Hawaii Capacity Assessment

An Analysis of Issues Affecting the Management of Coral Reefs and the Associated Capacity Building Needs in the Main Hawaiian Islands

OCTOBER 2013

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NOAA CORAL REEF CONSERVATION PROGRAM

An Analysis of Issues Affecting the Management of Coral Reefs and the Associated Capacity Building Needs in the Main Hawaiian Islands

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The concepts and methods described in this document have evolved over many years and benefited from the ideas, experience and wisdom of many people, from scientists to spiritual leaders, from policy makers to practitioners. This document is a product of continued learning, based upon the art of convening and listening. Our goal is to improve our collective understanding and practice of the ecosystem approach by creating authentic engagement in meetings, gatherings and conversations to address the pressing issues of our time. Since the ultimate objective of this capacity needs assessment is to increase capacity for stewardship of coral reefs, we firmly believe the approach must integrate across sectors, social structures, and disciplines and take on a systems view that incorporates biophysical and social dimensions. We call this integrated approach the ecosystem approach. It is neither easy nor inexpensive to practice and requires continued investments in capacity building. The methods applied in this document draw from many sources including the work of Stephen B. Olsen, Director Emeritus of the Coastal Resources Center at the University of Rhode Island, a key author of Increasing Capacity for Stewardship of Oceans and Coasts: A Priority for the 21st Century (National Research Council, 2008) and the lead advisor of our consultant team. We have integrated methods and lessons learned from the fields of needs assessment for social interventions, innovations in interdisciplinary scholarship, developmental evaluation, capacity assessment practice and theory in the context of international development as well as complexity concepts drawn from ecosystem science. Because the methods are a composite of elements from a wide range of disciplines, they are experimental, and will be customized for each jurisdiction to match the context and capacity of the situation. This capacity assessment process has been designed in close consultation with NOAA CRCP.

Cover Photo: Sunset off the shores of West Maui. (Photo credit: Glenn Page, SustainaMetrix.)

Summary of Major Findings and Recommendations

This capacity assessment, commissioned by National Oceanic Atmospheric Administration's Coral Reef Conservation Program (NOAA CRCP), directly follows the coral reef management priority setting process facilitated by NOAA CRCP and initiated in Hawaii in 2009. In Hawaii, the priorities are summarized in the 2010 publication Hawaiian Archipelago's Coral Reef Management Priorities (henceforth, the "Priority Setting Document," or "PSD") and were largely created in support of the ongoing development of the Hawaii Coral Reef Strategy: Priorities for Management in the Main Hawaiian Islands 2010-2020 (henceforth, the "Strategy") and The Papahānaumokuākea Marine National Monument Management Plan.

As outlined in **Section One** of this report, the consultant team facilitated a rapid, largely qualitative, participatory approach to gain the perspectives of a representative group of resource users, managers, upper-level administrators and funders who are engaged in coral reef management in Hawaii[1]. The primary purpose of this assessment is to examine the issues that affect capacity in Hawaii as it relates to implementing the priorities expressed in the PSD and the Strategy document and present a set of near-term recommendations for addressing persistent capacity gaps and barriers for implementing the current Strategy. The recommendations are offered in an appreciation of the unique and dynamic contexts of each of the Main Hawaiian Islands. They will require an adaptive implementation strategy, dropping some, moving ahead with others and adding what may not have been anticipated as part of this process. Indeed, the challenges facing coral reef management in the State of Hawaii, and the rest of the world, will require more than a long-term strategy for building adaptive capacity within the current governance system where decision-making is often ad hoc and clear authority to resolve conflicts across sectors or to deal with cumulative effects is often lacking (Crowder et al., 2006). As with the other jurisdictions that depend on the provisioning, regulating and cultural services that coral reef ecosystems provide, Hawaii will need to honestly evaluate its current ecosystem governance paradigm and structures that support or impede it. Shifting to new governance pathways may be very difficult as it requires exploring new paradigms for economic growth and sustainable development that challenge current opinions and worldviews, incentives, power relationships, and institutions operating at different scales that do not support such shifts (Olssen et al., 2010). Nevertheless, Hawaii is home to the richest coral resources in the United States (U.S.) by far, and features a growing interest across the sources of governance (civil society, market forces and government) in building capacity to deal with anticipated, abrupt and surprising changes that are ahead. This report focuses on building capacity within the current governance paradigm, however, the recommendations are intended to build adaptive capacity to reconfigure and reorganize to face the uncertainty ahead and serve as progress toward the transformation needed to create a fundamentally new governance system that supports the ecological, economic and social benefits that coral reef ecosystems provide.

While many of the recommendations in this document focus on the Department of Land and Natural Resources (DLNR) and Division of Aquatic Resources (DAR), there are many state, county, and federal agencies with authorities to manage corals (i.e. Hawaii Costal Zone Management Program, Hawaii State Department of Health,

[1] The Hawaii Coral Reef Strategy: Priorities for Management in the Main Hawaiian Islands 2010-2020 was the main lens for the capacity assessment process. For the purposes of this assessment, our scope included exclusively the Main Hawaiian Islands which we refer to as Hawaii and State of Hawaii as distinctive terms that are more appropriate in a given context.

United States Fish and Wildlife Service, United States Army Corps of Engineers, NOAA, etc.) and they are fully expected and invited to participate in the review of the recommendations and to identify how each can contribute to the process and play a significant role for implementation of capacity building strategies.

Section Two of this report presents the context for coral reef management and why reefs are extremely valuable and important to the economy, culture and future of the state's 1.4 million residents and over 7 million annual visitors. Collectively, the entire Hawaiian Archipelago, covering a linear distance of over 2,500 km, contains 85% of the coral reef area of the U.S. As in other parts of the world, the coral reefs in the eight Main Hawaiian Islands are fragile, subject to increasing pressures of over harvesting of marine resources, water quality decline from land use in adjacent watersheds, and climate change. While much of what we have found regarding capacity to manage coral reefs in Hawaii is moving in a positive direction, increased adaptive capacity is needed to address increasingly complex, multi-scale, uncertain and dynamic management challenges.

Section Three presents findings related to the capacity to manage coral reefs in Hawaii that address a widening range of issues across many scales. At the local scale, two geographical areas have been selected as priority for management focus and for building adaptive learning: one in South Kohala on the island of Hawaii and the other located on the northwestern portion of the island of Maui. At the next larger scale of the Main Hawaiian Islands, the focus is on the issues that are being addressed by a larger network of managers and their organizations and the critical need for collaboration, integration, knowledge sharing, and adaptive learning across this expanding network.

In the eight Main Hawaiian Islands, the issues are managed by an increasing number of agencies and organizations. Most agencies manage based upon their own mandates, policies, goals and objectives, some of which are complementary to what other agencies are doing, and sometimes competing or simply disconnected. While marine resources in the Main Hawaiian Islands are largely managed by DAR, issues are being addressed by a widening range of federal, state and local policies as well as conservation initiatives of non-governmental organizations (NGOs). In the short run, this current governance structure, with its highly complex management context involving a myriad of actors with jurisdictions at multiple scales, means more effective management that requires the capacity to work effectively together. Highly complex management challenges must be met with quality coordination and collaboration, functioning across a a complex geography of eight islands, each with unique social, cultural and political contexts. Even with this growing network, there are a number of issues at the global scale that are well outside any agencies control such as ocean acidification, sea level rise, increasing climate variability and other effects associated with global drivers of ecosystem change.

Therefore, an uncertain future is ahead and preparing for it requires an adaptive learning-by-doing approach. Wisdom gained through thousands of years of traditional management of reefs is bringing insight into adaptive strategies. However, today's challenges have no real historical analogue for the multi-scale and rapid pace of change. While integrated engineering solutions are essential, the challenges today require a long list of competencies related to issue analysis, selecting options, securing formal commitment, implementing in shifting context and having the time, energy and methods to adaptively learn along the way. Interpersonal competencies are also needed to build emotional intelligence (i.e. mutually-beneficial professional relationship building, creative conflict resolution, etc.) to foster effective collaboration. This is not simple, and there is no clear and obvious path, panacea, or training program that will solve these challenges of enforcement and compliance, remove procurement barriers, solve staff

recruitment and retention issues, transform science to better inform policy, and grow better relationships with local government and the legislature. Addressing these persistent barriers takes time, resources and collective commitment. Nevertheless, from an analysis of the issues, we have offered a set of recommendations to serve as a "road map" for the continued development of adaptive capacity.

Section Four presents a set of recommendations that are divided into three groups. The first group involves decisions that are highly political in nature. The ultimate timing, control and direction needs to be decided from the highest levels of government within the state. We believe these actions are the most critical to build long-term adaptive capacity to manage coral reefs and promote Ecosystem-based Management in Hawaii. The second group requires increasing collaboration among implementing and funding partners at the West Maui and South Kohala priority sites to more fully realize the goals of Ecosystem-based Management at these sites. The third group is a range of actions that can be done at the scale of committees, task forces, within organizations, and by groups of individuals. These are important, but their overall impact will only be realized if there is significant progress made in capacity building by the other two groups.

This first group begins with the priority to develop a strategic plan for DAR to move forward with a range of legislative actions with the new Administrator. Attention is needed to improve hiring and retention at DLNR, strengthen Division of Conservation and Resources Enforcement (DOCARE), and increase engagement across multiple sectors. Ideally, the new DAR Administrator will renew the sense of purpose and direction for DAR and this will lead to improved management of the resources. These actions require formal commitment at DLNR and must fit into a larger political landscape and are the most critical as they would signal clear upper-level support for resource allocation and formal support for building capacity to manage coral reefs in Hawaii. This group is also the most complex because they feature difficult political decisions that need to be made by senior officials in Hawaii who must factor in a wide range of extenuating circumstances. That said, we believe their adoption would support the tourism and fisheries sectors and strengthen the ecosystem services provided by coral reefs including coastal protection, cultural, recreational and property values, education and research.

The second group of recommendations involves a series of collaborative actions that can be done within a relatively small segment of the coral management network and focused on select geographies. Together, the recommendations in this group promote the collaborative use of a common management framework to sequence and prioritize implementation in select priority areas. As a pilot demonstration, we suggest initiating this effort at the West Maui and South Kohala priority sites, where an established collaborative process and community-based management process is gaining traction at both sites. However, there are a range of capacity challenges associated with scaling up for improved management and the need to build the enabling conditions of supportive and informed constituencies, clear goals, formal commitment and adequate capacity. There are highly significant actions that we believe, if accomplished, would provide momentum for improved coral reef management in Hawaii, even as the context becomes increasingly complex, dynamic, and uncertain.

The third group of recommendations includes actions that contribute to building adaptive capacity, yet their implementation can be controlled by a small group of people, an organization or a network of organizations. While this group is more commonly associated with the traditional capacity building tasks of developing and

improving knowledge, skills and competencies, we believe investment here will have far greater return as long as attention is paid to implementing the two groups described above.

Key findings and recommendations of our work in Hawaii include:

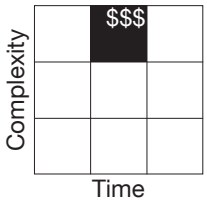
- For reef conservation to truly succeed, it is imperative to build an understanding among decision makers and the general public that the economic and cultural value of the state's reefs is very high for tourism, fisheries, recreation, and coastal protection.
- There are several politically challenging recommendations that can only be achieved with broad political support and formal, high-level commitment. These include creating and enforcing a recreational fishing license and developing and implementing a strategic plan for DAR.
- DOCARE was widely cited by our interviewees on the one hand as an essential partner for marine resource management, and on the other hand as a frequent impediment to effective management and in need of significant reform. Without reform, both enforcement of, and compliance with, natural resource protection regulations will be undermined, further reducing the effectiveness of measures designed to enhance and protect the state's natural heritage.
- Staff capacity needs to be built for coral reef protection within DLNR. Significantly improving the efficacy of coral conservation within DLNR will require the commitment of additional personnel resources.
- Natural resource managers across Hawaii have increasing responsibilities with often shrinking resources and continue to seek external support through grants, agreements, and innovative partnerships. While securing additional resources can build capacity, managing multiple forms of support creates unnecessary administrative burdens often requiring accountability for a dizzying array of performance metrics that can generate fragmentation among partners rather than collaboration. A common Ecosystem-based Management framework is proposed to effectively sequence, prioritize and guide action toward clear goals. Ideally, such a framework would be accepted across funders to maximize management and minimize administration. Pursuing a concerted program to train managers in, and promote the use of, the language and tools of Ecosystem-based Management can bear great fruits in improving management efficacy, increasing collaboration and guiding adaptive learning. To test its effectiveness, a common framework should be actively piloted at one or two priority coral conservation sites to complete a single "generation of management" by progressing through the five identified steps of the Management Cycle, thereby providing evidence for potential transferability to other sites.

Section Five concludes the report with a strategy for the development of a long-term capacity building action plan that will require contributions from all stakeholders to fully implement these recommendations. Creating capacity building action plans allows the wide range of implementing partners in government, civil society and market forces to more effectively preserve and protect coral reefs. Committing to a long-term capacity building strategy will require support and participation from resource management agencies, from local to federal, from large and small NGOs, from coalitions and funding partners, from resource users who depend on coral reefs of Hawaii for their livelihood, and from upper-level administrators.

LEGEND

TIME SCALE	COMPLEXITY SCALE	MONETARY SCALE
Short = <1 year	**Low** = Somewhat context independent recommendations such as "best practices" and "standard operating procedures" that have fairly high certainty of building capacity.	**$** - Less than $5,000
Medium = 1 to 2 years	**Medium** = Context is more important and the recommendation may require either coordination of technical expertise that may or may not be present in the system, or may require a degree of social engagement and relationship building that creates a common ground; i.e. either socially or technically complicated.	**$$** - Between $5,000 and $20,000
Long = >2 years	**High** = Context is highly dependent and the recommendation may require strategies that are adaptively implemented and address dynamic, emergent, non-linear and complex conditions.	**$$$** - Between $20,000 and $100,000
		$$$$ - Greater than $100,000

EXAMPLE



This graphic shows project time scale of 1 to 2 years (**Medium**) with complexity scale equal to **High** and monetary scale between $20,000 and $100,000 (**$$$**).

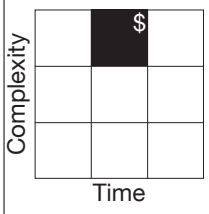
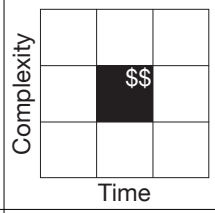
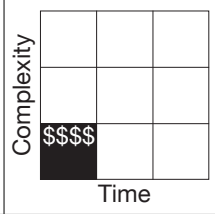
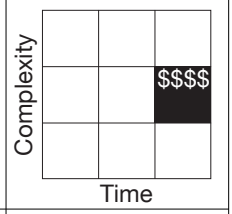
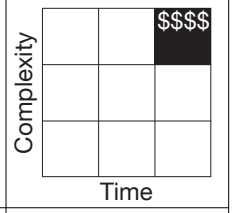
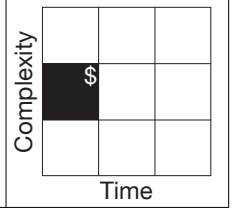
PRIORITIZATION

The prioritization was developed in consultation with the Hawaii Jurisdictional Capacity Assessment Team members who were asked to rate each recommendation. The resulting top recommendations are presented in order of priority in this table and in this document. Please note, while prioritized, the recommendations are not intended to be implemented sequentially as a checklist. Rather, in complex and dynamic systems, adaptive capacity will be about building momentum with investments in relatively simple, inexpensive and quick forms of capacity building, and marking progress toward the larger systemic changes that are needed to effectively build adaptive capacity.

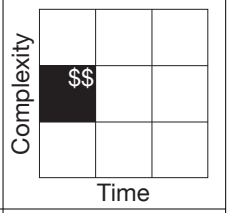
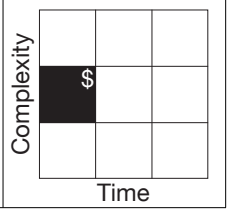
Group 1 Recommendations: Politically Challenging Goals to Improve Formal Commitment to Coral Reef Conservation

This group of recommendations is highly political in nature, will require high-level governmental action, and in many respects lies beyond the direct control of the Main Hawaiian Islands coral reef management network.

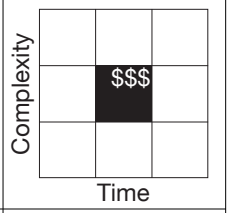
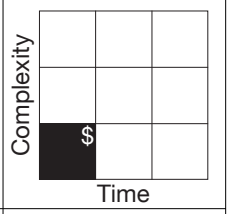
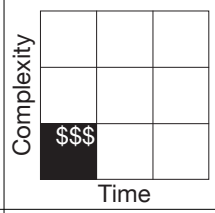
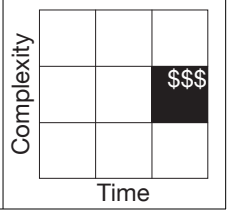
Theme 1. Strategies to re-establish and improve the high-level function and purpose of Division of Aquatic Resources (DAR) within the Department of Land and Natural and Natural Resources (DLNR) and DLNR as whole

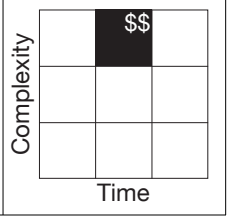
Page #		Capacity Building Strategy / Recommendation / Potential Partners	Complexity / Time / Cost
52	4.1A	**Ensure DLNR Creates Thorough Orientation for the New DAR Administrator** **Recommended Lead:** DLNR **Potential Partners:** DLNR partner agencies and organizations	
53	4.1B	**Develop a Strategic Plan for DAR** **Recommended Lead:** DAR **Potential Partners:** A local expert in facilitation, an organizational development and strategic planning company or an academic partner	
53	4.1C	**Create a Community-Based Subsistence Fishing Area (CBSFA) Program within DAR with Program Manager, CBSFA Planner and Makai Watch Coordinator Positions** **Recommended Lead:** DAR **Potential Partners:** Division of Conservation and Resource Enforcement (DOCARE), Makai Watch, existing CBSFAs, Natural Resource Councils (i.e. Maui Nui)	
54	4.1D	**Improve Hiring and Retention at DLNR** **Recommended Lead:** DLNR **Potential Partners:** An organizational development company, academic partner (i.e. Masters in Organizational Change at Hawaii Pacific University)	
55	4.1E	**Strengthen DOCARE Enforcement and Encourage Voluntary Compliance** **Associated PSD and Strategy Priority Objective: Goal:** 2.2 **Recommended Lead:** DLNR Chairperson, DOCARE, DAR Administrator **Potential Partners:** DLNR Legal Fellow	
57	4.1F	**Explore Pathways of Sustainable Financing through Tourism** **Recommended Lead:** DLNR, or a potential "Friends" group of DLNR (note: name is placeholder only) **Potential Partners:** Hawaii Tourism Authority (HTA), Hawaii Better Business Bureau, Micronesia Challenge, Palau Conservation Society, The Nature Conservancy (TNC)	

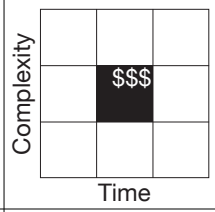
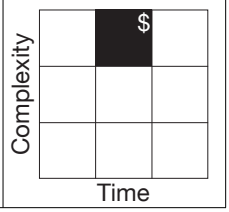
Theme 2. Strategies to create long-term, sustainable financing for coral reef conservation in Hawaii

Page #		Capacity Building Strategy / Recommendation / Potential Partners	Complexity / Time / Cost
58	4.1G	**Create a Non-Profit "Friends" Group of DLNR (Note: Name is Placeholder Only)** **Recommended Lead:** Castle Foundation **Potential Partners:** DLNR and University of Hawaii (UH)	
58	4.1H	**Create a Philanthropy Roundtable on the Topic of Sustainable Financing** **Recommended Lead:** DLNR **Potential Partners:** Castle Foundation, Conservation International (CI), "Friends" group of DLNR and associated funders	

Theme 3. Strategies to promote better rules and regulations to conserve coral and marine resources in Hawaii

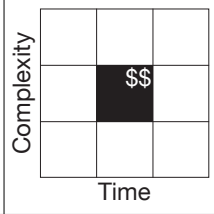
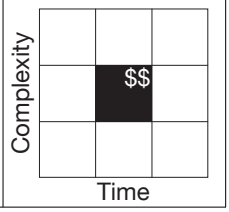
Page #		Capacity Building Strategy / Recommendation / Potential Partners	Complexity / Time / Cost
59	4.1I	**Create and Enforce a Recreational Fishing License** **Associated PSD and Strategy Priority Objective:** 2.1 **Recommended Lead:** DAR **Potential Partners:** Florida Division of Marine Fisheries Management, Hawaiian Islands Humpback Whale National Marine Sanctuary	
60	4.1J	**Move Forward with the First CBSFA Rules Package** **Associated PSD and Strategy Priority Objective:** 1.1 **Recommended Lead:** DAR **Potential Partners:** Proposed CBSFA Program within DAR, DLNR Legal Fellow, communities proposing CBSFAs	
61	4.1K	**Move Forward with the Draft Coral and Live Rock Damage Rules** **Associated PSD and Strategy Priority Objective:** 2.3 **Recommended Lead:** DAR and Legislature **Potential Partners:** County government and local communities	
61	4.1L	**Institutionalize Standards into the Tourism Permitting Process** **Associated PSD and Strategy Priority Objective:** 2.3 **Recommended Lead:** Division of Boating and Ocean Recreation (DOBOR) and DAR **Potential Partners:** Malama Kai Foundation	

Theme 3. Strategies to promote better rules and regulations to conserve coral and marine resources in Hawaii (cont.)			
Page #	**Capacity Building Strategy / Recommendation / Potential Partners**		**Complexity / Time / Cost**
62	**4.1M**	**Provide Specific Guidance on Coral Reef Mitigation Standards** **Associated PSD and Strategy Priority Objective:** 3.2 **Recommended Lead:** DAR and United States Army Corps of Engineers **Potential Partners:** United States Fish and Wildlife Service, National Oceanic and Atmospheric Administration (NOAA) and other federal partners with regulatory oversight with coral reef mitigation standards	

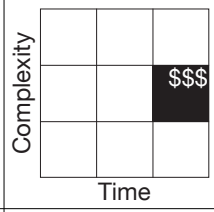
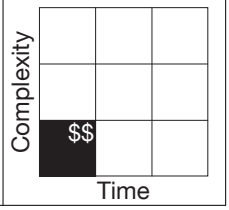
Theme 4. Strategies to promote better engagement with the Hawaiian Legislature			
Page #	**Capacity Building Strategy / Recommendation / Potential Partners**		**Complexity / Time / Cost**
62	**4.1N**	**Increase Engagement between the Tourism Sector and the Legislature** **Recommended Lead:** HTA and Legislature **Potential Partners:** DLNR and UH	
63	**4.1O**	**Enhance DLNR Engagement with the Legislature** **Recommended Lead:** DLNR **Potential Partners:** DAR Administrator, individuals with experience in communicating effectively with the Legislature	

Group 2 Recommendations: Using a Common Management Framework to Pursue Ecosystem-based Management at Priority Site

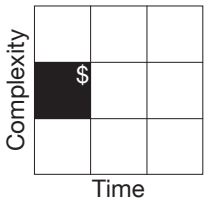
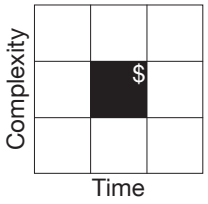
This group of recommendations will require a collaborative and coordinated approach to management at select priority areas, and involve interconnected systems and engagement with multiple resource users, government entities, NGOs and funders.

Page #		Capacity Building Strategy / Recommendation / Potential Partners	Complexity / Time / Cost
66	4.2A	**Promote the Use of a Common Language and Management Analysis Tools Through Management Training** **Recommended Lead:** DAR and the Hawaii Coral Reef Management Point of Contact **Potential Partners:** An institution of known competence in training on the practice of ecosystem governance	
66	4.2B	**Tie Coral Reef Project Funding to Steps in Management Cycle** **Recommended Lead:** NOAA Coral Reef Conservation Program (CRCP) **Potential Partners:** National Fish and Wildlife Foundation (NFWF), DAR, coral reef management funding partners	

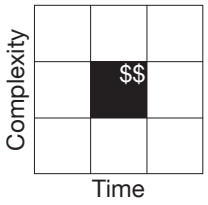
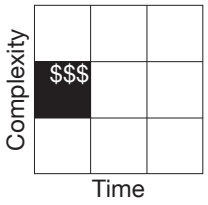
Step 1. Recommendations Associated with Issue Identification (4.2.1)

Page #		Capacity Building Strategy / Recommendation / Potential Partners	Complexity / Time / Cost
67	4.2.1A	**Increase Engagement with Local Government** **Recommended Lead:** DAR **Potential Partners:** Maui County Environmental Coordinator, state and federal managing agencies, Natural Resource Councils, Aha Moku Councils, County Prosecuting Attorney's Offices	
67	4.2.1B	**Establish a Community-Based Management Network and Learning Group** **Associated PSD and Strategy Priority Objective:** 1.1 **Recommended Lead:** Kua'aina Ulu 'Auamo (KUA) **Potential Partners:** DAR, TNC, Maui Nui Marine Resources Council	

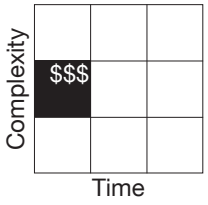
Step 2. Recommendations Associated with Preparation of a Plan of Action (4.2.2)

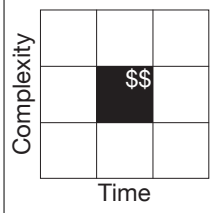
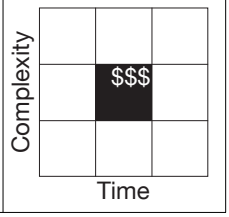
Page #		Capacity Building Strategy / Recommendation / Potential Partners	Complexity / Time / Cost
68	4.2.2A	**Increase Facilitation Capacity at Public Meetings and within DAR to Improve Management Plans** **Recommended Lead:** DAR **Potential Partners:** Hawaii Coral Reef Initiative Research Program (HCRI-RP), UH, NOAA	
69	4.2.2B	**Integrating Eco-tourism, Volun-tourism, and Premium Tourism Experiences into Management Plans** **Recommended Lead:** DAR Coral Program, Recreational Impacts to Reefs Local Action Strategy Advisory Group **Potential Partners:** HTA, Hawaii Eco-Tourism Association, Hawaii's Green Business Program	

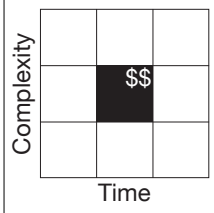
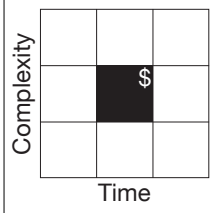
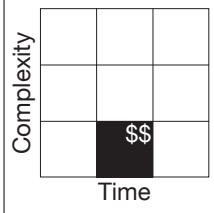
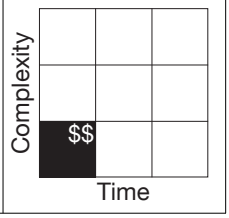
Step 3. Recommendations Associated with Securing Formal Commitment (4.2.3)

Page #		Capacity Building Strategy / Recommendation / Potential Partners	Complexity / Time / Cost
70	4.2.3A	**Use Social Science to Secure Formal Commitment for Natural Resource Protection** **Associated PSD and Strategy Priority Objective:** 1.1 **Recommended Lead:** Hawaii Coastal Zone Management (CZM) Program and Office of Planning **Potential Partners:** UH Manoa Geography Department, HCRI-RP, and National Park Service	
71	4.2.3B	**Secure Formal Commitment to Institutionalize Key Positions Such as Watershed or Coastal Coordinators** **Associated PSD and Strategy Priority Objective:** 1.1 **Recommended Lead:** DAR, NOAA, NFWF **Potential Partners:** DLNR Secretary, Castle Foundation, Hawaii Department of Health (HI DOH), Environmental Protection Agency (EPA), United States Coral Reef Task Force (USCRTF)	

Step 4. Recommendations Associated with Program Implementation (4.2.4)

Page #		Capacity Building Strategy / Recommendation / Potential Partners	Complexity / Time / Cost
72	4.2.4A	**Using Outreach Tools Such As Community-Based Social Marketing To Influence Behavior of Resource Users** **Recommended Lead:** NOAA Coral Fellow and Public Relations DLNR staff member **Potential Partners:** Coral Reef Alliance, SeaWeb, NOAA Coral Reef Ecosystem Division	

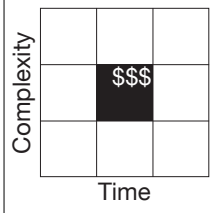
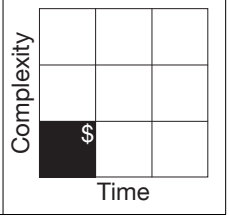
Step 4. Recommendations Associated with Program Implementation (4.2.4) (cont.)			
Page #	**Capacity Building Strategy / Recommendation / Potential Partners**		**Complexity / Time / Cost**
72	4.2.4B	**Strategies to Improve Program Implementation Through More Effective Grants Management** **Recommended Lead:** Administrative lead within DAR **Potential Partners:** NOAA CRCP grants administrators and other jurisdictional grants administrators	
73	4.2.4C	**Reinvigorate the Managing Better Together Learning Network** **Recommended Lead:** TNC and Managing Better Together Learning Network (MBT) **Potential Partners:** Coral reef management network of the Main Hawaiian Islands	

Step 5. Recommendations Associated with Reflection and Evaluation (4.2.5)			
Page #	**Capacity Building Strategy / Recommendation / Potential Partners**		**Complexity / Time / Cost**
74	4.2.5A	**Learn from CAP Process and Explore Ways to Expand It** **Associated PSD and Strategy Priority Objective:** 2.1 **Recommended Lead:** TNC **Potential Partners:** DAR, Hawaii CZM Program	
74	4.2.5B	**Create an Inventory of Completed Coral Reef Management Projects** **Associated PSD and Strategy Priority Objective:** 2.2 **Recommended Lead:** DAR, NOAA CRCP, Pacific Islands Marine Protected Areas Community (PIMPAC) **Potential Partners:** All involved in implementing and managing coral reef projects	
75	4.2.5C	**Case Study Curriculum** **Recommended Lead:** PIMPAC **Potential Partners:** HCRI-RP and MBT	
76	4.2.5D	**Use Scorecards and Inventories to Track Evidence of Enabling Conditions for Improved Coral Reef Management** **Recommended Lead:** NOAA CRCP and DAR **Potential Partners:** NOAA CRCP funding recipients, NFWF	

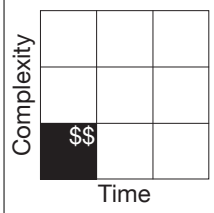
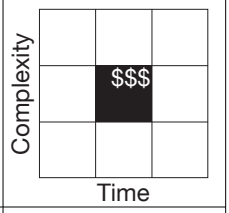
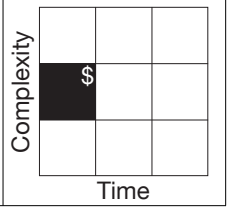
Group 3 Recommendations: Tractable Projects

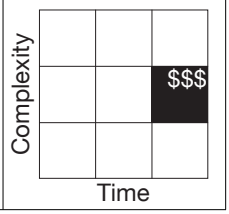
This group of recommendations includes programs, trainings etc. that focus on building a range of technical, financial, social, institutional and political capacities.

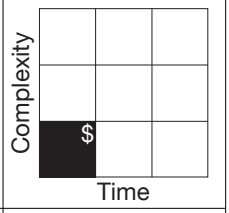
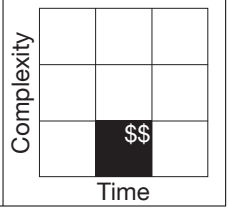
Theme 1. Recommendations to re-establish and improve the high-level function and purpose of DAR within DLNR and DLNR as a whole

Page #		Capacity Building Strategy / Recommendation / Potential Partners	Complexity / Time / Cost
77	4.3A	**Make the Business, Political and Common-sense Case for Improved Coral Reef Management within DLNR** **Recommended Lead:** DAR and DLNR's other ocean-related Divisions (DOBOR, Office of Conservation and Coastal Lands (OCCL), DOCARE, Division of Forestry and Wildlife (DOFAW), etc.) **Potential Partners:** UH (Economic Resource Organization), organizational development companies in Hawaii	
78	4.3B	**Increase Quality of Formal Communication between DLNR and Board of Land and Natural Resources (BLNR) on Coral Reef Management Status** **Recommended Lead:** DNLR and BLNR **Potential Partners:** Land Board Secretary	

Theme 2. Recommendations to improve management of coral reef conservation activities

Page #		Capacity Building Strategy / Recommendation / Potential Partners	Complexity / Time / Cost
79	4.3C	**Inventory Best Management Practices Status, Regulation Guidance, Compliance and Enforcement, and Engage County as well as Federal and State Stakeholders** **Recommended Lead:** HI DOH and EPA **Potential Partners:** NOAA, OCCL, Hawaii CZM Program, DOFAW	
79	4.3D	**Move Forward with the Rapid Response Contingency Plan** **Recommended Lead:** DAR, NOAA Coral fellow **Potential Partners:** DOBOR, DOCARE	
79	4.3E	**Re-invigorate the Coral Reef Working Group** **Recommended Lead:** DAR **Potential Partners:** Main Hawaiian Islands coral reef management network, Program Manager HCRI-RP	

Theme 2. Recommendations to improve management of coral reef conservation activities			
Page #	**Capacity Building Strategy / Recommendation / Potential Partners**		**Complexity / Time / Cost**
80	**4.3F**	**Define the Range of Potential MPA Structures** **Recommended Lead:** DAR Administrator **Potential Partners:** Learning Exchange Partners in California	

Theme 3. Recommendations targeted to the resource users			
Page #	**Capacity Building Strategy / Recommendation / Potential Partners**		**Complexity / Time / Cost**
81	**4.3G**	**Inventory Effective Mentorship and Public Outreach Programs** **Recommended Lead:** DAR and the Inter-Agency Outreach Working Group **Potential Partners:** Existing mentor programs such as SeaHarmony, Coral Reef Alliance, TNC, Trilogy, UH, etc	
82	**4.3H**	**Targeted Outreach to Build Eco-Cultural Capacity** **Recommended Lead:** KUA **Potential Partners:** West Hawaiian Canoe Club and Surfrider Foundation, UH Hawaiian Studies Program, Department of Hawaiian Homelands, Office of Hawaiian Affairs, Kahoʻolawe Island Reserve Commission	

Section One: Introduction

1.1 Scope and Purpose of this Assessment

This capacity assessment is a component of the coral reef management priority setting process facilitated by the National Oceanic and Atmospheric Administration's Coral Reef Conservation Program (NOAA CRCP) and initiated in 2009. The stated purpose of this process was "to develop place-based, local coral reef management priorities" for the seven United States (U.S.) state and territorial coral reef jurisdictions, including Hawaii. In Hawaii, the priorities in the 2010 publication of Hawaiian Archipelago's Coral Reef Management Priorities (henceforth, the "Priority Setting Document," or "PSD") were largely created in support of the ongoing development of the Hawaii Coral Reef Strategy: Priorities for Management in the Main Hawaiian Islands 2010-2020 (henceforth, the "Strategy) and The Papahānaumokuākea Marine National Monument Management Plan. Given that, the Strategy was the main lens for the capacity assessment process. For the purposes of this assessment, our scope included exclusively the Main Hawaiian Islands (also referred to as Hawaii and State of Hawaii as distinctive terms that are more appropriate in a given context). The Strategy includes, in Section 6, a brief summary of governance capacity issues in Hawaii entitled "Capacity Gaps." In this section, the Strategy states that, "The HCRS [the Strategy] cannot be implemented effectively without addressing capacity gaps in coral reef management." In September 2011, NOAA CRCP hired SustainaMetrix to conduct a more detailed assessment across all seven coral jurisdictions including Hawaii, which expands on this initial effort to address capacity gaps in ecosystem governance for coral reef management in Hawaii. This report summarizes the findings of our capacity assessment conducted in Hawaii between September 2012 and April 2013, including a 14-day site visit to Hawaii from November 26 to December 10, 2012, the review of over 140 background documents, over 65 interviews, and ongoing collaboration with the Hawaii Jurisdictional Capacity Assessment Team (J-CAT).

The Strategy identifies two high-priority geographic areas (or "priority sites") at which to apply key goals and objectives. The PSD and the Strategy guided our initial approach to the capacity assessment, essentially framing the assessment in terms of the capacity present in the system to accomplish the goals, and objectives detailed in them. From this starting point, we adaptively deployed a set of methodological tools aimed at building our understanding of the system and illuminating current capacity gaps, as well as persistent barriers to building capacity, as they related to realizing the goals and objectives in the PSD and Strategy.

The primary purpose of this assessment is to examine capacity in Hawaii as it relates to the priorities expressed in the PSD and the the Strategy document. It is important to note that the Strategy was developed with local staff from most task force agencies at the table, and the group envisioned it as something they would all work to implement. While many of the recommendations in this document focus on the Department of Land and Natural Resources (DLNR) and Division of Aquatic Resources (DAR), there are many state, county, and federal agencies with authorities to manage corals (i.e. Hawaii Costal Zone Management Program (Hawaii CZM Program), Hawaii State Department of Health (HI DOH), United States Fish and Wildlife Service (USFWS), United States Army Corps of Engineers (USACE), NOAA, etc.) and they are fully expected to participate in the review of the recommendations and to identify how they can play a significant role for implementation of capacity building strategies. Furthermore,

the Strategy acknowledges that while threats to coral reefs are diverse and operate at a range of scales, from local fishing pressures and regional pollution impacts to the global drivers of climate change and ocean acidification, the document concludes that "to improve ecosystem health these threats have to be managed comprehensively and in a holistic manner." In Hawaii, this directive was expressed by the creation, in the the Strategy and in turn the PSD, of five priority objectives under four goal headings to be addressed primarily at two priority sites (Kāʻanapali-Kahekili in West Maui and Pelekane Bay-Puako-Anaehoʻomalu Bay in South Kohala). In the strictest sense, as envisioned by these high-level NOAA CRCP documents (the PSD and the Strategy), the scope of our work in the state is to assess the capacity to manage coral reefs in Hawaii as it relates to the PSD and Strategy goals and objectives, made operational at the priority sites.

That being said, we recognize the wide geographic range of coral reefs in Hawaii and the complexity inherent in managing coral resources, and realize that approaches and capacities will need to be present across a range of topics (that require a broad range of competencies and capabilities) and at a variety of scales to adequately address the challenge of managing Hawaii's marine resources, and those scales may go beyond the bounds of individual programs targeted within the priority sites. Indeed, in many cases, we found that many of the practitioners involved with coral reef management in Hawaii felt that the Strategy, was not a primary driver of management actions, and some noted that it did not adequately capture the specifics of the tasks of managing coral and other coastal resources across the state. As discussed in more detail at the end of this Section (Section 1.4), one of the challenges of this capacity assessment has been to balance the need to aim our inquiry flexibly across multiple scales and topics with the critical need to preserve focus on the more circumscribed issues laid out by the PSD and Strategy goals and objectives addressed at the priority sites.

