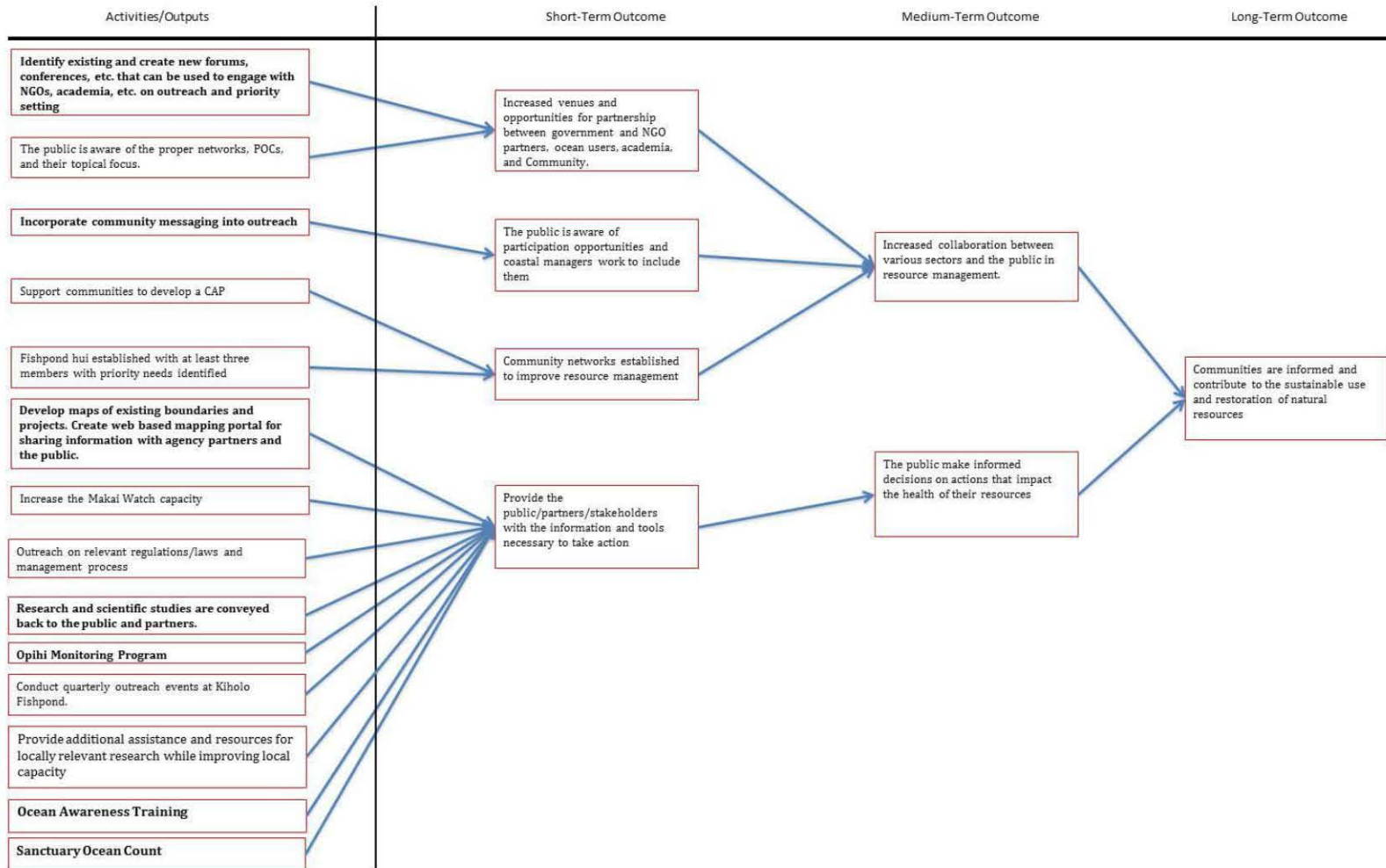
Objective: Communities are informed and contribute to the sustainable use and restoration of natural resources.