1.2 Our Approach: Ecosystem-based Management

Our approach to conducting this capacity assessment, which we believe aids in creating the required flexibility, is described in the document prepared by SustainaMetrix "Coral Reef Management Capacity Assessment Methodology" which was submitted to, and approved by, NOAA CRCP in February 2012. Our methodology builds off of a conceptual framework known as "Ecosystem-based Management", or simply "the ecosystem approach" (NRC, 2008; Olsen et al., 2009; McLeod and Leslie, 2009). The ecosystem approach has been expressly endorsed by NOAA CRCP in its Coral Reef Conservation Program Goals and Objectives 2010-2015 document and in the language included in the preliminary capacity assessment appendices in most of the jurisdictional PSDs (which appear in the Strategy in Hawaii). Simply put, the ecosystem approach acknowledges that ecosystems and the people that live within them and in proximity to them, and depend on them for goods and services, must be understood and managed as a dynamically linked, interdependent system. The ecosystem approach requires a fundamental management paradigm shift that transcends single-species management, as well as the more holistic consideration of larger natural systems (e.g. watersheds, coral reefs), to explicitly include the human and social components therein. It further accepts that natural and social systems are dynamically linked and that changes in one realm have impacts in the other and that these impacts can include self-reinforcing feedbacks (Figure 1).

In our approach to the assessment of capacity to the practice of Ecosystem-based Management, we have complemented a core philosophy with a peer-reviewed set of tools, methods and a common vocabulary. The common vocabulary terms are defined in Appendix A.

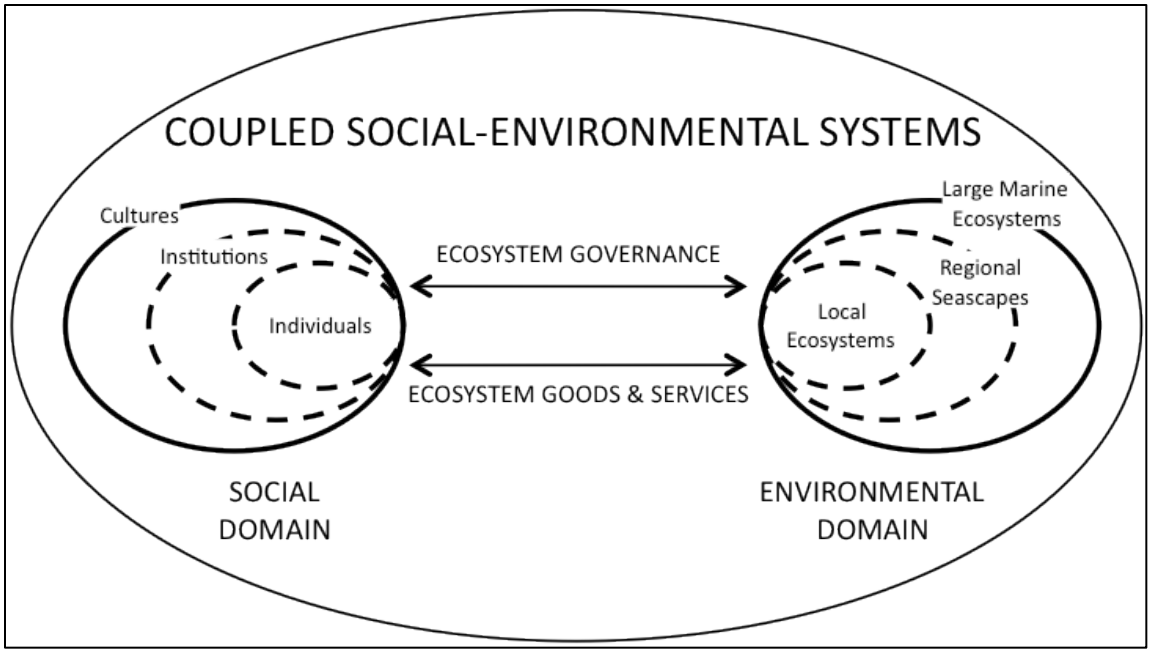


Figure 1*: Dynamic human and ecological systems are referred to as "coupled social-ecological systems." Interactions between the social and ecological domains occur over multiple geographic scales, and understanding connections across scales is critical to long-term success. Figure adapted from McCleod and Leslie (2009).*

These methods are designed for application in a variety of locations, embracing the local context as well as the complexity and dynamism of the coupled social and natural ecosystem. Our purpose is to help assess capacity of a given management system's readiness and capability to truly pursue management actions that are realistic with the current operational realities and that seek a more holistic approach to understand, consider and adapt to changes in the coupled human/natural system. Our goal is to provide products and services that have the best likelihood of meaningful success given current situational dynamics and recommending strategies for preserving and enhancing both the natural and social systems being managed. Among these tools are two related frameworks for assessing the maturity of a given program and its progression along a series of steps toward program success, growth and long-term goal attainment. We have designed these to be simplifying frameworks that feature systems thinking and complexity concepts to enhance innovation in management and use of findings.

The first of these tools is the **Management Cycle** (Figure 2), which gives a clear and straightforward presentation of the main steps through which a program should progress through linked cycles of adaptive management.

These steps are:

- Analysis of problems and opportunities (Step 1);
- Formulation of a course of action (Step 2);
- Formalization of a commitment to a set of policies and a plan of action and the allocation of the necessary authority and funds to carry it forward (Step 3);
- Implementation of the policies and actions (Step 4); and,

- Evaluation of successes, failures, learning and a re-examination of how the issues themselves have changed (Step 5).

These steps are imagined as a cycle, in that evaluation and learning in Step 5 can and should inform a new round of analysis, matching program formulation with the situation and context (ideally more ambitious and innovative as time progresses), the securing of additional formal commitment, new program implementation, followed by reflection and so on. Ideally, thoughtful progression through these linked cycles facilitates true "adaptive management."

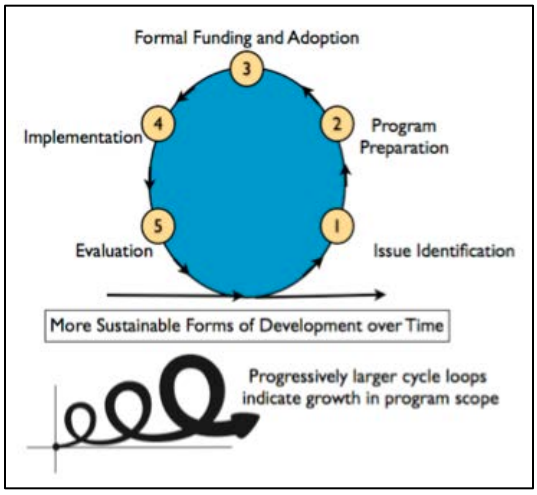


Figure 2*: The Management and Learning Cycle.*

The second tool, **Outcome Analysis**, is envisioned as a complement to the Management Cycle and is intended to help focus analysis clearly on the specific, intended outcomes of programs that seek to work generally to achieve societal and environmental goals (Figure 3).

This tool helps to disaggregate and characterize the goals of a program into well-defined Orders of Outcomes that can be readily discussed, analyzed and compared across disparate settings (e.g. priority sites or the seven U.S. flag coral jurisdictions). Within the Orders framework, the four Orders of Outcomes progress from assembling the enabling conditions for success through to the realization of long-term, sustained social and natural systems health, with two intermediate steps:

- **First Order Outcomes:** Assembling the enabling conditions for the successful implementation of a plan of action:
    1. Clear, time-bound and unambiguous goals that describe both realistic and desired societal and biophysical conditions that may be reached in the near-term (such as 5-10 years);
    2. Supportive and informed constituencies for attainment of the desired goals;
    3. Formal commitment for a desired plan of action to meet the goals; and,
    4. Sufficient institutional capacity to implement the plan of action to meet the goals.
- **Second Order Outcomes:** Successful program implementation resulting in the desired behavioral change that is required to meet the goals;
- **Third Order Outcomes:** Achievement of target environmental and societal conditions as defined in the First Order - this is fully expected to be adaptive; and,
- **Fourth Order Outcomes:** Guiding long-term vision towards a purpose, such as sustainable development, that may include sustaining and maintaining the target outcomes over the long-term.

While the "Capacity Gaps" presented in Section 6 of the the Strategy makes explicit reference to the necessity of addressing capacity gaps in coral reef management for program success, it does not expressly refer to the enabling conditions within the Orders framework. Doing so simply recognizes that assembling the key enabling conditions is

a 1st Order Outcome; that is, there are appropriate first order goals that must be achieved before programs can be mounted that seek to change behaviors (2nd Order), in order to achieve targeted social and environmental outcomes (3rd Order), which can then be institutionalized to achieve a stable, sustainable and healthy social and environmental norm (4th Order).

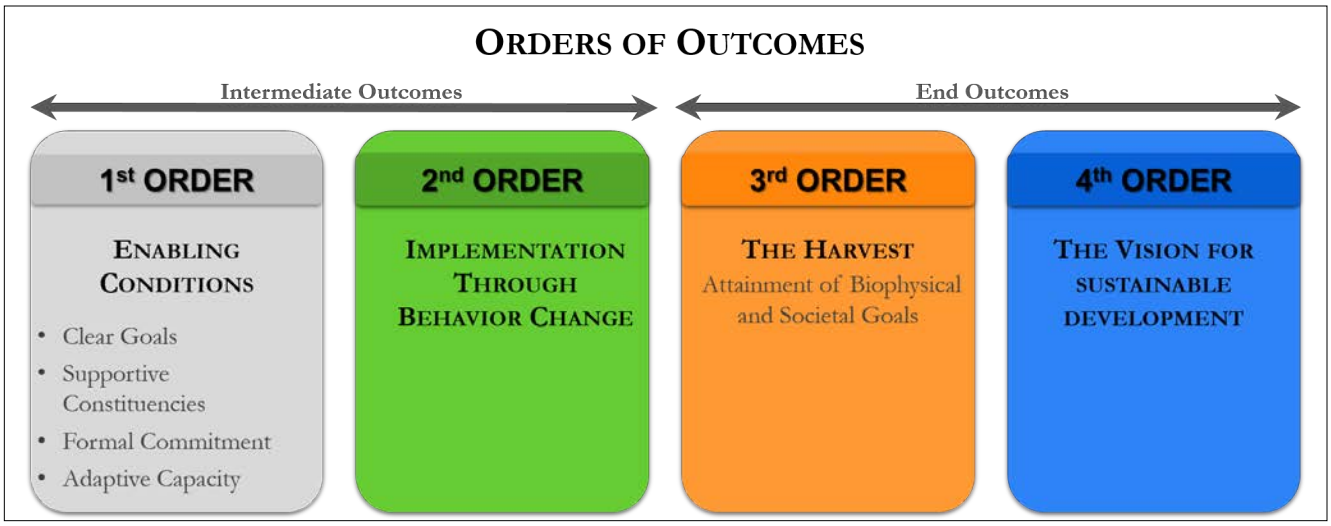


Figure 3: *Orders of Outcomes analysis helps focus analysis clearly on the specific, intended outcomes of programs that seek to work generally to achieve societal and environmental goals (Olsen et al., 2009).*

With respect to this (or any) capacity needs assessment, it is important to recognize that having the capacity present within an organization (e.g. DAR within DNLR) is only one piece of a whole that also includes setting clear and realistic goals, having supportive constituencies, and obtaining formal commitment across all levels of the government. That said, DAR is at the center of a larger, complex system of coral reef management entities within Hawaii, including local government, many large and small non-governmental organizations (NGOs), and other state as well as federal managing agencies. This necessitates a broader view of "capacity" beyond the financial, personnel and equipment resources that reside within the target organization.

It is our intent in this capacity assessment to apply these analytical tools (The Management Cycle and the Orders of Outcomes) to create a common language in order to examine the capacity present in coral reef management network in the Main Hawaiian Islands. While the concepts and vocabulary may be unfamiliar to some, we believe that they provide a clear and well-developed methodological framework for both process and outcomes that will help coral practitioners across Hawaii, from local site managers to high-level government officials, clearly evaluate and compare plans and programs that intend to improve social and environmental outcomes.

1.3 Our Approach: Adaptive Capacity

While employing the tools and language of Ecosystem-based Management can add great clarity to the process of identifying issues, developing goals and the plans to accomplish them, and engaging in meaningful reflection and learning, it is equally important to recognize that the process is inherently complex, dynamic and highly contextual. Social and environmental conditions are undergoing constant change, and the nature of this change, and how best

to respond to it, can vary significantly from place to place. Acknowledging this, and creating robust methods to detect, understand and respond to change in a contextually relevant manner (i.e. "adaptive capacity") is essential.

Accomplishing this in the complex and multi-level system that exists to manage and protect coral reefs in the State of Hawaii presents many unique challenges. Coral management is expressed at the federal and state level, and increasingly at the local level, through Community Managed Marine Areas (CMMAs), Community-Based Subsistence Fishing Areas (CBSFAs) and other community-based management structures. Building resilient and flexible management regimes that can sense, learn from, and adapt to operational and strategic issues that emerge and evolve at a variety of scales across federal, state and local natural resource management programs (Figure 4) will be critical to long-term, sustainable and successful coral management in Hawaii (Armitage, 2005). In the remainder of this Section, we review the specific methods we used to gather data about coral reef management in the Main Hawaiian Islands and analyzed and integrated it into a coherent description of the problems affecting the system. We review the findings and explain the development of our recommendations for sequencing and prioritizing capacity building activities that meet the management needs as understood from the perspective of adaptive capacity and Ecosystem-based Management.

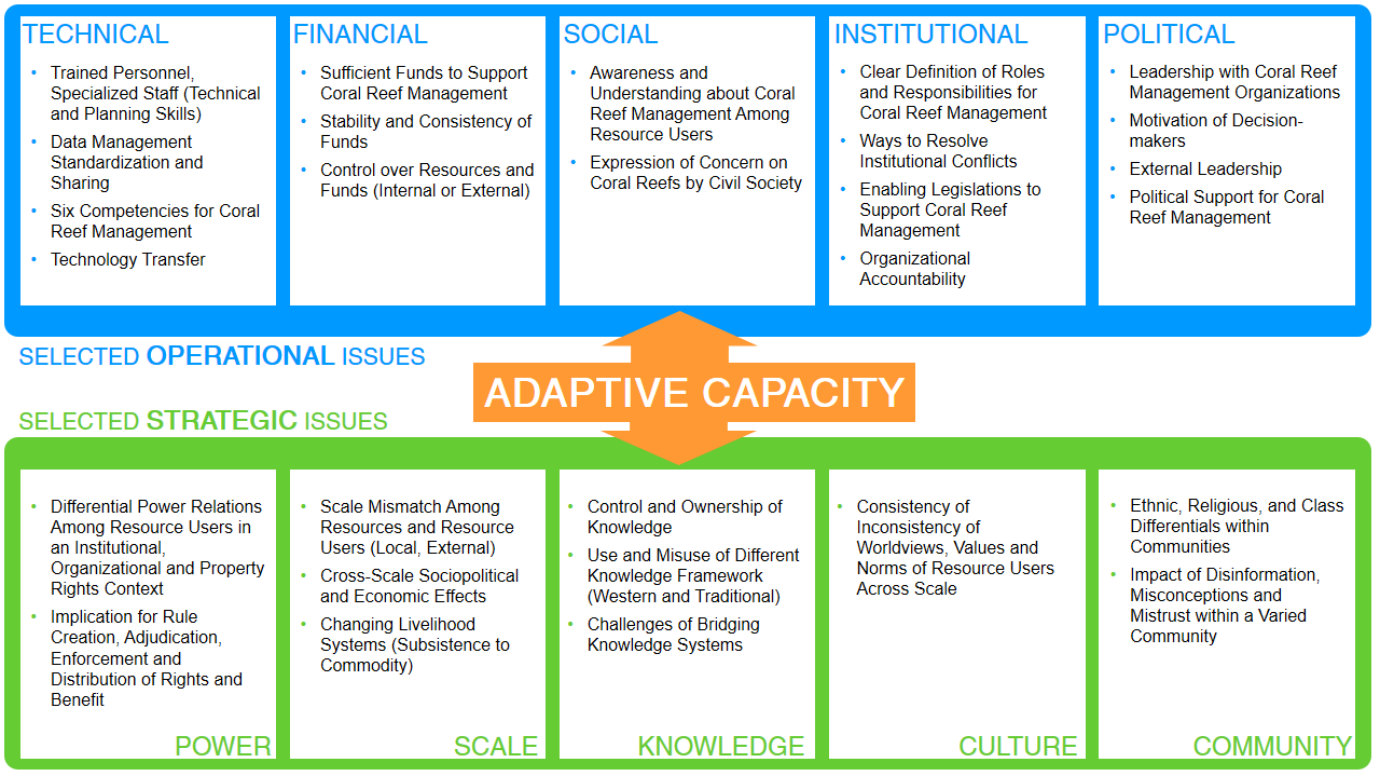


Figure 4: *Adaptive capacity diagram displays the dialectic between operational and strategic issues (adapted from Armitage, 2005).*

1.4 Additional Capacity Assessment Tools

The capacity assessment work began with a detailed document review and discussions with key NOAA personnel, as well as a review of the current literature, selected projects, pressing issues, and preparation of a timeline to grow an understanding of recent activities in coral reef management in the Main Hawaiian Islands. This review was used

initially to illuminate capacity gaps as well as underscore existing management capacity in the system. The assessment continued with in-depth telephone interviews, email correspondence, and in-person interviews and focus groups conducted during a site visit to the Main Hawaiian Islands in November/December 2012. After the site visit, the data gathering continued with follow-up interviews, further document review, analysis and synthesis through June 2013, with a range of stakeholders throughout the Main Hawaiian Islands coral reef management system. The key components of how we gathered and analyzed data and conducted the capacity assessment are summarized below.

Jurisdictional Capacity Assessment Team: As part of the process of inquiry into capacity needs, we convened a small standing committee of people with in-depth knowledge and deep personal involvement in coral reef management in the Main Hawaiian Islands that we dubbed the "J-CAT." We held seven meetings with this group, either by conference call or in person, between September 2012 and March 2013 including an in-person meeting during our November/December 2012 site visit. We collaborated with J-CAT members during scheduled meetings, as well as on an ad hoc basis, to:

- Share available information at key points in the capacity assessment process;
- Create a shared communications strategy about the capacity assessment process;
- Customize the methods based on local context;
- Coordinate an efficient process of data collection;
- Provide input to assist in prioritizing capacity building needs;
- Analyze and summarize results and recommendations; and,
- Make the overall process as useful as possible within the current context of coral reef management in the Main Hawaiian Islands.

Our goal was to build high quality collaboration among the consultant team and the J-CAT with a clear beginning, middle and end to our process that provided extensive opportunity for input along the way. J-CAT members summarized the experience with largely positive comments particularly noting the huge amount of material gathered for the analysis and learning that occurred during the process. It is important to note that while consensus was a common outcome from the J-CAT collaborative process, the consultant team made it clear that the role of the J-CAT was as a supportive and guiding function across all aspects of the process, not with the specific goal to arrive at consensus. Therefore, the consultant team remains responsible for the overall product and process. This document was developed, carefully reviewed, prioritized and edited in consultation with the Hawaii J-CAT.

Goals and Objectives for Coral Reef Management in Hawaii: The Strategy identifies four primary management goals:

- Goal 1: Coral reefs undamaged by pollution, invasive species, marine construction and marine debris;
- Goal 2: Productive and sustainable coral reef fisheries and habitat;
- Goal 3: Coral reef ecosystems resilient to climate change, invasive species and marine disease; and,
- Goal 4: Increased public stewardship of coral reef ecosystems.

Under those four goals there were thirty total objectives developed. Of those thirty objectives, five were deemed priority objectives:

- Objective 1 (G1, G2, G3, G4): Reduce key anthropogenic threats to two priority near-shore coral reef sites by 2015 and five by 2020 using ahupua'a-based management;
- Objective 2 (G1, G3): Prevent new invasive species introductions and minimize the spread of established aquatic invasive species populations by 2020;
- Objective 3 (G2): Increase the abundance and average size of ten targeted coral reef fisheries species critical to reef health and ecological function by 2020;
- Objective 4 (G2, G3): Designate a sufficient area of marine waters under effective conservation by 2020 to ensure sustainable and resilient coral reef ecosystems; and,
- Objective 5 (G2, G3): Reduce anchor damage and trampling on coral reefs through implementation of no-anchor zones, utilization of day-use mooring buoys (DMB) and other means by 2020.

An early step in the capacity assessment was to review previous Local Action Strategies (LAS) as well as site-based management plans, as appropriate, for the two priority sites. Plans and reports on coral reef management across the Main Hawaiian Islands were used to better understand the wide array of coral reef-related projects in the system, with the goal of investigating the capacity present in the system to execute these projects and achieve the goals and objectives stated in the Strategy and PSD.

It is important to note that there is an ongoing and healthy discourse regarding the pros and cons of working at priority sites versus working on issues across a wider geography as described by the LAS. Dialogue with the Hawaii J-CAT revealed this diversity of opinion. Nonetheless, we believe our focus at the scale of selected priority sites, as well as considering issues across wider geographic areas, represent instructive examples to help uncover and illuminate capacity challenges. We believe the two priority sites are at the appropriate scale to be an incubator for developing a range of capacities and are reflected in a specific group of recommendations in this report (Section 4.2 Recommendations). We also note, however, that our examination of capacity issues and our recommendations are not limited in relevance to only the priority sites.

After building background knowledge of coral reef management in the state we developed, with J-CAT members, a list of key contacts associated with various initiatives and projects across the Main Hawaiian Islands, and developed a plan to interview each contact. Interviews built our understanding of how the projects fit into the larger coral reef management system in the state and how its "performance story" could illuminate capacity gaps and persistent barriers as well as successes in building capacity and managing coral resources. The associated coral reef management initiatives became a primary, but not the only (or in some cases even the dominant) line of inquiry in our interviews. We prepared detailed qualitative summaries of each interview, coded and collated in several ways, including gap and barrier "issue themes" as well as groups of related potential capacity building approaches and existing examples of successes in capacity for coral reef management.

Each interviewee was given the opportunity to review and contribute to the Timeline of Coral Reef Management in Hawaii as a participatory element of the interviewing process. (Photo credit: Glenn Page, SustainaMetrix.)

Timeline for Coral Reef Management in Hawaii

We developed a detailed timeline of key events affecting capacity to manage coral reefs in Hawaii, and their management, beginning in with a few select events that underscore the previous expressions of traditional Hawaiian ecosystem management to the present with far more detailed descriptions of events and elements that provide evidence of building capacity. An analysis is presented in the next Section 2.2 and 2.3. The timeline includes natural events such as large hurricanes and bleaching events, as well as key governance milestones, from political events like the establishment of Hawaii as a U.S. state, to laws and rulings that directly affect coral management. The timeline was based upon our documentation of interviews and anecdotes as well as historical information published about the system from perspectives in social science, humanities and natural science.

We printed out, on a long sheet of paper (about 10 ft), a physical timeline and brought it with us to meetings during the site visit for review and input. The timeline proved to be of interest to interviewees, who often expressed gratitude in the level of detailed information about coral reef management over time pulled together in one place, in particular the recognition of Native Hawaiian contributions to the social, political, economic and ecological circumstances of the Hawaiian archipelago. All were encouraged to "grab a Sharpie" and add new events. With strong input, the timeline became far more detailed and complete during the course of our visit and afterwards via email (see Appendix B: Timeline of Coral Reef Management in Hawaii for a tabular representation of the timeline, including these additions). The timeline not only presents highly useful, contextually relevant information, but it serves as a visual reminder of the wide range of antecedents, actions, and plans that have built the platform for contemporary coral reef management, and that current and future managers need to consider these historical antecedents. The timeline also became an "icebreaker" and created an engaging environment within which to conduct our interviews.

While timelines are never fully complete, the timeline reveals that recently there has been significant capacity built to manage the coastal zone, and more recently coral reefs. However, the timeline also reveals a range of management plans and mandates that have been formulated and may have received formal commitment, but are not fully implemented (such as the Community-Based Fishing Area Rules Package). As a result, the timeline reveals that there is a positive trend for building capacity for integrated coral reef management in the Main Hawaiian Islands, but with additional analysis also provides evidence of implementation gaps, forces of fragmentation, periods of high and low management capacity and political will, challenges posed by dynamic natural and social systems, and conflicting priorities. These dates are not evident in the timeline as they represent the wide range of forces that tend to constrain institutional capacity building and adaptive implementation of coral reef management and are the focus of this assessment.

Adaptive Approach to Capacity Needs Assessment: Over the course of conducting the assessment and applying the tools discussed above, we adapted our approach due to realities encountered during the site visit and during interviews. While interviewees expressed that the LAS's guided their management, it was commonplace among those interviewed that neither the PSD, the LAS's or other relevant management plans appeared to be the key expressed driver of their coral reef management priorities or activities. Furthermore, in some instances, when we investigated a given current activity with staff who were thought to be involved in the activity, they were not familiar with it, or dismissed it as something in a document in which they had little investment. Nonetheless, our semi-structured interview approach worked well as we often began inquiring about a specific activity and expanded the scope to include more open-ended dialogue that illuminated gaps and barriers, successes, and more broadly, the current status and context of the coral reef management system in the Main Hawaiian Islands. Finally, we also conducted an analysis of the enabling conditions (1st Order), which includes reflections on what may be needed regarding changes in behavior and social norms (2nd Order) required to effectively build capacity to improve coral reef management in the Main Hawaiian Islands.

Our investigation of current activities yielded specific and often detailed information about gaps and barriers to successful implementation of the projects. These findings are not presented here in a project-by-project review, as that would be beyond the scope of this effort. The findings on capacity building needs, as presented here, are therefore informed by:

- A review of over 140 documents relevant to the system (please see Literature Cited and Appendix C: For More Information);
- Over 65 in-depth interviews with key actors in the system (please see Appendix D for full interview list);
- Development of the timeline (with over 130 entries) and review of current activities as defined above;
- Our discussions with, and feedback from, the J-CAT, which spanned over 7 meetings held on: October 22, November 7, November 19, December 7 (in-person), January 9, February 27, and March 28;
- Our immersion in and contributions to the professional literature of coastal governance, capacity assessment, organizational behavior and other related disciplines; and,
- Our professional judgment, informed by similar assessments in other U.S. flag coral jurisdictions and locations around the world.

Generation and Prioritization of Recommendations: The recommendations in Section Four are intended to serve as the core of a comprehensive capacity building strategy. Section Five presents a long-term capacity building "road map" with an overview of elements that would serve as main ingredients of a long-term capacity building strategy. Together, they represent a range of tasks that should not be viewed as another list of things to do. Rather, they are presented as core elements of the ecosystem approach that recognizes that context is dynamic and ever changing. Therefore sequencing and prioritizing what is done to build momentum for capacity building is crucial. The recommendations presented in this report were generated after careful consideration of the need to sequence and prioritize, and in close coordination with the Hawaii J-CAT. SustainaMetrix used the results of this process to summarize the recommendations in their final, prioritized order as presented in the Recommendations Table in the Summary of Major Findings and in Section Four of this report.

Section Two: The Context for Coral Reef Management in Hawaii

2.1 Introduction to Context in Hawaii

Situational awareness and contextual understanding is important for all natural resource managers but particularly important for coral reef management in the Main Hawaiian Islands. The context is dynamic and rapidly changing, with a landscape of coral reef management in the Main Hawaiian Islands that operates at multiple scales across a distance of over 1,200 miles and a diverse range of cultural settings. As noted in the previous section, assessment of capacity to manage coral reefs in the Main Hawaiian Islands is highly dependent on the socio-ecological context within which such management is taking place. This calls for an understanding of the pressures on coral reef systems, the current state (condition) and likely emerging trends in the coral reef condition and comprehension of the larger governance dimensions that are responding to the drivers and pressures influencing the state of the coral reef resource. This consideration of the broader context of capacity for coral reef management is a central tenet of the ecosystem approach (Section 1.2). Understanding interactions across spatial and temporal scales is essential to interpreting the context of coral reef management in Hawaii. This analysis helps to ensure that recommendations in later chapters of this report are grounded in the awareness that specific attributes and determinants of adaptive capacity may be scale-dependent (Adger and Vincent, 2005), culture and place specific (Adger, 2003), and may involve tradeoffs (Folke et al., 2002; Allison and Hobbs, 2004; Pelling and High, 2005).

In this section we briefly characterize the context for coral reef management in Hawaii across these dimensions. We use the term drivers to include natural or human induced factors that cause changes to the state of the coral reefs of Hawaii. Direct drivers unequivocally influence ecosystem processes while indirect drivers cause ecosystem change by influencing one or more direct drivers (Millennium Ecosystem Assessment, 2005). For a more complete review of the ecological systems of the Hawaiian Islands, there are many resources, one example is the An Ecoregional Assessment of Biodiversity Conservation for the Hawaiian High Islands (TNC, 1998). For a more detailed summary of coral reef health please consult The State of Coral Reef Ecosystems of the Main Hawaiian Islands (Friedlander et al., 2008).

2.2 Importance of Social and Historical Context

Throughout the history of Hawaii, the community of entities engaged in coral reef management has been constantly evolving and expanding. Today we see a strong presence across federal and state agencies, as well as a wide variety of NGOs, markets, and civil society. The level of engagement and number of managing entities varies not only across the four counties, but also across the eight Main Hawaiian Islands and the communities therein. Understanding the "island context" and "community context" is therefore critical to efficient and effective coral reef management in the Main Hawaiian Islands, as every island has unique sources of power, constituents, interest groups, and levels of support, all of which must be taken into account when engaging in coral reef management.

The Timeline of Coral Reef Management in Hawaii (Appendix B) tells us a great deal about the context for coral reef management, particularly with respect to drivers, pressures, and associated responses of governance. At the time of Polynesian settlements in Hawaii over 1,300 years ago, natural resources were managed in a sustainable manner and ecosystem stewardship was firmly installed in the values of society. Native Hawaiians had a deep connection to the terrestrial and marine resources that they depended upon for subsistence. They also believed that their ancestral elders' spirits were embodied in those natural resources, and as such they treated them with the utmost respect and complied with sophisticated social controls and regulations in place to ensure they were used sustainably (Higuchi, 2008; Jokiel et al., 2011). The Konohiki, a group of appointed chiefs under the King, supported a series of prohibitions, or kapu system, to ensure coordinated conservation practices for the harvest of natural resources. The Konohiki had the right to regulate or tax practices such as the timing, species and amount of fish caught. Penalties and enforcement were strict, and in turn compliance under the Konohiki system was high (Tanaka, 2008). With the arrival of Europeans in 1778, Hawaii experienced a rapid increase in ranching, agriculture, and natural resource exploitation, creating a mix within Hawaiian society of traditional and Western forms of environmental use. The shift from traditional resource management and fishing rights to U.S. government regulations in the early 1900s via the Hawaiian Organic Act (1900) marked the end of the Konohiki system in Hawaii and the formal establishment of Western mandate for environmental exploitation. With the development of trans-oceanic commercial flights, tourism boomed in Hawaii starting around the 1950s. At that point, Hawaii had shifted away from traditional environmental stewardship and was becoming rooted in exploitation for economic gain. Hawaii's environmental stewardship revival of the 1970s and 1980s, spurred by awareness that unsustainable development and exploitation were causing harm to the terrestrial and marine environment, mirrored the national swell in attention to the impacts of human behavior on ecosystem function. State-led initiatives of this time (e.g. the Hawaii State Planning Act of 1978 and the Western Pacific Regional Fishery Management Council's multiple Fishery Management Plans) nicely nested within recently created federal legislation, such as the Clean Water Act and the Clean Air Act. This manifested itself further in the form of newly created stewardship organizations, natural resource management councils, and increased presence of NGOs in Hawaii. During this time agriculture lost its prominent place in Hawaii's economy and tourism overtook it as the most influential sector of the state's economy. This economic dynamic caused a fundamental shift in land use across the Main Hawaiian Islands, affecting working lands, residential sprawl, and infrastructure needs. A new era of focus on coral reefs emerged in the late 1990s, beginning with the establishment of 1997 as the International Year of the Reef and Hawaii's renewed initiatives for coral reef management. Examples include the Hawaii Coral Reef Assessment and Monitoring Program, evaluation of the Hawaii Ocean Resources Management Plan, and the first Hawaii State of the Reef, 1998 report published by DLNR. Strategic planning for coral reef management in the form of the LAS in the early 2000s and the Strategy in 2010 marked a future path of clear purpose to improve management capacity. Today, Hawaii has a variety of expressions of centralized resource management and is also considering moving towards community-based and site-based management. The coral reefs are a critical component of Hawaii's approximately $800 million a year marine tourism industry (Friedlander et al., 2008). The times of strong compliance for natural resource use within a hierarchical society are in the past. For more detail on the timeline of cultural and natural resource management in Hawaii, please see section 2.3 below as well as A Cultural Context for Preserving Hawaii's Diverse Ecological Landscape (NPS, 2008), Ho'ohana aku, Ho'ola aku: First Steps to Averting the Tragedy of the Commons in Hawaii's Nearshore

Fisheries (Tanaka, 2008), Hawaiian Islands Marine Ecosystem Case Study: Ecosystem- and Community-Based Management in Hawaii (Tissot et al., 2009), A Historical Perspective of Hawaii's Marine Resources, Fisheries, and Management Issues over the Past 100 Years (Shomura, 2001) and Marine Protected Areas and Community-Based Fisheries Management in Hawaii (Friedlander and Brown, 2001).

2.3 Societal Dimension of Coral Reef Management

There are strong cultural ties between Hawaiians and coral reefs. In the traditional Hawaiian creation chant *Kumulipo*, coral polyps, sea urchins and limu (seaweed) were the first entities to be created from the darkness. Corals were seen as the basis of life in Hawaii within the creation myth, and therefore deserve the utmost respect and protection. For more information, see The Kumulipo: A Hawaiian Creation Chant (Beckwith, 1981).

In ancient Hawaiian culture, chiefdom boundaries were established around complex integrated farming systems that connected agricultural watershed ecosystems to nearshore mariculture/fisheries ecosystems. This system of land division, still recognized today, is called the ahupua'a system. The ahupua'a system is a holistic approach to watershed management that historically has included land and sea tenure systems where local communities and natural resources were uniquely fitted to the terrestrial and marine resources of that watershed, with strong cultural norms and enforcement related to proper (pono) use of marine and terrestrial resources that met societal needs. Its relevance continues today by illustrating an adaptive management approach for ridge-to-reef management. Throughout Hawaiian history it has been the traditional basis for community-based natural resource management. The Konohiki, appointed for each ahupua'a, was the hand of enforcement, and offered harsh punishments for natural resource violations. The traditional laws (kapu) included strict and severe punishments for violations such as inappropriate fishing access and timing. Death, either by force or by shame, was not an uncommon consequence for violations such as exceeding the permitted amount of fish catch or for fishing during a spawning season (Higuchi, 2008; Jokiel et al., 2011). Fishponds, a traditional form of aquaculture, were abundant across the islands and often integrated in a landscape farming system that was based on a holistic, watershed perspective. Totemic animals such as sea turtles and whales represented and protected families, subsistence fishing was a pillar of society, and ecosystem stewardship was seemingly strong. Marine resources were harvested for the commons due to the social and geographical structure of the land at the time. For more information see Propagating Cultural Kīpuka: The Obstacles and Opportunities of Establishing a Community-Based Subsistence Fishing Area (Higuchi, 2008), Marine Resource Management in Hawaiian Archipelago: The Traditional Hawaiian System in Relation to the Western Approach (Jokiel et al., 2011) Indigenous Management Models and Protection of the Ahupua'a (Minerbi, 1999), Marine Reserves in Hawaii: A New Call for Community Stewardship (Antolini, 2004) and Ecological Aquaculture: The Evolution of the Blue Revolution (Costa-Pierce, 2002).

When Westernization and colonization occurred in Hawaii, diseases and displacement of traditional communities occurred and a gradual shift in demographics as well as social structure occurred. The population became more heterogeneous, which was directly linked to the shift to large-scale production of sugar cane and other plantation agriculture, as well as expanded cattle ranching. Since sugar cane and pineapple plantations required a cheap and abundant labor force, the century following Western arrival in the late 1700s led to a massive influx of people from other parts of the world, mostly willingly, in hopes of stable employment. People came in waves from many

locations such as Japan, Portugal and Puerto Rico, causing a shift in population demographics. Some ports, such as Lahaina in Maui, became a destination for whaling, building communities that looked like coastal New England with well-documented cultural clashes and resource exploitation. This transformation of the culture post-colonization has carried a profound legacy still evident in the impacts upon the landscape, agricultural lands and social conflicts that continue to shape environmental stewardship issues across the state today. For more information see The Economic History of Hawaii: A Short Introduction (La Croix, 2002).

The tourism industry now dominates the economy of Hawaii, bringing in over $800 million annually (Friedlander et al., 2008). Recent decades have shown an increased influx of tourists annually, increasing the variety of users and roles of Hawaiian residents therein. In recent years, political agendas are often driven by the promise of increasing economic growth and development, increasing employment opportunities and growing the tax base within the State of Hawaii. Tourism has also created a growing range of job opportunities associated with marine resources and coral reefs such as fishing, diving, snorkeling, sailing, whale watching, etc. The cost of living in Hawaii is high. Data from the Council for Community and Economic Research in 2013 shows that the average cost of living in Honolulu was 66% higher than the national average. Cost of housing in Honolulu was estimated to be 137% higher than the national average, and cost of utilities in Honolulu was estimated to be 67% higher than the national average (Council for Community and Economic Research, 2013). While Hawaii's unemployment rate has been lower than the national unemployment rate by an average of 1-2% over the past decade, many individuals must cobble together multiple income streams to create a sustainable livelihood given Hawaii's high cost of living (Bureau Labor of Statistics, March 2013). Political agendas within the state often favor the tourism and development sectors over social programming and natural resource protection. Many individuals are employed directly or indirectly through activities associated with coastal/marine resources.

Through our interviews we learned that a local fisherman, all in one day of fishing, could be categorized as an artisanal, subsistence, black market, recreational and commercial fisher. This is interesting to note because it reveals the multiple layers involved in resource use by residents: the economic demands of crafting a livelihood in Hawaii, cultural and religious practices, and modern legal structures, to name a few. Overwhelmingly, people who were interviewed expressed that the communities in Hawaii are fully aware of the traditions of stewardship and many want to take on a larger role in co-management of the reef resources. There has been an upsurge in organized action at the community scale, through local councils such as The Aha Moku Councils, yet conflicts remain high and there are not many models of community-based co-management. Despite few models, demand seems to be growing for community-based co-management, and many are paying close attention to where it is being developed such as in Moʻomomi Bay in Molokaʻi, Kahoʻolawe, and the Polanui CMMA in Maui, where the local resource users have created the necessary political will. For more information on community-based co-management in Hawaii, please see The Use of Traditional Hawaiian Knowledge in the Contemporary Management of Marine Resources (Poepoe et al., 2001), Customary Marine Resource Knowledge and Use in Contemporary Hawaii (Friedlander et al., 2013), Application of Hawaiian Traditions to Community-based Fishery Management (Friedlander et al., 2000) and 2011 Pono Fishing Calendar for Moʻomomi, Molokaʻi (Hui Malama o Moʻomomi, 2011).