NOAA Habitat Blueprint: West Hawai'i Implementation Plan

Project Title: Habitat Blueprint Hawai'i Focus Area

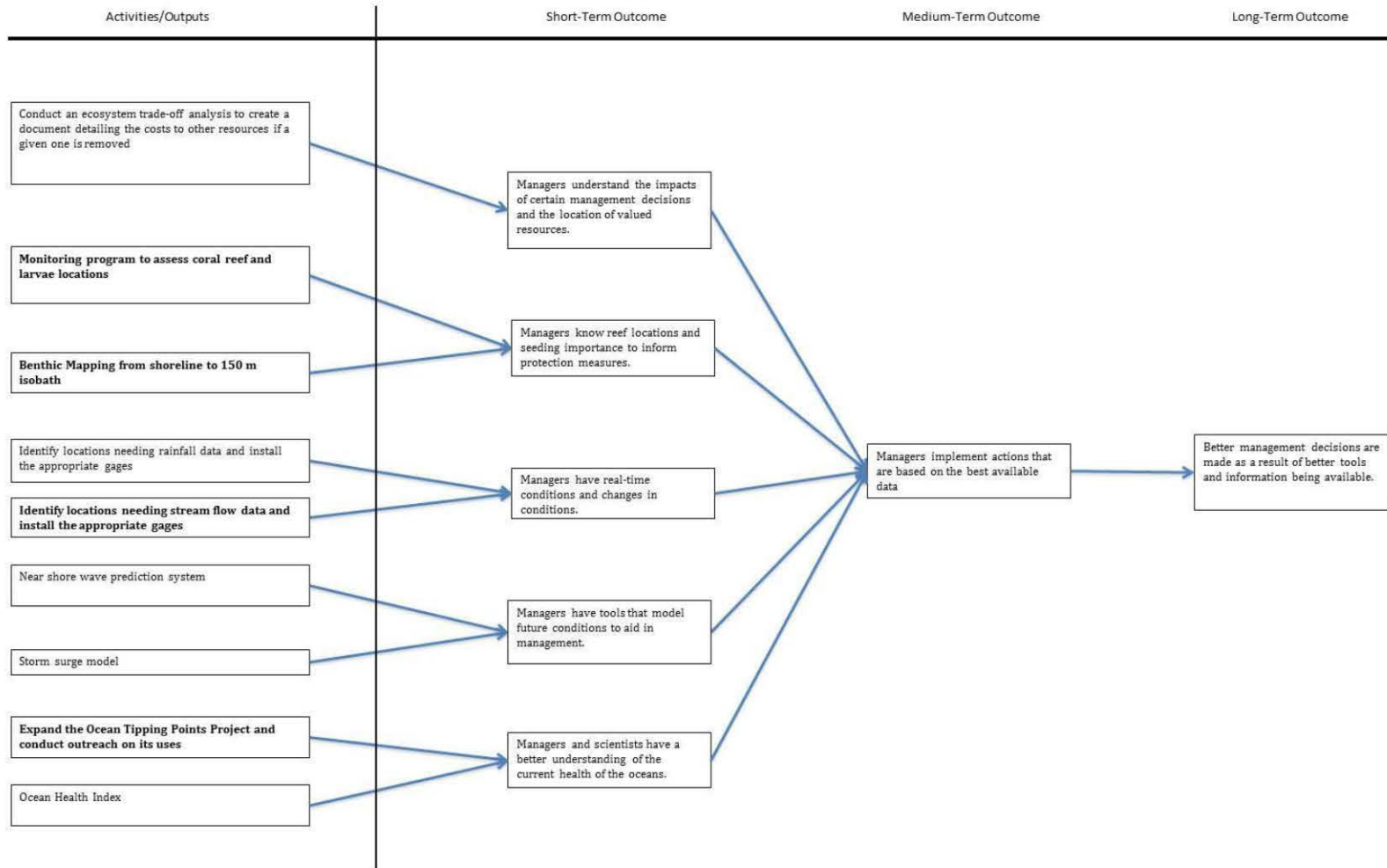
Objective: Communities are informed and contribute to the sustainable use and restoration of natural resources.



NOAA Habitat Blueprint: West Hawai'i Implementation Plan

Project Title: Habitat Blueprint Hawai'i Focus Area

Objective: Better management decisions are made as a result of better tools and information being available.



Appendix II: Cross Walk Document

Project Blueprint: Existing Efforts in Hawai'i

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Entire Focus Area:

Division of Aquatic Resources (DAR)

Long-Term Monitoring of Coral Reefs of the Main Hawaiian Islands Final Report

- POC/Partners: NOAA CRCP, DAR
 - Key Contributors: William Walsh, Stephen Cotton, Camille Barnett, Courtney Couch, Linda Preskitt, Brian Tissot, Kara Osada-D'Avella
- Timeline:
 - Project: October 1, 2009 - December 31, 2012
 - Final Report: February 2013
- Location:
 - <http://www.coralreefnetwork.com/kona/NOAA%20961%20Final%20Report.pdf>
- Summary:
 - Goals: To provide an overview and detailed description of the surveys of main coral reefs around the Hawaiian Islands that have already taken place
 - Results: Reports on the studies and their results within the following categories:
 - Benthic

- Coral and Habitat Surveys
- Coral Disease Surveys
- Temperature Trends
- Fish
 - Introduced Species/Fish Die-Off
 - Aquarium Species
- Invertebrates
- East Hawai'i

A Continuing Proposal to Department of Land and Natural Resources Division of Aquatic Resources from University of Hawai'i: West Hawai'i Coral Recruitment Monitoring

- POC/Partners: DLNR, DAR/Dr. William Walsh, University of Hawai'i/David Duffy
- Timeline: July 1, 2013-June 30, 2014
- Location: N/A
- Summary:
 - Goals: Continuation of long-term collection of coral recruitment time-series data with the following project objectives:
 - Examine and quantify temporal trends and geographic patterns in recruitment rates of scleractinian corals at 9 sites in West Hawai'i
 - Compare trends and patterns with the existing data for other locations in Hawai'i and worldwide
 - Identify coral recruits to genus or family, and identify spatial settlement on individual tiles
 - Identify adjacent land-use type, and examine physical oceanographic drivers of regional recruitment processes
 - Expected Results: The continuation of this data collection and assessment in consultation with data already collected can help resource managers, communities and economies (tourism, fisheries, and island-based) at local, state and Federal levels, who are reliant on ecologically resilient and sustainable coral reefs, better understand the health and resiliency of West Hawai'i coral reefs and identify potential land-based stressors that may affect ecosystem health by interfering with coral recruitment

International Energy Agency (IEA)

Pacific Islands Region—Candidate Habitat Focus Area Documentation Template

- POC/Partners: PIFSC EOD/Evan Howell, PIFSC Kona IEA, Cascadia Research, NOAA (NOS/NCCOS, NMS/HHWNMS), University of Hawai'i- International Pacific Research Center, TNC, DAR
- Timeline: May 23, 2013 (Date of Proposal)
- Location: N/A
- Summary:
 - Goals: Use existing satellite tagging data deployed on three species of cetaceans to assess the relationships between population densities and environmental factors, and to develop species-specific models.