Despite the strong history and tradition of ecosystem stewardship in Hawaii, the growing population of nearly 1.4 million people (U.S. Census, 2010) with diverse ethnic backgrounds is increasingly disconnected from notions of

ecosystem stewardship, and there is a general lack of awareness among the residents and tourists concerning their impacts on the ocean environment around them. While people are generally aware that coral reefs are declining and are in need of protection, they often have difficulty connecting their personal behavior to that decline and lack an understanding of how they can help. From recent surveys of public attitudes and perceived value of coral reefs, there is reported to be a "disconnect" in the public's understanding of coral reef health and how it is related to human health, economic benefits and quality of life in Hawaii. For more detail on public perceptions of coral reefs in Hawaii, please see Perceptions of Hawaii's Living Reef Program: A Qualitative Study (Ward Research, 2007).

2.4 Brief Summary of the Current State of the Reefs in Hawaii

According to NOAA's Coral Reef Information System, The Hawaiian Archipelago is distributed across approximately 1,296 nmi (2,960 km) in the north central Pacific Ocean. Fringing reefs, barrier reefs and atolls are found throughout Hawaii. The archipelago consists of two regions: the eight populated large Main Hawaiian Islands and 124 mostly uninhabited small islands, atolls, reefs, and submerged banks to the northwest of the Main Hawaiian Islands, the Northwestern Hawaiian Islands (NWHI). Although we will mention management efforts in the NWHI, specifically the Papahānaumokuākea National Marine Monument (henceforth, the "Monument"), our focus for this capacity assessment is on the Main Hawaiian Islands and particularly the priority sites of South Kohala and Wahikuli-Honokōwai. There has been a general decline in coral reefs over the past 20 years or so in Hawaii, but generally the coral reefs are in good condition. The nearshore coral reefs, specifically those near large population centers such as coral reefs near Waikiki, are far more degraded and are often the tourist destination. In the NWHI, the coral reef ecosystems are healthier than in the Main Hawaiian Islands, with more large predators, coral cover, and larger fish populations, reflecting the historical and growing population and development pressure in the Main Hawaiian Islands. Average coral cover in the Main Hawaiian Islands is around 20%, and coral cover is highest in the southern portion of the archipelago near Molokini and Kaho'olawe. Coral reefs at the priority site of West Maui are ecologically important and generally in a healthy condition, however long-term coral reef monitoring has showed declines in coral cover of up to 75% in some areas in recent years. Coral reefs at the priority site of South Kohala are also reported among the healthiest and most productive in the state, though they, too, face threats such as overfishing and land-based sources of pollution. For more information on the state of coral reefs in the Main Hawaiian Islands as well as the NWHI, please see The State of Coral Reef Ecosystems of the United States and Pacific Freely Associated States (Waddell and Clarke (eds.), 2008), Contrasts in Density, Size, and Biomass of Reef Fishes Between the Northwestern and the Main Hawaiian Islands: The Effects of Fishing Down Apex Predators (Friedlander and DeMartini, 2002), Coral Reefs in Kaneohe Bay, Hawaii: Two Centuries of Western Influence and Two Decades of Data (Hunter and Evans, 1995), The West Maui Watershed Management Plan, and the South Kohala Conservation Action Plan.

2.5 Major Biophysical Pressures and Drivers of Coral Reef Condition

The coral reefs of the Hawaiian archipelago have evolved through millennia of geographical isolation, and much of the marine life is unique to the area. The percentage of endemic marine species is estimated at 25% or higher. The Hawaiian archipelago is also home to about 85% of all of the coral reef area in the United States (Tissot et al., 2009). In the face of increased species loss and coral reef decline in recent years, the high level of endemism and

uniqueness of this marine system makes it an extremely important biodiversity hotspot, specifically for the U.S. The Strategy identified six major threats to coral reefs around which the LAS were organized: fisheries, public outreach and awareness, land-based sources of pollution, aquatic invasive species, recreational impacts to coral reefs, climate change, and marine disease. When considering ideal societal behavioral shifts in respect to natural resource use and protection, it is important to note that overfishing is considered by scientists to be the largest threat to nearshore marine ecosystems in the Main Hawaiian Islands, however the general public assumes that coastal development and land-based sources of pollution are the largest threats to nearshore marine ecosystems in the Main Hawaiian Islands (Tissot et al., 2009). For a more detailed description of drivers of coral reef condition in Hawaii, please see the Strategy.

FISHING PRESSURE

Despite increased fishing efforts, wider fishing ranges, and specialization of fishing equipment, studies have shown that coral reef fisheries in Hawaii have been in decline for the past century. Fish populations in the Main Hawaiian Islands are significantly smaller than those of the NWHI. There are less than 1,000 commercial fishing vessels in Hawaii, however the number of recreational fishing vessels has been steadily increasing since the 1960s and is now over 100,000 (Friedlander et al., 2008). There are 52 Marine Protected Areas (MPAs) in the Main Hawaiian Islands, but less than 1% of coastal areas are fully protected and enforcement of and compliance with fishing regulations are relatively weak. For more information on the status of fish populations in Hawaii, see Status of Hawaii's Coastal Fisheries in the New Millennium (Friedlander, 2004), Effects of Aquarium Collectors on Coral Reef Fishes in Kona, Hawaii (Tissot and Hallacher, 2003), Essential Fish Habitat and the Effective Design of Marine Reserves: Application for Marine Ornamental Fishes (Friedlander, 2001), Multi-century Trends and the Sustainability of Coral Reef Fisheries in Hawaii and Florida (McClenachan and Kittinger, 2012) and The State of Coral Reef Ecosystems of the Main Hawaiian Islands (Friedlander et al., 2008).

RECREATIONAL OVERUSE

Tourism is the largest industry in the State of Hawaii. Over a thousand ocean tourism operators were reported in Hawaii in 1998, and the number of tourists as well as tourism operators in Hawaii has been on the rise in recent decades. The average number of visitors to the islands annually has become larger than the resident population. Studies have shown that over 80% of those visitors are engaging in some form of ocean recreation (Friedlander et al., 2008). Very few areas of high tourism in Hawaii have user fees or associated costs that directly feed back to natural resource protection. Increases in tourism pressures have resulted in increases in development, physical damage to coral reefs, pollution, and sedimentation. Local residents feel that they are being overrun by tourists and tourism and express concern that many popular sites for marine recreation are being "visited to death" (Friedlander et al., 2008). For more information, see Ecological Economic Modeling of Coral Reefs: Evaluating Tourist Overuse at Hanauma Bay and Algae Blooms at the Kīhei Coast, Hawaii (van Beukering and Cesar, 2004), Voluntary Standards as a Tool for Increasing Sustainability of the Marine Recreation Industry and Improving MPA Effectiveness in Hawaii and Mesoamerica (MacPherson et al., 2008), and The State of Coral Reef Ecosystems of the Main Hawaiian Islands (Friedlander et al., 2008).

LAND-BASED SOURCES OF POLLUTION

Surface runoff and groundwater seepage pose a significant threat to coral reefs in the Main Hawaiian Islands. Sediment is often referenced as the leading land-based pollutant causing coral reef alteration and decline in the Main Hawaiian Islands (Strategy, 2010). Legacy fertilizers and chemicals from pineapple and sugar cane farming, as well as heavy ranching and deforestation have caused nutrients and pollutants to end up on the reef. Many islands in Hawaii also have high rainfall gradients and steep inclines, and ephemeral streams and gullies transport huge amounts of sediment and nutrients to reefs during rain events. Sewage treatment across Hawaii is varied, and in 2004 38.1% of Hawaiians were using Individual Wastewater Systems such as cesspools and septic tanks (HI DOH). Very few sewage treatment plants go past advanced primary treatment. Seven of the major wastewater treatment plants in Hawaii discharge to coastal waters. Five of these seven discharge through deepwater outfalls of more than 40 meters, which causes less impact to coral reefs (Friedlander et al., 2008). A high profile spill from a wastewater treatment plant occurred near Waikiki in 2006, which released more than 48.7 million gallons of untreated wastewater and interrupted recreational activities in the tourist epicenter on O'ahu (Friedlander et al., 2008). There have been several incidents across the state of leaching from injection wells. For example, lawsuits regarding water quality and sewage injection wells have occurred in areas such as Kahekili in the priority site of West Maui. For more information, see Effects of Sewage Discharge, Fishing Pressure and Habitat Complexity on Coral Ecosystems and Reef Fishes in Hawaii (Grigg et al., 1994), Hawaii's Land-Based Sources of Pollution LAS (2004), NOAA CRCP Land-Based Sources of Pollution Implementation Plan FY 2011-FY 2015 (NOAA CRCP, 2012) Hawaiian Islands Marine Ecosystem Case Study: Ecosystem- and Community-Based Management in Hawaii (Tissot et al., 2009), Land Use Planning in Maui, Hawaii, to Prevent Sedimentation of Fringing Coral Reefs (Crane, 2011) and The State of Coral Reef Ecosystems of the Main Hawaiian Islands (Friedlander et al., 2008).

INVASIVE SPECIES

Due to the high percentage of endemism, Hawaii is particularly vulnerable to invasive species. Hawaii's isolation makes it ecologically vulnerable to invasions of foreign species that may out-compete the existing species. Invasive species in Hawaii are typically introduced by maritime traffic or intentional introduction for aquaculture. Currently there are several species of invasive algae, fish and invertebrate species competing with native marine species in Hawaii, including *Gracilaria* algae and fin fish such as roi. Their proliferation in Hawaii has been linked to nutrient pollution and a loss of native grazers on the reef. For more information, see Distribution and Reproductive Characteristics of Non-indigenous and Invasive Marine Algae in the Hawaiian Islands (Smith et al., 2012), Invasive Alien Algae (University of Hawaii Manoa, 2001), Effects of Herbivory, Nutrient Levels, and Introduced Algae on the Distribution and Abundance of the Invasive Macroalgae Dictyosphaeria cavernosa in Kaneohe Bay, Hawaii (Stimson et al., 2001) and The State of Coral Reef Ecosystems of the Main Hawaiian Islands (Friedlander et al., 2008).

GLOBAL WARMING, CORAL BLEACHING, OCEAN ACIDIFICATION AND DISEASE

The global threats of ocean temperature rise, coral bleaching, ocean acidification and disease are impacting the reefs of Hawaii. The occurrence of large-scale bleaching events has increased since the first event in 1996, with notable massive events in 2002 and 2004. This has brought attention to the study of coral disease, which is still a relatively new field in Hawaii. Calcification rates have been declining on reefs across Hawaii as evidence of ocean acidification. The frequency and intensity of storms and conversely droughts have been increasing linked with

changes in global climate patterns. Natural disasters such as Hurricane Iniki in 1992, prolonged droughts experienced in many places such as South Kohala and tsunamis in 1960 and 2011 impact human well-being as well as ecological function. For more information, see Resistance and Resilience to Coral Bleaching: Implications for Coral Reef Conservation and Management (West et al., 2003), Hawaii's Climate Change and Marine Disease LAS (DLNR/DAR, 2007), One-Third of Reef-Building Corals Face Elevated Extinction Risk from Climate Change and Local Impacts (Carpenter et al., 2008), Baseline Levels of Coral Disease in the Northwestern Hawaiian Islands (Aeby, 2006), Patterns of Coral Disease Across the Hawaiian Archipelago: Relating Disease to Environment (Aeby et al., 2011), Projected Changes to Growth and Mortality of Hawaiian Corals over the Next 100 Years (Hoeke et al., 2011) and The State of Coral Reef Ecosystems of the Main Hawaiian Islands (Friedlander et al., 2008).

2.6 The Governance Context for Coral Reef Management

Hawaii is home to a wide range of decision-making groups, particularly with respect to coral reef management. These include state, federal, NGO, community-level, market forces, civil society, county government, mayors, governor, industry, unions, resource management councils, etc. and the groups with the most power, presence and influence differ on each island. For example, unions have a strong voice in the communities of Maui, particularly hotel workers' unions and construction unions, and many people reported that often initiatives such as development proposals will not be implemented or completed, despite support from constituencies or mandate, if the unions do not support them. Likewise, there are local community councils that are becoming more powerful and capable of enabling or preventing progress. Understanding the power dynamics within communities in individual islands has been a necessary yet informal capacity that has been developed to identify what is truly important to the people of the place. As many of the interviewees recognize, this capacity is critical for coral reef management in Hawaii.

Hawaii does not have a formally mandated coral reef program, yet there is a wide range of legislative actions that recognize the value of the resource and guide management actions. Many interviewed described a growing need to work with the Legislature, and promote engagement and collaboration between the Legislature and coral reef users and stakeholders. There is legislative mandate through existing coral reef laws, but enforcement is uneven and therefore compliance has been eroded as well. Selected laws in Hawaii that are relevant to the management of coral reefs are:

- The State Land Use Law, Act 187 (1961): Vested the DLNR with jurisdiction over the Conservation District which now includes the sea floor, which is able to formulate sub-zones within the Conservation District, and regulate land uses and activities therein. Now found in Chapter 205 of the Hawaii Revised Statutes.
- Hawaii State Constitution – Article 12 Section 6: Marine resources provision, sets the public trust over submerged lands in the marine environment (the current constitution was redrafted in 1978, but this provision goes all the way back to the Organic Act of 1900).

- HRS – Chapter 187A-190: Constitution gives the state the public trust responsibility, Legislature passes laws and statutes to the executive branch for things like managing fisheries, and sets the foundation for what DLNR can do.
- Act 266: Expands Division of Conservation and Resource Enforcement's (DOCARE) enforcement role to include all state laws and county ordinances on all state lands, beaches, shore waters, and county parks.
- Commercial Marine License HRS 189-2 3: Commercial Marine License required for anyone (Residents and Non-residents) to take marine life for commercial purpose. Also known as the Commercial Fishing License.
- Public Lands, Management and Disposition of - HRS Chapter 171: Prohibits taking of sands, seaweed, etc.
- Hawaii Coral Reef Initiative (HCRI) - HRS 379: HCRI was validated in 1994 by legislative resolution to increase community-based approaches to education, conservation and research on coral reefs.
- Act 241 – Community-Based Subsistence Fishing Act: Legislation was passed in 1994, a process by which communities could have an essential role in actively managing their marine resources in a way that drew from portions of the traditional ahupua'a aquatic ecosystem management.
- Act 306 (1998): Required DLNR to develop a West Hawaii Regional Fishery Management Area Plan, and to adopt rules to effectuate its purposes, with very specific dates.
- Executive Order 13089 on Coral Reef Protection (1998): Enabling legislation for the U.S. Coral Reef Task Force. Provides an opportunity for federal and local partnerships.
- Executive Order 13158 on Marine Protected Areas (2000): To establish a national network of marine protected areas.
- Coral Reef Conservation Act of 2000 (2000): Main focus was to develop a funding source for coral reef conservation projects.
- Beach Act 2000: Structured program for monitoring of recreational waters across the nation, established bacteria standards, protocols, notification, monitoring, etc.
- HRS – Chapter 188-22.6-9 (2006): Main focus was the protection of Native Hawaiian fishing practices through the creation of unique rules in a spatially explicit aquatic area (Hā'ena and Miloli'i).
- Act 212 (2007): Established the Aha Moku Councils.
- Chapter 226 State Planning Act (2012): Outline of 20 items for climate change adaptation.

2.7 Context of Institutions Involved in Reef Management and their Recent Development Over Time

The three major expressions of governance in the system are government, market forces and civil society. These are expressed at different scales. For the government, it is expressed in Hawaii through the federal government, state government, the four county governments and local municipal governments. Government expresses its power

through laws and regulations, taxation and spending policies, and educational outreach. Market forces are expressed through differently sized corporations and businesses. Their power is expressed through profit seeking activities, ecosystem service valuation, and cost-benefit analyses. Civil society includes organizations and institutions whose geographic and programmatic scope vary. Examples include large international NGOs, mid-sized civic organizations and local marine resource councils. Their power within a governance system is expressed through advocacy and lobbying activity, vote casting, co-management and stewardship activities.

CONTEXT OF FEDERAL GOVERNMENT INSTITUTIONS

The presence of federal agencies is high and continuing to increase. Agencies such as NOAA, USACE, USFWS, the Environmental Protection Agency (EPA), the U.S. Geological Survey (USGS) and the National Park Service (NPS) over the past 10 years have generally expanded their capacity to address the increasing issues associated with coral reef management in Hawaii. This has resulted in a much greater presence of federal implementing partners, greater opportunities for collaboration, and a much wider network that requires a greater degree of coordination. Much of the federal presence in Hawaii serves as a central location for work in the broader Pacific and U.S. flag coral jurisdictions including Guam, The Commonwealth of the Northern Mariana Islands (CNMI), American Samoa and the Freely Associated States of Micronesia. While there has been remarkable capacity built in a relatively short period, many interviewed, including representatives from federal agencies, noted that the urgency for collaboration has increased due to the increase in the range and scope of the federal agency representatives and the need to engage with state agencies involved in coral reef management in Hawaii. In DAR, HCRI is often referred to informally as "NOAA" because nearly all of the funding for coral reef management in Hawaii comes from NOAA and their presence is significant. It is worth noting that this expansion, fully justified from a variety of financial, technical and logistical perspectives, has had unintended consequences. Some staff within state agencies described the feeling of being uncomfortable and skeptical about the intentions of federal agencies. This underscores the need for increased quality of collaboration.

Ideally, staff within state agencies see their federal partners as an asset not a threat and likewise the federal implementing partners empower the state to better manage its own resources. This situation has the potential to become more severe with the recent federal actions such as the listing of many Pacific coral species under the Endangered Species Act, potential mitigation standards from the USACE and water quality standards from the EPA. While the full scope and scale of the federal investment in resource management is beyond the scope of this report, a few examples are illustrative of the capacity that has been built at the federal scale. For example, NOAA CRCP contributed roughly $3 million to support coral reef management in FY 2011 and has two staff based in Honolulu. NOAA's Pacific Islands Regional Office houses eight staff and manages a budget of roughly $1 million to support programs for domestic and international conservation and management of living marine resources within the Pacific. NOAA also supports management efforts in Hawaii through grants to improve coastal zone management, community-based conservation, etc.

The Western Pacific Fisheries Management Council (WESPAC) supports seventeen staff members and receives in the range of $5 million per year in federal funds to carry out the Magnuson-Stevens Act provisions relating to Pacific Insular Area Fishery Agreements, Community Development Program, and Western Pacific Demonstration Projects. According to its website, WESPAC "is one of eight regional fishery management councils established by

the Magnuson Fishery Conservation and Management Act of 1976. Amended in 1996 to prevent overfishing, minimize bycatch and protect fish stocks and habitat, it is now called the Magnuson-Stevens Fishery Conservation and Management Act. During its first 35 years, the Council's accomplishments have run the gamut from being the first Regional Fishery Management Council in the nation to prohibit drift gill-net fishing and to develop an ecosystem-based fishery management plan, to being the pioneer of the vessel monitoring system for fishing vessels, which is now being implemented in fisheries worldwide. The Council is made up of 16 Council members, the Council staff and several Council advisory panels. The Council process is a bottom-up process, emphasizing public participation and involvement of fisheries management at the local and community levels."

The Natural Resources Conservation Service (NRCS) has eleven staff located in a range of locations including a state NRCS office in Honolulu, one field office per county (the Big Island has three field offices). Funding in FY 2010 was reported at $9.6 million and used primarily for distributing technical and financial assistance through Farm Bill Programs. In addition to a wide range of activities, the EPA contributes to coral reef management in a variety of ways with five to six staff located across two offices on O'ahu. With an annual budget in the range of $1.3 million their focus is on improving water quality in Honolulu, support activities at HI DOH through EPA Region 9 Clean Water Act funding, collaborate on projects that affect coral reef health such as land revitalization, removal of non-native marine seaweeds, and oversee cleanup of contaminated sites. The Pacific Ocean Division of the USACE has been a major partner and collaborator in the West Maui Watershed Partnership, which includes the priority area.

CONTEXT OF TOURISM AS A DRIVING MARKET FORCE

It is important to note that the tourism sector is a critical partner for coral reef management in Hawaii, particularly due to its scale and impact on the overall economy of Hawaii's. As mentioned previously, tourism is the largest industry in Hawaii, bringing in over $800 million annually to the Hawaiian economy. Marine recreation in Hawaii is increasing, not only in size but also in diversity. Therefore the type and diversity of impacts and pressures upon resources are increasing as well. There are examples in Hawaii where the tourism sector has made progress towards coral reef conservation and stewardship, such as Trilogy's beach cleanups and mentor programs on Maui.

The Hawaii Tourism Authority (HTA) is a government agency established by the State of Hawaii in 1998 with the mission to "strategically manage Hawaii tourism in a sustainable manner consistent with economic goals, cultural values, preservation of natural resources, community desires and visitor industry needs." Within their Hawaii Tourism Strategic Plan: 2005-2015, the need to improve stewardship of natural resources is recognized and the HTA Natural Resources Program exists to improve the industry's contributions to natural resource stewardship activities across the state. For example, in 2012 HTA allocated $1,000,000 to support projects related to natural resource protection.

There is tremendous potential for increased collaboration between the tourism sector and DLNR in order to move towards common goals of coral reef management, particularly in the areas of large-scale public outreach and sustainable funding. Examples include eco-tourism certification pilot programs on Maui and user fees at Hanauma Bay. However, this relationship and inter-dependency seems to be largely unrealized. The tourism sector has much to gain if they were to apply their social responsibility functions to coral reef stewardship and to engage with other potential partners such as DLNR and the Legislature. This shift will require concerted and collaborative efforts to move beyond piecemeal one-off stewardship actions by individual companies (e.g. such as a single beach clean up

that is not coordinated with other local management efforts) towards cultivating a culture within the tourism sector to link closely with ongoing management efforts and commit long-term resources to protecting the natural system upon which it depends.

CONTEXT OF CIVIL SOCIETY AND NGO PARTNERS

The NGO presence in Hawaii is also on the rise. Large international NGOs such as The Nature Conservancy (TNC), Conservation International (CI), the Audubon Society, Sierra Club, Reef Check, CORAL, the Marine Aquarium Council and many others have become especially prevalent throughout Hawaii and are filling some critical capacity needs for coral reef management. For example, TNC's efforts in the Conservation Action Plan (CAP) process in South Kohala have made progress toward community-based co-management. Also, CI's seed funding for the Fisheries Enforcement Unit within DOCARE has helped fill some capacity for funding. Smaller NGOs and public-private partnerships are also beginning to spread across the state, with organizations such as the LOST FISH Coalition, Malama Kai and Makai Watch supplementing some state capacity for coral reef management in program areas such as mooring buoys and enforcement. Please see the Hawaii Community Stewardship Network website for more information on site-based community partners.

2.8 Governance Response to Shifts in Hawaiian Ecosystems

CONTEXT SURROUNDING RECENT CHANGES IN DLNR AND DAR

DLNR is the state agency in Hawaii that is responsible for "managing, administering, and exercising control over public lands, water resources, ocean waters, navigable streams, coastal areas (except commercial harbors), minerals, and all interests therein". Most projects for coral reef management are therefore pushed forward by DLNR, however issues of capacity and sustainable funding often cause these projects to lose momentum and remain in the planning stage. DLNR is also the recipient of funds through the cooperative agreement with NOAA CRCP. Within DLNR there are ten Divisions, one of which is the DAR, which is responsible for coral reef management. There are three umbrella programs within DAR: Commercial Fisheries and Aquaculture; Aquatic Resources Protection; Enhancement and Education; and Recreational Fisheries. Capacity within each program is uneven and often based on availability of federal or grant funds, institutional knowledge and political and public pressure. DOCARE is a separate Division that is "tasked with enforcing all of the state laws that protect Hawaii's natural, cultural and historic resources and all the rules and regulations of nine other divisions within the DLNR. Their jurisdiction ranges from the tip of the mountains to three miles out to sea for the eight Main Hawaiian Islands and the Papahānoumokuākea Northwestern Hawaiian Islands" (DOCARE Strategic Plan 2009-2014). Capacity within the state agency has been relatively low in recent years, with issues such as staff turnover and lack of leadership creating barriers to progress and silencing the voice of DAR within the larger context of coral reef management in Hawaii. DAR is currently at a crossroads, and has a window of opportunity to build capacity and partnerships in order to effectively reassert the state's role in coral reef management in Hawaii. Further findings for institutional capacity will be discussed in Section 3.

HAWAII CORAL REEF STRATEGY

The Coral Reef Working Group in Hawaii successfully completed the Strategy, which contains goals, objectives and action items for the future of coral reef management in Hawaii. The Strategy is still in the implementation phase, and there is a strategic focus for sequenced implementation at priority sites (originally planned to focus on

select priority sites for 3-5 years and then to move to the next). However, one of the biggest barriers to implementation is the lack of political will and institutional support within DAR. There is an increasing presence of federal agencies and large international NGOs in Hawaii, which are currently filling in the capacity gaps that exist within DAR for coral reef management. DAR is therefore at a critical turning point in which it has the potential and windows of opportunity (explained further in Section 3) to increase its capacity and re-take its position at the center of coral reef management in Hawaii. DAR has the mandate for on-the-ground action that is currently occurring on a limited basis at the state level. DAR is the key agency to turn the goals and objectives of years of planning into realized outcomes.

Hawaii is currently undertaking a wide range of projects for coral reef management, all at different geographical scales and largely limited timeframes (1-2 years). To our knowledge, project results are documented but not aggregated in any holistic way for a larger analysis against a plan of action. Implementing managers focus on their context and geography, know their own constituents and are well aware of capacity challenges in their focal areas but are not fluent with the 'big picture' across all projects. Indeed, there is a great deal of coral reef management activity going on and much of it at the pilot scale being conducted with a growing number of implementing partners across government, market and civil society levels. An example of a pilot scale project is the multi-year project to control invasive algae through native urchins (*Tripneustes gratilla*) in Kaneohe Bay. While there are some outstanding web-based sources of information about the importance of coral reefs, there is no central source of accessible information for all the implementing partners to routinely share updated project information. For more information on projects funded by the the Strategy beginning in FY2010, please see Appendix E: Current (as of January 2013) Coral Reef Management Projects Supported by NOAA CRCP in Hawaii.

When HCRI was created, its methodology was firmly based in the concept of LAS, of which there were six: Fisheries, Aquatic Invasive Species, Climate Change and Marine Disease, Lack of Awareness, Land-Based Sources of Pollution, and Recreational Impacts. LAS plans were developed for each in the early 2000s, but were not regularly updated as originally intended. Each LAS originally had its own coordinator position, and also had working groups and advisory groups to increase collaboration across partners and aid in the implementation of the plans.

With the Strategy, there has been a shift away from issue-based LAS and towards implementing management activities at the pilot site-specific level in order to effectively show success. In the planning process for the Strategy, two priority sites were selected based on a specific set of criteria under Biological Value, Degree of Threat, and Conservation Viability. In an effort to consolidate and more effectively employ resources and funds for coral reef management, coordinators will now be placed at the two priority sites instead of within the six issue-based LAS.

With the help of the Coral Reef Working Group, the LAS Advisory Committees, and a group of key biologists, the two sites that were chosen were Pelekane Bay-Puako-Anaehoʻomalu in South Kohala and Kāʻanapali-Kahekili in West Maui. It should be noted that while showing success at the two pilot sites builds momentum, the management issues that the Strategy addresses extends beyond the two selected sites across the whole state. For a detailed description of the timeline of the site selection process, as well as the criteria for site selection, please see Sections 3 and 5 of the Strategy.

SOUTH KOHALA

The biophysical landscape of South Kohala is described by many as a "moonscape." The geology is entirely volcanic rock and therefore virtually everything from the land ends up in the ocean. The area has been struggling with a drought for over a decade, coupled with issues of wildfires and deforestation. The stretch from the top of the mountain in South Kohala to the sea has an extremely steep rainfall gradient, ranging from 0-200 inches over 11 miles, which causes high runoff and sedimentation during episodic rain events. Fish stocks have been declining in recent years. The area is home to a large amount of feral and invasive animals that cause clashes in the community between natural resource protection interest groups and hunting groups. In the last century, ranching has faded from being a dominant economic and social force, to now a struggling industry. Grazing continues, but with drought conditions and hard economic times, few ranchers are able to effectively manage land-based sources of pollution. There are two completed management plans for South Kohala, one for Pelekane Bay Watershed and one for Wai'ula'ula Watershed, both of which are in the process of being implemented. There is relatively low agency presence in South Kohala compared to West Maui. DAR and TNC have the strongest presence there. The TNC CAP process has already been completed there (TNC, 2012), and the next step for partners involved with the priority site is to hire a coordinator and proceed with the implementation of the management plans, as well as move forward with the plan to have a 5-10 year assessment and "lessons learned" with TNC regarding the CAP process.

WEST MAUI

The area of West Maui is home to ecologically important marine resources, including Olawalu Reef, which seeds reefs in Maui, Molokaʻi and Lānaʻi. There are issues of land-based sources of pollution and wastewater injection wells, and a lawsuit was recently undertaken regarding water quality south of the Lahaina Wastewater Reclamation Facility. There are two watersheds in the priority site, and those two watersheds were just incorporated into the recently completed Wahikuli-Honokōwai Watershed Management Plan. Management plans are due to be completed for three other watersheds within three years, which together constitute the five watersheds that fall under the West Maui Ridge to Reef Initiative. There are CAP processes underway for Kahekili, Molokini and Kahoʻolawe. A watershed coordinator is already in place in West Maui. There are over a dozen state and federal agencies and NGOs that have a presence at this priority site, and the U.S. Coral Reef Task Force designated the West Maui Watershed Plan as the priority partnership in the Pacific in 2011. There is a highly politicized community there and public meetings are often heated and full of debate. A large portion of the population there is retired. U.S. Census Bureau statistics from 2010 showed that people between the ages of 55 and 64 represented 13.9% of the population in Maui, while those above the age of 64 represented 12.8% of the population for a total of 26% above the age of 55. This demographic continues to increase. Tourism and marine recreation is the main reason that nearly 2.5 million visitors go to Maui annually (Maui Now, 2013) therefore management is largely informed by development and jobs instead of science. The local labor unions are very strong in Maui and hold a significant amount of power in the community and within local politics. The local economy is driven by the expansion of tourism and development, and that expansion is strongly supported by the organized workers in the construction and hotel sectors. This is represented in the 24.6% increase in housing units in Maui between 2000 and 2010 (U.S. Census Bureau, 2010). Maui has also maintained a portion of its plantation economy, as sugar and pineapple farming represent the second and third largest industries in Maui (Fry, 2013). Several natural resources management councils, such as the Maui Nui Marine Resource Council and the Aha Moku Council, have strong presence and influence there, particularly in

implementing community-based management, the Ridge to Reef Initiative, and the Maui Island Plan. These councils have particularly strong ties with the 7.4% of the Maui population that identify themselves as Native Hawaiian (U.S. Census Bureau, 2010). With a large potential for collaboration and many plans and initiatives underway, West Maui is at a critical tipping point and could be a real model for community-based co-management in Hawaii.

Interview with representatives from the Maui Nui Natural Resource Council. (Photo credit: Audrey Swanenberg, SustainaMetrix.)

Section Three: Findings Related to Coral Reef Management Capacity in Hawaii

3.1 State Coral Reef Initiative Management Process

In this section, we briefly review the recent progress that has been made in coral reef management in Hawaii and outline what we believe are some of the major gaps and barriers. The Management Cycle will be used to explore the developmental and adaptive nature of coral reef management. While there are expressions at multiple scales, this section will focus largely on management at the scale of HCRI. We place emphasis on the transition from issue analysis and planning (Steps 1 and 2) to securing formal commitment (Step 3) and then explore the degree to which implementation of a plan of action has occurred (Step 4), and if so, if it has been followed by a commitment to learn about the management effectiveness through reflection and assessment (Step 5). When management actions are linked together in such a cycle, we believe the process provides evidence of adaptive coral reef management capacity. For this analysis, we have selected some "hot" issue topics that we believe remain priority issues for which capacity needs to be built.

Recent Development of "Top-down" State-based Management Arrangements

Enabling legislation (HRS 379) with a formal mandate for coral reef management in the form of the HCRI was a major step for the state to define its management agenda in order to "support monitoring and research activities to build capacity to more effectively manage Hawaii's coral reef ecosystems…[and more specifically] assess major threats, build management capability, develop database and information systems, conduct public awareness programs, and implement education and training". With increasing federal and international awareness of coral reef-related issues and increased mandate for their protection, the State of Hawaii was forced to look internally at its own capacity and effectiveness for managing coral reefs in the late 1990s (Step 1). Several state agencies and organizations, including the Sierra Club, the University of Hawaii (UH), the Hawaii CZM Program, the Pacific Whale Foundation, Save Our Seas, and the Malama Kai Foundation, began activities to encourage increased protection of coral reefs in Hawaii, particularly in the 1990s (Step 2). As a result, in 1994 HCRI was validated by legislative resolution HRS 379 in order to define the role of the state for coral reef management, while also encouraging community-based approaches to education, conservation and research on coral reefs (Step 3).

Momentum for coral reef management in Hawaii was building in the late 1990s and was further supported by President Clinton's Executive Order 13089 in 1998 establishing the U.S. Coral Reef Task Force and federal approval of the Coral Reef Protection Act. These represent much needed expressions of formal commitment (Step 3) at the next higher scale. It is noteworthy that the coral reef policy work at the federal level featured powerful input by scientists from Hawaii who understood the urgency for increased management.

These mandates at the federal level led to the creation of the HCRI Research Program (HCRI-RP) in 1998, which established formal mandate (Step 3) for a partnership between DLNR and UH (MOU). This partnership allowed for NOAA funds to flow through UH and go toward management-based research projects, with some guidance

from DAR via the management committee, thus setting up the administrative structure for project management. Implementation of coral reef management projects through routine funding cycles (Step 4) continued to build the knowledge base of marine resources and progress toward Ecosystem-based Management in Hawaii. However, given the capacity challenges within DAR, including the recent restructuring and persistent staff vacancies, there is little staff capacity to focus on monitoring and evaluation to improve adaptive learning to inform action. The lack of appropriate allocation of funding to coral reef management by the Hawaii Legislature is further discussed below in this Section in "Findings for Step 3: Formal Funding and Adoption." For the HCRI to complete the Management Cycle, emphasis must be placed on Implementation and Evaluation (Step 5) for Ecosystem-based Management initiatives across the state.

Recent Development of "Bottom-up" Co-Management Arrangements

The development of effective co-management strategies is a priority issue that will likely be at the forefront of coral reef management in Hawaii for the foreseeable future. As stated earlier, traditional forms of co-management have been practiced for thousands of years. However, a new era of co-management, in the modern context, is being built with experience from CBSFAs. Early threats to coral reefs and associated fish regulations were recognized by the state government in the late 1980s and early 1990s largely around issues related to subsistence fishing and support for co-management of marine resources. Alarmed by the depletion of their ocean resources, in 1993 the Molokaʻi Subsistence Task Force was appointed by the governor to "document how important subsistence is to Molokaʻi families" (Higuchi, 2008). This report brought attention to issues surrounding subsistence fishing under centralized resource management and the desire of Hawaiian communities to promote local management of marine resources (Steps 1 and 2). This led to the formal passage of the CBSFA Act in 1994, with formal adoption demonstrating clear commitment from the state (Step 3). These actions were taken through DLNR authorities and enabled them to designate CBSFAs once a subsistence community had proposed the area for designation. Implementation of the plan of action was originally focused on a pilot program at Moʻomomi Bay on Molokaʻi, with the intent "to provide Native Hawaiians with the opportunity to educate and perhaps guide Hawaii and the world in fishery conservation" (Step 4) (Higuchi, 2008). Since then, despite over 19 communities expressing interest in receiving the designation, only two other areas have been designated as CBSFAs: Milolii in West Hawaii and Hāʻena in Kauaʻi. Several noted that these have not been successful for a variety of reasons, largely due to lack of political will, formal commitment, and technical capacity of the state to engage with communities. Moʻomomi Bay was not formally or permanently designated by DLNR once the pilot program ended in 1997, and although Milolii and Hāʻena have been permanently designated as CBSFAs, their management plans have not been formally approved by DLNR and their Rules Packages have not yet been approved (though it is in process). As of April 2013, DLNR has been soliciting for a full-time employee to be designated as the "CBSFA Planner" and is a concrete step forward for the state to effectively support the successful establishment of officially recognized CBSFAs. To our knowledge, other than the requirement to include a plan for "evaluation and monitoring" the resource as well as the associated rules in the management plan for the CBSFA, no formal evaluation or assessment process has been conducted or required to improve learning (Step 5). From people who were interviewed on this topic, learning did occur but was not structured and not documented. The current example on Molokaʻi seems to have been an evolutionary process that evolved from this desire for co-management. For more information on the CBSFA process in Hawaii, please see Institutional Analysis of Community-Based Marine Resource Management Initiatives in Hawaii and American

Samoa (Richmond and Levine, 2012) and Propagating Cultural Kīpuka: The Obstacles and Opportunities of Establishing a Community-Based Subsistence Fishing Area (Higuchi, 2008).

The work with the CAP process indicates a new generation of co-management where local communities work with TNC as well as other stakeholders to develop strategies to address conservation priorities. Since 2010, CAP processes have been initiated at both priority sites, Kahekili in West Maui and in South Kohala, consisting of a series of workshops with a wide range of stakeholders, a final report, and plans for continued engagement and lessons learned to be addressed in the future. In South Kohala, the CAP process is helping to guide the DAR coral program on how best to support and facilitate the implementation of the watershed management plans for Wai'ula'ula Watershed and Pelekane Bay Watershed, and has helped build trust and other critical enabling conditions for community-based co-management.

High Quality Collaboration

The urgency for high quality collaboration is another core issue for current and future coral reef management with several good examples in Hawaii.

The Monument in the NWHI is one of the largest MPAs in the world, including 140,000 square miles and a chain of 10 islands, and numerous atolls, submerged banks, shoals, and reefs. The Monument is another example of a program that has completed effective movement through the Management Cycle. Even though the massive island chain is largely unpopulated, the cultural and ecological significance has been known to Native Hawaiians since the time of Polynesian settlement and is becoming well known to residents of Hawaii today.

The NWHI has strong cultural and ecological importance. The islands are known to Native Hawaiians as kūpuna (elders), and younger generations have the responsibility of taking care of them and learning from them. The islands are home to extensive coral reefs and twenty-three endangered and threatened plant and animal species. Issues of anthropogenic impacts and overexploitation, particularly the hunting of the extensive bird populations, were identified over a hundred years ago (Step 1) and led to President Theodore Roosevelt's Executive Order in 1909 to create the Hawaiian Islands Bird Reservation from the islands of Kure to Nihoa (excluding Midway Islands) (Steps 2 and 3). With the realization of increasing anthropogenic impacts, mostly due to activities beyond the boundaries of the islands, such as climate change and marine debris, protection of the NWHI from federal and state entities has increased over the last hundred years. The first sign of formal commitment and political will toward long-term federal protection of the entire NWHI (Step 3) was in 2000 when President Clinton created the NWHI Coral Reef Ecosystem Reserve. In 2006, President Bush further defined the protective status when he signed Proclamation 8031, which designated the Northwestern Hawaiian Islands Marine National Monument under the Antiquities Act of 1906. Following the designation, joint implementing regulations were established for the Monument. A memorandum of agreement (MOA) was then created by the three co-trustee managing agencies of the Monument: the State of Hawaii (DLNR), the U.S. Department of the Interior (USFWS), and the U.S. Department of Commerce (NOAA) (Step 4). An organizational structure was created for periodic review, consisting of a Senior Executive Board, a Monument Management Board, and an Interagency Coordinating Committee (Step 5). A first generation was completed to craft and implement the policy of protecting the Monument, a second generation followed to effectively manage the huge expanse across multiple federal partners. In 2008, the issue of managing the newly created Monument was a major topic of dialogue (Step 1), which led to the completion of the Papahānaumokuākea

Marine National Monument Management Plan (Step 2). The plan has been formally approved and is now in the process of distribution and implementation (Steps 3 and 4). Part of the management plan calls for increased quality of collaboration between the three managing agencies of the Monument and other partners. Many who were interviewed reported that the quality of collaboration, engagement and meetings between the Monument's managing agencies is relatively low. However, one of the key elements of the Management Framework in the management plan for the Monument is, "institutional arrangements to promote and enhance collaboration with jurisdictional partner agencies and other stakeholders." Several activities in the management plan's action plan directly address the need for increased quality collaboration, such as, Activity EN-1.2: Develop necessary interagency agreements; Activity AC-2.2: Establish agreements for coordinated management and conduct cooperative management operations; Activity AC-2.4: Convene Interagency Coordinating Committee meetings, including an annual workshop; and Strategy AC-3: Promote international, national, and local agency collaborations to increase capacity building and foster networks that will improve management effectiveness. Each agency has its own level of capacity, as well as investment in the Monument, with interests ranging from cultural to biophysical to management-based. Many interviewed noted that regional ocean partnerships across the Pacific present a challenge to collaboration in such a culturally diverse and context-specific landscape. There is an Evaluation Action Plan within the management plan that outlines the comprehensive evaluation and State of the Monument Report that will serve as the primary input for a five-year management plan review. "International Cooperation and Collaboration" is one of the six cross-cutting priorities in that Evaluation Action Plan. The evaluation portion of the plan demonstrates the Monument managing agencies' foresight to include adaptive reflection and assessment (Step 5) as part of the process. For more information, please see Papahānaumokuākea Marine National Monument Management Plan (2008).

While the examples above are presented to show how effective management action can "close the cycle" we more commonly heard examples where implementation gaps hampered good management. For example, if a plan of action is presented to the Legislature for review, a typical reaction was to send the proposal back for more issue analysis in lieu of crossing into formal commitment and implementation. Across the world, the implementation gap is common as jurisdictions struggle with the ecosystem approach. On the one hand, issue analysis and planning are of relatively low risk and potentially high reward with few political minefields. Formal commitment and implementation are potentially fraught with political fallout due to high costs of implementation and potentially negative results if an external assessment is conducted. Also, the rewards of investment in implementation are largely realized beyond the horizon of political term cycles, making its support even more problematic. In the face of these realities, and in the face of the current context in Hawaii, we believe it is imperative to pay attention to the steps in the Management Cycle at multiple levels (but particularly at the state level) to grow adaptive capacity in a learning-by-doing fashion.

At the local scale, the same pattern of failing to complete all steps in the cycle is often repeated. Many independent and unconnected projects, including research projects, monitoring programs and public education campaigns, funded largely by the federal implementing partners and foundations, are being undertaken. We believe targeted funding from foundations such as Castle Foundation and National Fish and Wildlife Foundation (NFWF) as well as other funding partners should move toward requirements that feature scorecards to track progress in the Management Cycle. This would help identify where grantees are and where additional resources and collaborations may be needed

to complete generations of coral reef management. Management plans have been prepared for many areas and categories of terrestrial conservation, calling for reducing land-based sources of pollution and sedimentation that contribute to coral reef degradation. However, most of the plans do not have the force of law behind them. It is important to note that there are lobbying restrictions for government employees, and that a gap often widens in the formal funding and adoption phase due to lack of formal commitment (Step 3), preventing the plan from moving towards the implementation phase (Step 4). Furthermore, reflection, assessment or evaluation is rarely factored into the project plans or budgets (Step 5).

In summary, the following are a set of findings related to the capacity to move through the Management Cycle at the state level.

Findings for Step 1: Issue Identification. Hawaii has demonstrated strong capacity and has been very successful at identifying the issues facing coral reefs. Principal environmental, social and institutional issues and their implications have largely been assessed. The consensus among the people interviewed was there is little need for huge new investments in natural science research; however, there is a need to maintain current levels while growing the contributions from social science to inform the science knowledge base of the human dimensions of coral reef management. While there is tremendous research capacity in Hawaii for most coral reef-related issues, a continued challenge lies in the quest of translating the findings into policy or management relevant formats. Hawaii agency staff seem well-informed of the predominant threats facing coral reefs and their social, economic and biophysical implications, however this is not the case as one moves up the decision-making ladder to the Legislature, the judiciary and some upper-level administrators. Documents such as the Strategy outline in detail the major drivers of coral reef change in Hawaii and identify the prominent current research in those areas, yet few were aware of the document. Major stakeholders' interests have been identified and many were involved in the goal-setting process for the Strategy, yet there was not a public communications effort to disseminate the results or gauge the findings with upper-level staff. The legislatively mandated Main Hawaiian Islands Marine Resource Investigations Program (MHI-MRI), a pilot survey project initiated by DAR in the early 1990s, is an example of the willingness to invest in better knowledge of the issues surrounding Ecosystem-based Management in Hawaii (Tissot et al. 2009; Lowe, 1995).

Findings for Step 2: Assessment of Options/Program Preparation. The sheer number of management plans in Hawaii speaks to the abundant planning capacity currently in place in Hawaii. These plans include: the Hawaii Ocean Resources Management Plan, Watershed Management Plans for both priority sites (and other watersheds across the state), several Fishery Management Plans (FMP), Humpback Whale National Marine Sanctuary Management Plan, Papahānaumokuākea Marine National Monument Management Plan, and many others. The consensus among people interviewed was that Hawaii does not need more plans, and that they are in fact saturated with plans and need to make the shift towards implementing those plans. Pilot activities are being implemented at the priority sites, and the geographic areas of focus for the priority sites is well-defined. Documents such as the Strategy, Wahikuli-Honokōwai Watershed Management Plan, Wai'ula'ula Watershed Management Plan and the Pelekane Bay Watershed Management Plan provide a clear set of priority goals, objectives and in some cases activities in order to move forward with coral reef management at the pilot level.

Findings for Step 3: Formal Funding and Adoption. Gaining formal commitment for coral reef management initiatives is often difficult in Hawaii due to what was regularly described as a lack of political will and lack of

funding. Most of the funding for coral reef management initiatives comes from federal partners or foundations. Potential funders in the form of foundations and large NGOs (Castle, NFWF, TNC, CI) and individuals (Gordon Moore, head of eBay, etc.) may be valuable to coral reef management. However there must be an infrastructure within the state agency to effectively spend and leverage that money, coupled with long-term strategic plans for sustainable funding initiatives. Taxes, fees and other revenue such as that from tourism are largely not contributed to the financial basis of coral reef management. In fact, recent legislation to support the collection of revenue such as user fees from tourists to go towards natural resource protection, such as the MOANA Act, have been declined by the Legislature. Natural resource protection is often not included in political agendas, and political leaders seem to be largely influenced by vocal, if minority, opposition constituencies such as fishing and hunting groups. Increasing engagement between coral reef users, stakeholders in coral reef management, and the Legislature is critical in Hawaii, particularly due to the inter-relatedness and the dependency that exists between them.

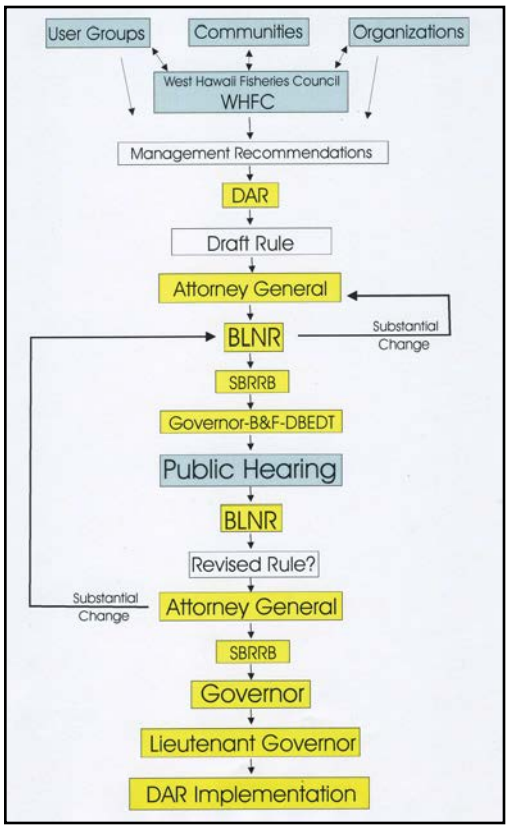


Figure 5: *West Hawaii Administrative Rule Making Process Chart.*

Although much of the necessary mandate is already in place for coral reef management in Hawaii, enforcement and compliance with such regulations is limited. We heard from many of those interviewed that rule-making procedures such as Hawaii Revised Statutes Chapter 91 present barriers to approval of rules and regulations for natural resource management. Many people expressed frustration with the processes involved in HRS Chapter 91, particularly that the opportunity for public comment and exchange with the agencies is limited. This does not allow DLNR the opportunity to clarify the purpose and objectives of the rules for the public constituents. We learned that public hearings are rarely held on the outer islands and final decisions on the rules are decided in O'ahu, where major lobbying groups are prominent, and therefore the voices of communities on smaller islands who are ultimately most affected by these rules are often not represented in the final testimony. Please see Figure 5: West Hawaii Administrative Rule Making Process Chart and Appendix F: Non-Emergency Rule Making Process Department of Land Natural Resources.

Those interviewed also explained the difficulties of passing natural resource management bills through the Legislature[1]. People mentioned that bills are often turned down by

[1] An example is the Plastic Bag Ban. In 2012, a bill was proposed in which grocery stores would charge five cents for plastic bags and the money generated would go directly to DLNR for watershed restoration. Despite overwhelming public support, the bill was turned down in the legislature. It was believed by those interviewed that another similar rule was passed at the county level in Maui to ban plastic bags with no fee structure in place. While the bill for the State of Hawaii would have established a mechanism for revenue to go towards natural resource protection, it may have also reversed or overridden the efficient local laws such as that in Maui. Therefore, although this demonstrates a lost opportunity for the state to receive sustainable funding for management, effective county laws such as Maui's bag ban may have been replaced by less restrictive state laws in order to receive those funds. Those issues may have contributed to a lack of political will to approve a statewide Plastic Bag Ban.

the Legislature in committees that are not related to natural resource management, and in many cases without clear justification, decreasing capacity and available resources for DLNR. One cited example is the MOANA Act. The act was proposed in 2012, and would have installed user fees as well as a mechanism to collect and effectively distribute those fees to DLNR for natural resource management. Proposed user fees could have significant impact on the amount of money allocated to natural resource management. For example, if the proposed modest $2 user fees per person were implemented at just one of the many popular tourist sites, then over $1 million could be generated annually. $1 million dollars is nearly half of DAR's current annual allocation from the state general fund. The creation of this mechanism can only occur by a mandate from the Legislature and could make this currently unrealized source of funding transform into a crucial pathway for state-level support for Hawaiian natural resources. Another example is the "ABOUTFACE Bill", also proposed in 2012, which would have allowed DLNR to apply non-criminal monetary penalties through civil enforcement for natural resource violations. However, both bills failed in the Legislature. These examples provide evidence of interest in generating revenue as well as lost opportunities for the state to generate revenue to directly support DLNR, an expression of a lack of political will from and engagement with the Legislature on these types of issues.

Findings for Step 4: Program Implementation. There are many implementers and therefore from the face of it, it would seem that capacity is high to implement effectively. However, much of the actual "do" is in the form of pilot projects, planning processes, research, and coordination. Without a conceptual management framework, the appearance is of high activity, yet capacity gaps remain that are persistent barriers to progress. Relevant research, monitoring and public education can be well coordinated but often do not inform strategic implementation. Consensus among the people that were interviewed was that a conceptual framework for coral reef management in Hawaii would be a valuable tool for creating coherence across initiatives and for sequencing and prioritizing management actions. An example of the need to bridge the implementation gap in Hawaii currently is recreational fishing licenses. Without a recreational fishing license, the enforcement of fisheries regulations, and compliance with the fishing regulations, that have the potential to have a major beneficial impact on the entire economy, is low. Thus the implementation gap is the dominant feature of the coral reef Management Cycle at both the state and local scales, and capacity building recommendations are directed at closing that gap.

Findings for Step 5: Reflection and Evaluation. Meaningful reflection on, and evaluation of, coral reef management initiatives is also inadequate in Hawaii. Program outcomes are often not documented and goals are not regularly reassessed. Priorities and policies are not readily adjusted to reflect experience and changing social and environmental conditions. Some initiatives, such as TNC's CAP Process and the management of the Monument, do have regular benchmarks and evaluations. However, most programs are not held accountable for their progress or success after a regular amount of time, making it difficult to have initiatives that are capable of adapting to the complex and constantly changing context in Hawaii. This prevents coral reef management from building adaptive capacity to learn better, faster and more quickly in order to manage reefs most effectively.

3.2 Brief Review of Management Enabling Conditions (1st Order Outcomes)

A brief analysis is presented below of the degree to which the conditions are present that enable effective Ecosystem-based Management of coral reefs in Hawaii. As applications of Ecosystem-based Management mature, the need to complement methods of organizing the processes of management with methods for assessing the outcomes of management has become apparent. The unifying framework is useful for this purpose since it disaggregates the ultimate goals for coral reefs, as described in the Strategy, into a sequence of more tangible thresholds of achievement. This framework suggests sets of indicators that can be used to trace the evolution of coral reef management as it progresses from the baseline conditions documented to progressively more sustainable conditions and patterns of use. The framework defines the 1st Order as the most critical set of outcomes as they enable effective management.

Only after the requisite changes in behavior have been practiced for a sufficient period (defined by 2nd Order outcomes) can improvements be expected in coral reef health and in the social benefits that constitute the 3rd Order achievement of the environmental and societal goals selected in the earlier phase of program design. In an operational sense, and given global ecosystem change, the ultimate goal of sustainable forms of coral reef management is a "north arrow" that points in the direction of desired change. It is important to recognize that some expressions of 1st, 2nd and 3rd Order outcomes will accumulate concurrently within a given time period. While there are causal relationships between the three Orders, they are not, and should not, be achieved in a strictly sequential order. For example, once some progress has been made in assembling 1st Order outcomes, coral reef management programs should work to achieve some evidence of 2nd and 3rd Order outcomes in a learning-by-doing mode. This can be accomplished, for example, by coral reef management activities at a pilot scale such as at the two priority sites. Experience has repeatedly confirmed that the most successful initiatives focus their efforts on one or two issues and then expand the scope of the program as experience, capacity, and constituencies are built. It is usually a mistake to launch a fully integrated program directed at multiple issues before capacity, clear goals, supportive and informed constituencies, and formal commitment for improved management are effectively in place.

Clear and unambiguous goals that define desired coral reef conditions and intensities of use

There are few time-bound and measurable goals with respect to coral reef management within the HCRI. Section 4 of the Strategy, "Ten-Year Priority Goals and Objectives," successfully defines purpose (4th Order Outcomes) and a set of activities for implementation of coral reef management (2nd Order). However, very few are specifically time-bound and measurable nor do they feature a tracking mechanism to monitor their progress and success. At the scale of DAR, the state agency mandated with the responsibility of coral reef management, there are also few stated 3rd Order goals or an overall strategic purpose and direction for the agency. With re-organization and new leadership, DAR has the opportunity to explicitly state its purpose and goals for management in a manner that is well-defined, well-understood, and inclusive to other key partners and features a monitoring system that builds toward a learning-by-doing adaptive approach.

Informed and supportive constituencies for coral reef conservation

Although the general public in Hawaii is largely aware that coral reefs are declining and in need of protection, many who were interviewed described the on-going need for greater and more widespread awareness of the interrelatedness of coral health and economic health. Such large-scale public education, tied to learning goals within primary and secondary education (which is expanding in Hawaii), also needs to be more strategic and targeted, including aspects such as social media and school curricular standards. The current engagement with SeaWeb is an example of such a commitment to build upon the results of public surveys to inform action that leads to more desirable forms of behavior change (2nd Order Outcomes) (Ward Research, 2007). Conservation through social media is growing, but remains relatively nascent in Hawaii. There is a growing demand at the community scale to be able to co-manage resources. Communities are generally not well-versed on their options when it comes to resource management, and while there are exceptions, community groups are often underfunded, poorly organized and also lack dedicated, knowledgeable leaders. Some initiatives such as CMMAs and the Hawaii-Palau Exchange with TNC in 2012 have been successful in increasing the capacity for community-based co-management at the local pilot scale. There is a historical sentiment among the public that responsibility for resource protection (in the form of funding, infrastructure, etc.) should lie in the hands of the state (and not the federal government), but the state currently has little capacity to support co-management as a significant investment.

Generally, we have found little evidence of a fully functional nested system of management authorities between the four Hawaiian counties and the state's resource management authority. The relationship between the state and federal implementing partners, as well as NGOs, is far more developed. Indeed, many people who were interviewed reported that communication and engagement break down largely at the county scale where land use decisions are made. Here again, the dynamics of local context (each county with its distinct characteristics), power dynamics, authority, leadership changes over time, and most critically individuals in leadership positions that support improved coral reef management is a significant capacity gap.

It is noteworthy that there exists a small but vocal opposition to restricting local rights through increased management, particularly for MPAs. Verbal conflicts among user groups are common, with some advocating for increased management and others strongly opposed, particularly during community meetings, and are often not resolved. Thus, quality of facilitation takes on an even greater importance at the community level. Many have described the situation as a clash between somewhat innovative limited-access management (Ecosystem-based Management) and maintaining status quo open-access forms of management. Leveraging traditional ecological knowledge and incorporating it into contemporary management practices is already identified as an important step toward striking that balance.

Enforcement and compliance is often described as a persistent challenge and major capacity gap, as many recognize that DOCARE has an expanding mandate, limited funding, and priorities that transcend enforcing natural resource rules and regulations. For example, there is currently no civil penalty structure in place, and violations, such as the illegal catch of fish, are adjudicated in criminal courts that deal with a wide range of issues such as theft, assault and battery, and murder. Judges therefore often do not view natural resource violations as critical and often they are not well versed in the significance and reasoning of the resource violations. Links in the enforcement chain are also separated by county and state governments, which make information sharing and

processing of cases difficult. As mentioned previously, with a population of nearly 1.4 million people (U.S. Census, 2010) with a wide range of social and economic challenges, such as few jobs and high cost of living, natural resource protection seems to fall low on the public's perception of priority issues that require reform. For more information, please see Enforcement Chain Analysis of Aquatic Resource Enforcement on O'ahu Island and North Shore Maui (Tanaka et al., 2012).

Adaptive capacity to practice effective coral reef management

There is a wide array of parties engaged in coral reef management in Hawaii, ranging from federal, NGO, Pacific-wide, state, community, academia, etc. All entities are engaged at different levels and involved in different projects. The presence of federal agencies and large international as well as small and intermediate NGOs is growing, which are filling some of the capacity gaps of other entities within Hawaii, such as DAR and DLNR. Many of the federal agencies, as well as DLNR, are based in O'ahu and face-to face meetings with staff from outer islands are expensive and therefore not routine. Given the "O'ahu-centric" nature of resource management, collaboration and communication with staff on the outer islands is difficult, although it is certainly not impossible given current communication technologies. DLNR is at the heart of the state-led coral reef management initiative in Hawaii. With the creation of the Strategy and the mandate from the laws discussed in Section 2, DLNR and DAR have the mandate and a plan for moving forward with coral reef management. However, there are multiple capacity gaps and barriers to implementing those plans. For example, DLNR and DAR have gone through significant staff cuts in recent years, decreasing their staff and technical capacity. The state investment in DLNR is extremely low at 1% or below of state funds, which ranked Hawaii as the 50th state in terms of funding for fish and wildlife management in 1994, and the 37th state in terms of spending for the state's environmental agency's budget in 1997 (Dator et al., 1999). Those funds are distributed across ten different divisions within DLNR, all with different priorities and goals. Its lack of financial capacity and dependency on federal and foundation funds for coral reef management often inhibits progress past the planning phase or limits implementation to pilot projects. Sustainable financing, reformed relationship with DOCARE as well as formal commitment for increased management capacity at multiple scales will be critical to DLNR moving forward with efficient coral reef management. Currently, DLNR has had to face a high degree of staff turnover, causing multiple downstream effects of projects losing momentum, "brain drain," the potential for dysfunctional organizational culture and increased need to build a knowledge-base among new hires. DLNR also struggles to attract and maintain staff, as many of the "best and brightest" coming out of Hawaii's higher institutions are drawn to federal agencies or large NGOs that can offer higher salaries. Administratively, there are a number of barriers that exacerbate these effects. For example, several interviewed reported that the approval process for new hires and position descriptions for state positions must go through the Legislature and is therefore difficult and slow. As a "work-around" DAR has been using contractors from the Research Corporation of the University of Hawaii in an attempt to temporarily fill some staff capacity. Finally, DAR had been without an Administrator for nearly three years, and the lack of leadership, coupled with the previously discussed re-organization of DAR, have contributed to low morale. A new DAR Administrator was recently hired in 2013.

We believe that DAR is at a critical point in which it has the opportunity to build its internal capacity as well as its partnerships in order to re-assert its position at the center of coral reef management in Hawaii. The opportunity

comes at a time when top-down management from centralized natural resource management could be grown in parallel with investments in building bottom-up community-based co-management, evoking more applied strategies from traditional ahupua'a-based methods of ecosystem stewardship. However, in order for that initiative to be successful, the infrastructure needs to be in place within the state agency to support both bottom-up and top-down management. Developing a common framework for coral reef management, particularly for DAR's role in supporting community-based co-management, is a core capacity need and path forward for DLNR in order for it to keep up with a changing ecosystem and a changing social consciousness. A true paradigm shift away from weakened administrative management and toward a more effective nested system of natural resource management is required within the agency so that it may maintain and continue to re-assert its role at the center of coral reef management in Hawaii.

Formal commitment to coral reef conservation, protection and management

In this context, "formal commitment" refers to commitment to, or political will in support of, coral reef management within DLNR and other key power stakeholders. This is perhaps the most important of the enabling conditions for coral reef management within Hawaii. Nearly everyone interviewed in the capacity assessment process reported that political will was one of the biggest barriers and opportunities to coral reef management in Hawaii. Clearly, the State of Hawaii faces huge issues with its budget realities and tends to focus on traditional indicators of economic growth and development over natural resource protection. However, the connectivity and inter-dependence between those priorities seems largely unrealized at the scale of the legislative, judiciary and executive branches of state government. Management priorities are therefore rarely informed by science, but rather by other needs such as employment or development pressures. Scientific research, along with the voice of DAR and DLNR as a whole, seems to be relatively unheard by the Legislature, largely due to a wide range of other, more powerful interest groups that have a significant presence within the legislature. People that were interviewed communicated that decision-making and motivation in Hawaii is largely determined by emotions of a few key people, serving as a basis for political will in Hawaii and not commonly reflecting or recognizing "island context" or the interests of the outer islands in general and reef protection in particular. Interviewees reported a somewhat common reality experienced throughout the world, that politics are instead driven by the "most powerful political interest group" or the "loudest voice in their ear" at that time, which often do not reflect the priorities or emotions of all the islands or the community at large. Some in political positions described being "nervous" to express their true feelings about natural resource protection for fear of losing votes among the public and losing support from other political interest groups. Hawaii's capacity for Ecosystem-based Management is not significantly limited by the legal mandate, indeed building blocks of the law exist to support it, but barriers lie in the lack of political will and lack of resources to support effective management. Few attorneys in Hawaii are versed in natural resource protection and administration, making engagement with the legislature and rule-making for natural resources more difficult. From the interviews conducted as part of the capacity assessment process, most interviewees consider the current leadership at DLNR to be extremely supportive of coral reef management and effective at moving forward with projects and engaging with necessary partners, including with the Legislature. Many people in leadership positions within DLNR Divisions are planning on retiring in the next two years, and many people interviewed in such positions expressed concern about "passing the torch" to people that are competent at managing adaptively in a complex and changing context. This creates a

window of opportunity for DLNR to focus on new leadership that is collaborative, engaged, and well versed in ecosystem governance in order to increase the agency's capacity for effective coral reef management.

Lay net ban signage at Puako Bay and Puako Reef Fisheries Management Area on the Big Island. (Photo credit: Glenn Page, SustainaMetrix.)

Section Four: Priority Capacity Building Strategies

Note on recommendations: The recommendations in this section have been divided into three groups based upon their complexity, scale, practicality and the degree of control over their implementation. The Group 1 Recommendations are highly political in nature, will require high-level governmental action, and in many respects lies beyond the direct reach of the Main Hawaiian Islands coral reef management network. The Group 2 Recommendations will require a collaborative and coordinated approach to management at select priority sites and involve interconnected systems and engagement with multiple resource users, government entities, NGOs and funders. The Group 3 Recommendations are designed to build capacity at an organizational scale where leadership and control over implementation is relatively high. Each recommendation includes insight on the degree of complexity, cost, and the time required to implement. Section Five presents broader contextual guidance on how to develop a long-term strategy to build adaptive capacity to improve coral reef management in the Main Hawaiian Islands.

The recommendations in Group 1 are grouped into four themes, with the highest priority theme presented first, and the recommendations within each theme also presented in general priority order, incorporating the guidance of the Hawaii J-CAT and our best professional judgment. The four themes in Group 1 are:

- **Theme 1** (Recommendations 4.1A to 4.1F): Strategies to re-establish and improve the high-level function and purpose of DAR within DLNR and DLNR as a whole;
- **Theme 2** (Recommendations 4.1G to 4.1H): Strategies to create long-term, sustainable financing for coral reef conservation in Hawaii;
- **Theme 3** (Recommendations 4.1I to 4.1M): Strategies to promote better rules and regulations to conserve coral and marine resources in Hawaii; and,
- **Theme 4** (Recommendations 4.1N to 4.1O): Strategies to promote better engagement with the Hawaiian Legislature.

The recommendations in Group 2 are organized into a logical sequence that will aid their implementation at two priority sites in Hawaii and were not subject to prioritization.

The recommendations in Group 3 are grouped into three themes, also with the highest priority theme presented first, and the recommendations within each theme presented in general priority order, again incorporating the guidance of the J-CAT and our best professional judgment.

The three themes in Group 3 are:

- **Theme 1** (Recommendations 4.3A to 4.3B): Recommendations targeted to high-level administrators that support or fund coral reef conservation;
- **Theme 2** (Recommendations 4.3C to 4.1F): Recommendations targeted to managers of coral reef conservation activities and initiatives; and,

- **Theme 3** (Recommendations 4.1G to 4.1I): Recommendations targeted to the stakeholders and more specifically those who routinely rely upon the coral reef resource for livelihoods, recreation and cultural purposes

4.1 Group 1 Recommendations: Politically Challenging Goals to Improve Formal Commitment to Coral Reef Conservation

The recommendations in this section are politically challenging, and in many respects, accomplishing them will require actions beyond the reach of NOAA CRCP, DLNR and the larger coral reef management network in the Main Hawaiian Islands. Nonetheless, there are concrete measures that NOAA CRCP and DLNR can take that can improve the likelihood of success and can lead to an improved climate for coral management and marine conservation in the state. Indeed, a top priority to build the capacity for effective coral conservation in Hawaii is to generate high-level institutional and political support for coral reef conservation and management.

THEME 1: STRATEGIES TO IMPROVE THE HIGH-LEVEL FUNCTION AND PURPOSE OF DAR AND DLNR

4.1A Ensure DLNR Creates Thorough Orientation for the New DAR Administrator

DAR has recently hired a new Administrator after approximately three years with the position vacant. Having an effective Administrator is critical to the entire process of building institutional capacity within DAR, as well as for building capacity for coral reef management in the Main Hawaiian Islands as a whole. The new Administrator has the opportunity to employ Ecosystem-based Management and become effective at building structures for community-based co-management that could restore morale in the Division and re-assert DAR's role as leader in coral reef management in the Main Hawaiian Islands. An effective orientation procedure for the new Administrator should be developed so that institutional knowledge can be transferred by a transition team with an understanding of the past and current functioning of the program. This acclimation will be an important step to inform the restructuring of DAR (Recommendation 4.1B). The transition team could develop a multiple-day briefing workshop where federal, state, county, local, academic, NGO and other partners can brief the new leadership on past, current, and upcoming initiatives. During these briefings, the new Administrator could be provided with resources such as lessons learned from other coral jurisdictions, organizational charts, job descriptions, handbooks, informal briefings on relationships with existing federal, state and local partners, and other mechanisms to ensure continuity of institutional knowledge that will be critical for enabling them to effectively practice Ecosystem-based Management in the Main Hawaiian Islands. These briefings will ideally foster personal relationships among the leaders of the partner agencies and organizations, which could lead to regular collaboration and communication. The same orientation process should be put in place for the hiring of program managers within DAR. Implementation of this recommendation should be the responsibility of DLNR and its partners.

Recommended Lead: DLNR
Potential Partners: DLNR partner agencies and organizations

4.1B Develop a Strategic Plan for DAR

With the leadership of the new DAR Administrator, DAR should develop a strategic plan that targets building capacity within DAR by prioritizing and sequencing activities, defining purpose for coral reef management and creating realistic, time-bound and measurable biophysical and socio-economic goals. There is a clear sequence of events that needs to occur in order to enable the implementation and utility of this recommendation as well as others, beginning with the orientation of the new DAR Administrator (Recommendation 4.1A) and the development of a business, political and common-sense case for improved coral reef management within DLNR (Recommendation 4.3A). The implementation of this recommendation would then facilitate improved hiring and retention (Recommendation 4.1D), as a strategic plan could be coupled with the creation of standard operating procedures, organizational charts, terms of reference and updated job descriptions as detailed in Recommendation 4.1A. This plan would also be directly linked to the DLNR Business Case (Recommendation 4.3A) and would take into consideration other existing planning documents in order to build upon current efforts to provide DAR with clear direction, purpose, and a plan of action. Having such resources in place within DAR would help to increase sustainability and continuity of initiatives in the face of high staff turnover. Developing a strategic plan would allow DAR to reflect on its current capacity in order to target areas for capacity building and move forward more effectively with coral reef management. The strategic planning process would also create a cogent, shared mission across the DAR field offices. This document would be critical to providing a clear path forward for the new DAR Administrator. DAR may consider partnering with an organizational development partner in implementing this recommendation. For more information on select organizational development literature, please see the organizational development section of Appendix C: For More Information.

Recommended Lead: DAR

Potential Partners: A local expert in facilitation, an organizational development and strategic planning company or an academic partner

4.1C Create a CBSFA Program within DAR with Program Manager, CBSFA Planner and Makai Watch Coordinator Positions

We recommend that a CBSFA Program within DAR be created with Program Manager, CBSFA Planner and Makai Watch Coordinator positions. We commend the pilot initiative of this program that is currently underway with the hiring of a CBSFA Planner position (April 2013), who will be tasked with:

- Developing a clear and replicable process (Framework) to provide important information to communities;
- Engaging communities as they development management plans and CBSFA proposals;
- Review of existing ecological, economic, and sociocultural data and communicate with communities and DLNR about the implications of this information;
- Review of threats to resources identified by communities and recommend research and/or monitoring;
- Review of submitted CBSFA proposals, complete Chapter 91, HRS rule-making for CBSFAs;
- Advising communities currently engaged in CBSFA planning and conduct targeted public outreach programs;

- Perform administrative activities to support program, develop CBSFA application protocol for DLNR staff, and create a guidance document for applying communities; and,
- List priority management activities identified by convened communities groups.

With the leadership of the new Administrator, DAR has the opportunity to contribute to community-based co-management structures and enforcement through the creation of a CBSFA Program, Program Manager, CBSFA Planner and Makai Watch Coordinator. We believe capacity would be built through these positions and should be permanently funded within DAR. Such positions would create ties from DAR to DOCARE and enforcement, as well as to site-based community co-management. With a CBSFA Program, DAR would have a home for CBFSA principles, frameworks and guidelines from which to learn and expand. Case studies and lessons learned from local managed marine areas from around the world would also have a home in the program, such as learning exchanges with Fiji and Palau. There have been innovative compliance techniques employed at the community-level at the priority sites in order to increase awareness and compliance. For example, the Makai Watch program provides local people in the field with training and materials to educate resource users and also be the eyes and ears for natural resource protection in order to increase awareness and compliance. This could be a low cost way to increase voluntary compliance linked with more effective enforcement. With a CBSFA Program community-based co-management efforts across the state would become more cohesive and would receive more institutionalized support from DAR. There is already a process in place, as well as allocated grant funding, to find people for those coordinator positions. However, attaining sustainable funding and institutionalizing those positions will be extremely important for their foundation and continuance.

Recommended Lead: DAR

Potential Supporting Partners: DOCARE, Makai Watch, existing CBSFAs, Natural Resource Councils (i.e. Maui Nui)

4.1D Improve Hiring and Retention at DLNR

Given DLNR's high rate of staff turnover, new strategies should be developed to increase staff retention and ensure that institutional memory is retained. DLNR should reform the recruitment and hiring process to be more effective, such as developing an organizational chart where only top-tier positions require approval from the Legislature and low- to mid-level staff hires can be approved within DLNR. Historically, a dependency on contractors and high staff turnover has created barriers to building capacity within DLNR. Administrative hiring functions are very slow and difficult and may need to be re-evaluated. Job descriptions should be updated routinely. Trainings and mechanisms for information sharing should be made available for new hires. DLNR should continue to work toward encouraging resident Hawaiian applicants and more aggressively market job postings to recent resident Hawaiian graduates. Targeted recruitment strategies aimed at graduates of natural resource management and student mentoring programs (Recommendation 4.3G) could provide a steady source of high quality employees. Ensuring that structural elements as well as trainings are in place within DLNR to support incoming new hires and provide them with institutional knowledge is crucial. Those elements should be coupled with clear expectations and job descriptions, standard operating procedures, simplified grievance mediation, as well as mentorships and supervision to increase accountability. Considering that pay increases are likely not an immediate option within DLNR, incentives should be created instead to make open positions at DLNR more desirable to applicants. Examples

include opportunities for professional development, trainings, certifications, flexible schedules, etc. DLNR may consider partnering with an organizational development group, or an academic partner (such as the Masters in Organizational Change at Hawaii Pacific University), in implementing this recommendation.

Recommended Lead: DLNR

Potential Partners: An organizational development company, academic partner (i.e. Masters in Organizational Change at Hawaii Pacific University)

4.1E Strengthen DOCARE Enforcement and Encourage Voluntary Compliance

Recognizing DOCARE's recent progress towards transforming the efficacy of the Division, DLNR could build on the positive momentum by working in tandem with DOCARE to continue to support the implementation of positive institutional changes that strategically refocus DOCARE on natural resource enforcement activities. Formal commitment and support from the highest levels of DLNR will be necessary for this recommendation to gain the needed traction and support. Understanding DOCARE's expanding role of enforcing a broader range of laws, requiring it to patrol more areas, and do more routine police work in small harbors, parks and on public lands, it is recognized that DOCARE is unable to allocate sufficient staff and resources to all of the requisite activities to fulfill its mandate. We recommend that DLNR commission an assessment of DOCARE's needs to implement the current "Preliminary Action Plan" outlined in its strategic plan drafted in the fall of 2008. This needs assessment would not be an evaluation but an appreciative assessment that builds upon the strengths, but also identifies the needs, within the agency as it works to implement its strategic plan. We applaud the strategic plan for its "Preliminary Action Plan - Outlining Steps to Implementation" (Appendix 1 of the strategic plan), and such a needs assessment could enable DOCARE to make further progress in its efforts to implement its strategic plan to transform the Division. For more information, please see the Division of Conservation and Resources Enforcement Strategic Plan 2009-2014. Ideally the types of recommendations that would be generated from such a needs assessment could include:

1) The assignment of DOCARE officers to different DLNR Divisions, which would allow them to focus on a specific area of regulation and become specialized for their assigned Division. Funding and personnel within DOCARE are spread thin, and resources should be distributed in the most efficient way to increase capacity within both DOCARE and DLNR as a whole. Building this mutual capacity to enable DOCARE to move forward with the implementation of its strategic plan would increase enforcement and voluntary compliance across the state.

2) Already under way at DLNR is a process to shift away from criminal to administrative penalties for natural and cultural resource violation cases, as described by SB1170 – Relating to Enforcement of Violations by the Department of Land and Natural Resources. We applaud this progress and recommend that in most cases, this shift from criminal to administrative penalties with fisheries and natural resource infractions is appropriate and should be increased. Moving DLNR sanction procedures from criminal courts to civil courts will allow for cases to be dealt with more efficiently.

3) County Police share the ability with DOCARE to enforce HRS Title 12 Conservation and Resources via HRS 199-3 Conservation and Resource Enforcement Officers, Duties; Other Law Enforcement Officers. DOCARE could develop collaborative structures or an MOU with the four county police

departments with the purpose of supplementing the limited number of DOCARE officers the personnel capacity from the county police departments so that natural resource violation enforcement expectations are collectively met (PIMPAC Marine Enforcement and Compliance Workshop Hawaii Report).

4) Officers should be able to respond to incidents such as groundings, disease outbreaks, and bleaching events and be familiar with the protocols and mandates currently in place to deal with them.

5) The reported success of the Fisheries Enforcement Unit (piloted on Maui by a joint initiative between DLNR, CI and the Castle Foundation) should be built off of and expanded to other areas of Hawaii. The strengths of this program should continue to be supported by increasing technical and administrative support for the Unit as it expands beyond its pilot site in Maui.

6) Continue the support for DLNR's Joint Enforcement Agreement with the National Marine Fisheries Service Office of Law Enforcement to access funds for marine law enforcement, particularly as it is useful for establishing routine learning exchanges for DOCARE officers with natural resource enforcement officers of other coral jurisdictions.

7) The CI Hawaii Fish Trust Program's recent document, Enforcement Chain Analysis of Aquatic Resource Enforcement on O'ahu Island and North Shore Maui (Tanaka et al., 2012) should be researched in-depth for more specific recommendations to enhance Hawaii's enforcement system. One specific recommendation from the Enforcement Chain Analysis would be for DLNR to implement the Criminal Resource Violation System (CRVS) Penalty Schedule for non-commercial violations. The Board of Land and Natural Resources' (BLNR) authority to process administrative violations pursuant to a penalty schedule and without requiring a BLNR hearing except when contested case hearings (appeals) are pursued. See HRS Chapter 199D. "Alternatively, for certain violations falling under the jurisdiction of CRVS, DOCARE officers or the CRVS administrator may make an initial finding of a violation and issue a CRVS violation notice. In such a case, BLNR action is not required for a violation to be found; however, these violation notices must indicate the set monetary penalty for the underlying violation, and thus require a penalty schedule for the underlying violation to have been established by the DLNR. HRS § 199D-1, HAR §§ 13-1-61 -63. Due to this requirement for an already-established penalty schedule, CRVS notices are currently only available for commercial marine license catch report violations" (Tanaka et al., 2012).