- Expected Results: A better understanding of relationships between cetacean species and their environment, and species-specific models that allow managers to foresee seasonal presence on the species on a finer scale than typically provided by visual transect surveys.

MHI Biogeographic Assessment

BOEM—Funded Research in Hawai'i

- POC/Partners: BOEM, NOAA, USGS
- Timeline: September 2013
- Location: <http://www.boem.gov/PROUA-Hawaii-Studies-Fact-Sheet/>
- Summary:
 - Goals: To identify BOEM's role and responsibilities in Hawai'i, and to outline the organization's information needs and new studies. The following studies are underway:
 - "Habitat Affinities and At-Sea Ranging Behaviors Among Main Hawaiian Island Seabirds"
 - "Pacific Regional Ocean Uses Atlas"
 - "Maritime Cultural Resources Site Assessment in the Main Hawaiian Islands"
 - Expected Results: To carry-out the new studies to assess available information, determine knowledge gaps, and collect new baseline information. And then, to use the information gathered from the studies for informed, science-based decision-making about renewable energy development offshore the Main Hawaiian Islands.

Ocean Tipping Points

- POC/Partners: University of California Santa Barbara (UCSB), National Center for Ecological Analysis and Synthesis (NCEAS), NOAA Northwest Fisheries Science Center, Stanford University Center for Ocean Solutions, Environmental Defense Fund (EDF), Cal Poly - San Luis Obispo, Parks Canada, Fisheries and Oceans Canada, the Council of Haida Nation, the Hawaiian Islands Humpback Whale National Marine Sanctuary (NOAA and the State of Hawaii)
 - Funding: Gordon and Betty Moore Foundation
- Timeline: 2014-Spring 2016 (expected completion date)
- Location: <http://oceantippingpoints.org/sites/default/files/uploads/TippingPointsOverview.pdf>
- Summary:
 - Goals: "To understand and characterize tipping points in ocean ecosystems" with the following research goals:
 - Improve knowledge and understanding of ocean tipping points in relation to the potential impacts, and their relevance to management
 - Develop a "toolbox" of tested approaches for management of ecosystems prone to tipping points, so that managers can set targets, monitor using early warning indicators, prioritize management actions and evaluate progress towards ecosystem objectives, and above all so that they can operate in a "safe space" for decision-making
 - Expected Results:

- Advancement of scientific understanding of the complex ecological and social dynamics within marine ecosystems.
- “The final product of this collaboration will be a toolbox, general framework and guide to setting targets for place-based management of multiple human activities with the context of ecosystem tipping points.”

A Marine Biogeographic Assessment of the Northwestern Hawaiian Islands

- POC/Partners: NOAA (NOS, ONMS-PMNM, CCMA-BB), University of Hawai'i at Mānoa, NCCOS
 - Key Contributors: Alan Friedlander, Kaylene Keller, Lisa Wedding, Alicia Clarke, Mark Monaco
- Timeline: July 2005 - May 2009
- Location: <http://ccma.nos.noaa.gov/ecosystems/sanctuaries/nwhi/>
- Summary:
 - Goals: To develop and implement a “biogeographic assessment [plan] to directly support the research and management needs of the Papahānaumokuākea Marine National Monument (PMNM) by providing a suite of spatially articulated products in map and tabular formats.” The four major working objectives include:
 1. Identify and compile priority biological, physical and environmental data for the Northwestern Hawaiian Islands
 2. Define significant biological areas or “hot spots” based on distributions, abundance, habitats and community metrics
 3. Define ecological linkages of living marine resources and habitats
 4. Organize all data and information into digital products for incorporation into the Monument’s geographic information system (GIS)
 - Results: A report including all of the major findings from the assessment in the following categories:
 - Oceanography
 - Geology and Benthic Habitats
 - Benthic Communities
 - Fishes
 - Protected Species
 - Seabirds
 - Non-indigenous and Invasive Species
 - Connectivity and Integrated Ecosystem Studies
 - Management

Other Significant Documents:

Understanding Dolphin Swim Experiences and Human Perceptions

- POC/Partners: York University/Carlie S. Weiner, Duke University
 - Funding: Social Science and Humanities Research Council, Dolphin Quest
- Timeline: Presented at the 2014 Ocean Sciences Meeting (2/27/2014)
- Location: Abstract available at: <http://www.sgmeet.com/osm2014/viewabstract.asp?AbstractID=15112>
- Summary:

- Goals: The purpose of this project is to assess the implications and effects of dolphin-based ecotourism, and to understand how possible management will influence the attitudes and behaviors towards dolphin populations in high-tourism areas. The main goals of the research include:
 - Assess social implications and effects of dolphin-swim tourism
 - Gather baseline data of human attitudes and physical interactions with Hawaiian spinner dolphins
 - Identifying the reasons for participation in dolphin tourism
 - Understand how management and education will influence attitudes/behaviors of dolphin swim participants
 - Articulate community problems surrounding dolphin-swims
- Results: Identification of current knowledge gaps pertaining to dolphin tourism through classification of social debates associated with marine tourism, especially illustrating areas of neglect in field research. Also, research methods involving broad consideration of both human and natural systems are discussed, so that they can be used as a tool for social-ecological linkages and placed in a broader context of balancing human interest and ecosystem health.