8) There are multiple benefits for both DOCARE and DAR to work collaboratively to identify and share resources for more effective marine natural resource violation enforcement. Issues of non-aligned enforcement priorities between DAR and DOCARE could be avoided by developing an enforcement priority setting process with DAR and DOCARE together, perhaps facilitated by DLNR. If DAR and DOCARE shared enforcement priorities, then DOCARE officers could be assigned to DAR field offices across the Main Hawaiian Islands. If DOCARE officers are successfully assigned to DAR field offices, then DOCARE officers could be partnered with DAR biologists who can provide scientific briefings on an ad hoc basis for violation procedures. Ideally the successful implementation of such a recommendation would foster a better working relationship between the two Divisions.

This recommendation links with Priority Objective 2.2 in the PSD and Strategy.

Associated PSD and Strategy Priority Objective Goal: 2.2
Recommended Lead: DLNR Chairperson, DOCARE and new DAR Administrator
Potential Partners: DLNR Legal Fellow, TNC, DOCARE Legal Fellow

THEME 2: STRATEGIES TO CREATE LONG-TERM, SUSTAINABLE FINANCING FOR CORAL CONSERVATION IN HAWAII

4.1F Explore Pathways of Sustainable Financing through Tourism

In 2011, visitors to Hawaii spent $12.25 billion (DBEDT, 2011); the state has an opportunity to build sustainable financing through the role of tourism and its linkage with natural resource management. User fees, entry/exit fees, mooring fees, taxes on recreational water sports, increased prices for eco-tourism, land transfer taxes, real estate/property taxes, etc. could generate much needed revenue from the tourism industry to go directly toward coral reef protection. Several valuation studies have been conducted for coral reefs in Hawaii, and perception studies have shown that both visitors and residents to Hawaii are willing to pay higher fees if those funds are directly applied to natural resource protection (Cesar and van Beukering, 2004a; Bishop et al., 2011; Hawaii's Recreational Impacts LAS). Therefore, if a pathway is to be created for sustainable financing through tourism, DLNR needs to clearly identify a location and a purpose for those funds before they are collected (Recommendation 4.1G). DLNR needs to have complete control over how those funds are stored and utilized in order to foster accountability for return on investment of tourism-generated revenue. It is critical for contributors to be able to clearly see how their funds are being spent and how their investment will benefit natural resources. Molokini is an example where studies have shown that if user fees were increased, people would still be willing to pay. However, as there is presently no location within DLNR where those funds can be collected and secured from other users such as the Legislature, any revenue generated would go to general funds and would not be translated directly to management at Molokini. This clearly demonstrates the need for a framework under the control of DLNR by which those funds can be collected and distributed. A "Friends" group of DLNR that is outside of DLNR, yet to be developed, that would support DLNR activities (Recommendation 4.1G) would be an ideal location for tourism-generated revenue to contribute directly to natural resource management. The Hawaii Better Business Bureau and the HTA could be possible partners with DLNR in fostering this linkage and exploring these mechanisms of sustainable financing through tourism. We also recommend that DLNR explore the possibility of conducting learning exchanges between Hawaii and Micronesia and using initiatives such as the Micronesia Challenge and the Palau Protected Area Network Fund (Green Fee) as model mechanisms for sustainable financing.

Recommended Lead: DLNR, "Friends" group of DLNR (Note: name is placeholder only)
Potential Partners: HTA, Hawaii Better Business Bureau, Micronesia Challenge, Palau Conservation Society, TNC

4.1G Create a Non-Profit "Friends" Group of DLNR (Note: Name is Placeholder Only)

The process to develop a non-profit organization dedicated to supporting the mission of DLNR has already been initiated, and we recommend that moving forward with the initiative be prioritized by DLNR and other stakeholders that are already involved with the initiative, such as the Castle Foundation and UH. Lessons learned from the initial effort to establish such a non-profit should be integrated into the revival of a "Friends" group of DLNR. While the naming of the group is important and should be a topic for discussion, having this structure to optimize and maximize the capabilities of the state, particularly in a non-profit format where 100% of the proceeds go directly to supporting DLNR, is important for building the business model of DLNR. Such a non-profit organization should include clear policies, objectives, frameworks and mechanisms for distributing funds, which would avoid the current situation of slush funds supporting long-term projects without critical reiterative review. It will be important that such mechanisms specifically identify the destination of the funding, so that there is increased accountability and buy-in for supporting specific projects. The funds from this non-profit could allow increased flexibility and creativity for leadership within the state to try new programs and support innovative programs without initial permission from the Legislature or the constraints of current funding structures from the Legislature. The success of such programs could then justify receiving increased funding from the state or other funders. In addition, the consistency of funding from such a non-profit could provide a stream of reliable resources for core services of DLNR. The program has already received formal support from leadership in DLNR, and has also been offered an initial home within UH. Such an organization would be useful for identifying DLNR's strengths and successes and communicating them to potential funders, the Legislature, as well as the public at large in order to justify and increase their support across Hawaii. The non-profit could make clear connections to investors (including tourists) as to why investment is needed and exactly how the investment supports resource protection, as well as illuminate past successes and future goals.

Recommended Lead: Castle Foundation
Potential Partners: DLNR and UH

4.1H Create a Philanthropy Roundtable on the Topic of Sustainable Financing

The idea of a "funders roundtable" has been used to some extent by the Castle Foundation and CI, and has been discussed but never implemented by DAR. We believe such a forum provides a unique opportunity to bring together both private and public funders, hear from those funders about what is important to them, and let them hear from the people on the ground working in management about what is needed. Federal granting agencies, NGOs, private funders, foundations and other critical finance stakeholders are all intended to participate in such roundtables. This helps to foster a multi-party relationship for sustainable funding so that even if critical point-people move on, the roundtable can be sustained. This would also bring together those that have been interested in, or even attempted, sustainable financing initiatives in the past and would create a single, cohesive platform dedicated to such discussions. The roundtable should be done in addition to existing funding programs such as the Maui Reef Fund and the Big Island Reef Fund. However, in this case DLNR would be a critical partner in determining where those funds are distributed and how they are used to most efficiently support natural resource management. DLNR should be the lead on implementing this recommendation, with help from partners such as CI, the Castle Foundation and the "Friends" group of DLNR if and when it is created (Recommendation 4.1G). There is a sequence of events that needs to occur before a funders roundtable can be successfully implemented. DLNR

should first identify its existing amounts and sources of funding as well as define exactly what they are funding. That process will help DLNR to identify specifically where gaps and needs exist in its funding, which can then be targeted at a funders roundtable. The DLNR business case (Recommendation 4.3A) will help to inform this process. Having a framework in place for storing and utilizing those funds would be the next step towards implementation of this recommendation (Recommendation 4.1G). It is critical that DLNR, and DAR in particular, is able to clearly show those present at a funders roundtable where there are funding gaps and needs and what exactly those funds would go toward in order to foster justification and accountability before DLNR can implement this recommendation. Once those needs are met, we recommend that a funders roundtable be used as a core aspect of sustainable financing for coral reef management in Hawaii described in more detail in Section 5.

Recommended Lead: DLNR

Potential Partners: Castle Foundation, CI, "Friends" group of DLNR (note: name is placeholder only), and associated funders

THEME 3: STRATEGIES TO PROMOTE BETTER RULES AND REGULATIONS TO CONSERVE CORAL REEF AND MARINE RESOURCES IN HAWAII

4.1I Create and Enforce a Recreational Fishing License

We recommend that DAR create a recreational fishing license program, and issue and enforce the use of the resulting licenses. Hawaii is one of the few U.S. states with a viable coastal fishery that does not have a recreational marine fishing license, and it generates the lowest percentage among all U.S. states of total fishery program costs from fishing license fees. The marine recreational fishery in Hawaii is large and a license program could potentially generate significant revenues, providing an opportunity to invest the revenues in enforcement activities and marine conservation projects. Over time, improved habitat values and increasing fish populations can help build support for, and commitment to, improved management among the public and policy makers. The license program would require strong political as well as institutional support and additional infrastructure within DLNR. The associated reporting structure would have to be clearly defined and training may be required for DOCARE officers. Recent research conducted by DAR Legal Fellows on the structure of recreational fishing licenses in other states may be useful in this regard. While DLNR has tried to create a recreational fishing license in the past, and seems committed to doing this in the near future, sufficient political will is needed to move this to completion. A marine recreation license program can build off of the existing recreational fisheries special fund. The fund can provide a mechanism to collect the money and ensure that the revenue generated is used for sport fishing programs and is not available to the Legislature for general expenditures. This recommendation links with Priority Objective 2.1 in the PSD and Strategy.

If DLNR does pursue a marine recreational license, it should be aware of the following important considerations:

- A learning exchange between DAR and Florida's Division of Marine Fisheries Management could be very useful to Hawaii; define a clear mechanism for distributing collected funds and that the types of programs and plans are clearly articulated to all stakeholders to help gain support from communities and fishermen.

- DAR needs to make sure it defines a clear mechanism for distributing collected funds and that the types of programs and plans are clearly articulated to all stakeholders to help gain support from communities and fishermen;
- Funded programs should enhance co-management and Ecosystem-based Management of fisheries, and include programs to collect, analyze and disseminate better recreational catch and effort data;
- Better data can be used to generate better estimates of the economic value of the fishery, potentially bolstering the case for conservation to the Legislature and other leaders; and,
- This is a politically charged, socially and culturally sensitive issue and should be handled appropriately. As such, DLNR should consider employing techniques such as those found in the Native Hawaiian Consultation Handbook to engage with local communities and fishing interests in order to raise awareness and increase the level of buy-in.

Associated PSD and Strategy Priority Objective: 2.1
Recommended Lead: DAR
Potential Partners: Florida Division of Marine Fisheries Management, Hawaiian Islands Humpback Whale National Marine Sanctuary

4.1J Move Forward with the First CBSFA Rules Package

We recommend that DLNR, the Legislature and associated communities move forward with implementing the proposed Hā'ena CBSFA Rules Package through the state's Chapter 91 rule-making process, and to go beyond the Chapter 91 process to specifically engage stakeholders such as fishing communities, NGOs, and local government to help promote co-management objectives and gain support for the rules package. Implementing the Hā'ena CBSFA Rules Package should be relatively simple to achieve and could help build momentum for community-based co-management in Hawaii. It also links strongly to the larger goal of creating a statewide framework for implementing and developing community-based co-management across the Main Hawaiian Islands, as discussed in Recommendation 4.1C. Accomplishing Recommendation 4.1C will enable stakeholders to better understand what CBSFAs are, what the roles and responsibilities of the involved agencies and organizations are, and what entities can support and provide resources for them. Implementing the CBSFA Rules Package at Hā'ena will be a valuable milestone for creating clarity and functionality for the site as well as for potential future CBSFAs in the Main Hawaiian Islands, and will help lay the groundwork for the challenging process of re-distributing management responsibilities from the centralized DLNR to a more de-centralized community-based co-management model. Following the implementation of this recommendation, DLNR may consider conducting a "lessons learned" debrief from the experiences in Hā'ena in order to inform the proposal, implementation, and long-term support of community-based co-management areas in the future. This recommendation links with Priority Objective 1.1 in the PSD and Strategy. For more information, please see Institutional Analysis of Community-Based Marine Resources Management Initiatives in Hawaii and American Samoa (Richmond and Levine, 2012).

Associated PSD and Strategy Priority Objective: 1.1
Recommended Lead: DAR

Potential Partners: Proposed CBSFA Program within DAR, DLNR Legal Fellow, communities proposing the CBSFAs

4.1K Move Forward with the Draft Coral and Live Rock Damage Rules

We endorse and applaud the process that is already underway to formally approve and adopt the draft Coral and Live Rock Damage Rules in Hawaii. At the time of this assessment, the draft rules are currently awaiting approval by the Department of the Attorney General, after which they will proceed through a series of hearings and administrative reviews. The process of their designation is advancing, however the process should be prioritized and supported to ensure that the rules become effective as law. Creating those laws would be a valuable short-term gain for coral reef management. A critical step toward the implementation of this recommendation is educating those involved, such as the Legislature, landowners and community members about the benefits of the rules. Damage rules are especially important in the context of Hawaii, where the aquarium trade is prevalent and tourism is one of the largest industries. For more detail on justification for the rules, particularly with respect to the aquarium trade in Hawaii, please see Competing Perspectives in Resource Protection: The Case of Marine Protected Areas in West Hawaii(Capitini et al., 2004) and Ecological Impacts and Practices of the Coral Reef Wildlife Trade (Thornhill, 2012).

Associated PSD and Strategy Priority Objective: 2.3
Recommended Lead: DAR and Legislature
Potential Partners: County government and local communities

4.1L Institutionalize Standards into the Tourism Permitting Process

We recommend that standards for tourism permits be institutionalized and incentives be created for tourism operators to encourage and promote coral reef protection. Expanding the criteria for receiving a tourism operating permit, such as restricting use until accountability or capacity for education has been demonstrated, (eco-tourism certification process, user fees, educational presentations during experiences, biologists or educators on staff, etc.) would increase compliance and awareness in the tourism sector. A dialogue centered on incentives for natural resource protection within the tourism sector needs to occur across stakeholders. For example, the tourism sector, particularly dive/snorkel operators, depend upon DMB infrastructure that are currently maintained by an NGO (Malama Kai) but the time may be right for the state to reassert its responsibility for maintenance of this important infrastructure. We recommend that DLNR, specifically Division of Boating and Ocean Recreation (DOBOR) and DAR, address the appropriate and strategic support for the DMB program. DLNR may decide to either continue to engage with Malama Kai and support its efforts by providing it with resources, guidance and capacity, or DLNR may decide to foster capacity within DOBOR and DAR in order to put full responsibility for the DMB program in the hands of the state. In either case, we underscore the need for DAR to continue to work with DOBOR to hire a part-time DMB coordinator (NOAA CRCP funded) to continue the development of a DMB program for the state and to develop a cohesive program with sufficient funding for maintenance and management of the program. Malama Kai developed a Hawaii Day-Use Mooring Buoy 10-Year Strategic Plan in 2010 for DAR/DLNR, which contains recommendations for the future of day-use moorings in Hawaii and particularly addresses DAR/DLNR's participation and role. If this is currently the document of reference guiding DMBs in the Main Hawaiian Islands, the plan should be widely disseminated and implemented, and should help guide the decisions associated with the

implementation of this recommendation. If this recommendation is not implemented the risk is high that capacity will not be built to develop and institutionalize a DMB program with strong state-level support (see Strategic Plan for more details) in Hawaii. DMBs are an important tool for coral reef protection in Hawaii and the program is in need of capacity, commitment, and institutionalization.

Associated PSD and Strategy Priority Objective: 2.3
Recommended Lead: DOBOR and DAR
Potential Partners: Malama Kai Foundation

4.1M Provide Specific Guidance on Coral Reef Mitigation Standards

Clear and unambiguous guidance is needed from the USACE and other federal partners with regulatory oversight for appropriate standards, metrics and indicators for coral reef mitigation. Projects such as those involving harbor development, improvements to navigation that requires dredging, filling, etc., may involve unavoidable impacts to coral reef habitat. Although we have been told that such projects are routinely discussed at the collaborative inter-agency partnership meetings, as of March 2013, there are no clear coral reef mitigation standards and/or guidance protocols for Hawaii coral reef mitigation projects and there may not be a "standard" per se. However, without some sort of clear and specific guidance, DAR is unable to provide consistent oversight for evaluating and permitting projects, causing significant delays in permitting. Specifically, DAR seeks guidance on procedures for coral mitigation, measures of success, protocols, and performance criteria for acceptable mitigation practices for planned activities impacting coral reef ecosystems. Such guidance will streamline management and increase efficiency by eliminating trial-and-error methods that may not result in the desired outcomes. This will help guide DAR activities particularly as it relates to port and harbor development. Ideally, the USACE will provide some direction or other form of guidance that will assist DAR in the overall process. Specifically, USACE and other federal partners can support DAR with regulatory oversight by reviewing draft mitigation plans.

Associated PSD and Strategy Priority Objective: 3.2
Recommended Lead: DAR, USACE
Potential Partners: USFWS, EPA, NOAA and other federal partners with regulatory oversight with coral reef mitigation standards

THEME 4: STRATEGIES TO PROMOTE BETTER ENGAGEMENT WITH THE HAWAIIAN LEGISLATURE

4.1N Increase Engagement between the Tourism Sector and the Legislature

We recommend that an experienced facilitator approach the HTA (and specifically the Natural Resources Advisory Group therein) to make the case to spearhead a renewed effort to engage the Legislature for increased investment in natural resource protection. Ideally, this will result in high quality engagement and collaboration between the tourism sector and the Legislature in Hawaii with regard to natural resource management and implications for the state at large. The tourism sector and the Legislature are interrelated and interdependent, and they therefore have the opportunity to work toward common goals related to natural resource protection. The tourism sector and the Legislature should have clear lines of communication and collaboration on topics such as tourism, development and the economy, with the understanding that those sectors are all directly related to and dependent on the health of the

natural resources of Hawaii. Engagement should be centered on addressing how best to work together so that a balance is met between those sectors, and the interests of both are kept in mind and mutually benefited long-term. For example, the HTA contributes to bridging the tourism sector with the Legislature, and has created revenue pathways generated from tourism taxes collected at hotels and put towards natural resource protection. HTA is responsible (among several other mandates) for distributing the Transient Accommodation Tax (TAT), which is intended to go toward natural resource management. The TAT currently stands at 9%, and 17.3% of the funds generated are deposited into the convention center enterprise special fund, 34.2% are deposited into the tourism special fund, and 44.8% are transferred to the various counties, with any remaining revenues are deposited into the general fund. Of the 34.2% that goes to the tourism special fund, a fixed amount of $1,000,000 is allotted to DLNR, of which 90% is allotted to the State Parks Special Fund and 10% is allotted to the special fund for the Statewide Trail and Access Program (Na Ala Hele). A proposal exists to raise the rate from 9% to 11% in the near future. If increased, we recommend that a significant portion of the funds be directly allocated to DLNR, and particularly to DAR, to fund coastal and ocean resource management across Hawaii. This links to Recommendation 4.3A, in that the DLNR business case should clearly outline return on investment and make the case for natural resource protection to justify these actions. Increasing the quality of collaboration, communication and transparency between the tourism sector and the Legislature will help natural resource protection bills such as the MOANA Act and the ABOUTFACE bill be more readily and effectively brought to the attention of legislators. Ideally, this would then lead to higher levels of buy-in and awareness before the bills are even presented to the Legislature. The MOANA Act and the ABOUTFACE bill failed in the Legislature in 2012 (see Section 3 for more detail) largely because the benefits of the legislation were not explained and justified to the Legislature or the tourism industry. DLNR should therefore also be a partner in implementing this recommendation, as it will play a vital role in the interaction between the tourism industry and the Legislature with respect to natural resource issues, particularly in the form of making the case for the protection of coral reefs (Recommendation 4.3A). Engaging an academic partner, such as a resource economics department or program, in the communication of a potential DLNR business plan to the Legislature and the tourism industry may be useful. The HTA would be another valuable partner in implementing this recommendation, particularly for communicating directly with legislators and natural resource issues and policy legislative task forces and working groups. DLNR should explore potential joint ventures with HTA in order to foster a working partnership for this recommendation as well as other initiatives.

Recommended Lead: HTA and Legislature
Potential Partners: DLNR and UH

4.1O Enhance DLNR Engagement with the Legislature

We recommend that DLNR, as well as other managing entities in Hawaii, increase their degree of engagement with the Legislature to ensure presence in committee negotiations and to try to reduce unfunded mandates. It is important to note that unfunded mandates from the Legislature have the potential to create enormous capacity gaps within DLNR and DAR. Increasing effective engagement with the Legislature is critical for increasing political will and motivating decision makers to commit to the support of coral reef conservation efforts. We recommend that DLNR consider having a specific hired employee that is assigned to the Legislature and is responsible for communicating with legislators and engaging them on a regular basis with respect to natural resource management

issues. DLNR should work to ensure that the Legislature is apprised of the natural resource conservation implications of upcoming and current legislative issues, and well-informed about past legislation relevant to natural resource policy. Innovative methods of connecting with the Legislature should occur at several scales, beyond the office of the DLNR chairperson.

For example, engagement with the Legislature could include outreach and field experiences for key decision makers to demonstrate the cultural and economic importance of coral reefs. It was reported to us that, although field trips for legislators do occur in Hawaii, they are irregular and inconsistent. DLNR should ensure that these interactions with the Legislature are structured in such a way to meet specific goals and objectives. DLNR should approach Legislature trips with a strategic plan that clearly outlines what it wants to communicate and what it wants the legislators to get out of it. The scheduling of these field experiences should be more consistent and targeted, and DLNR may consider tailoring the trips for specific groups of people, as well as conducting them when there are particular bills or acts coming up in the Legislature, so as to increase their efficacy. When conducting learning exchanges that include members from multiple sectors of society from several different geographic locations, such as legislators, managers, community members etc., it is important to conduct specific exercises and workshops in such a way that people in the same sector are teamed together and have the opportunity to interact one-on-one and share lessons learned from their own offices and locations. This enables the members to relate to one another and be more sympathetic to the ideas being addressed, which fosters formal as well as informal learning. There is potential for DLNR to reach the Legislature through stakeholders in their districts as well, such as by organizing and hosting Legislature briefs and holding events at the capitol building. Although there was an event hosted at the capitol building during the Year of the Reef, it was reported to us that there was little attendance by legislators themselves and no follow-up from their staff, which further demonstrates the need to build relationships with legislators and engagement with the Legislature as a whole.

If DLNR wishes to move forward with such methods of increasing engagement with the Legislature, a set of key points should be identified that can be used consistently during interactions. The DLNR business case (Recommendation 4.3A) would be a useful document in developing those key talking points, as well as for developing strategic plans for conducting engagements and identifying their goals and objectives. This recommendation also links with engagement between the Legislature and the tourism industry (Recommendation 4.1N), as DLNR should be included in those interactions as well to ensure that all three sectors are on the same page regarding natural resource protection needs and policy. It was reported to us that one example of such a person with these skills is a previous DAR Administrator, Dan Polhemus, who was effective at engaging and communicating with the Legislature, both one-on-one and with the Legislature as a whole, in order to build awareness and buy-in for natural resource legislation and DAR. Interviewees also mentioned that the failure of natural resource legislation such as the MOANA Act was largely attributed to a lack of engagement and outreach between DLNR and the Legislature prior to the bill being introduced. In order to address this capacity gap, DLNR should explore the possibility of directly sharing that institutional knowledge and "best practices" of legislative engagement with the new DAR Administrator. Such mechanisms are critical in order to build and maintain the relationship and quality of collaboration between DLNR and the Legislature and, in turn, the level of political will and formal commitment for natural resource protection in Hawaii.

Recommended Lead: DLNR

Potential Partners: DAR Administrator, individuals with experience in communicating effectively with the Legislature

4.2 Group 2 Recommendations: Using a Common Management Framework to Pursue Ecosystem-based Management at Priority Sites

This second group of recommendations, taken together, constitute what we believe can be a pilot program to pursue holistic Ecosystem-based Management at the West Maui and South Kohala priority coral reef management sites. Much of the suggested activity lies within the purview of DLNR and the NOAA CRCP cooperative granting process, but accomplishing it will require a collaborative and coordinated approach to management and involve interconnected systems and engagement with multiple resource users, government entities, NGOs and additional funders. Given the relatively limited scope of available financial and personnel resources, and the complex issues of coral reef management that relate to politics, power, scale, knowledge, community and culture, we believe a common conceptual framework is needed to help sequence and prioritize coral reef management actions. Thus, a top priority for building capacity for coral reef management is to make a concerted effort to bring together the many contributing parties to gain a shared appreciation of the dynamic issues of the coral reef management process and improve the situational awareness of coral reef practitioners.

The recommendations presented here in Group 2 are aimed at creating a common understanding of the ecosystem approach to natural resource management across the Main Hawaiian Islands coral reef management network. Ideally, such an approach is applied at a demonstration scale and made a condition of the grant whereby implementing partners would track progress through a simplified monitoring and evaluation process. Initial recommendations in the group are aimed at creating trainings that promote the use of a common framework and language among coral reef practitioners, and encourage its use throughout the larger granting and management infrastructure. The recommendations that follow are organized by steps in the Management Cycle to highlight the utility of using the Management Cycle to guide the sequencing of management actions.

It has been our experience in similar settings that the application of a peer-reviewed set of tools, methods and a common vocabulary greatly increases the efficacy of Ecosystem-based Management. These methods are summarized in Section One of this report and synergize with the emergent CAP process being applied in the priority sites. Together, the tools and vocabulary constitute a framework that can guide resource allocation and team-based actions that proceed through the logical steps of the Management Cycle: Step 1 (issue identification), Step 2 (preparation of plan of action) and Step 3 (securing formal commitment) should, if effectively completed, generate the enabling conditions for a transition to effective implementation (Step 4) and thoughtful reflection and evaluation as part of adaptive management (Step 5). Furthermore, application of the Orders of Outcomes framework enables managers and funders to clearly define and analyze the current and desired state of the enabling conditions for successful program implementation as well as the appropriate short-, medium- and long-term program goals and outcomes. These tools emphasize the importance of taking into account the nature of coral reef management actions, the target or purpose of the project, the range and scope of other organizations, a concrete implementation strategy and the use of monitoring and evaluation to build adaptive learning. Central to this framework is moving beyond planning and into implementation that is based on the changes in behavior of resource users, managers as

well as the funders that are needed to bring about the desired environmental and social outcomes. We believe that building competencies across the wider coral reef management network in the tools and language of Ecosystem-based Management (creating a shared, common management framework) will help clarify goals and enable a more focused and strategic approach to management at the priority sites.

4.2A Promote the Use of a Common Language and Management Analysis Tools Through Management Training

Select an institution of known competence in training on the practice of ecosystem governance to offer an annual course (or courses) designed in partnership with a selected university unit that would address the principles and the practice of the ecosystem approach and core competencies required to build adaptive capacity for effective coral reef management. The expectation would be that once the curriculum has been developed and the course established, the university would assume full responsibility for the program and incorporate it into its curriculum. The curriculum should emphasize lessons learned from Hawaii and other jurisdictions and address in particular the transition from issue analysis and planning (Steps 1 and 2) to commitment to, and implementation of, a management plan of action (Steps 3 and 4). A central theme should be recognition of how the contributions of the natural and social sciences shift with each step. Such courses should strive to attract a diversified participant mix so that each class is exposed to the views and experience of natural and social scientists, managers, lawyers, educators, the NGO community and enforcement personnel. Such a capacity building curriculum could be adapted to feature short courses or seminars for senior administrators, judges, journalists and educators. Sample training modules are suggested in Appendix F.

Recommended Lead: DAR and Hawaii Coral Reef Management Point of Contact
Potential Partners: An institution of known competence in training on the practice of ecosystem governance

4.2B Tie Coral Reef Project Funding to Steps in Management Cycle

While we recognize that it is a large step, we believe to be successful and truly build capacity to manage coral reefs, it is important to use a common management framework that is integrated with the CAP process and is widely distributed across the entire coral reef management network, including funders (i.e. NOAA CRCP and NGOs). This would be enhanced by specifically requiring grantees to propose their strategies and organize their grants requests around the steps in the Management Cycle. Funding decisions, tracking of progress and reporting would also fit well into this organizing framework. Specifically, we recommend that projects funded by NOAA CRCP and other funders such as NFWF involved at the priority sites link the proposed activity to the appropriate step or steps in the coral reef management process at the site or sites where the activity is to be conducted. Research and monitoring proposals should also explicitly link the proposed activity to the issues addressed by management and identify how the activity will inform the management process.

Recommended Lead: NOAA CRCP
Potential Partners: NFWF, DAR, coral reef management funding partners

4.2.1 RECOMMENDATIONS ASSOCIATED WITH ISSUE IDENTIFICATION (STEP 1)

The foundation of an Ecosystem-based Management initiative is an assessment of the issues – the problems and the opportunities - that are affecting an ecosystem, and the selection of the spatial scale at which a management initiative

will be made. We have been impressed with the significant capacity that is in place in Hawaii to conduct issue analysis that can be used to guide planning. Pursuing the following recommendations will enable more effective identification of the issues affecting reef management at the critically important scale of local governments and communities.

4.2.1A Increase Engagement with Local Government

In order to increase cross-sector and cross-scale collaboration throughout the state and in turn increase the efficacy of community-based co-management efforts, we recommend that state management agencies increase their level of engagement with local government via county governments. If county governments are to be more actively included in management decisions by the state and federal agencies that are related to water quality, land development, resource protection and coral reefs, then state and federal agencies will need to successfully engage county government staff. Specifically, state and federal agencies should have discussions with county government staff on how to incorporate county government's voice and perspective into state and federal decision-making at key opportunities of intervention. Federal and state agencies should increase engagement with the divisions of county governments that directly manage similar issue areas, such as DAR field offices working in collaboration with the County Prosecuting Attorney's Offices to increase information sharing and improve the handling of natural resource violation cases; or EPA working with county and municipal government departments responsible for storm water management. The focus should extend beyond a project-by-project approach and should include discussions on increased long-term institutional collaboration. Such engagement should clearly articulate benefits of incorporating the county level point of view as it relates to their mandates and priorities. Each island has its own variety of councils representing citizens concerns related to natural resources (e.g. Aha Moku Councils) and state and federal agencies should engage with them by sending representatives to their meetings and by having representatives from these councils attend agency meetings. For more specific information on engagement with Native Hawaiian organizations, please refer to Native Hawaiian Consultation Handbook. We believe West Maui is an ideal site to document the benefits and processes of increased engagements with county governments, given existing efforts to formalize environmental concerns within county government through the establishment of the Maui County Environmental Coordinator's Office and the existing strength of the West Maui Ridge to Reef Initiative. One way to institutionalize this process would be to identify an ombudsman for each of the four counties that could facilitate more effective collaboration between federal and state agencies with county level agency staff as the Main Hawaiian Islands progress toward increased co-management of natural resources.

Recommended Lead: DAR

Potential Partners: Maui County Environmental Coordinator, county governments, state and federal managing agencies, Natural Resource Councils, Aha Moku Councils, County Prosecuting Attorney's Offices

4.2.1B Establish a Community-Based Management Network and Learning Group

If the community-based co-management methodologies of CMMAs and CBSFAs are to be sustained and replicated across the state, we recommend the establishment of a locally managed marine areas network and learning group. CMMA structures for community-based co-management have been successful in places such as Maui. In order for this model to be replicated in other places across the state, a network should be created to enable communication and lessons learned between them. Kua'aina Ulu 'Auamo (KUA), formerly known as the Hawaii Community

Stewardship Network, should be the lead for the implementation of this recommendation, which would be a critical step to growing and expanding their current network. We applaud the efforts of the KUA and encourage its continued support. Clear linkage, collaboration and regular correspondence should occur between this network and the potential future CBSFA Program within DAR, CBSFA Program Manager, CBSFA Planner and Makai Watch Coordinator positions (Recommendation 4.1C). Those positions and programs could act as a vital framework and mechanism by which community-based management efforts can interact with the state.

DLNR should engage directly with KUA, as well as its annual E Alu Pū meeting, in order to build momentum for community-based co-management and the role of the state in it. Enabling that collaboration and communication could be the task of the upcoming CBSFA Coordinator position. The network could also foster a linkage between Hawaii and other areas around the world where locally managed marine areas lessons could be learned. Trainings and workshops with successful locally managed marine areas in places such as Fiji and Palau have been extremely helpful to the development of community-based co-management practices in Hawaii. The Maui Nui Marine Resources Council and TNC have been exploring the possibility of creating such a network and learning group and should be engaged as partners for this recommendation.

Associated PSD and Strategy Priority Objective: 1.1
Recommended Lead: KUA
Potential Partners: DAR, TNC, Maui Nui Marine Resources Council

4.2.2 RECOMMENDATIONS ASSOCIATED WITH PREPARATION OF A PLAN OF ACTION (STEP 2)

After clearly identifying and communicating the problems and opportunities to be addressed, the next step in the Management Cycle is the preparation of a plan of action, with goals that address both the desired environmental *and* societal outcomes of the management action. Once again, we believe the capacity to conduct planning is not a limiting factor. However, we do believe steps can be taken that will serve to improve the preparation of management plans.

4.2.2A Increase Facilitation Capacity at Public Meetings and within DAR to Improve Management Plans

Since DAR and other implementing partners have expressed a strong desire to expand engagement with communities toward co-management arrangements, we recommend that best practices of facilitation be employed at community and public meetings across the state to inform management planning. Such engagement is not limited to the planning process, but it is critical to gain community perspective as early as possible in the process and maintain a pathway for input throughout the management process. Through our interviews, it was noted that a number of quality facilitators based in several communities throughout the islands are linked to an informal network to exchange ideas, stories and build capacity across their informal network. We recommend that these key individuals be institutionally supported and critical skills and core competencies needed in fostering quality dialogue between community members and government agencies be documented. HCRI-RP could take the lead housing such an institutionalized facilitators network because of its position at UH campuses throughout the Main Hawaiian Islands and its work in concert with university faculty involved in organizational behavior. Facilitation training workshops also exist at the College of Tropical Agriculture and Human Resources at UH Manoa, which could be an important

partner for implementing this recommendation. An ideal model could be a traveling corps of facilitators made up of staff from federal implementation partner agencies. These individuals would ideally be competent in both the topic issues of the meeting as well as have a strong command of facilitation methods. High-level institutional support from DAR in the form of formal funding, commitment and recognition of the importance of high quality facilitation is crucial for the success of such a network. In addition to outside neutral facilitation for public meetings, DAR employees could benefit from facilitation trainings to improve their interactions internally and externally by increasing the skill set of individuals in dispute and resolution philosophy and techniques. Ideally, the responsible agencies and organizations would support the corps of facilitators by building incentives such as payment, in-kind support, trainings and continuing their engagement in conservation and community efforts for coral reef protection for the long-term.

Recommended Lead: DAR
Potential Partners: HCRI-RP, UH, NOAA

4.2.2B Integrating Eco-tourism, Volun-tourism, and Premium Tourism Experiences into Management Plans

Since the priority sites have abundant opportunities for increasing tourism and public involvement, we recommend the development of a specific task force to integrate strategic eco-tourism, volun-tourism and premium eco-tourism experiences at priority sites. We believe a task force such as this should gather over a fixed period (i.e. 1-2 years) and generate a set of recommendations for premium experience tourism operators that could be a model across the Main Hawaiian Islands. The non-premium tourist experiences, where most of the revenue is generated, such as boats that take out large amounts of first-time snorkelers every day, could be certified under an eco-tourism brand and also charge a slightly higher rate for the "reef-friendly eco-tourism" experience. Studies (e.g. Cesar and van Beukering, 2004a) have shown that tourists in the Main Hawaiian Islands are willing to pay higher user fees than are currently in place, and that they see such fees as reasonable because they realize that they are in some part responsible for coral reef destruction. Such user fees and revenue generated from eco-tourism and premium tourism must be tied directly to the resource, and developing a clear location, pathway and purpose for those funds is a critical first step that must occur before such programs can be implemented (Recommendations 4.1.F, 4.2.A, and 4.2.B). Volun-tourism and capacity within organizations that use volunteers should also be built in Hawaii. Places such as Maui, where a high percentage of the population is composed of retirees that are interested in volunteer opportunities, could be targeted for creating premium volun-tourism opportunities that appeal to the public. Eco-tourism and volun-tourism opportunities should be linked to hotels, as they represent a critical part of the supportive constituency that should be marketing those experiences to their guests. Eco-tourism in Hawaii also needs more formal commitment, and capacity should be built within the Hawaii Eco-Tourism Association in order to move forward with effective certification and permitting. Hawaii's Green Business Program, which currently has an eco-friendly certification program for hotels, has potential for expansion and involvement in building momentum for eco-tourism in Hawaii. The Recreational Impacts to Reefs LAS Advisory Group could be the lead in implementing this recommendation, and may provide a central location for the working group or task force. A pilot program for eco-tourism was started in 2011 and could be the focal point for the task force to recommend marketing ideas, industry standards, and ways to secure formal commitment. The DAR Administrator should also be involved in any

working group or task force that emerges from these efforts in order to clearly outline DLNR's involvement in and linkage to these initiatives.

Associated PSD and Strategy Priority Objective: 1.1
Recommended Lead: Recreational Impacts to Reefs LAS Advisory Group
Potential Partners: DAR, HTA, Hawaii Eco-Tourism Association, Hawaii's Green Business Program

4.2.3 RECOMMENDATIONS ASSOCIATED WITH FORMAL COMMITMENT (STEP 3)

Following issue identification and plan preparation, management cannot truly progress unless the plan is widely accepted, formally adopted and supported by the appropriate rules, regulations and enforcement regime, and adequately funded. Without formal commitment, programs run the risk of engaging in ongoing planning and failing to progress to successful implementation – "the implementation gap." Accomplishing the following recommendations can help overcome this gap and lay the groundwork for achieving this critical step in the Management Cycle.

4.2.3A Use Social Science to Secure Formal Commitment for Natural Resource Protection

DLNR needs to more effectively apply available social science to inform cycles of management, especially at the pilot scale at priority sites that will further the case for improved resource protection. For example, there is a growing capacity among resource economists to generate quantitative information regarding the range of ecosystem services that reefs provide such as tourism services, recreational uses, fisheries, coastal protection, amenity values and educational and research services. Such an analysis provides a much needed reference point to compare possible alternative development strategies and conservation plans and the results of these studies should inform the development of the DLNR Business Case (Recommendation 4.3A).

A total economic valuation can provide the basis for advocating for preservation, establishing damage compensation standards, setting fees for permit applications, and determining appropriate user fees for residents and tourists. When tied to mapping, a visual image can be created to depict areas of high use and vulnerability, types of functions and ecosystem services, and guide decision-making regarding what should be managed, protected, and maintained. The characterization, valuation, and management of ecosystem services (cultural, provisional, supporting, and regulatory) in Hawaii is becoming an increasingly important academic topic, particularly how it may influence human well-being, social-ecological function, and planning in the tropics. Research activities that link social-ecological infrastructure to adaptive capacity and management actions are becoming more important interdisciplinary topics of interest.

Existing surveys, such as the Living Reef Public Perception study conducted in 2001 and the ongoing Hawaii Coastal Use Mapping Project at the priority sites, should be updated every 3-5 years. Results from such studies should be incorporated into management practice and methods. A simple step would be to inventory the research that has been done, define clearly the messages that have already been crafted and share them with decision makers. This recommendation also fits with the direction of the Hawaii CZM Program of the Office of Planning as it relates to their initiatives regarding coastal marine spatial planning. They are conducting primary data gathering, combining other GIS data layers from multiple agencies, and conducting analyses to try and inform decisions on current regulations for coastal zone management. They also seek to develop an easy-to-use tool for decision makers to assist

with scenario planning and anticipating behaviors. In addition to the Hawaii CZM Program, the UH Manoa Geography Department, HCRI-RP and the NPS could be among potential partners for linking social science and coral reef management in an interdisciplinary fashion to inform management practices. For information on social science priorities within NOAA CRCP, please see the Strategy.