South Kohala Priority Area:

South Kohala CAP

South Kohala Conservation Action Plan Summary

- POC/Partners: South Kohala Coastal Partnership, DLNR, DAR, NOAA (CRCP, HIHWNMS), NPS, TNC/Chad Wiggins, NRCS
- Timeline: September 2010-July 2012
- Location:
 - http://www.hawaiicoralreefstrategy.com/PDFs/3_Priority_Sites_Kohala/skcap_summary.pdf
- Summary
 - Goals: Use the CAP process to effectively determine conservation targets, and to develop plans of implementation. Then, using this plan outline how to best to address the high-ranked threats in South Kohala communities including:
 - Land based pollution
 - Invasive, habitat-modifying species
 - Overfishing
 - Lack of community capacity
 - Results: Thorough situation analysis surrounding each threat to create comprehensive and relevant strategies, and clarification of the current understanding of the project situation.

South Kohala Conservation Action Plan Final Report

- POC/Partners: South Kohala Coastal Partnership, DLNR, DAR, NOAA (CRCP, HIHWNMS), NPS, TNC, and NRCS
 - Key Contributors: Aric Arakaki, Chad Wiggins, Elia Herman, Emma Anders, Kathy Chaston, Kim Hum, Malia Chow, Matthew Wung
- Timeline:
 - Final Report: September 2012

- Implementation: 2013-2020
- Location:
 - http://hawaiiicoralreefstrategy.com/PDFs/3_Priority_Sites_Kohala/skcap_final_report.pdf
- Summary:
 - Goals: To gain “a restored healthy, abundant, resilient South Kohala coastal system, cared for and cherished by an island community guided by the values and traditions of South Kohala” using the following 6 strategies:
 1. Community Partnership
 2. Community Co-managed areas (CCAs)
 3. Fisheries Management
 4. Sediment Reduction
 5. Invasive Species
 6. Additional threat analysis
 - Results: Work plans have been developed and submitted for these various strategies with different organizations and agencies agreeing to lead the implementation of these actions. Continuously increasing partnerships are expected to lead to more specific and on-the-ground and in-the-water action.

Pelekane

Coastal Circulation and Sediment Dynamics in Pelekane and Kawaihae Bays, Hawai'i Final Report 2012

- POC/Partners: USGS, NOAA-HCRI
 - Key Contributors: Curt D. Storlazzi, Michael E. Field, M. Katherine Presto, Peter W. Swarzenski, Joshua B. Logan, Thomas E. Reiss, Timothy C. Elfers, Susan A. Cochran, Michael E. Torresan, Hank Chezar
- Timeline: November 2010-March 2011
- Location: <http://pubs.usgs.gov/of/2012/1264/> (PDF download available)
- Summary:
 - Goals: To implement various upland watershed management activities to reduce land-based sources of pollution in Pelekane Bay based on data found on circulation and sediment dynamics in the Pelekane and Kawaihae Bays.
 - Results: Confirmation of the complex coastal circulation and sediment dynamics in Pelekane and Kawaihae Bay, and information on the physical oceanographic processes and sediment transport within the bays during winter conditions, which can be used to better understand their relation to coral reef health.

Thirty Years of Coral Reef Change in Relation to Coastal Construction and Increased Sedimentation at Pelekane Bay, Hawai'i

- POC/Partners: HIMB, NPS/Eric Brown, Washington State University/Brian Tissot
 - Key Contributors: Yuko Stender, Paul L. Jokiel, Ku'ulei S. Rodgers
- Timeline: 1976-Present
- Location: <https://peerj.com/articles/300.pdf> (Final version)
- Summary:

- Goals: To assess long term monitoring programs of coral reefs from 1976, 1996, and 2012, and to provide evidence to support corrective actions that have been undertaken to prevent further precipitous reef decline.
- Results: Based on the assessment of past project results, and the changing structure of the Pelekane Bay area, the region has developed a tolerance resistance to severe environmental impacts such as storm events, and land-based sedimentation. The reef has been found to maintain the ability to withstand these disturbances and maintain functional capacities. Since the last survey of the area the situations contributing to level of reef resilience have improved due to watershed management programs and mitigation of human impacts. Overall, it is concluded that this type of monitoring and dataset expansion will be necessary for future continuation of these assessments.

Terrigenous sediment impact on coral recruitment and growth affects the use of coral habitat by recruit parrotfishes (F. Scaridae)

- POC/Partners: Blue Wilderness Dive Adventures, NOAA (Fisheries, Office of Habitat Conservation)
 - Funding: CRCP
 - Key Contributors: E. DeMartini, P. Jokiel, J. Beets, Y. Stender, C. Storlazzi, D. Minton, E. Conklin
- Timeline: 2010-2012
- Location:

[http://www.researchgate.net/publication/241276636_Terrigenous_sediment_impact_on_coral_recruitment_and_growth_affects_the_use_of_coral_habitat_by_recruit_parrot_fishes_\(F._Scaridae\)](http://www.researchgate.net/publication/241276636_Terrigenous_sediment_impact_on_coral_recruitment_and_growth_affects_the_use_of_coral_habitat_by_recruit_parrot_fishes_(F._Scaridae)) (Document must be viewed or downloaded as a pdf from the site)
- Summary:
 - Goals: To quantify the spatial distribution of sediment impact on the benthos of Pelekane Bay and juvenile parrotfishes that inhabit it in order to provide insight into potential response of the nearshore reef community.
 - Results: A conceptual “space-for-time” substitution that compliments long-term temporal monitoring of responses of the nearshore reef to restoration. This illustrates the possibility of predicting temporal responses to watershed restoration that may occur in the future.