Associated PSD and Strategy Priority Objective: 1.1
Recommended Lead: Hawaii CZM Program and Office of Planning
Potential Partners: UH Manoa Geography Department, HCRI-RP, and NPS

4.2.3B Secure Formal Commitment to Institutionalize Key Positions Such as Watershed or Coastal Coordinators

Coordinators form critical links between the community and other stakeholders in management at state and federal scales and add vital capacity for the collaborative process. Since the potential return on investment in these positions can be quite high for increasing capacity for management in the priority sites, we recommend that DLNR, NOAA CRCP and NFWF discuss methods to institutionalize these positions. Since a watershed coordinator is already in place in West Maui, and hiring a coordinator is the next step in the management process of South Kohala, the collaboration between both recently hired watershed coordinators should also be a priority. In the future, we recommend that DLNR have institutionalized positions for watershed coordinators at select priority sites and pilot project sites.

Watershed coordinators could rotate across geographies as issues are identified, plans developed, commitment gained, projects implemented and learning documented to facilitate sharing of expertise. Ideally this process could model the work with the fisheries enforcement unit whereby seed funding was provided by the Castle Foundation and implemented in partnership with CI for a few years. The goal was to slowly transition the program, and positions fully institutionalized within the state agency under the heading of DAR within DLNR. This investment is particularly critical if community-based co-management arrangements and ahupua'a-based management are part of a long-term strategy. Critical next steps would be to proceed with the hiring of a South Kohala coordinator, clearly define roles and desired outcomes at the watershed scale and define a path for the positions to move from pilot demonstrations to institutionalized positions within the state agency, building capacity both within DLNR and at the community-scale at the priority sites. Simply by changing the name to "coastal coordinators" could sufficiently broaden the scope of the roles and responsibilities to better align with Division of Forestry and Wildlife (DOFAW) and manage the ahupua'a from ridge to reef.

Associated PSD and Strategy Priority Objective: 1.1
Recommended Leads: DAR, NOAA, NFWF
Potential Partners: DLNR Secretary, Castle Foundation, HI DOH, EPA, U.S. Coral Reef Task Force

4.2.4 RECOMMENDATIONS ASSOCIATED WITH PROGRAM IMPLEMENTATION (STEP 4)

Crossing the bridge to effective implementation is a critical step that focuses on the changes of behavior of resource users, managers and funders/investors in coral reef management. The following recommendations will aide in accomplishing the successful implementation of properly prepared plans, after first identifying the issues and securing formal commitment, authority and funding, prior to implementation.

4.2.4A Using Outreach Tools Such As Community-Based Social Marketing To Influence Behavior of Resource Users

We recommend the strategic use of social media in outreach efforts for several key objectives. DLNR has attempted general messaging and social marketing campaigns in the past, but many people that were interviewed noted that the campaigns were generally ineffective. We recommend that DLNR continue to pursue engagements (such as current engagement with SeaWeb that could be considered a pilot effort) with professional communications agencies to further develop messages about the importance of coral reefs, and engage with professionals in community-based social marketing to hire community-based social marketing staff. With the new DAR Administrator, there may be an appropriate time in the near future to focus on the growing positive culture within DLNR (i.e. "Your DLNR is Working Harder Than Ever To Protect Your Hawaiian Natural Heritage"). Past efforts for DLNR messaging have been broad in order to promote the range of priorities across all ten Divisions within the Department. To create a more focused message, we recommend that a professional social marketing campaign be piloted specifically for improved marine management with coral reefs as the core theme. A lead for implementation of this recommendation could come under the purview of the NOAA Coral Fellow within his or her broader outreach initiative, and the Public Relations staff member at DLNR should be aware of the effort with occasional interface and regular communication with the NOAA Coral Fellow. This individual could establish a formal relationship with an organization that conducts biophysical monitoring such as NOAA Coral Reef Ecosystem Division (NOAA CRED) to translate the research and effectively communicate it to DLNR and the public. Collaborations between DAR and NOAA CRED at the priority site in Maui (or more specifically at Kahekili Herbivore Fisheries Management Area) could be seen as a successful pilot scale example of science-based social media communication that appeals to local communities. The Coral Reef Alliance could be a potential advising partner for this outreach initiative. Implementation of this recommendation would include the work of presenting at fishing shows, boat shows, on commercials/TV programs, for multi-media education for flights, hotels, car rentals, etc.

Recommended Lead: NOAA Coral Fellow and Public Relations DLNR staff member
Potential Partners: Coral Reef Alliance, SeaWeb, NOAA CRED

4.2.4B Strategies to Improve Program Implementation Through More Effective Grants Management

Funding time scales are often far short of, and out of sync with, the long-term time horizons that are required for implementing an ecosystem approach to natural resource management. To bridge this gap, managers are often seeking funding from a variety of sources requiring multiple tracking and increased time for grants management. NOAA CRCP is attempting to move toward long-term support and to provide adequate support for administration and grants management. Ideally funders would, to some degree, unify and align reporting and accounting requirements to encourage more accurate, timely and straightforward methods. Until such time when reform occurs, staff dedicated to managing grants is a core requirement. One full-time equivalent (FTE) should be institutionalized. Strategies to improve grants management performance include: adding administrative training on the updates to NOAA accounting processes for grants managers relating to the NOAA CRCP cooperative grant proposal on an annual basis, establishing routine calls among grants managers to share lessons learned between Guam, CNMI, American Samoa and Hawaii, and specifying the use of the Management Cycle (Section 1.2) and the degree to which the work builds the enabling conditions for effective management. Specifically, routine topics to discuss could be how to best maintain and track project performance, the learning that has occurred with respect to grants

management software, sharing effective strategies to improve communication back to the site managers regarding what has worked well and what needs improvement.

Recommended Lead: Administrative lead within DAR
Potential Partners: NOAA CRCP grants administrators and other jurisdictional grants administrators

4.2.4C Reinvigorate the Managing Better Together Learning Network (MBT)

MBT is a group that is committed to improving the quality of collaboration across natural resource implementing partners. The group should begin its revitalization by clarifying its purpose around a shared mission for improved collaboration among the natural resource management entities involved in the group. There should be renewed commitment to improved meeting practices, that includes creating a rotating secretary position to send out a meeting agenda, write meeting minutes and disseminate meeting records. Putting high quality collaboration practices into use will increase the quality of collaboration within the group and will ideally foster continued motivation and innovation within the group with implications for improved management of natural resources within Hawaii. The members of the group should be continuously re-visited and new entities should be invited as deemed appropriate. Additionally, the collection, analysis, dissemination, integration and archiving of lessons learned from MBT could be a good way to increase Hawaii's involvement with Pacific Islands Marine Protected Areas Community (PIMPAC) through the development of case studies as part of the improved record keeping of the group (Recommendation 4.2.5C). If the group seeks a common framework to improve the quality of collaboration, we recommend that it investigate employing the Collaboration Evaluation and Improvement Framework (CEIF), or similar collaboration framework, as a means to improve collaboration across the Main Hawaiian Islands coral reef management network, and expanding across the entire natural resource management network of the Main Hawaiian Islands. The CEIF, described in more detail in Appendix H is a simplifying methodology that has recently been developed to systematically measure, assess and promote the process and outcomes of high quality collaboration by employing five "points of entry" to thinking about where, when, and how to engage in building capacity for improved collaboration (Woodland and Hutton, 2012). It is based on a synthesis of lessons learned across multiple disciplines, sectors, management hierarchies, fields, settings and stages of partnership development. Appendix G: Portfolio of Training Modules details the five phases of the framework intended to provide specific and actionable steps to building capacity for high quality collaboration for coral reef management in Hawaii.

Recommended Lead: TNC, MBT
Potential Partner: Coral reef management network of the Main Hawaiian Islands

4.2.5 RECOMMENDATIONS ASSOCIATED WITH REFLECTION AND EVALUATION (STEP 5)

Finally, engaging in regular reflection and evaluation, leading to program adjustments (adaptive management) is critical to achieving successful natural resource management. Such reflection must be institutionalized into the management process, not applied as an afterthought. The following recommendations with help build a culture of reflection and adaptive management into coral reef management network at the priority sites, and can serve as a model for the larger reef management community across the Main Hawaiian Islands.

4.2.5A Learn from the CAP Process and Explore Ways to Expand It

It has been reported to us that the CAP process has been very successful in creating linkages and collaboration among communities, civil society organizations, NGOs, and the state, and catalyzing community-based management actions and buy-in at the pilot scale at priority sites, including especially in South Kohala. If this process is one that is intended to be replicated in other locations and continued at current locations, we recommend that the benefits be identified and documented in order to ensure long-term sustainability and to help define the proper role for local and state government involvement. We commend the CAP process in Hawaii, as it is the method most similar to moving through the steps in the Management Cycle (Section 1.2), and believe that it could benefit from scorecarding and outcome metric measurements. TNC should be the lead for implementing this recommendation, and it should be responsible for the dissemination of its findings. State entities such as DAR and the Hawaii CZM Program should be trained in the CAP process and methodology as well, which could be led by TNC and their CAP participants, so that all stakeholders are well-versed and involved in the process. This will make partner agencies and organizations better collaborators and facilitators of the CAP, particularly if the CAP process is to be replicated and continued throughout the state as a model for community-based natural resource management in the future.

Associated PSD and Strategy Priority Objective: 2.1
Recommended Lead: TNC
Potential Partners: DAR, Hawaii CZM Program

4.2.5B Create an Inventory of Completed Coral Reef Management Projects

There are and will be an increasing number of projects associated with the management of coral reefs in Hawaii and a data portal for sharing this information is needed. DAR has long identified the importance of an inventory, and attempts have been made but an inventory does not currently exist. Cajoling project managers to regularly report progress does not work. Technological fixes such as online templates do not often work. We were told NOAA CRCP staff attempted the establishment of a database to improve access to progress reports so that jurisdictional agencies could upload and see what others were doing. Those who worked with this system for over a year noted that it was not user-friendly, required valuable time to maintain the information, was overly complicated and as a result there was limited value. With limited staff resources and limited guidance, such a task can divert attention from other pressing tasks. Canada's International Development Research Center faced a similar problem and crafted an innovative response. As documented in a case study, they created a simple process for documenting project completion reports in a simple interview process. A process once regarded with distain became "a source of energy and enlightenment and a manifestation of evaluative thinking infused into our organizational culture" (Carden and Earl, 2007). A modification of the process to fit the Hawaii coral reef management context is suggested:

- Start with a defined list of a manageable number of projects (i.e. 5-10). Ideally they would be large and complex projects, such as those that require multiple years of implementation, and involve collaborations across sectors and disciplines where documentation of lessons learned would be quite useful. The purpose would be to test the applicability of this simple interview process across a range of project sizes. Ideally, a list of 10-20 people would be identified from all coral reef implementing partners who would be willing to conduct the interviews. They would be divided based upon their experience as junior level staff, project managers, as well as upper-level administrators.

- Prepare a set of interview questions that are relevant to each stage of the project's implementation: the beginning, middle, and end. The interview should be planned for roughly 20 minutes. At the beginning stage, a "junior" level manager would interview the project manager with questions relating to the design, issues with start-up, etc. At the middle stage, a project manager would conduct the interview.
- A senior-level manager would then interview a project manager - "What do you need? Where are you going"? It's a kind of rolling reporting process that is high on learning and low on effort and time.

There are many success stories to build upon that include the Hawaiian Islands Humpback Whale National Marine Sanctuary Advisory Council and its Interagency Law Enforcement Task Force, TNC's Train the Teachers workshop, Papahānaumokuākea's cross-agency management, etc.

Associated PSD and Strategy Priority Objective: 2.2
Recommended Lead: DAR, NOAA CRCP, PIMPAC
Potential Partners: All involved in implementing and managing coral reef projects

4.2.5C Case Study Curriculum

Natural resource managers, funders and practitioners could benefit from improved documenting and sharing of case studies of management success stories and lessons learned through a case study curriculum housed at HCRI-RP. This curriculum in coral reef management would emphasize case studies from Hawaii and other jurisdictions and addresses in particular the transition from issue analysis and planning (Steps 1 and 2) to commitment to, and implementation of, a management plan of action (Steps 3 and 4). A central theme should be recognition of how the contributions of the natural and social sciences shift with each step. Such courses should strive to attract a diversified participant mix so that each class is exposed to the views and experience of natural and social scientists, managers, lawyers, educators, the NGO community and enforcement personnel. Such a capacity building curriculum could be adapted to feature short courses or seminars for senior administrators, judges, journalists and educators. Audience-specific seminars could be developed to address capacity building needs and mechanisms for each stakeholder group and prepare case studies of coral reef management in Hawaii both as curricular elements and for re-tooling as public education materials. Such a curriculum would have multiple uses:

1) As an information sharing database among the natural resources managers, funders and practitioners through MBT (Recommendation 4.2.4C);
2) Reinvigorate Hawaii's participation in PIMPAC by sharing this Hawaii-specific management information;
3) Incorporating information into lesson plans of curriculum from junior high schools through the PhD-level; and,
4) Could be re-tooled for public education and outreach.

Such a database could be housed and maintained by HCRI-RP, assuming funding continues. Interviewees shared the successes of PIMPAC Learning Exchanges about bringing together natural resource managers from across the region around common issue areas. While these exchanges are incredibly useful for individuals present, there is a lack of quality documentation and dispersal of records after these meetings. One solution would be to create a

Hawaii-specific knowledge base through the MBT group and then sharing the information through multiple avenues. Scripted interviews described in 4.2.5B would be additional good content to include in the database.

Recommended Lead: PIMPAC
Potential Partners: HCRI-RP and the MBT

4.2.5D Use Scorecards and Inventories to Track Evidence of Enabling Conditions for Improved Coral Reef Management

Experience suggests that scorecards can be extremely useful in tracking the ongoing assembly and maintenance of the enabling conditions as part implementation of a coral reef management initiative. A simple scorecard can guide progress through each step in the Management Cycle and track the four enabling conditions and the degree to which they are present. The enabling conditions that support successful program implementation are:

1) A core group of well-informed and supportive constituencies supports the program;
2) Sufficient capacity is present within the institutions responsible for the program to implement its policies and plan of action;
3) Governmental commitment to the policies of a program has been expressed by the delegation of the necessary authorities and the allocation of the financial resources required for long-term program implementation; and,
4) Unambiguous goals define both the societal and the environmental conditions against which the efforts of the program can be measured.

Scorecards should be completed on an annual basis, with a focus on adaptive management and learning rather than accountability. Such a process could be built into revisions of the watershed management plans, or with the CAP process that integrates effective timing and processes.

Recommended Lead: NOAA CRCP, DAR
Potential Partners: NOAA CRCP funding recipients, NFWF

4.3 Group 3 Recommendations: Tractable Projects

This group of recommendations can be controlled by a small group of people, an organization or a network of organizations. While some do involve improving coordination with other government agencies or NGOs, many can be pursued and led from within DLNR or other implementing partners within the current management paradigm. This group of recommendations includes programs and trainings that focus on building a range of technical, financial, social, institutional and political capacities.

THEME 1: RECOMMENDATIONS TARGETED TO HIGH-LEVEL ADMINISTRATORS THAT SUPPORT OR FUND CORAL REEF CONSERVATION

4.3A Make the Business, Political and Common-sense Case for Improved Coral Reef Management within DLNR

We recommend that DAR, along with the other divisions within DLNR related to ocean resources, work toward making a "business" case for coral reef management. This includes gathering existing and, if necessary, commissioning new socio-economic studies of the value of coral reefs across sectors including tourism, fisheries,

traditional cultural practices, etc. Existing resources include Total Economic Value for Protecting and Restoring Hawaiian Coral Reef Ecosystems (Bishop, et al., 2011) and Sustainable Financing of Marine Managed Areas: Experiences from around the World (Cesar and van Beukering, 2004b). We believe the case needs to be made in light of the budget realities and political issues in Hawaii that have limited the Legislature's financial investments in coral reef management at the present time. For example, UH could be commissioned to conduct a study on how Hawaii's economy is dependent on coral reef ecosystems. Finally, a common-sense case is needed to answer the question "Why should we manage coral reefs?" and demonstrate how crucial it is to re-assert DLNR's role at the heart of coral reef management in Hawaii and plan ahead for the ecosystem changes that are likely in the future. Ideally, a succinct and clear case for coral reef management will justify allocation of resources from the Legislature when mandates are issued, encourage greater consultation on legislation and help to engage other potential funding partners such as a "Friends" group of DLNR described in Recommendation 4.1G. Such a case statement, when completed, should be a shared document that all staff can understand and that clearly presents the vision and goals of DAR, strategic implementation plans, types and amounts of expenditures, signs of success and ultimately provides language regarding return on investment and the clear link between natural resources management and improved economic, social and environmental conditions within the state as a whole. This can be quite challenging since returns from more effective ecosystem management often require long-term time horizons and are often outside of traditional political cycle time frames.

Components of such a business case could include:

- Economic valuation of coral reefs (examples may range from dollar value of reef protection to maintaining or growing jobs and job opportunities associated with the tourism and recreation sector);
- Valuation of ecosystem services of coral reefs;
- Long-term and short-term return on investment for coral reef management and protection;
- The importance of coral reef management in building resilient communities in Hawaii;
- Balancing responsible extractive activities while maintaining cultural and social integrity of coral reefs;
- The promise of sustainable development; and,
- A list of literature that references the source of this information.

Recommended Lead: DAR/DLNR's other ocean-related divisions (DOBOR, Office of Conservation and Coastal Lands (OCCL), DOCARE, DOFAW, etc.)

Potential Partners: UH (Economic Resource Organization), organizational development companies in Hawaii

4.3B Increase Quality of Formal Communication between DLNR and BLNR on Coral Reef Management Status

We recommend that DLNR increase the quality of formal communication with BLNR at BLNR's bi-monthly meetings in order for the entities to increase the efficacy of the rule making process and to inform status of coral reef management policy status. BLNR "heads the DLNR and has the authority to adopt rules that have the force of law, set and collect administrative fines…among other responsibilities," which provides DLNR with pathways toward the formal adoption of rules (Governance Review 2008). Unlike the Legislature in Hawaii, BLNR is relatively consistent and does not change with each political term. BLNR is a strategic guiding committee for DLNR needed

to secure formal commitment and political will for coral reef management. Improving engagement with BLNR will enable DLNR to more effectively communicate policy proposals and receive feedback from BLNR. Engaged land board members on each island can contribute to specific divisions of DLNR, having better preparation before policies relevant to those field offices are presented to the Board. We also recommend that BLNR rotate the location of its meetings, currently held only on O'ahu, at least on an annual scale, to convene meetings on other islands in the Main Hawaiian Islands. This would more readily allow other islands to contribute their voices and thoughts on policies, rules and mandates that directly affect their natural resource management. Recognizing that Board meeting agendas are often filled, the Land Board Secretary could schedule educational presentations during meetings with lighter schedules. In addition, if the enabling conditions are in place to support their dissemination and success, including effective backing and demonstration of support from DLNR, then we recommend that policy briefs be used as a tool to raise awareness among constituents and increase formal commitment and political will for coral reef management. These briefs should be centered around emerging topics in natural resource management that are being addressed by DLNR, including endangered species, critical habitats, coral reef mitigation, and community-based management. Potential titles for policy briefs include: A Nested Coastal and Marine Governance System; Integrating Voluntary Compliance with the Effective Enforcement of Fishery Regulations; and A Statewide Framework for Fisheries Co-Management in Hawaii.

Recommended Leads: DNLR and BLNR
Potential Partner: Land Board Secretary

THEME 2: RECOMMENDATIONS TARGETED TO MANAGERS OF CORAL REEF CONSERVATION ACTIVITIES AND INITIATIVES

4.3C Inventory Best Management Practices (BMPs) Status, Regulation Guidance, Compliance and Enforcement, and Engage County as well as Federal and State Stakeholders

We recommend that the coral management effort align with the Hawaii CZM Program's Coastal Non-point Pollution Control Program to develop and inventory existing BMPs as well as the guidance and regulation that already exist for storm water management, retrofits and new development. NOAA CRCP should assist HI DOH and EPA to discuss how to better regulate existing BMP strategies. A manual alone would be insufficient to effectively build capacity, and guidance strategies should be coupled with effective dissemination and regulation. It would be useful to review what guidance already exists, identify gaps, and examine the barriers to BMP installations in each county. This needs to be done in partnership with county officials to discuss how to increase enforcement and compliance for BMPs. Effective dissemination and trainings, such as demonstration sites, lessons learned, tours and exchanges, should also be promoted at the county-level. Although there are no statewide BMPs for storm water management, the Hawaii CZM Program has provided guidance on this topic (such as the Coastal Nonpoint Pollution Program), and NOAA is currently contracting an Island Stormwater Green Infrastructure Guide as a "reference guide for designers, engineers, and plan reviewers in Pacific and Caribbean islands to inspire a green infrastructure approach to storm water management." Honolulu County also developed a City and County of Honolulu Storm Water Best Management Practice Manual in 2011, and some islands such as the Big Island and Kaua'i have requirements for construction regarding drainage and flooding. Having an inventory of such efforts would help build capacity to address issues of land-based sources of pollution affecting coral reefs in Hawaii, and

would help prevent, as well as prepare stakeholders to respond to incidents such as improper or lack of implementation of BMPs at construction sites leading to sediment erosion issues (i.e. sediment blankets).

Recommended Lead: HI DOH and EPA
Potential Partners: NOAA, OCCL, Hawaii CZM Program, DOFAW

4.3D Move Forward with the Rapid Response Contingency Plan

We recommend that DLNR move forward with next steps on the Rapid Response Contingency Plan. The plan requires formal commitment, a designated coordinator and institutional support. The new NOAA Coral Fellow with DAR will address this in part. DAR may also consider creating a full-time institutionalized position to address reef resiliency issues, or, alternatively, to incorporate such responsibilities into one of the currently vacant biologist positions at DAR. This would help gain formal commitment and institutional support to address not only rapid response for bleaching and grounding, but also help address reef resiliency issues and coordinate efforts to deal with those issues-at-large for the state. DAR should partner with other divisions within DLNR that address ocean resources, such as DOBOR and DOCARE, to ensure the implementation and continued enforcement of, and compliance with, this plan.

Recommended Lead: DAR, NOAA Coral Fellow
Potential Partners: DOBOR, DOCARE

4.3E Re-invigorate the Coral Reef Working Group

The Coral Reef Working Group in Hawaii has the potential to be a valuable informer for the state and a platform for communication and collaboration across sectors engaged in coral reef management. The Working Group was responsible for creating the Strategy and should be a key partner in its implementation, as well as a resource for bringing other potential partners together to aid in implementation. Although extremely valuable and necessary, the role of the Working Group should not solely be to select projects for funding from the NOAA CRCP grant. The Working Group should re-visit its charter and re-adapt if necessary to meet the goals and objectives related to its purpose. It should consider adjusting its membership so that other agencies and organizations can more readily be involved, such as developing local working groups under the umbrella of the larger group to compliment local management councils and interest groups. The Working Group is relatively agency-dominated in its current state, and many people expressed that increasing the presence of NGOs, foundations, community groups and other coral reef users in the Working Group would be valuable. The Working Group should consider creating smaller sub-groups, likely based on geographic location, so that interest groups at all scales of governance can be represented and involved under the larger umbrella of the Working Group. For example, creating smaller sub-groups would allow for the inclusion of entities, such as NGOs and community groups, that receive grant money from the NOAA CRCP cooperative grant at a scale separate from the broader Working Group that makes the grant distribution decisions. Re-invigoration and possible re-organization of the Working Group should be a key priority to increase collaboration and communication across stakeholders in coral reef management in Hawaii, and in particular to build capacity within DLNR for adaptive management.

Recommended Lead: DAR
Potential Partners: Program Manager HCRI-RP, Hawaii coral reef management network

4.3F Define the Range of Potential MPA Structures

MPAs have widely been identified as an effective tool for coral reef management (Friedlander et al., 2007; Antolini, 2004). The desire to move toward a comprehensive network of MPAs in Hawaii has been expressed at the community and individual level, and a lessons learned session was coordinated by the previous planner of DAR with staff associated with the MPA network in California. This has been described as a positive experience where potential models were discussed, particularly those of securing formal mandate for a specific percentage of protected areas that guided California to make progress toward marine spatial planning. If DLNR and the State of Hawaii wish to move forward with a comprehensive network of MPAs, then we recommend that DAR identify and define the wide range of MPA types that are possible and practical in Hawaii. DAR and its partners should be familiar with the wide range of MPA structures and the degree of state and community involvement required for each. A type of descriptive toolbox should be created that clearly outlines for each MPA structure the roles and responsibilities of partners and stakeholders, the legal authority required, sources of funding, techniques for monitoring, methods for evaluating efficacy, etc. For example, having these criteria identified will help with the potential establishment of additional CBSFAs in Hawaii (Recommendation 4.1C), and will ensure that all those involved, ranging from the state government and DLNR to community members, are well aware of their responsibilities and how the designation will affect them. As co-management actions are put into place, the state should be able to define the co-management structure and how it links to other co-management structures or management regimes so as to create a network with shared resources and "lessons learned." When similar legislation was introduced in the past, there was a strong and effective backlash from certain fishing interests. Therefore, if the state wishes to move forward with the implementation of this recommendation, it will require a high level of formal commitment from the DAR Administrator and DLNR Chairperson as well as strong buy-in at the county and community level. The implementation of this recommendation may also require legislative action.

For examples of a model MPA network toolboxes, please see: National Marine Protected Areas Center and Reef Resilience Toolkit Module Resilient MPA Design.

Recommended Lead: DAR Administrator
Potential Partner: Learning Exchange Partners in California

THEME 3: RECOMMENDATIONS TARGETED TO THE STAKEHOLDERS AND MORE SPECIFICALLY THOSE WHO ROUTINELY RELY UPON THE CORAL REEF RESOURCE FOR LIVELIHOODS, RECREATION AND CULTURAL PURPOSES.

4.3G Inventory Effective Mentorship and Public Outreach Programs

A rising number of programs have been developed in relative isolation that have generated remarkable results such as the Pacific Islands Minorities Capacities Program, Sanctuaries Ocean Training, Ocean FEST (Families Exploring Science Together), and ReefTalk (innovative engagement via public education). Key resources include SeaHarmony and Coral Reef Alliance's Making a Difference: An Action Guide to Marine Conservation in Hawaii and should be regularly updated. Other steps would be creating a platform for sharing lessons learned from each program, assessing the potential to scale up, etc. Ideally this would foster connectivity across the programs and increase engagement of individuals by maintaining their involvement in coral reef activities throughout their lifetimes. The Coral Fellow at DAR should be a lead for implementing this recommendation. The fellowship plans to explore

mechanisms for reaching out to the younger generations in Hawaii and providing a pipeline for their continued engagement in coral reef management, particularly for potential future NOAA Coral Fellows. The Coral Fellow can be a critical link between the state agency and the next generation of managers that want to get involved but are not sure how. We recommend that DAR build on state-supported mentor programs (i.e. DAR Legal Fellows, NOAA Coral Fellows, etc.) within DAR. We also recommend DAR identify, through case studies, the basic program requirements, cost and expertise needed as well as the resulting knowledge skills, attitudes, tools and values that are developed as a result of implementing such programs. Mentor programs in Hawaii are important for building confidence, competence and stewardship in local youths, including specifically for adaptive natural resource management. Examples of successful mentor programs in Hawaii include those of TNC and the "Pacific Islands Minorities Capacities Program." DAR's Fellowship program should be expanded on and re-designed to be more interdisciplinary so that it increases competencies in youth such as social skills, delivery of information, politics, organizational processing, etc. Setting up the best and brightest next generation of managers to take positions in DLNR, and specifically DAR, will be extremely important for long-term capacity building in the state agency. Community-scale mentor programs, such as the Trilogy mentor program in Lāna'i, are also valuable for fostering stewardship and interest in coral reef management among youth in Hawaii. State fellowships and mentorships should also be linked to external partners, such as the Legal Fellowship with UH, to ensure sustainability and continuity of the program through shifts in administration and funding. Incentives should also be built to encourage DLNR employees to mentor incoming fellows as well as employees, and also to enable them to have sufficient time to do so. An Inter-Agency Outreach Working Group is being developed where representatives from involved agencies will meet on a regular basis to discuss topics related to outreach. This could be a useful platform for building capacity in existing outreach initiatives and a potential home for a mentorship/outreach program inventory that can be regularly updated.

Recommended Lead: DAR and the Inter-Agency Outreach Working Group

Potential Partners: Existing mentor programs such as SeaHarmony, Coral Reef Alliance, TNC, Trilogy, UH, etc.

4.3H Targeted Outreach to Build Eco-Cultural Capacity

We recommend that the linkage continue to be deepened between contemporary natural resource management and traditional cultural ties to those resources in Hawaii. Traditional ties to natural resources in Hawaii are strong, including practices such as canoeing, subsistence fishing, self-sustaining agriculture and surfing. Creating a sense of culture around coral reef ecosystems increases the sense of responsibility and in turn stewardship for those resources. Partners for building eco-cultural capacity include organizations such as the West Hawaiian Canoe Club and Surfrider Foundation. Engagement with the UH Hawaiian Studies Program, Department of Hawaiian Homelands, Office of Hawaiian Affairs, and the Kaho'olawe Island Reserve Commission could lead to specific actions for pursuing integration of traditional ecological knowledge into coral reef management in Hawaii. Native Hawaiian "Uncles" and "Aunts" have deep-seated appreciation for, and understanding of, how to integrate and practice traditional ecological knowledge and community-level management and are valuable partners in implementing this recommendation. High profile celebrities such as an accomplished Native Hawaiian surfer could be an ideal spokesperson for coral reef conservation and attend events to foster public education and raise awareness related to coral reef conservation.

Recommended Lead: KUA

Potential Partners: West Hawaiian Canoe Club and Surfrider Foundation, UH Hawaiian Studies Program, Department of Hawaiian Homelands, Office of Hawaiian Affairs, Kaho'olawe Island Reserve Commission

Red-crested Cardinals are one of the many introduced species that now call Hawaii home. (Photo credit: Glenn Page, SustainaMetrix.)

Section Five: Developing a Strategy for Building Adaptive Capacity

5.1 Building a Long-Term Action Plan

This section begins with a brief review of the three-phased approach to the capacity assessment process and the critical importance of the final phase of post-assessment. This is the most important phase as it represents a transition from the capacity assessment to the development of an action plan that features three main groups of recommendations, many of which can be framed into a series of implementable activities that can be sequenced and prioritized to build needed momentum for effective coral management. While there are no panaceas or "silver bullets" for building capacity for coral reef management, this action plan is needed to guide involvement of multiple implementing partners. Capacity building for improved coral reef management is a long-term process and no one group alone will have the power, resources or skills to respond to the increasing issues, challenges and degree of complexity. Likewise, there is no single group that is expected to provide the wide portfolio of tools, methods, trainings etc., to support adaptive capacity and more effective coral reef management. Therefore, a distributed approach to capacity building is needed that features both short-term and long-term investments. In other words, it takes a village.

Since the challenge of building adaptive capacity is enormously complex, a section on lessons learned from the Great Barrier Reef (GBR) in Australia is featured that outlines the critical nature of operationalizing adaptive capacity to deal proactively with the uncertainty and complexity of the future of the GBR. A key message is that managers have recognized the same set of change processes as in Hawaii (i.e. overfishing, water quality decline and climate change), that they are operating across many scales, and that the capacity to respond is highly contextual, extremely variable, uncertain and mainly a function of the governance system. They have acknowledged the critical nature of building adaptive capacity across stakeholders (resource users, managers, and decision makers), the importance of public perceptions, the inherent complexities in trying to satisfy diverse interests, and realize that building adaptive capacity must go hand-in-hand with an analysis of the "fit" of the governance of coral reefs.

Considering the Hawaii context and lessons learned from other large scale coral reef programs, a long-term and blended approach is recommended to sequence and prioritize what is done. Less expensive tactical capacity building is needed to build momentum, adding building blocks that address some aspects of the current challenges of coral reef management. Long-term sustained strategies are also needed to address operational issues of staff turn-over and retirement, changing political administrations, as well as dynamic trends in social and biophysical health and well-being. Blending strategies that address both short- and long-term capacity building issues can guide an action plan.

To develop this action plan, the recommendations within this document have been divided into three groups based upon their complexity, scale, practicality and control of implementation. The first group is a set of essential recommendations that are complex largely because they are highly political in nature and therefore decisions regarding the timing and strategy must be made at upper-level administrators and officials who will factor in a wider range of issues. The second group involves implementing a more collaborative and coordinated approach to

management at select focal areas and involves interconnected systems and engagement with resource users, other managers and funders of coral reef management. Implementing these recommendations will require a significant degree of coordination, formal commitment and adaptive implementation. To assist in this process, a common management framework is featured to underscore the importance of tracking both process and outcomes to help map the development of this action plan. The third and final group is a prioritized range of recommendations that are designed to build capacity at an organizational scale where leadership and control over implementation is relatively high. This final group of capacity building recommendations is important, but likely will not be as effective without progress made in the first two groups.

This section concludes with a set of principles, tips and suggestions for a more integrated and strategic approach for how to implement and track the development of capacity, paying attention to patterns, trends and indicators of how to improve capacity building strategies. While much of the focus of this document is on DLNR and DAR, capacity building is a shared responsibility across all management partners. The process of building and maintaining adaptive capacity, as a key function of the ecosystem approach, takes far longer than one might expect and is a long-term commitment. It requires the development of an action plan, adaptively implementing and experimenting, and seeking out leaders across the implementing partners who can carry forward its importance. The action plan requires an honest assessment of what can actually be done in a given timeframe and at what scale, constantly assessing and reassessing where the power is in the system and how power may be shifting, where the threats are and how they are shifting, where the windows of opportunities are and how they are opening and closing. Building a shared understanding of these dynamics and acting upon them is a process that develops over time, ideally across organizations. This section of the report provides a preliminary strategy or the beginnings of a "road map" for an action plan that ultimately can only be developed by the implementing partners based on the shared commitment to build adaptive capacity.

5.2 Three Phases of the Assessment of Coral Reef Management Capacity

There are three phases to the capacity assessment process: Phase I featured the initiation of the capacity assessment and began with the priority setting process in Hawaii in 2010 and continued through the development of the most recent LAS in 2011 and concluded with the formation of the J-CAT in Fall 2012. Phase II featured collecting and examining information related to capacity, building an understanding of needs across stakeholders, summarizing key issues and prioritizing recommendations. This phase is concluded with the preparation of this report. Phase III is based upon the distribution of the report, a socialization process that includes soliciting and receiving comments, preparing an action plan based upon local context, implementing and monitoring the plan for a defined time period, and evaluating what was learned from the capacity assessment process and defining further action.

Given that building capacity for improved coral reef management is a journey, with no clear and precise destination, this section is intended to provide the basics for making the transition from Phase II to Phase III.

The importance of Phase III or post-capacity assessment, cannot be overstated because very little will happen if post-assessment activities do not take place. If Phase III is done well, it positions DLNR and DAR and the coral reef management network for improvement and further development toward its intended goals. If results are not acted upon in some manner, it can serve to undermine future processes of stakeholder engagement in Hawaii and

underscore the inadequacy of the status quo. Key actions in building an action plan include engaging a team to finalize the sequence and prioritization of the plan, identifying persons responsible, and creating timelines and mechanisms for assessing progress. Success will be determined by both the substance of the plan as well as the facilitation process used to broadly communicate and gain support for, adaptively implement, monitor associated activities, and revise it as needed. The following sections have been developed with insight from experiences in building capacity for the ecosystem approach in other locations around the world and in a wide range of organizational development contexts (Stevahn & King, 2009).

Building capacity requires change. Change, by its definition is acting in new ways, using resources differently, and seeing the world through fresh eyes. This is neither easy nor simple, indeed it is complex and can create discomfort, anxiety, confusion, and some ineffectiveness when transition occurs from one way of doing something to another. Adaptive capacity is rooted in the ability to collectively work through concerns, anxiety and fears as new practices are tested, new skills developed, and new understandings are revealed (Fullan, 2007). Done well, positive momentum is built and can be leveraged for greater change. Done poorly, it reinforces fear, anxiety and mistrust. A range of literature exists that can guide organizations through the developmental steps of change and selected references are presented in the organizational development section of Appendix C: For More Information.

Potential positive benefits include reinvigoration of members of the coral reef management network in Hawaii, providing actionable steps for the new DAR leadership to commit to building stronger collaborations across the network of organizations involved in coral reef management, and increased adaptive capacity. Given the new administration within DAR and DLNR, a window of opportunity will exist to focus on long-term commitment for sustained capacity building for coral reef (and other natural resource) management. As such, a customized plan is recommended which identifies a "home" and most accountable person for overseeing implementation of capacity building efforts. Such a strategy should feature a detailed budget, timeline, milestones, and contextually relevant principles for capacity building within DLNR and across all other coral reef management agencies. The strategy document should be distributed widely and feature clear opportunities and specific budget justifications that could become part of external funding requests to federal implementing partners and foundations. Such a strategy should include a detailed directory of capacity building training modules that currently exist and those that need to be developed (Appendix G: Portfolio of Training Modules).

5.3 Lessons Learned in Building Adaptive Capacity From the Great Barrier Reef

One of the world's most iconic coral reef systems, the management of the GBR provides insight for building adaptive capacity for Hawaii. Specifically, recent analysis of adaptive capacity has led to implications for management and governance in the region and provides some useful lessons for Hawaii. Not surprisingly, managers of the GBR face the same overarching threats as managers in Hawaii including over-harvesting of marine resources, declining water quality from land-based sources of pollution and the effects of climate change (Hughes et al., 2007). Furthermore, each of the threats is managed by a different agency, addressed by separate policies. At the state level, fisheries is managed under land and natural resource management. A federal government agency is responsible for the management of national marine waters, reef tourism, and shares responsibility for issues relating to climate

change with another federal agency. Water quality is addressed by an initiative started in 2003 as a nested system to involve all levels of government, as well as industry, community organizations, scientists and indigenous groups. In such complexity, with high stakes decisions, conflicting interests, high levels of uncertainty and seemingly intractable management situations, the way management plays out depends to a large degree on the capacity to adapt (Bohensky et al., 2010). Resource users, resource managers, leaders, and the general public were surveyed to provide greater insight into the capacity of the management system to adapt to change.

From the perspective of resource users, the commercial fishing industry has been at the center of public debate as it responded to changes in regulatory policies to reduce impacts of fishing. From research on fishers' capacity to adapt to the changes in policy they found that there is a combined effect of age, education and commitment to fishing that is central to the capacity to adapt. Younger, better educated fishers not strongly attached to their profession were more flexible and able to adapt to abrupt changes in policy. Likewise, fishers with strong business acumen and those who felt they had a level of involvement in the decision-making process, as well as the implementation and interpretation of the regulatory change, demonstrated capacity to adapt. Conversely, those who perceived themselves as lacking options and strategic skills were far less able to adapt to the changes (Marshall, 2007).