Community Restoration Partnership Online Proposal Application: Watershed Restoration Project at Pelekane Bay

- POC/Partners: Kohala Watershed Partnership (KWP), Queen Emma Land Company, DLNR, DOFAW, Parker Ranch
 - Funding: The Kohala Center, Inc.
- Location: N/A
- Summary:
 - Goals: Continuing to restore native vegetation as a means to reduce the bare ground on the watershed, and to act as model to share these methods, so that they can be applied along the entire Kohala coastline. Effective preparation for future storm/sedimentation to deal with predicted changing rainfall patterns will also be included, as well as monitoring/confinement of farm animals.

- Expected Outcome: Regeneration of Pelekane Bay's marine habitat, as well as along the rest of the Kohala coastline, and properly addressing the land-based sediment pollution.

Water Quality in the Brackish Waterbody at Pu'uloholā Heiau national Historic Site

Summary Report

- POC/Partners: NPS, NRDS, PUHE
 - Key Contributors: David F. Raikow, Anne Farahi
- Timeline: 2007-2011
- Location: <https://science.nature.nps.gov/im/units/pacn/parks/puhe.cfm> (fill out search boxes)
OR
https://irma.nps.gov/gueststs/users/issue.aspx?wa=wsignin1.0&wtrealm=https%3a%2f%2firma.nps.gov%2fApp%2f&wctx=rm%3d0%26id%3dpassive%26ru%3d%252fApp%252fReference%252fDownloadDigitalFile%253fcode%253d471964%2526file%253dPACN_Water_Quality_PUHE_Report_2007-2011.pdf&wct=2014-06-11T00%3a49%3a46Z
(automatic download)
- Summary:
 - Goals: To provide a “data report” for long-term water quality monitoring projects that are meant to be used as indicators of aquatic ecosystem conditions. The summary is meant to provide park managers with information on current conditions and temporal trends in ecosystem health, so that they can use data to respond to resource conditions, and to evaluate management actions.
 - Results: This report focuses on the data collected from a minor algal bloom in 2009 and a flood event in 2011 in relation to the brackish waterbody at PUHE. The information gathered indicates that relatively large amount of nutrients, especially nitrogen, are delivered to the waterbody during major events such as flooding. This suggests the increased risk of future algal blooms, and potentially increased surface scums. Determining the relative importance of groundwater versus overland-flow delivery of nutrients in these situations will be necessary to contribute to similar studies in the future.

Survey of the Coral Reefs of Pelekane Bay

- POC/Partners: TNC, PUHE, University of Hawai'i Hilo, NELHA Water Quality Lab, and researchers from Cornell University and the Scripps Institution of Oceanography
 - Key Contributors: Dwayne Minton, Eric Conklin, Courtney S. Couch, Melissa Garren, Marah J. Hardt, Russell Amimoto, Kydd Pollock, Chad Wiggins
- Timeline: Final Report January 2011
- Location: <https://www.yumpu.com/en/document/view/23286238/survey-of-the-coral-reefs-of-pelekane-bay-the-kohala-center>
- Summary:
 - Goals: Erosion control and re-vegetation project on over 400 acres of degraded land above Pelekane Bay so that the coral reefs in the bay can recover through natural processes.

- Rehabilitation of the *mauka* watershed through erosion, ungulate control, and native vegetation restoration in order to decrease the amount of soil transported into the bay.
- Develop an effective *Mauka* to *Makai* model for resource management in Hawai'i
- Results: Confirmation that the coral reef community in Pelekane Bay is under chronic, sediment-related stress, and that there is a lack of young coral colonies within the bay. But, there is also evidence of higher diversity and abundance of corals and fish just outside of the affected area, which indicates potential for recovery. Specific recommendations based on this information and for future monitoring are also included, so that original goals to naturally restore the area can be met.

Pelekane Bay Watershed Restoration Project

- POC/Partners: KWP/Melora Purell & Brad Lau, Parker Ranch, Queen Emma Land Company, DOFAW
 - Funding: NOAA through the American Recovery and Reinvestment Act (ARRA)
- Timeline: August 2009-February 2011
 - Final Report: May 31, 2011
- Location: N/A
- Summary:
 - Goals: To address the sources and the impacts of land-based sediment flowing into Pelekane Bay. The restoration plan had these guiding objectives:
 1. Maintain existing ground cover to prevent actively eroding areas from expanding.
 2. Restore native vegetation to critically eroding and strategically important areas of the watershed.
 3. Reduce sediment transport and storage in drainage ways and to mitigate actively head-cutting gullies.
 - Expected Outcome: This project is an endeavor to accomplish large-scale ecosystem rehabilitation, and requires commitment over the long term. The eventual success requires a commitment to maintenance of the fencing, irrigation system, and plantings for many years.

Pelekane Bay Watershed Management Plan: South Kohala, Hawai'i

- POC/Partners: Mauna Kea Soil and Water Conservation District
 - Funding: EPA, Hawai'i Department of Health - Clean Water Branch
 - Key Contributor: M. Carolyn Stewart (Marine and Coastal Solutions International, Inc.)
- Timeline: Final Report 2005
- Location:
 - http://health.hawaii.gov/cwb/files/2013/05/PRC_Maps_PelekaneBayWatershedPlan.pdf
- Summary:
 - Goals: This updated management plan of the Pelekane Bay Watershed Management Project was initiated under the requirements to prepare a Watershed Restoration Action Strategy (WRAS) for the priority watersheds

identified in EPA and USDA's Unified Watershed Assessments. The goals are to list specific water quality problems; identify sources of contaminants causing those problems; provide a schedule of action items that should be undertaken to address those sources; estimate the funding needs for those action items; and establish a monitoring program to assess effectiveness of conservation measures in addressing water quality problems.

- Results: As part of the watershed management project, the following have been accomplished since 1994:
 - Improvement in ground cover density and quality, as reflected in increased stubble heights and ground cover throughout most of the watershed.
 - The fencing and grazing of Paddocks 5A and 5B, which help minimize soil loss by reducing the risk of fires within the watershed.
 - The construction of firebreak that protects neighboring communities from fire.
 - Initiation of monitoring of instream water quality, stubble height, vegetative cover, and soil erosion.
 - The recommended actions contained in this plan include more activities needed to reduce soil loss and provide ongoing comprehensive monitoring to measure trends and changes over time.

Pelekane Bay Watershed Sediment Runoff Analysis

- POC/Partners: Group 70 International Inc., Oceanit Center, U.S. Army Corps of Engineers
- Timeline: Final Report December 2007
- Location: http://www.csc.noaa.gov/digitalcoast/_pdf/PelekaneBayWatershedSedimentRunoffAnalysis_FinalReport2007.pdf
- Summary:
 - Goals: 1) estimate average annual sediment yield; 2) estimate sediment yield from historical storm events; 3) characterize Pelekane Bay sediment deposit; and 4) define critical watershed issues.
 - Results: Erosion prevention measures should concentrate in the lower watershed area as these soils have the greatest potential for erosion during the large storm events.

Reefs at Risk: Revisited

- POC/Partners: WRI, TNC, WorldFish Center, ICRAN, UNEP-WCMC, GCRMN
 - Key Contributors: Lauretta Burke, Kathleen Reytar, Mark Spalding, Allison Perry
- Timeline:
 - Program: 1998-Present
 - Report: 2011
- Location: <http://www.wri.org/publication/reefs-risk-revisited> (Document can be downloaded from this site)
- Summary:
 - Goals: To raise awareness about the location and severity of threats to coral reefs. To catalyze opportunities for changes in policy and practice that could

safeguard coral reefs and the benefits they provide people for future generations.

- Key Findings:
 1. The majority of the world's coral reefs are threatened by human activities.
 2. Local threats to coral reefs are the most severe in Southeast Asia and least severe in Australia.
 3. Threat levels have increased dramatically over a ten-year period.
 4. Changes in climate and in ocean chemistry represent significant and growing threats.
 5. While over one quarter of the world's coral reefs are within protected areas, many are ineffective or only offer partial protection.
 6. Dependence on coral reefs is high in many countries, especially small-island nations.
 7. Degradation and loss of reefs will result in significant social and economic impacts.
 8. Need to improve, quickly and comprehensively, on existing efforts to protect reefs and the services they provide humanity.

Puakō

Biologist: Malama the aina

- POC/Partners: South Kohala Utility and Improvement Design (SKUID, skuid.org), NOAA Fisheries/Lani Watson, DLNR
- Timeline:
 - Article published: June 10, 2014
 - Project: Presently underway
- Location: <http://westhawaiiitoday.com/news/local-news/biologist-malama-aina>
- Summary:
 - Goals: Minimize the damage that cesspools create in coral reefs in the Puakō region, including proper regulation of untreated wastewater entering the ocean. And, to get local community members and Puakō residents involved through SKUID, proposing that individual homeowners replace the current cesspools.
 - Results: The development of SKUID allows the community to work independently, without completely relying on government officials. This program has already jump-started initiatives to conduct surveys of current septic systems, and to raise funds to help subsidize the replacements.

Waiulaula

Wai'ula'ula Watershed Management Plan: Mauna Kea Soil and Water Conservation District

- POC/Partners: Mauna Kea Soil and Water Conservation District (MKSWCD)
 - Funding: EPA, Hawai'i State Department of Health, NOAA, Hawai'i DLNR
 - Key Contributors: Carolyn Stewart, Jene Michaud, Mike Donoho, Orlando Smith
- Timeline:
 - Plan Outline Published: 2011

- Project implementation: Underway
- Location:
 - http://hawaiiicoralreefstrategy.com/PDFs/3_Priority_Sites_Kohala/waiulaula_plan_final_w-o_appendices.pdf
- Summary:
 - Goals: Implement proper management techniques to protect the vital watershed focusing especially on addressing existing sources of polluted runoff, threats to the watershed health, and preventing further degradation of resources as predicted land-use changes occur. Also, sustaining a healthy *mauka-makai* connection and promoting community-based environmental stewardship is important.
 - Results: Development of a plan to meet the needs of maintaining a healthy watershed, including brief outlines of a sample and analysis plan (SAP), data management, and an adaptive management approach.