In terms of managing land-based sources of pollution, the Australian government wanted much greater involvement across sectors and across scales of government from local to state to federal and established a nested system of institutional arrangements where public engagement is a legislated requirement to bring in diverse perspectives. While still relatively new, the complex arrangements have created a confusing environment, where managers need to untangle information, figure out exactly where within the nested system they need work at any given moment in time and work proactively to help residents respond to water quality impacts and find the parties responsible for the pollution. While critical, they have found that public involvement in planning becomes very challenging if the system of rules is misunderstood by the public and thought to be overly complex. For example, in one location, residents perceived the most accountable agency for handling water quality issues to be a local government agency that has limited or no ability to take action, whereas the actual responsibility is shared across a confusing system of government agencies and organizations. To more effectively manage collaboratively, while simplifying the bureaucracy, managers emphasized the importance of building the enabling conditions of improved capacity, supportive and informed constituents and formal commitment through capacity building structures, processes and tools including the following:

- Building values and attitudes among the managers that lead toward a desire to solve water quality problems collaboratively, across a nested system, to clarify how to approach and solve persistent problems and more clearly define the appropriate institutional responses;
- Working with the media to share positive stories as case examples of successful management, describing the challenges and most importantly the benefits of what happens when collaboration across agencies and organizations works well;
- Building a knowledge base that is easily accessible and provides sound, honest and diverse information that can be easily communicated, exchanged, widely shared and debated;

- Recognizing the importance of informal and formal social networks and partnerships that are specifically intended to cross up and down scales of the nested system and horizontally across specific agencies;
- Encouraging the use of market-based instruments to promote the adoption of best management practices as well as increasing the diversity of economic activities at scales of stakeholders and at the scale of the whole watershed; and,
- Encouraging the use of predictive tools and scenario thinking to better understand potential impacts of ecosystem change at the global scale - specifically climate change and its impacts on the reefs as well as potential changes in weather patterns that influence many economic activities.

Leaders were also engaged in scenario planning. In 2008, 47 leaders of agencies across local, state and federal levels as well as industry, NGOs, research organizations and indigenous groups were asked about perceptions and aspirations for the future and specifically issues related to building adaptive capacity to deal with the increasing challenges over the next 30 plus years (Bohnet et al., 2008). There was general consensus among interviewees that management tends to be reactive rather than proactive in response to ecosystem change and that catastrophe and crisis is required to make the shift to new operational modes and more appropriate governance structures. In other words, capacity is needed to both react to the issues of the day and to consider changes in the overall system of management. Many noted the critical importance of champions or leaders to effect this change, the importance of education and access to information (e.g. the lack of sufficient numbers of well-trained extension officers) and integrated social science and biophysical research to more effectively inform policy. Many noted a key constraint of adaptive capacity was the uncertainty of scientific information needed to both understand and guide action. Two key uncertainties were noted specifically. The first was the nature and timing of climate change impacts and therefore the lack of any clear guidance on the nature and timing of response to the impacts. The second involved the type and fit of governance structures and the uncertainty of the extent to which it is influenced by local and regional leadership or global and regional economic forces. Simply identifying these uncertainties allowed the leaders to strengthen their resolve to improve the quality of collaboration to help learn across scales (Bohensky et al., 2010).

The case example illustrates that in the GBR region there is a growing awareness that significant ecosystem change is inevitable and that looking ahead and considering the range of responses by resource users, managers and decision makers has built adaptive capacity (or at the very least a high potential for developing it) and a plan for marine zoning. A key lesson from this work was the realization that crisis was required to broaden the awareness that the current governance structure was inadequate and required transformation. Such a reality of waiting for catastrophe to strike for generating real commitment to building adaptive capacity was unsettling to GBR leaders and that reversing this trend was their greatest, most pressing and complex challenge that they face in the region (Bohnet et al., 2008). Other lessons learned from 30 years of managing the GBR Marine Park include the fact that ecosystem-level management was a transformative and led to the inclusion of fisheries management and governance into the process. They were able to gather evidence that there was a growing national consensus and international recognition that the GBR is 'iconic' and worth conserving. There were a set of well developed institutional arrangements with the adjacent jurisdiction (Queensland) including complementary legislation that enabled more effective governance. Ongoing research and monitoring programs were reconfigured and prioritized to provide

timely information for management decision-making and helped to avoid what they referred to as 'scientific holding patterns'. Community participation and ownership was central to an adaptive management approach is fundamental (<5% of the Marine Park was no-take for 28 years; only after 30+ years of adaptive management and the rezoning in 2004 did the extent of no-take become >33%. Zoning is not the panacea for all marine conservation issues (other management tools are also essential; zoning is only one of many management tools used in the GBR). A complementary approach between state and federal agencies is also fundamental. The recognition that marine areas and the land are linked as are social, economic and environmental issues when it comes to landscape/seascape management. Finally, the leaders noted that from 30 years of implementation that there remains a persistent need effective for leadership both within agencies and across political domains as well as the need for true integration and collaboration across and within the agencies of government as well as civil society and market forces.

5.4 Key Considerations For Developing A Post-Assessment Action Plan

The following are a set of key considerations in the capacity building action plan/implementation process that can help define the necessary logistics, whom to include, networks and norms for communication, and proper methods for information management (Stevahn & King, 2010):

- **Involvement in a Capacity Building Action Plan:** Involvement in the process of defining the capacity building action plan and overseeing its implementation should be carefully considered. Major tasks may include the development of an action plan, making final decisions about when to implement which specific actions, monitoring progress and evaluating the effectiveness of the plan as it relates to goals for building capacity. The first major step is circulating the document and seeking input. The J-CAT members are ideal distribution channels but distribution should not end with this. A distribution strategy and possibly convening a listening session to review responses may elicit useful feedback. Ideally, a small representative group that is invested in seeing resources directed to address persistent capacity issues, barriers, etc., should oversee implementation. While it does not need to be precisely the same members as the J-CAT, it serves as a logical starting point from which to build and make recommendations for a long-standing structure. A capacity building committee could nest within an existing committee structure, such as a coral reef committee within DLNR that would routinely report out to the All Islands Committee of the U.S. Coral Reef Task Force. However, capacity building should be a shared responsibility and needs to have appropriate authority from upper-level administrators to assign activities and delegate tasks so that implementation is a distributed and shared process. The Social Science Research Institute's Program Administrator could be designated as the coordinator for arranging the efforts to craft the capacity building action plan, with additional technical assistance likely needed.
- **Logistical Concerns:** A series of logistical concerns should be attended to that includes maintaining calendars, scheduling committee meetings, preparing agendas, and documenting completion of capacity building activities. A major step is defining who is responsible for managing logistics. One additional FTE would likely be sufficient to oversee this work and could be blended with other related tasks and responsibilities of coordinating capacity building for resource management in Hawaii.

- **High Quality Communication:** The culture and quality of communication around the importance of building capacity defines the spirit and intent. Ideally, communication around capacity building is appreciative, open, honest, responsive, and culturally appropriate. Unfortunately, breakdowns and other issues associated with communications are at the heart of organizational conflicts, interpersonal challenges and program difficulties. Establishing agreed upon communication protocols and adhering to them can improve the communications process.
  - **Communication within committees:** Good committee behavior is the responsibility of all involved and will become the norm if it is established from the start and reinforced through periodic reflection. A brief list of best meeting practices should be identified and customized to fit the cultural context, agreed upon and distributed, and could include the following: engage all voices, listen respectfully, explore alternatives, raise issues constructively, appreciate each persons skills, unique histories, perspectives, and talents. Assume confidentiality unless otherwise defined and mutually agree on what information is to be shared with others outside the meeting.
  - **Communication among committees:** Since there are a growing range of committees that are associated with coral reef management, defining the general guidelines for how to track their progress and ways to best communicate among them is an essential element of capacity building. Once established, a short and simple protocol may be needed to ensure that this level of communications sharing is maintained.
  - **Communication beyond committees:** It is often not made clear what information can be shared outside of coral reef management committee structures such as other administrative hierarchies, governing or advisory boards, private sector operations, program funders etc. The leadership team should define policies, guidelines and procedures for communication beyond the coral reef management committees.
  - **Electronic communication:** Sharing information electronically is rapid, efficient and inexpensive with quick turnaround potential. Given that e-mail and technology overload is a possible downside, set guidelines for electronic communications such as a file naming convention, use shared directories or a shared project website to host information in one location, and describe the situations where e-mail is preferred or face-to-face communication is preferred.
  - **Confidentiality:** Transparency fosters trust but can work against confidentiality. It is helpful to appreciate the tension between confidentiality and transparency and agreement should be reached within the group as to what information and documents can be shared and what should remain confidential. Be clear and direct on matters regarding confidentiality.
- **Information Management:** Document and keep records of significant capacity building actions that have been taken so there is an easy to follow trail that documents the degree to which resources have been allocated to this end. Such a document trail is useful for reflecting on actions taken and the level of investment allocated. Examples include chronological timetables of various steps in the capacity assessment and capacity building program, records of training, assessment reports and findings, and evaluations of coral reef management and capacity building efforts. Such information is the basis for

high quality lessons learned and ensuring that a knowledge base is maintained in the face of unexpected events such as staff turnover, new leadership, new budget priorities, and program audits.

5.5 Acting on the Grouping of Recommendations

As presented in Section 4, the recommendations that serve as the basis for an action plan are divided into three groups. The first group involves recommendations that require decisions that are political in nature and requires decision-making from senior administrators. The ultimate timing, control and direction needs to be decided from the highest levels within state government. These actions are the most critical for long-term adaptive capacity to be built into the system of coral reef and other Ecosystem-based Management. The second group requires the collaborative force of implementing partners working closely with funding partners to model a customized form of Ecosystem-based Management that is based on a shared language and process of management at both priority sites. The outcomes of these actions are in the hands of the implementing partners and can be accomplished largely within a relatively small segment of the coral management network. This set of actions is largely independent of progress associated with the first group, although they would be greatly enhanced by accomplishing recommendations within Group 1. Together, the recommendations in Group 2 promote the collaborative use of a common management framework to sequence and prioritize implementation in select priority areas. To be effective, this would require linking with funding partners such as NOAA and NFWF in the short run to tie funding to the strategy for implementation and adaptive learning at locations such as West Maui. Ideally there are additional federal partners in the future, but in the near-term, this would be applied at a demonstration scale, with select partners that are tied to specific funding opportunities such as the NOAA Cooperative Agreement and NFWF support for priority watershed investments. As a condition of the grant, the recipients would track progress of implementation through a simplified monitoring and evaluation process. Since this strategy pertains to the preparation of proposals, including how they are written, the setting of priorities and how they are administered, this action requires strong commitment, partnership and a shared agenda among funders and the recipients. In the short run, it is our advice to keep the process as simple as possible, provide clear guidance and training for those who are preparing proposals so they are clearly identifying what part of the Management Cycle they are contributing to, and how they will track progress along the way.

The third group of recommendations are a range of actions that can be done at the scale of committees, task forces, within organizations, and by groups of individuals. These are important, but their overall impact will only be realized if there is significant progress with capacity building in the other two groups. Actions within this group can be controlled by one or a few organizations and generally don't require significant resources. We believe these are good places to build capacity as long as attention is paid to implementing the first two groups described above.

5.6 Building Adaptive Capacity

As has been shown in this analysis, increasing adaptive capacity for coral reef management requires competencies in at least four key decision environments: the ecological system, the political system, the organizational system and the community system. As a manager, the work requires winning support among a diversity of stakeholders, engaging effectively within one's own organization, securing formal commitment from the political process, and then implementing a plan of action over the long-term. Given this level of complexity, team-based management

competencies are required to address a growing range of cross-scale issues outlined in this report. Competencies include, but are not limited to the following:

- How to engage local communities in the analysis of long-term changes in condition and use of coral reef ecosystems;
- How to analyze the governance structures and processes that encompass values, policies, laws and institutions that determine how coral reef ecosystems are conserved and used;
- How to build leadership required to excite "political will" to design, adopt and implement plans of action that address complex challenges posed by coral reef ecosystem change;
- How to build strength in facilitation, mediation, stakeholder engagement and public education;
- How to strategically design a transformative program or plan of action that fits within the existing governance dimensions; and,
- How to design and implement a monitoring and evaluation program in support of adaptive management.

In practical terms, this means moving beyond best management practices and focusing on building high quality collaboration, building bridges between scientists and policy makers, and using a common language to build common ground across diverse perspectives. The modern-day adaptive manager must display competency as a scientist, collaborator, politician, humorist, evaluator, and strategist. The manager must pay attention to his or her home agency, and back up the formal commitment expressed higher up the chain. At the same time, the manager must create an individual identity and build social capital across different organizations, engage stakeholders and avoid moving in isolation or moving too quickly and losing support from constituencies (Westley, 2002). Adaptive management requires control of emotions, great humility, little fear of conflict and being able to capitalize on the energy and movement of others. Rather than pulling strings or moving levers, effective and adaptive management is more like being in the right place - with the right skills, attitude and desire - to catch the right wave and riding it in and then doing it again under completely different conditions.

While many of these basic elements can be taught, the integration and application of these diverse and somewhat paradoxical competencies are built through experience, persistence, strong values and relentless commitment. Frances Westley (2002) described natural resource management as juggling four balls at once: bureaucratic process, political process, adaptive science-based process and community process. In the 2002 book Panarchy, she writes:

> Depending on his or her values and skills as well as his or her formal position and contextual factors, it is easy to drop one or more balls. Extending the metaphor, *surprise* may act like a sudden wind, looping the ball into a new dynamic, or like a sudden shift in terrain, which causes the juggler to lose his footing and his balance. The trick is to keep the eye on these four balls and somehow, with peripheral vision, *adjust* to those surprises as they unfold, or, even better, use them like the good golfer or tennis player uses the wind. In complex, adaptive systems, disequilibrium and surprise are the rule, and failure is as instructive as success.

Building adaptive capacity to manage effectively requires paying attention to both the theoretical and operational implications of the holistic "ecosystem approach" when responding to the challenges brought by accelerating

societal and environmental change. Management requires looking ahead, watching for and nurturing the conditions that enable change and can lead to tipping points. Building this capacity will require scenario thinking, sharing information on how to build momentum, how to see opportunities, how to select a strategic and politically viable management agenda. The work requires sharing lessons learned on how best to excite the "political will" and maintain it for addressing complex ecosystem management challenges. Connecting with others, building more effective collaborations, paying attention to enabling conditions, committing to a common language across a wide network to sequence and prioritize collective action must feel like luxuries, valued, to be sure, but easily put off until the crisis of the day is past. Unfortunately, there is always a new crisis, things never quite get under control and global drivers of coral reef decline accelerate. Building adaptive capacity for improved ecosystem management is the challenge of our time.

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Papahānaumokuākea National Marine Monument encompasses 139,797 square miles of the Pacific Ocean and is the single largest conservation area in the United States. (Photo credit: Glenn Page, SustainaMetrix.)

Appendix A: Glossary

Adaptive Management: A central feature of the practice of any form of Ecosystem-based Management is that it must respond positively to changing conditions and to its own experience. The practice of coral reef management must be grounded in a process of learning and adaptation. Adaptive management is not reactive management whereby the practitioner simply responds to the unexpected. It is rather a conscious process of examining the course of events as they unfold at larger, or smaller, spatial and temporal scales, and being cognizant of future projections and developing adaptation options in consideration of these dynamics. In other words, in the face of uncertainty, this includes being able to change or redirect decision-making based on the evolving outcomes.

Actions: Projects, procedures or techniques intended to implement an objective as defined in the priority setting documents.

Best Management Practices: Management measures or practices that are established and widely accepted as meeting the intent of coral reef conservation in a variety of disciplines (fisheries management, watershed management, biophysical monitoring, etc.)

Capacity: The overall ability of the individual or group to perform their responsibilities for coral reef management. It depends not only on the capabilities of the people (their knowledge, abilities, relationship and values), but also on the overall size of the task, the resources which are needed to perform them, and the framework within which they are discharged.

Capacity Building: Programs that are designed to strengthen capacity (knowledge, abilities, relationship and values) to reach goals defined in the priority setting documents. This includes strengthening the institutions, processes, systems, and rules that influence collective and individual behavior.

Capacity Development: A widely recognized definition of capacity development was published by the United Nations Development Programme in 1997 as: "the process by which individuals, organizations, institutions and societies develop abilities (individually and collectively) to perform functions, solve problems and set and achieve objectives." We expand this definition to put greater emphasis on the strategic role of a facilitator in helping this process in an uncertain and changing environment. Our suggested definition is: "Externally or internally initiated processes designed to help individuals and groups to manage coral reefs and to enhance their abilities to identify and meet coral reef management challenges in a sustainable manner."

Capacity Strengthening: Capacity strengthening is part of the capacity development process and is set within a dynamic context and involves individuals, networks, organizations and even societies who have a stake in functioning coral reefs. It involves such processes as continuous learning, adaptation and innovation in dealing with unanticipated problems or issues. A central feature of capacity strengthening is assessing and reacting to current and future needs in order to improve the ability to learn and solve problems in the long-term.

Commitment: In the case of coral reef management and governance, commitment often refers to governmental commitment to the policies of a program and is expressed by the delegation of necessary authorities and the allocation of financial resources required for long-term program implementation. When commitment is used in a different context it will be defined.

Conservation Action Plans (CAPs): The Nature Conservancy's process for "helping conservation practitioners develop strategies, take action, measure success, and adapt and learn over time." From Conservation Action Planning: Developing Strategies, Taking Action, and Measuring Success at Any Scale--Overview of Basic Practices. The Nature Conservancy 2005. Available in English and Spanish at: http://conserveonline.org/workspaces/cbdgateway/cap/resources/1/TNC_CAP_Basic_Practices.pdf/download

Constituencies: While constituencies can be broadly defined, we use the word to define active support of the coral reef management program by a core group of well-informed and supportive people composed of stakeholders in the private sector, civil society and government agencies.

Coral Reef Management Priorities: Those goals and objectives that have been defined by a core group of coral reef managers and stakeholders in each of the seven jurisdictions and identified through a voting process as those that require immediate attention over the short-term of 3-5 years. For the purposes of the capacity assessment, the term goals will refer to the highest-level results the jurisdiction seeks to achieve (e.g., stable, sustainable coral reef ecosystems), as articulated in the jurisdictional priority setting documents. These goals in general refer to efforts to understand and address the three major threats to reefs; impacts from climate change, fishing, and land-based sources of pollution as well as other identified jurisdictional priorities.

Coral reef resilience: According to the Reef Resilience Toolkit (http://www.reefresilience.org/) website, resilience is more than being able to recover from a major disturbance, surviving bleaching, or resisting bleaching. For a coral community to be resilient, it must also be able to continue to thrive, reproduce, and compete for space and resources. For example, coral communities that have experienced bleaching but not mortality may be weakened and less able to thrive, grow, and reproduce in the competitive reef environment. Multiple factors

contribute to resilient coral communities, some of them known and others to be discovered. Scientists are working to identify important factors (biological, physical and ecological) that managers can evaluate to determine the health or resilience of a coral community. It is important that managers build the capacity to be able to identify and better understand these factors, so management strategies can be focused on maintaining or restoring communities to more optimal conditions to maximize coral survival after stressful disturbances.

Core managers group: This term refers to the agencies/organizations involved in management of coral reefs in a jurisdiction not just a geographic site within a jurisdiction. Most locations have a core group like this and will be the central focus of the capacity assessment process.

Ecosystem approach: According to the COMPASS Scientific Consensus Statement, Ecosystem-based Management emphasizes the protection of ecosystem structure, function and key processes; is place-based in focusing on a specific ecosystem and the range of activities affecting it; explicitly accounts for the interconnectedness among systems, such as between air, land and sea; and integrates ecological, social, economic and institutional perspectives, recognizing their strong interdependences.

Local Action Strategy (LAS): LAS's are a U.S. Coral Reef Task Force led initiative to identify and implement priority actions needed to reduce key threats to valuable coral reef resources in each U.S. coral reef jurisdiction. In 2002, the U.S. Coral Reef Task Force adopted the "Puerto Rico Resolution" which calls for the development of three-year LAS by each of the seven U.S. jurisdictions containing coral reefs: Florida, Puerto Rico, the U.S. Virgin Islands, Hawaii, Guam, American Samoa, and the Commonwealth of the Northern Mariana Islands. These LAS's are locally driven roadmaps for collaborative and cooperative action among federal, state, territory, and non-governmental partners.

Marine Protected Areas (MPAs): Any area of the marine environment that has been reserved by federal, state, territorial, tribal or community law, mandate, regulation or declaration to provide lasting protection for part or all of the natural and cultural resources therein.

Nested Systems: Thinking in terms of nested systems is essential because issues of coral reef management impact upon, and are impacted by, conditions and actions at both higher and lower levels in an ecosystem and governance hierarchy. Some issues of coral reef management can be addressed more effectively at one level, and less effectively at another. The choice of the issue or set of issues to be addressed must therefore be made in full knowledge of how responsibility and decision-making authority is distributed within a layered governance system. Planning and decision-making at one scale, for example within a jurisdiction, should not contradict or conflict with planning and management at another – for example, at the scale of the nation. The reality is that such contradictions and conflicts are common across the world. A major challenge for the coral reef manager is to recognize these differences and work to either change them or select goals and strategies that recognize that such contradictions must be accommodated or resolved. In practical terms this means that a central feature of ecosystem approach is that all planning and decision-making must recognize and analyze conditions, issues and goals at least at the next higher level in the governance system. Thus, the ecosystem approach at the jurisdictional scale must – at a minimum – be placed within the context of governance at the smaller scale of the village or municipality while governance at the scale of a state/territory – at a minimum – be analyzed with an eye to governance at the scales of the village/municipality as well as that of the nation.

Objectives: The environmental, social, and institutional outcomes the jurisdiction must achieve to reach the end goal, generally actionable within a three to five-year time frame.

Participation: One of the defining characteristics of the practice of the ecosystem approach is its emphasis on participation and its relevance to the people affected by its practice of coral reef management. The ecosystem approach recognizes that the support of those whose collaboration is needed if a program is to be successfully implemented must be won by involving them in the processes of defining the issues that the program will address and then selecting the means by which goals and objectives will be achieved. Both individuals and members of institutions are more likely to comply with a management program when they feel that it is consistent with their values, responds to their needs and to their beliefs of how human society should function. Voluntary compliance by a supportive population lies at the heart of the successful implementation of a program. A participatory approach helps stakeholders and the public to see the efforts of a program as a whole.

Site managers: Site managers: A person or persons designated with authority to manage the marine protected area at any level be it community, agency, state or federal.

Situation Analysis: A preparatory document for the priority setting process that summarized coral reef threats, condition and trends, key management issues, and goals of management agencies.

(Key) Stakeholder: A person, group, or organization that has a direct or indirect stake in an organization that is involved with managing coral reefs.

Stewardship: Where equitable and sustainable forms of development are the ultimate goals of ecosystem approach, the practices of stewardship is the path to that destination. Ecosystem stewardship is an ethic practiced by individuals, organizations, communities and

societies that strive to sustain the qualities of healthy and resilient ecosystems and their associated human populations. Stewardship takes the long-term view and promotes activities that provide for the well-being of both this and future generations.

Appendix B: Timeline of Coral Reef Management in Hawaii

Event	Start Date	End Date	Description
Early Polynesians discovered and settled in Hawaii	1190	1290	The connection between discovery and fishing is part of pan-Polynesian tradition of islands being fished out of the sea. Traditional uses of coral reefs and their presence in the traditional culture of Hawaii and the Hawaiian people. Fish ponds and aquaculture were common. Plants and animals were brought by Polynesians to Hawaii.
A Spanish explorer named Juan Gaetona discovered Hawaii	1555		First European to discover the Hawaiian Islands There are undoubted proofs of the discovery of the Hawaiian Islands in 1555 by the Spaniard, Juan Gaetano. Le Perouse, the celebrated Frenchman who visited Hawaii in A. D. 1796, says that Gaetano saw these islands "with their naked savages, cocoanuts and other fruits, but no gold or silver."
Captain Cook re-discovered the Hawaiian Islands and was killed there in 1779.	1778		Cook's "discovery" opens the door to Western contact Tens of thousands die of disease over the next century.
Goats, sheep, cattle and other grazing animals were introduced to Hawaii from Western contact	1778		Altered vegetation of native lowland and upland forests
Kamehameha unified Hawaii	1795	1810	Establishment of the Kingdom of Hawaii
Western sailing ships began to exploit Hawaiian waters for marine animals	1700s		Main exploitation: seals, whales, reef fish, turtles, sharks, birds, pearl oysters, and sea cucumbers
Horses arrived in Hawaii and ranching intensified	1803		
Sandalwood trade	1810	1830	Dramatically altered upland forests, and also brought about great loss of life from Hawaiians working in cold and wet conditions (coupled with introduction of new diseases)
American Protestant Missionaries arrived	1820		Western education and principles of commerce influence Hawaiian culture
Kingdom of Hawaii was formally recognized by France and Britain as an independent sovereign nation	1843		As a sovereign nation, the Kingdom of Hawaii would have the power to settle difficulties with other nations, and negotiate treaties.
Parker Ranch established	1847		Due mostly to Parker's efforts, beef replaced sandalwood as the Big Island's chief export.
Mahele - Erosion of the traditional marine tenure system	1848		A large portion of konohiki lands divided among 245 chiefs
Kuleana Act	1850		Enabled fee simple ownership, further eroded the konohiki system. Herd expansion disrupts forest ecosystems and range landscapes.
U.S. took formal possession of Midway Atoll	1869		In support of transpacific commerce
Sugar mills were built throughout North Kohala to Puako	1870s		Upcountry Maui forests cleared to cultivate vegetables that were shipped to California to feed an exploding population after the Transcontinental Railroad was completed in 1869.

Event	Start Date	End Date	Description
Reciprocity Treaty between U.S. and Kingdom of Hawaii	1875		The U.S. and the Kingdom of Hawaii ratify a reciprocity treaty, allowing for duty-free entry of Hawaii sugar to the U.S. As a result, the sugar industry enjoys phenomenal profits and expands at an exponential rate.
Paia sugar mill built in Maui	1880		Sugar mills attracted Chinese, Filipino, Japanese, Korean, Puerto Rican, Portuguese, and Native Hawaiian workers who lived and worked together
HC&S, Hawaiian Commercial & Sugar, Hawaii's largest sugarcane plantation, was founded by Claus Spreckels	1882		Hawaii begins to change dramatically as land and water resources are increasingly devoted to sugar production.
Kure Atoll was annexed by King Kalākaua	1886		Kure Atoll is the most remote of the Northwestern Hawaiian Islands, and the northern-most coral atoll in the world. Twenty eight species of stony corals have been documented at Kure and the atoll has almost 80,000 acres of coral reef habitat. Kure Atoll is an important pupping and resting area for Hawaiin Monk Seals. is A large amount of marine debris brought in by a main Pacific current poses a major entanglement threat to birds and marine life
The Hawaiian Kingdom was overthrown, nearly annexed by the U.S., and a provisional Republic of Hawaii established.	1893	1894	Orchestrated with U.S. Minister John Stevens, sugar business interests initiate their plan to overthrow the Hawaiian Kingdom, and have Hawaii annexed to the U.S. To avoid armed conflict with the U.S. marines under Stevens' authority, Lili'uokalani, under protest, conditionally yields her sovereign authority to the U.S. until the U.S. completes an investigation of its agents' involvement and undoes the actions of those agents. President Cleveland discovers their plan and withdraws the annexation treaty from Congress. A provisional government is established.
U.S. annexed "the Hawaiian Islands and their dependencies"	1898		As the Spanish American War began, most of the NWHI are annexed by the U.S.
Miles of irrigation ditches were dug in Maui and Kauai in the 1850s and 60s. Sugar mills were fueled in part by wood - massive amount of trees were felled for that purpose	late 1800s		
Hawaiian Commercial and Sugar Company built Pu'unene mill	1901		

Event	Start Date	End Date	Description
James Dole began growing pineapple on the island of Oʻahu	1901		*From the records of the 25th anniversary class book of the Harvard College Class of 1899, published in 1924.* James Drummond Dole: I started my first pineapple plants in the spring of 1901, our company was incorporated in December of that year, and in the summer of 1903 we put up our first season's pack of 1893 cases. In 1923 we packed 2,038,671 cases, or 43,497,828 cans. The period between has been one of repetitive cycles of more land, more pineapples, more canneries. Our plantings in 1923, if extended in a straight line, would have made a double row from New York to San Francisco. Later causes a problem of legacy agriculture for LBSP
Published: The Commercial Fisheries of Hawaiian Islands, by John N. Cobb, agent of the United States Fish Commission	1901		First American Commercial Assessment of the Status of Fisheries of Hawaii. "In numbers the native Hawaiian fisherman surpass all the others combined… Some of the natives are at the head of quite important fisheries. Japanese are second… most of them being engaged in deep sea line fishing [off Oʻahu and Hawaiʻi] which they virtually monopolize." The Chinese pursued aquaculture along the shore, leasing the fish ponds in use on most of the island, and controlled the fish markets. Another Report was also published in 1905 as a followup.
Transpacific cable station began operating at Midway	1903		July 4, 1903 The last section of transpacific cable was laid between Midway and Honolulu, strung in portions from San Francisco to Manila. On July 4th it carried the first round-the-world message that was sent by President Theodore Roosevelt. He wished "a happy Independence Day to the US, its territories and properties."
First Supreme Court ruling for the conversion of the Konohiki System	1906		Forced people to register as landowners under strict qualifications then condemned people who didn't register
Maui Pineapple Company began cultivating pineapple on the island of Maui	1909		Later causes a problem of legacy agriculture for LBSP
President Theodore Roosevelt created the Hawaiian Islands Bird Reservation	1909		A preserve and breeding ground for native birds, which extends from Pearl and Hermes to Nihoa and included Kure
Del Monte began growing pineapple on the island of Oʻahu	1917		Later causes a problem of legacy agriculture for LBSP It is a 2000-acres superfund cleanup site due to pollution of groundwater with fumigants, solvents, benzene and pesticides.
Public officials denied requests to establish a fishing station and cannery at French Frigate Shoals	1917		During WWII, at FFS, the 11-acre Tern Island is converted into a 42-acre naval airstrip. A Coast Guard LORAN station is established at East Island, FFS. The French Frigate Shoals is now part of the Papahānaumokuākea Marine National Monument, the single largest conservation area under the U.S. flag.
The Tanager Expedition	1923	1924	Recorded its travels to a number of islands studying plants, animals, and geology. One of the first scientific expeditions to the NWHI

Event	Start Date	End Date	Description
Japanese attacked Pearl Harbor	1941		Presumable damage also done to natural environment including coral reefs Nearly 70 years after its demise, the USS Arizona continues to spill up to 9 quarts of oil into the harbor each day.
Kahoolawe taken over by military – bombardment intensified	1941	1980	In 1920, the U.S. Army and Navy began using Kahoolawe for target practice and began routinely bombarding it. In 1941 after the Japanese attack on Pearl Harbor, martial law was declared and the Navy took full control of Kahoolawe. The inhabitants were ordered off the island. The island was now used for gunnery and bombing training by the Navy, and was routinely subjected to torpedo bombing.
Japanese long-liners annually expended up to 2,170 vessel days fishing in the NWHI	1946	1959	Hawaii's longline fishery traces its roots back to 1917 when Japanese immigrants introduced "flagline" fishing to Hawaii.
Hawaii started collecting commercial fishing data	1948		The largest and oldest dataset in DLNR-DAR's fisheries data collection is the commercial fishing report. These reports have been collected, processed, compiled, and archived continuously since 1948.
Hawaii became the 50th US state	1959		Statehood brought certain political advantages as well as new access to federal funds.
Kawaihae Harbor built	1959		During the harbor excavation, the coral reef that had been a danger to ships was cut and scraped. The materials dredged from the reef were used to create a landfill upon which port facilities were built.
Hunting of sea turtles in Hawaii	1960s		Turtles received protection in 1978, following decades of commercial exploitation that caused their population to plummet, and the failure of a Hawaii state law passed in 1974 to reverse the decline. Efforts to de-list Green Turtles from the endangered species list and resume hunting them are underway.
Tsunami in Hilo	1960		On May 23, 1960, a tsunami destroyed much of downtown Hilo. Sixty-one people lost their lives and about 540 homes and businesses were destroyed or severely damaged.
State Land Use Law created	1961		First in the country to do state land use. In 1961, the Hawaii State Legislature determined that a lack of adequate controls had caused the development of Hawaii's limited and valuable land for short-term gain for the few while resulting in long-term loss to the income and growth potential of the State's economy.
Major freshwater kill of corals in Kane'ohe Bay, O'ahu	1965		Result of a '100 year storm' that brought torrential rainfall to the adjacent watershed.
Recording of catch and effort data on fishing	1966		Data recording effort began in 1966.
Hanauma Bay, Hawaii's first Marine Protected Area	1967		Hanauma Bay is a 101-acre, horseshoe-shaped bay near the southeast corner of the island of O'ahu, Hawaii. MPA established by the Hawaii State Division of Fish and Game. The Marine Managed Program for the State of Hawaii was created at the same time.

Event	Start Date	End Date	Description
Cooperative Quadripartite Program	1970s	1980s	NWHI fishery investigations involving National Marine Fisheries Service, US Fish and Wildlife Service, Hawaii Division of Aquatic Resources, and the University of Hawaii
Clean Water Act	1972		The Clean Water Act was passed in 1972. Coincidentally, The Water Quality Program for O'ahu with Special Emphasis on Waste Disposal, which was completed and concluded that the design of water control structures and wastewater treatment should be directed toward the conservation of corals and other indigenous aquatic organisms, the protection of the aesthetic qualities of the water environment, and the protection of the various recreational uses of the waters.
Five-year cooperative research program to identify NWHI marine resources	1978		The National Marine Fisheries Service, U.S. Fish and Wildlife Service, State of Hawai`i, and University of Hawai`i began a five-year cooperative research program to identify NWHI marine resources
Hawaii State Planning Act created	1978		The state's original coastal zone management legislation, enacted in 1977, established several priorities which were reiterated in Hawaii's 1978 State Planning Act.
Pineapple Farming waned, particularly on O'ahu	1980s		Decline due to labor costs and foreign competition
The Western Pacific Regional Fishery Management Council established the Precious Coral Fishery Management Plan (FMP)	1980		The Fishery Management Plan (FMP) for the precious corals fisheries of the western Pacific region was implemented in September 1983. It established the plan's management unit species and management area, as well as classifying several known beds.
Hurricane Iwa	1982		The south shore of Kauai was particularly hard hit by wave action with very severe damage around Poipu. The Waianae coast of O'ahu also had stretches of severe surf damage. In fact, all islands reported some surf damage along their southwest facing shores. Wind damage was widespread on Kauai and there were pockets on O'ahu that also received heavy wind damage
Crustaceans Fisheries Management Plan	1983		The Crustaceans FMP was approved in 1983. Initial provisions of the FMP, which was initially named "Spiny Lobster Fisheries of the Western Pacific Region," went into effect March 9, 1983 (48 FR 5560, 7 February 1983).
Bottomfish and Seamount Groundfish FMP	1986		The Bottomfish and Seamount Groundfish Fishery Management plan regulates fishing for bottomfish and seamount groundfish species in the waters of the western Pacific region.
Pelagic Fishery Management Plan	1987		The Pelagics Fishery Management Plan regulates fishing for pelagic species in the waters of the western Pacific region.
Na Ala Hele Trail Program established	1988		Established in 1988 in response to public concern about the loss of public access to certain trails and the threat to historic trails from development pressure.
NHWI Ho'omalu Zone bottomfish limited entry program	1989		The Fishery Management Plan (FMP) for Bottomfish and Seamount Groundfish Fisheries in the Western Pacific Region became effective on August 27, 1986 (51 FR 27413). A limited access system was established for the Ho'omalu Zone, with non-transferable permits and landing requirements for permit renewal and for new entry into the fishery.

Event	Start Date	End Date	Description
Hawaii established Hawaii Revised Statutes § 188-22.6	1990		Allowing for the designation of CBSFAs. Established for the purpose of reaffirming and protecting fishing practices customarily and traditionally exercised for purposes of native Hawaiian subsistence, culture, and religion.
Wasterwater injection wells practices scrutinized	1990s		Concerns grow over wastewater injection practices following major summer cladophora (green filamentous algae) blooms. Began the West Maui watershed planning process.
Hawaii EIS Law reviewed	1991		UH Environmental Center conducted a major review of the Hawaii EIS Law, including public meetings. Subsequent reviews have been conducted in recent years.
Hawaii's first Ocean Resources Management Plan developed	1991		The ORMP, first adopted in 1994 and subsequently updated in 1998 and 2006, is a statewide plan that promotes an integrated approach to managing Hawaii's marine and coastal zone resources. A great deal of public participation went into its development.
Hurricane Iniki	1992		Strongest hurricane to hit Hawaii in a century, and followed on the heels of Hurricane Andrew's devastation of Florida and Louisiana.
LORAN, a marine navigation system station on Kure Atoll, was closed	1992		
Fibropapiloma tumors in turtles	1992	present	Greater incidence of fibro-papiloma tumors in green sea turtles - assumed to be caused by LBSP
Humpback whale protection	1992		Hawaiian Islands Humpback Whale National Marine Sanctuary (sanctuary) established by Congress
Humpback whale sanctuary created	1994		The Humpback Whale sanctuary was created by a Congressional act to protect the humpback whale and its marine habitat in Hawaii. Habitat includes corals and associated substrate
Review of Coral Reefs around American Flag Pacific Islands	1995	2000	The review assesses the need and feasibility of establishing a coral reef fishery management plan for the Western Pacific Region
City and county of Honolulu settlement with HI DOH	1996		Resulted in Mamala Bay study and Kailua Bay Advisory Council
Midway Atoll control transferred	1996		Full jurisdiction and control of Midway Atoll is transferred from the U.S. Navy to the U.S. Department of Interior, U.S. Fish and Wildlife Service
Midway Atoll National Wildlife Refuge created	1996		Midway became an "overlay" refuge in 1988, while still under the primary jurisdiction of the Navy. With the closure of Naval Air Facility Midway Island in 1993, there began a transition from bullets to birds, a change in mission from national defense to wildlife conservation.
First large-scale bleaching event in Hawaii.	1996		The first large-scale coral bleaching event in Hawaii occurred predominantly in Kaneohe Bay in 1996. In 1997-98, mass bleaching occurred on reefs throughout the world due to increased sea surface temperatures associated with an El Nino event where an estimated 16% of the world's coral reefs were lost (Wilkinson et al., 1998).
State waters added to the Hawaiian Islands Humpback Whale National Marine Sanctuary	1997		On June 5, 1997, over four years after the Hawaiian Islands Humpback Whale National Marine Sanctuary was designated the nation's 12th marine sanctuary, Hawai`i Governor Benjamin Cayetano formally approved of the sanctuary in state waters.