Coastal Use Mapping

Coastal Uses Mapping

- POC/Partners: NOAA (NMPAC, CSC-Digital Coast), Hawai'i State Coral Reef Strategy
- Timeline:
 - South Kohala Map Completed: 2011
 - West Maui Map Completed: 2012
- Location: <http://www.hawaiiicoralreefstrategy.com/>
 - South Kohala Map:
 - <http://www.hawaiiicoralreefstrategy.com/index.php/southkohala>
 - West Maui Map:
 - <http://www.hawaiiicoralreefstrategy.com/index.php/prioritiesites/westmaui>
- Summary:
 - Goals: To fill a critical information gap in ocean management by mapping significant human uses of the nearshore ocean area at priority sites in Hawai'i (in this case South Kohala and West Maui, as designated by the State's and NOAA's Coral Program). Gaining a better understanding of the spatial range and intensity of key use types at the two sites to inform resource management was also a priority for this project.
 - Results: Participatory GIS mapping workshops were held to gather information on both extractive and non-extractive ocean uses from local resource users, scientists, and stakeholders. Data, maps and analytical products for both sites were completed, representing both priority sites.

Hawai'i Coastal Use Mapping Project: Ocean Uses Map Book

- POC/Partners: NOAA offices (OCRM, PIRO, PSC and PIFSC), DAR
- Timeline:
 - Project: September 23-25, 2010
 - Report: March 2011
- Location:
 - http://marineprotectedareas.noaa.gov/pdf/atlas/hi/hi_coastal_use_mapbook.pdf
- Summary:

- Goals: Gather spatial data on human uses of the coastal and marine environment in South Kohala and North Kona regions.
- Results: a 3-day workshop providing expertise on the various human use activities, as well as 15 different maps displaying the patterns of each of these activities. A compilation of the supplemental data provided by participants was also created during the mapping process.

Kīholo

Anchialine Ponds

Community Restoration Partnership Online Proposal Application: Kīholo anchialine pool restoration - invasive fish removal

- POC/Partners: Hui Aloha Kīholo/Michael Donoho, Hawai'i State Parks, USGS/Anne Brasher, and Lisa Marrack (UC Berkeley PhD candidate), US Fish and Wildlife Service/Gordon Smith, and Bill Walsh (State Aquatic Biologist for West Hawai'i)
- Timeline: Project Start Date- 1/1/2014 (Notice to Proceed + 11 months)
- Location: N/A
- Summary:
 - Goals: Conduct restoration activities in 6 anchialine pools along the North Kona Coastline that support a high level of endemism and representation of both aquatic and marine species that are tolerant of the range of conditions. The following steps are projected to take place in order to ensure this:
 - Removal of non-native fish using electrofishing and CO₂ application
 - Use of native Hawaiian customs and practices to benefit the local community socioeconomically.
 - Re-establish a sustainable population of `opae`ula in order to reintroduce traditional fishing practices (palu `opelu fishing)
 - Expected Results: Use of BACI design to assess the effects of the removal method on both the target (fish) and non-target (invertebrates). Long term monitoring will be conducted to document the return of native shrimp following invasive fish removal.

Proposed Restoration Pools - Anchialine Pool Restoration Project

- POC/Partners: NPS - Pu'uhonua o Hōnaunau National Historical Park
- Timeline: July 12, 2013
- Location: N/A
- Summary:
 - Goals: To inform the public on the anchialine pools restoration project in the park. Proper explanation of what the project entails, what species are involved, and the significance/importance of the project.
 - Results: Public awareness of the project and community outreach and education

Fish Pond

Ka Loko o Kīholo Rehabilitation Project Summary

- POC/Partners: TNC, Hawai'i State Parks Division, Hui Aloha Kīholo, Conservation International, US Fish and Wildlife Service, and US Forest Service

- Funding: NOAA's Community Restoration Program, and the Hawai'i Community Foundation
- Timeline: 2012-Present
- Location: N/A
- Summary:
 - Goals: Improve the estuarine habitat in Ka Loko Kīholo using an adapted traditional management approach with 4 main goals:
 1. Return Kīholo fishpond to its documented former ecological health by managing threats to the habitat
 2. Evaluate the potential for Kīholo fishpond to provide a reliable and sustainable food source for the community
 3. Improve or return habitat for formerly documented native flora and fauna
 4. Provide a place for researchers, students, and community members to study nature, learn about estuaries and traditional fishpond management, and to develop effective and innovative solutions to conservation's critical threats at multiple scales
 - Results: Development of mid-range strategies for Kīholo fishpond, provision of tangible opportunities for community members to take part in maintenance and restoration, as well as access to study of sea-level rise effects, and the means to tag, measure and track Pacific Green Sea Turtles. New partnerships have also developed throughout the project work, improving research support to enhance the knowledge relevant to fishpond management across the state.

State Park

Kīholo State Park Pre-Final Master Plan and Draft Environmental Assessment

- POC/Partners: Hawai'i State Parks Division, DLNR (Office of Environmental Quality Control, Department of Health), Planning Solutions, Inc.
- Timeline: August 2013*
- Location:

http://oeqc.doh.hawaii.gov/Shared%20Documents/EA_and_EIS_Online_Library/Hawaii/2010s/2013-09-08-HA-5B-DEA-Kiholo-State-Park-Pre-Final-Master-Plan.pdf
- Summary:
 - Goals: Implementation of a proposed Master Plan for Kīholo State Park to create a formal cultural-historic interpretive program at the park to channel the public to visit sites that are identified as appropriately managed, so that sensitive archaeological and historic sites can be managed and protected more effectively. The changes/additions to park would include:
 - At least one campground and parking area at Kīholo Bay and an optional campground and parking area at Keawaiki Bay
 - A new access road into the park from Queen Ka'ahumanu Highway, and an optional additional access road to Keawaiki Bay
 - Infrastructural improvements
 - The creation of interpretive trails, signs, and archaeological site restoration

- Expected Results: The Master Plan for Kīholo State Park will be implemented effectively in consultation with the environmental assessment, as well as public and agency comments with no potential to cause potential harm to the environment.

*Final Master Plan was published March 2014 and is available at: <http://dlnr.hawaii.gov/wp-content/uploads/2014/04/Kiholo-SP-Final-Master-Plan.pdf>

Kīholo Conservation Action Plan

- POC/Partners: Hui Aloha Kīholo, TNC, Conservation International, Ala Kahakai NHT NPS, Hawai'i State Parks Division
- Timeline:
 - Report: July 2013
 - Project: Presently underway, with objective program results by 2015-2020
- Location: N/A
- Summary:
 - Goals: Implement the following conservation strategies over the next 10 years to address known threats to Kīholo's conservation targets, and "to honor the vision of Kīholo kūpuna and community members who wish to see their traditions and the place they care so much about thrive and sustain future generations."
 1. Restore inland pond system
 2. Increase compliance
 3. Maintain groundwater flow
 4. Build management capacity
 5. Understand changes in the health and use of reefs, fisheries and fishponds
 - Results: The following are the completed outputs of Kīholo CAP:
 - 5 fully reviewed and prioritized conservation strategies to address threats to coastal and marine life in Kīholo
 - A dynamic partnership committed to implementation
 - 13 member participant network

As the plan is carried out the program's goals are expected to be achieved over the next 10 years, as well as changes in the health of the priority target resources.

Ka'upulehu

*No documents currently available

Acronyms

Acronym	Meaning
NOAA	National Oceanic and Atmospheric Administration
CRCP	Coral Reef Conservation Program
PIFSC	Pacific Islands Fisheries Science Center
NOS	National Ocean Service
NCCOS	National Centers for Coastal Ocean Science
ONMS	Office of National Marine Sanctuaries
HIHWNMS	Hawaiian Islands Humpback Whale National Marine Sanctuary

PMNM	Papahānaumokuākea Marine National Monument
CCMA-BB	Center for Coastal Monitoring and Assessment-Biogeography Branch
NCCOS	National Centers for Coastal Ocean Science
PacIOOS	Pacific Islands Ocean Observing System
CSC	Coastal Services Center
NGS	National Geodetic Survey
OCRM	Office of Ocean and Coastal Resource Management
NMFS	National Marine Fisheries Service
PIRO	Pacific Islands Regional Office
HCRI	Hawai'i Coral Reef Initiative
NMPAC	National Marine Protected Areas Center
PSC	Pacific Services Center

Acronym	Meaning
POC	Point of Contact
CAP	Conservation Action Plan
SKCAP	South Kohala Conservation Action Plan
DAR	Hawai'i Division of Aquatic Resources
DLNR	Hawai'i Department of Land and Natural Resources
MHI	Main Hawaiian Islands
BOEM	Bureau of Ocean Energy Management
USGS	United States Geological Survey
UH	University of Hawai'i
NPS	National Park Service
TNC	The Nature Conservancy
NEHLHA	National Energy Laboratory Hawai'i Authority
PICCC	Pacific Islands Climate change Cooperative
NRCS	National Resource Conservation Service
HIMB	Hawai'i Institute of Marine Biology
KWP	Kohala Watershed Partnership
DOFAW	Hawai'i Division of Forestry and Wildlife
NRDS	National Resource Data Series
PUHE	Pu'ukoholā Heiau National Historic Site
EPA	United States Environmental Protection Agency
WRI	The World Resources Institute
ICRAN	International Coral Reef Action Network
UNEP-WCMC	United Nations Environmental Programme-World Conservation Centre
GCRMN	Global Coral Reef Monitoring Network
NHT	National Historic Trail

Appendix III: NOAA Mandates Objectives and Outputs Achieved

The following are performance measures that the Habitat Focus Area projects meet:

- GPRA
 - Number of Acres Restored
 - Annual number of coastal, marine, and Great Lakes ecological characterizations that meet management needs
 - Percentage of tools, technologies, and information services that are used by NOAA partners/customers to improve ecosystem-based management
 - Number of communities that utilize Digital Coast
 - Percentage of U.S. and Territories enabled to benefit from a new national vertical reference system for improved inundation management
 - Number and percentage of recovery actions ongoing or completed
- OHC
 - Number of coastal, marine, and Great Lakes habitat acres protected from harmful impacts or identified threats
 - Number of service hours of coastal community participation associated with habitat protection, restoration, education and outreach
- CRCP
 - Number of projects completed from approved WMPs and CAPs to reduce land-based sources of pollution in priority coral reef areas
 - Number of active partnerships established with local, state/territory, federal and/or non-governmental organizations with a common goal to reduce LBSP impacts in priority coral reef areas
 - Stable or improved coral demographics (recruitment, size frequency, mortality in priority coral reef areas)
 - Number of watersheds with completed and approved WMPs or CAPs