Event	Start Date	End Date	Description
Outreach, Education and Research efforts start at Maui's 'Ahihi-Kina'u Natural Area Reserve	1997		This fragile ecosystem is now closed due until 2014 to tourists due to heavy damage by hikers, as well as the discovery of unexploded ordinance.
CRAMP developed	1997	1998	The Hawaii Coral Reef Assessment and Monitoring Program (CRAMP) developed. Result of a series of workshops with managers and reef scientists held that year in Hawaii to address major problems facing Hawaii's reefs.
Hawaii Ocean Resources Management Plan evaluated	1998		University group contracted by the state planning office to conduct an evaluative assessment of the Hawaii Ocean Resources Management Plan
Stony Coral protections	1998		Stony coral and live rock rules were established to prevent intentional take/break or damage of any stony coral
Hawaii Coral Reef Monitoring Workshop held in Honolulu	1998		Organized by DAR in conjunction with the East-West Center. Identified need for a coherent, integrated monitoring program for Hawaii using standard methods appropriate for their situation
West Maui Mountain Watershed Partnership	1998		State and private landowners form the West Maui Mountain Watershed Partnership. It stresses the importance of watershed management, and outlines the cost and contents of a comprehensive management plan for the 50,000 acres of forest and watershed vegetation occupying the summit and slopes of the West Maui Mountains on the island of Maui.
West Hawaii Regional Fisheries Management Area established	1998		Result of Act 306 - Actual effect is establishment of network of marine reserves in West Hawaii that (together with few small existing reserves) prohibit aquarium fishing in 35% of W Hawaii coastline. Rules come into effect 31 Dec 1999.
Maui's Pioneer Mill (in West Maui) stopped operations	1998		Contributed to the demise of sugar cane, which is a major water polluter - however, with thousands of acres of former sugar cane land gone fallow in West Maui, the area became susceptible to dust storms and storm runoff events
Sanctuary Compact Agreement	1998		Sanctuary Compact Agreement signed by State of Hawaii and NOAA, established formal co-management of the Sanctuary. It clarifies the State's continuing authority and jurisdiction over its State waters, submerged lands, and other resources within the Sanctuary.
Hawaii's State of the Reefs Report 1998, DLNR published	1998		This was the first comprehensive compilation of all the status and trends of Hawaii's Coral Reefs. It was patterned after similar efforts in the GBR in Australia and become the basis for the subsequent State of the Reefs Reports that were published by NOAA with chapters on every jurisdiction.
West Hawaii Aquarium Project initiated	1999		Partnership between DAR, HCRI, and researchers from UH Hilo and WSU Vancouver. Established 23 permanent fish monitoring sites that are surveyed 4-6 times/year
A large troop vessel struck a patch reef in Kane'ohe Bay	1999		Coral Relocation projects underway
HCRI MOA established between UH and DLNR	1999		Will create a new one-year law fellowship to enhance enforcement of Hawaii's environmental laws.
Beach Act	2000		Structured program for monitoring of recreational waters across the nation – established bacteria standards, protocols, notification, monitoring, etc.

Event	Start Date	End Date	Description
Open ocean aquaculture	2000		Hawaii legislature cleared the way for leasing of submerged lands and state waters for open ocean aquaculture (fish farms), making it the first state to pass such legislation
Ala Kahakai National Historic Trail established	2000		Established in 2000 for the preservation, protection and interpretation of traditional Native Hawaiian culture and natural resources, the Ala Kahakai NHT is a 175-mile trail corridor full of cultural and historical significance.
Landslide and muddy discharge at Pila'a, Kauai	2000		A Kauai landowner who caused a catastrophic mudslide on November 26, 2001, which destroyed a rare coral reef and polluted a pristine bay at Pilaa, Kauai, must pay a $4 million fine to the state, according to the Hawaii Intermediate Court of Appeals.
Grounding of fishing vessel in Kaua'i	2000		A longlining fishing vessel (the F/V Van Loi) ran aground on a fringing reef directly adjacent to the shoreline of Kaua'i. Portions of the vessel still remain atop the reef. Oil, debris and fishing gear spread across hotel beach. One example that illustrates the problems associated with abandoned wreckage on coral reefs
NOWRAMP	2000		NOWRAMP expedition was launched as a multi-agency and institutional partnership that brought together the best field resources (people, equipment, and funding) of both the resources trustees (state and federal) and the academic community
Executive Order 13178	2000		President Bill Clinton called for recommendations on the conservation of the NWHI and issues Executive Order 13178. Created the NWHI Coral Reef Ecosystem Reserve, which protects Hawaiian cultural and religious uses
HCRI	2000		Coral Reef Assessment and Monitoring Program (CRAMP) Final Report (See report for details on activities and plans)
Coral Reef Conservation Act	2000		To create a national coral reef action strategy
Polluted Runoff Control	2000		Hawaii's Implementation Plan for Polluted Runoff Control was developed by Hawaii CZM and HI DOH
Stony coral and live rock rules amended to remove the word 'intentional'	2001		These rules were now able to be applied to damage to reefs from boats, anchors, etc.
The Nature Conservancy Launches their Marine Program	2001		The Conservancy's Hawaii Marine Program was launched to restore and protect the nearshore coral reefs and marine resources surrounding the Main Hawaiian Islands.
Proposed creation of 14th National Marine sanctuary	2001		The process to designate the Northwestern Hawaiian Islands Coral Reef Ecosystem Reserve as the nation's 14th National Marine sanctuary began
Sediment Management Plan, Fire Management Plan, and Native Species Revegetation Plan	2001		Developed by Mauna Kea SWCD as part of its Pelekane Bay Watershed Management Project
Reef Environmental Education Foundation (REEF) launched in Hawaii	2001		"…enlisting and enabling divers and other marine enthusiasts to become active ocean stewards and citizen scientists."
Several of the regulated fish species minimum size regulations were updated	2002		Updates are based on L50 (size that 50% of the species is reproductively mature)
U.S. Coral Reef Task Force meeting in Puerto Rico	2002		U.S. Coral Reef Task Force adopted a Resolution which requested the seven States and Territories to work with their federal partners to develop local action strategies to address six primary threats to coral reefs

Event	Start Date	End Date	Description
NOWRAMP conducted expeditions to the NWHI	2002		Scientists map and assess the shallow reefs for biodiversity, status, and management needs
Sanctuary completed first Management Plan Review	2002		Hawaiian Islands Humpback Whale National Marine Sanctuary fulfilled review requirement
Sanctuary Entanglement Response Program established	2002		The Hawaiian Islands Entanglement Response Network is a community-based network, lead by the Hawaiian Islands Humpback Whale National Marine Sanctuary.
Bleaching Event in the NWHI	2002		The occurrence of two episodes of mass bleaching over a period of three calendar years lends credence to predictions that the frequency of bleaching events will increase.
Willingness to Pay surveys conducted at Honolua Bay and Molokini MLCDs	2002		Heightened public interest and understanding about MLCDs
Coast Watch started at Miloli'i	2003		Direct involvement by community in coastal management
Reef Stewardship Program started at Wai 'Opae	2003		Trained public monitors of coral reefs
Aquatic Invasive Species Management Plan (LAS) developed	2003		The goal of the Aquatic Invasive Species Management Plan is to enhance coordination of current management efforts and to identify gaps.
Hawaii Coral Reef Fisheries Management Workshop	2003		Workshop included scientists, fishers and managers from state and federal agencies
Fisheries Local Action Strategy Hawaii (FLASH) and Steering Committee Established	2003		The Fisheries Local Action Strategy's Steering Committee envisions a Hawaii with a healthy nearshore marine environment that is maintained through effective management for the benefit and appreciation of present and future generations.
Restrictions on fishing for crabs and lobster	2004		Legislature made it illegal to take any female spiny lobster, kona crab, and samoan crab
Local Action Strategy to Address Land-Based Pollution Threats to Coral Reefs was developed	2004		To improve coastal water quality and coral ecosystem function and health by reducing land-based pollution.
Lack of Awareness LAS was created and the Hawaii Living Reef Program launched	2004		Build and increase general public awareness of the importance of the coral reef ecosystem to Hawaii's lifestyle, teach and encourage positive behaviors, and coordinate similar coral outreach efforts
Additional NOWRAMP expeditions	2004		Northwestern Hawaiian Islands Reef Assessment and Monitoring Program (NOWRAMP) conducted additional expeditions to the NWHI to continue collecting data about the NWHI
WP Council (WPRFMC) Coral Reef Ecosystem FMP	2004		The FMP is the nation's first ecosystem-based plan for fisheries and includes specific measures to promote sustainable fisheries while providing for substantial protection of coral reef ecosystem resources and habitats throughout the Council's jurisdiction
A Living Reef Gives Our Islands Life campaign launched (supported by Lack of Awareness LAS)	2004		A cross-section of community organizations, in partnership with a consortium of public and private agencies — including the Department of Land and Natural Resources — are involved in the "Living Reef" outreach program.

Event	Start Date	End Date	Description
Crab and lobster fishing restrictions heightened	2004		Legislature made it illegal to take any female spiny lobster, kona crab, and somoan crab
Coral Reef Alliance began work in Hawaii	2005		Helped to develop online tools that facilitate and encourage citizen participation in reef monitoring, and sponsored programs to educate and excite local youth about their coral reefs.
Local Action Strategy to Address Recreational Impacts to Reefs was developed	2005		Coral reefs in the Main Hawaiian Islands are under increasing strain from recreational use as Hawaii's resident population, and thriving marine tourism industry
State Mauka-Makai Watch Program launched	2005		Partnership between DLNR and local community NGOs. Makai Watch volunteers in communities statewide serve as the 'eyes and ears' for the State's Division of Conservation and Resource Enforcement officials (DOCARE)
The Northwestern Hawaiian Island Coral Reef Ecosystem Reserve operations' plan was approved	2005		A thirty-day public comment period resulted in some modifications that allowed some fishing in the reserve.
State of Hawaii established the NWHI Marine Refuge	2005		The NWHI effectively closes nearly all coral reef areas in the NWHI to fishing (3 mile zone around all islands except Midway)
Main Hawaiian Island Survey Coral Reef Cruises (MHIRAMP) began	2005		MHI survey cruises funded by NOAA CRCP held in 2005, 2006, 2008, 2010, and next planned for 2013. Now established in triennial cycle. Reef fish survey component efforts supplemented by additional reef fish cruises in 2012 and early 2013, funded by NMFS.
Mauka-Makai Watch Program launched	2005		Partnership between DLNR and local community NGOs. Makai Watch volunteers in communities statewide serve as the 'eyes and ears' for the state's Division of Conservation and Resource Enforcement officials (DOCARE)
Ocean Awareness Training Program	2005		Collaborative free community education program, launched on Maui, coordinated primarily by the Hawaiian Islands Humpback Whale National Marine Sanctuary; later launched on O'ahu
E Alu Pu community network began	2005		E Alu Pu is a network linking more than 25 communities from around Hawaii to increase their effectiveness in managing local environmental heritage. Under the Hawaii Community Stewardship Network.
Project S.E.A.-Link	2005	2009	Helped coordinate Makai Watch program at Honolua Bay. Consisted of on-site educational outreach and community-based monitoring
Coral Reef Alliance launched work in Hawaii	2005		Initially launched to facilitate development of voluntary standards for marine tourism
Updated Pelekane Bay Watershed Management Plan	2005		Developed by the Mauna Kea SWCD The Pelekane Bay watershed was identified in Hawaii's Unified Watershed Assessment as a Category I watershed: that is, one of the state's watersheds in most urgent need of restoration.
Malama Kai Foundation receives permission to install moorings	2005		Letter of permission received from US Army Corps to install 15 additional day use moorings statewide. This includes five moorings each off Kauai, Maui, and Kona Coast of Hawaii.

Event	Start Date	End Date	Description
Mooring buoy installation manuals	2005		Hawaii DMB System Installation and Maintenance Procedures Manual developed by Malama Kai Foundation Dive West Hawaii by Day-Use Moorings guidebook published by Malama Kai Foundation
Northwestern Hawaiian Islands Marine Refuge designated in 2005.	2005		Largest marine or terrestrial conservation area ever established in Hawaii. This Marine Refuge and the permit system created for this site became the basis for the joint permitting regime that is now used for the Papahānaumokuākea Marine National Monument.
NWHI Marine National Monument	2006		President Bush issued the Presidential Proclamation establishing Northwestern Hawaiian Islands Marine National Monument
Hawaii's second Ocean Resources Management Plan developed	2006		The Coastal Program encourages ocean resource management that balances social, economic, cultural, and environmental considerations.
Ala Wai/Beachwalk sewage spill	2006		A spill of up to 800 gallons of untreated wastewater into the Ala Wai Canal occurred in the switchover to the Beachwalk wastewater emergency bypass system.
Largest single storm water penalty given to landowner in Pila'a, Kauai	2006		DOJ, EPA, HI DOH, Kauai County
Paia sugar mill demolished	2006		
PIMPAC conducted Management Planning Training and follow up support	2006	2007	Attendees included a community member from Hookena and a state NARS employee
Magnuson-Stevens Reauthorization Act	2006		Local knowledge sought to enhance scientific management practices
Project S.E.A.-Link, CORAL and DAR launch 'Take a Bite out of Fish Feeding' campaign	2006		Designed to eliminate the feeding of reef fish and the sale of fish food. More than thirty Hawaii-based marine recreation businesses have pledged their support.
EPA reviewed the county of Maui's West Maui injection well permits	2007		They held two public hearings and are still working with the county to come up with some agreed upon standards and limits for injection volume and nutrient levels
Gill net restrictions	2007		Lay gill net fishing prohibited on Maui and in various areas around O'ahu. Gillnet fishing restrictions imposed on all other areas where gillnet fishing was still allowed.
Climate Change and Marine Disease Local Action Strategy developed	2007		The last two threats identified by the USCRTF, coral bleaching/climate change and disease, are both being addressed in this LAS.
Kohala Mountain Watershed Management Plan drafted	2007		KWP authored a watershed management plan which defined actions for addressing threats to the watershed while preserving its biological, cultural, and economic resources
Reef Etiquette Signage started - Adopt a Sign also started	2008		Behavior change through education
PIMPAC conducted socio-economic monitoring and assessment at Hookena and provided follow-up assistance	2008	2009	PIMPAC provides support to area based management efforts in the region. 1 attendee from CCN using Hookena as site to do SEM-P assessment and monitoring
International Year of the Reef	2008		Events coordinated statewide through many organizations and agencies
Respecting Coral Reefs sign developed and Adopt-a-Sign program launched	2008		Coral reef education effort

Event	Start Date	End Date	Description
West Hawaii Regional Fisheries Management Area established	2008		West Hawaii Regional Fisheries Management Area was originally established and designated through Legislation via Act 306. Requires the DLNR to establish a network of fish replenishment areas on Maui and O'ahu with the option of establishing them on additional islands as warranted in the future.
Making a Difference	2008		An Action Guide to Marine Conservation in Hawaii is distributed through the Makai Watch Program.
West Hawaii Voluntary Standards for marine tourism debuts	2009		Marine tourism providers signed on to adopt the standards.
Ka'anapali Makai Watch established	2009		To raise awareness of the ocean and specifically the Kahekili Herbivore Fisheries Management Area (KHFMA). Consists of three components: education and outreach, monitoring, and observation/voluntary compliance.
Kahekili is declared an Herbivore Fisheries Management Area (KHFMA)	2009		All take of herbivorous fishes and urchins is now prohibited.
Maui Wide Study investigating colony scale dynamics for Porites dead zones	2009	2010	Showed that patterns and causes of coral decline are site specific.
West Hawaii Voluntary Standards for Marine Tourism approved by the U.S. Coral Reef Task Force	2009		State's first and only set of inclusive, multi-stakeholder, consensus based standards for marine recreation, facilitated by CORAL
Makai Watch launched at Kahekili	2009		Coordinated by Project S.E.A.-Link, CORAL and DAR
Coral Reef Monitoring Data Portal launched	2009		Resource for citizen science and community-based management
Hawaii DMB Manual	2009		Hawaii DMB System Background, Site Selection Criteria, Installation, and Maintenance Procedures Manual published by Malama Kai Foundation. The manual outlines statewide standards for day-use mooring materials, as well as installation and maintenance procedures
DLNR-DOBOR submits application to US Army Corps for 52 additional day use moorings statewide	2009		Letter of permission received from US Army Corps in 2010
Maui County Day-Use Moorings guidebook published by Malama Kai Foundation	2009		Further refinement of day-use buoy placement
Review of the Hawaii EIS Law	2010		Wind energy EIS (Environmental Impact Statement) prepared by Dept. of Energy
Wastewater pollution mapping	2010		Publication of report from Meghan Dailer in algal tissue used to map where wastewater is entering the ocean (funded by HCRI)
Final Report published on DAR's monitoring of coral reefs of the Main Hawaiian Islands	2010		When compared with the results of current reef monitoring, these long-term data sets have allowed for the identification and quantification of alarming trends at nearly all monitored reefs. Many sites have experienced a complete collapse of the coral community, as live coral cover dropped dramatically and reefs became dominated by invasive algae.
South Kohala Conservation Action Plan begins	2010		A vision for a restored healthy, abundant, resilient South Kohala coastal system that is cared for and cherished by an island community guided by the values and traditions of South Kohala is underway.

Event	Start Date	End Date	Description
Sanctuary begins Management Plan Review	2010		The target for completing a draft revised management plan is 2013, and a final revised plan is targeted for completion in 2014.
Hawaii Day-Use Mooring Program 10-Year Strategic Plan	2010		Developed by Malama Kai Foundation under contract to DLNR Today there is a statewide system of about 220 day-use moorings around the Main Hawaiian Islands.
Mauna Kea Watershed Management Plan drafted	2010		Prepared for the Mauna Kea Watershed Alliance
Working to reduce use of injection wells	2010 and 2011		The Maui County Wastewater Community Working Group completes one year of monthly working meetings and provided numerous suggestions to the county to help reduce/eliminate the use of injection wells to dispose of treated wastewater and to increase the use of recycled water for irrigation
Observation and Incident Reporting component of Makai Watch standardization project	2010	2011	Funded by coral damage settlement
Hawaii's second Ocean Resources Management Plan comes under revision	2011		This review process led to the management plan that is currently being circulated
CI Hawaii Fish Trust Program established	2011		CI partners with local fishing communities, businesses, non-profit organizations and the State of Hawaii to facilitate the sustainable management of Hawaii's nearshore fisheries.
Hawaii Coral Reef Strategy: Priorities for Management in the Main Hawaiian Islands	2011		DAR study and reaffirmation of goals
Partnerships between national and local groups open door to funding and technical assistance	2011		The U.S. Coral Reef Task Force designates the West Maui Watershed as the priority partnership in the Pacific The U.S. Coral Reef Task Force designates the Ka'anapali – Kahekili area within the West Maui Ridge to Reef Initiative as a priority watershed partnership
Tsunami Events in Hawaii	2011		Japanese tsunami waves hit Hawaii
NOAA study reveals coral reefs valued at 33.57 billion	April 2011		A peer-reviewed study, commissioned by NOAA, reveals the estimated total economic value the American people hold for the coral reefs of the Main Hawaiian Islands is $33.57 billion. From June through October 2009, the survey allowed the public to express its preferences and values for protection and restoration of the coral reef ecosystems around the Main Hawaiian Islands. In this study, total economic value includes so-called passive use values, such as the willingness to pay to protect the coral reef ecosystem for future generations, as well as direct use values, such as snorkeling over a coral reef or consuming fish supported by coral reef ecosystems.
Two workshops held to develop a conservation action plan for Kahekili (West Maui)	2011		The West Maui Ridge to Reef (R2R) Initiative is an all- encompassing approach across multiple agencies, organizations and jurisdictions to address adverse impacts to coral reefs in West Maui.
Two workshops held to develop a conservation action plan for Kawaihae-'Anaeho'omalu (South Kohala)	2011		Collaboration between TNC, DAR, NOAA

Event	Start Date	End Date	Description
Participatory mapping workshop for the West Maui Coastal Use Mapping Project	2011		The Coastal Use Mapping Project is designed to fill a critical information gap in ocean management by mapping significant human uses of the nearshore ocean area in the Honolua – Wahikuli region.
Wai'ula'ula Watershed Plan completed	2011		Focus on addressing existing sources of polluted runoff and threats to watershed health and preventing further degradation of the watershed resources as projected land use changes occur.
Hawaii-Palau Exchange	2011		The Nature Conservancy sponsors the Hawaii-Palau Exchange, with Palauans visiting Maui in March, 2011 and Hawaii contingent (and 2 from Amer. Samoa) traveling to Palau in February 2012.
Eco tour certification program	2011		Hawaii Ecotourism Association pilots Eco tour certification program
South Kohala Conservation Action Plan	2011		Goals established for a restored, healthy, abundant, and resilient South Kohala coastal system that is cared for and cherished by an island community and guided by the values and traditions of South Kohala
Total Economic Value for Protecting and Restoring Hawaiian Coral Reef Ecosystems	2011		The goal of the study was to estimate the total value – including both direct use and passive use values – for the U.S. population. (see results in April 2013)
Watershed Coordinator hired for West Maui	2012		Community engagement with local watershed groups
West Maui Ridge to Reef Initiative MOU signing with the USACE	2012		As an initial step, federal agencies and organizations are funding technical studies and public education efforts.
Legislative Climate Change Priority Guidelines included in Hawaii Revised Statutes Chapter 226	2012		The climate change adaptation priority guidelines are intended to prepare the state for climate change impacts
Maui County is sued by an environmental defense group representing 5 local groups in Maui	2012		Freshwater seeps just offshore of Kahekili are accused to not meet water quality standards of the Clean Water Act due to wastewater from Lahaina injection wells operated by Maui County
Wahikuli-Honokowai (West Maui) Watershed Management Plan completed	2012		Volumes 1 and 2 of the Wahikuli-Honokowai Watershed Management Plan have been finalized, incorporating the feedback and suggestions from community and partner reviewers of the draft versions released in 2012.
CORAL begins working with hotels on water reuse	2012		The intended audience is management, engineering and landscaping departments of West Maui properties
Ka'anapali Makai Watch pilots online version of DOCARE's Observation and Incident Report Form	2012		Online access to reporting of natural resource rules violations, enhancing public involvement.
The Nature Conservancy role widens, public/private partnership.	2012		TNC coordinates the Conservation Action Plan process for Maui and Hawaii Island Sites (Molokini, Kahekili, Kahoolawe, Puako)
Standardization of Makai Watch Education and Outreach component	2012		Funded by Castle Foundation and CI
50th Respecting Coral Reefs sign installed statewide	2012		Public awareness campaign matures
Launch of CORAL project to support hotel's implementation of water reuse in West Maui	2012		Hotel water reuse begins

Event	Start Date	End Date	Description
Day Use Mooring Guidebooks for Kauai and O'ahu published by Malama Kai Foundation	2012		Day-use Buoy program expands further
Strategy Implementation Projects	2013		Funding for first implementation projects - road repair project and post fire restoration plan project, plus bioretention basin (rain garden)
DOCARE Fisheries Enforcement Unit to begin	2013		Funding provided through a partnership among Department of Land and Natural Resources (DLNR), CI, and the Harold K.L. Castle Foundation (HKL Castle)
2011 Japanese Tsunami debris washed ashore in Hawaii	March 2013		Marine sanctuaries inundated with debris from 2011 Japanese Tsunami

Fisherman near Spencer Beach, Big Island, Hawaii. (Photo credit: Glenn Page, SustainaMetrix.)

Appendix C: For More Information

Climate Change

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Appendix D: Interviews

Name	Institutional Affiliation	Method
PRE-SITE VISIT		
Tracy Parsons and Kathy Chaston	NOAA CRCP	Phone (8/8/12)
Tracy Parsons and Kathy Chaston	NOAA CRCP	Phone (8/15/12)
Tracy Parsons and Kathy Chaston	NOAA CRCP	Phone (8/22/12)
J-CAT Meeting #1	J-CAT Members	Phone (10/23/12)
J-CAT Meeting #2	J-CAT Members	Phone (11/4/12)
Kathy Chaston	NOAA CRCP	Phone (11/6/12)
Eric Co	Castle Foundation	Phone (11/8/12)
Athline Clark	US Army Corps of Engineers	Phone (11/9/12)
Kathy Chaston	NOAA CRCP	Phone (11/12/12)
Russell Sparks	DAR Maui	Phone (11/13/12)
J-CAT Meeting #3	J-CAT Members	Phone (11/19/12)
Jenny Waddell	NOAA Grants Management	Phone (11/19/12)
Risa Minato	HCRI-RP	Phone (11/20/12)
Leo Asuncion	CZM	Phone (11/20/12)
Mike Lameier	NOAA Fisheries	Phone (11/21/12)
TUESDAY 11/27/12		
Emma Anders	DAR, POC	In Person
Liz Foote	Coral Reef Alliance, Hawaii Field Officer	In Person
Jim Coon	Trilogy (snorkel/sail tour operator)	In Person
Ekolu Lindsey	Maui Nui Marine Resources Council	In Person
Robin Newbold	Maui Nui Marine Resources Council	In Person
Sarah McLane	Maui Nui Marine Resources Council	In Person
WEDNESDAY 11/28/12		
Russell Sparks	DAR Maui	In Person
Skippy Hau	DAR Maui	In Person
Darla White	DAR Maui	In Person
Allen Tom	NOAA Sanctuaries	In Person
Robert Parsons	Mayor's Environmental Coordinator	In Person
Emily Fielding	The Nature Conservancy	In Person
Ranae Granske-Cerizo	Natural Resources Conservation Service	In Person

Name	Institutional Affiliation	Method
Donna Brown	Maui Community College Marine Option Program and REEF	
Jay Carpio	Maui Nui Marine Resources Council, Kahekili CAP Participant	In Person
Tova Callendar	West Maui Watershed and Coastal Management Coordinator	In Person
THURSDAY 11/29/12		
Chad Wiggins	The Nature Conservancy	In Person
Carolyn Stewart	Private Consultant, Malama Kai	In Person
Aric Arakaki	The National Park Service	In Person
Rick Gmirkin	The National Park Service	In Person
Nahaku Kalei	The National Park Service	In Person
Melora Purell	The Kohala Center	In Person
Kawika Auld	Shoreline Fisherman, South Kohala CAP Participant	In Person
FRIDAY 11/30/12		
Uncle Francis Ruddle	Mauna Lani Sea Adventures (owner/operator), South Kohala CAP Participant	In Person
William Walsh	DAR Aquatic Biologist	In Person
Rick Gaffney	West Hawaii Fisheries Council	In Person
Matthew Wung	Natural Resources Conservation Service	In Person
MONDAY 12/3/12		
Watson Okubo	HI DOH, Monitoring & Analysis Section Supervisor	In Person
Aulani Wilhelm	NOAA Monument Co-Manager	In Person
Paul Wong	NOAA Sanctuaries	In Person
Elia Herman	DAR, Sanctuaries Co-Manager	In Person
Hudson Slay	Environmental Protection Agency	In Person
Wendy Wiltse	Environmental Protection Agency	In Person
Ivor Williams	NOAA CRED	In Person
Kim Hum	The Nature Conservancy	In Person
TUESDAY 12/4/12		
Kem Lowry	Adjunct Senior Fellow, Research Program, UH	In Person
Alan Friedlander	UH/US Geological Survey	In Person
Carlie Weiner	Center for Ocean Sciences Education Excellence and Island Earth Program, Former Recreational Impacts LAS Coordinator	In Person
Jo-Ann Leong	HIMB, Director	In Person
Greta Aeby	HIMB, Coral Disease LAS Coordinator	In Person

Name	Institutional Affiliation	Method
Brian Bowen	HIMB, Researcher	In Person
Mike Hamnett	The Research Corporation of the University of Hawaii	In Person
WEDNESDAY 12/5/12		
Randy Awo	DOCARE, Chief	In Person
Dave Gulko	DAR Biologist	In Person
Wayne Tanaka	DLNR Legal Fellow '09-'10	In Person
Josh Demello	Western Pacific Regional Fishery Management Council	In Person
Matt Ramsey	NOAA Fisheries Extension	In Person
Steve Frano	NOAA OCRM (CZM contact for Hawaii)	In Person
Mike Lameier	NOAA Fisheries	In Person
THURSDAY 12/6/12		
William Aila	DLNR Chairperson	In Person
Bill Tam	DLNR Deputy Director, acting DAR Administrator at the time of interview	In Person
Gerry Davis	NOAA PIRO	In Person
Bob Schroder	NOAA PIRO	In Person
FRIDAY 12/7/12		
Hawaii J-CAT Meeting #4		In Person
SATURDAY 12/8/12		
Uncle Mac Poepoe	Hui Mälama o Mo'omomi - Molokai	In Person
POST-SITE VISIT		
Emma Anders	DAR, POC	Phone (1/4/13)
J-CAT Meeting #5	J-CAT Members	Phone (1/9/13)
Dan Polhemus	US Fish and Wildlife Service	Phone (1/10/13)
Jeffrey Pollack	NOAA OLE	Phone (1/14/13)
Arielle Levine	NOAA PIRO	Phone (1/14/13)
Kathy Chaston	NOAA CRCP	Phone (1/30/12)
Optional J-CAT Call on Coral Initiative vs. Coral Program	J-CAT Members	Phone (2/5/13)
Optional J-CAT Call on Sustainable Financing	J-CAT Members	Phone (2/26/13)
J-CAT Meeting #6	J-CAT Members	Phone (2/27/13)
Additional J-CAT Meeting (#7)	J-CAT Members	Phone (3/28/13)

Appendix E: Current (as of January 2013) Coral Reef Management Projects Supported by NOAA CRCP in Hawaii

Monitoring

- DAR has monitoring programs for Maui Nui, O'ahu, and West Hawaii. The protocols are not the same and both Maui and W. Hawaii do some monitoring specifically designed to evaluate management actions (e.g. monitoring of herbivores at Kahekili and monitoring of targeted aquatic species in W Hawaii FMA). DAR partners with CRAMP and CRED for coverage and statistics of monitoring activities.
- All commercial fishers are required to submit catch reports - this includes fishers for reef and pelagic species. The DAR statistics team is able to break out data by species that commercial take of reef fish can be evaluated

Incident response/mitigation

- There is one DAR biologist who leads investigations after groundings. In some cases, there bas been some rehabilitation (mostly cementing live coral heads to the substrate) after a major damage incident with a perpetrator that settles, but questions have been raised regarding the authority to prosecute based on damages caused by grounding - staff are working on strategies to address this
- There is one DAR specialist working on a mitigation bank/in-lieu fee program which would enhance the state's ability to mitigate/compensate for planned damages such as harbor repairs who is working with USACE and DOBOR to develop and implement approved mitigation plans that are mostly transplanting corals and developing protocols for day-use moorings
- As needed, DAR works with partners to respond to reports of disease/bleaching/crown of thorns outbreaks following the partially implemented Rapid Response Contingency Plan

Management (NOAA CRCP funding for the Strategy for FY12)

- Legal fellow to assist the Division of Aquatic Resources with many marine issues
- Control invasive algae through native urchins (*Tripneustes gratilla*) as a restoration tool for coral reefs in Kaneohe Bay.
- Monitor the reduction of nutrient loadings from animal waste and sediment loads from eroding stream banks from the Wai'ula'ula stream fencing project.
- Reduce pollutant loads in west Maui from land-based sources of pollution by implementing best management practices, such as baffle boxes and supporting the completion of a pre- and post- fire rehabilitation plan.
- Reduce pollutant loads in South Kohala from land-based sources of pollution by implementing best management practices selected from the South Kohala CAP.

- DAR and DOBOR are working to hire a part-time day use mooring coordinator (NOAA CRCP funded) to develop a DMB program for the state

Rule Making

- Multiple biologists as well as DAR's NOAA-funded legal fellow are responsible for stakeholder and staff engagement to contribute to the development of rule-making for resource protection

Education

- DAR has an education program that focuses mostly on fishery rules, and may include information regarding coral reefs and ecosystems

Other Divisions

- Ahihi-Kianu Natural Area Reserve (highest protection status) is managed by the Division of Forestry and Wildlife. It is the only marine natural area reserve in the state. DAR staff played a role in management planning but DOFAW manages the site: http://hawaii.gov/dlnr/dofaw/nars/reserves/maui/ahihikinau
- Kealakekua Bay: due to big problems with illegal kayak operators and lack of authority within DAR to implement fast management actions for non-extractive uses, the MLCD in the Bay was recently absorbed into the state park which included land around the Bay. All kayaking is temporarily prohibited until the state develops an enforceable permitting process and can have some on-site enforcement. In 2010, a DAR biologist led an inter-department planning process for the bay, but so far few actions have been implemented due to lack of formal commitment needed for successful inter-division collaboration

Appendix F: Non-Emergency Rule-making Process Department of Land Natural Resources

Authorities

HRS Chapter 91 (Hawaii Administrative Procedures Act)

HRS Chapter 201M (Small Business Review)

HAR Chapter 13-1 (http://hawaii.gov/dlnr/rules/Ch13-1-Official-Rules.pdf)

Governor's Administrative Directive No. 09-01 (see hawaii.gov/dbedt/main/about/annual/2011-reports/2011-sbrrb.pdf at pp. 044-48)

Informal process

1. Development of management proposal (through internal DLNR/DAR discussion, and/or submission of management plan by community groups to DAR liaison)
2. Scoping meetings -- DAR will often host informal meetings to discuss contemplated rule initiatives and obtain community feedback. For CBSFAs, this part is usually done by the communities pushing for establishment of a CBSFA in their ahupua'a. See HRS §§ 188-22.6 through 22.9.
3. Proposed rules are drafted in Ramseyer format and a BLNR submittal (explaining the history, justification, etc. of proposed rules) is prepared.
4. Note: HRS § 91-6 and HAR § 13-1-26 allows "any interested person" to petition the BLNR for the adoption, repeal, or amendment of rules. Upon the filing of a petition, the BLNR has 30 days to either deny the petition, or approve the petition for formal rule-making.

Formal process

1. Drafted Ramseyer rules are submitted by the Chairperson's office to the Attorney General's office for review as to form. Pre-hearing review shall be "on an expeditious basis." See GAD No. 09-01 at 3.
2. AG-approved rules and an agenda title are typically submitted to the Chair's secretary at least 2 weeks prior to the target board meeting for posting pursuant to Sunshine law requirements. See HRS chapter 92.
3. At the target BLNR meeting, the division administrator presents the rule along with division recommendation to approve the rules for public hearing. The BLNR is usually also asked to allow the Chairperson to appoint a hearings officer to conduct the public hearing(s). At or prior to the BLNR meeting, the public may testify on whether the rules should be moved forward or changed. If the board requests "substantial" changes to the proposed rules, they must be again reviewed by the attorney general as to form before moving on in the process.
4. If the rule proposal affects small businesses (i.e. less than 100 full- or part- time employees), a Small Business Regulatory Review Board ("SBRRB") hearing is required under HRS Chapter 201M. A "small business impact statement" is usually required for this hearing. Small businesses may submit testimony on the proposal, and are usually alerted to upcoming SBRRB hearings via "RegAlert," which automatically e-mails small business membership associations. See HRS § 201M-2; http://hawaii.gov/dbedt/business/start_grow/small-business-info/sbrrb/regalert.

5. A "Policy Statement" must be prepared prior to notice of public hearings. GAD No. 09-01 at 1-3. Both this statement and a copy of the proposed rules must be delivered to the Governor's office. Copies of the rules must also be provided to the Director of Budget and Finance and the Director of Business, Economic Development, and Tourism for comment. GAD No. 09-01 at 3.
6. Public notice of public hearings must be posted at least once in a newspaper of general circulation in the state and in each county affected by the proposed rule. See HRS § 91-3; HAR § 13-1-22. If small businesses will be affected, the notice must provide a summary of the business impact described in the small business impact statement, as well as a statement describing any new fees or compliance burdens on small businesses. GAD No. 09-01 at 3.
7. At or prior to the public hearing, the public may submit testimony on the proposed rules. At the close of the public hearing, the BLNR may decide on whether or not to approve the rule proposal, recommend any changes, or deny the rule proposal. The BLNR may also announce that its decision-making will occur at a specified later date. HAR 13-1-24.
8. If any revisions or changes are recommended by the BLNR, a copy of the revised rule proposal must be submitted to the Attorney General's office for approval as to form. The Attorney General must respond with its review within two weeks. If the Attorney General finds that any of the changes are "substantive," then the formal process restarts at step 2. GAD No. 09-01 at 3-4.
9. If there are no substantive changes, the Department must prepare a small business statement (including summaries of testimonies received and responses to such testimonies) and submit a copy to the SBRRB. HRS § 201M-3.
10. The Department must then seek the Governor's final approval, by submitting three copies of the proposed rules in standard (cf. Ramseyer) format. The Department must indicate whether any revisions are being recommended based on the public hearing, and whether the proposal affects small businesses (and if so, if a small business statement has been submitted to the SBRRB). GAD No. 09-01 at 3-4. The governor's approval will be indicated by his signature on the proposed rules.
11. Three copies of the rules approved by the governor must be filed with the lieutenant governor's office. Rules take effect ten days after filing with the lieutenant governor's office (or later if specified in statute or rule). HRS § 90-4.

Appendix G: Portfolio of Training Modules

Long-term capacity building requires an explicit focus on systematic learning. While there are a wide range of potential training modules, a defined set of in-person training courses, distance learning modules, and methods to cultivate local leaders are suggested below to focus on current and emergent topics. A key feature of these trainings and continuing education courses should be the building of a common management framework built around the Management Cycle and the Orders of Outcomes framework.

Recommended Standard Hawaii Coral Reef Management Training Course

On-site training courses are recommended to be conducted every two years, to respond to the staff turnover rate, including the following modules:

- Modules on the causes and drivers of reef decline, including land-based sources of pollution, fisheries impacts and effects of climate change and ocean acidification;
- Modules on the Management Cycle, and the steps needed to build political will;
- Modules on sustainable financing and coordination of funding across agencies, and grants management;
- Modules on fostering high quality collaboration that includes essential elements of effective meetings, including effective dialogue, conflict resolution and decision-making;
- Modules on codification of good practices for coastal zone management, MPAs, etc. that are made available to staff and the subject of mini-courses and trainings (e.g. Code of Conduct for Responsible Fisheries (FAO, 2007)); and,
- Modules on dealing with persistent administrative barriers such as staff turnover, improved collaboration, and integration across agencies, and writing SOPs (standard operating procedures).

Routine trainings are a well-established practice for building knowledge and skills for effective coral reef management and could feature a formal process for new staff (at all levels) to build a basic understanding of coral reef management issues and convey current knowledge and lessons learned so as to retain institutional knowledge. There are many sources available for building a custom curriculum and lessons learned for structuring training modules. For example, the Coastal Resources Center at the University of Rhode Island is developing a set of modules for the certification of professionals involved with MPAs. Custom modules for three levels of participants (field operations, management staff and policy and decision makers) have been prepared, applied and tested in East Africa. The CRC/WIOMSA certification program is one source of training materials that may be appropriate for Hawaii.

Produce Modules For Distance Learning

A set of pre-produced modules and resources are available from a wide variety of sources including Sea Grant, NOAA's Coastal Services Center, Center for Watershed Protection, International Waters Learning Exchange and Resource Network (IWLEARN), and UN Train Sea-Coast. There are a growing number of publications that would be useful in developing these modules to build capacity such as Reef Resilience Tool Kit, How's My MPA Doing,

Healthy Reefs Healthy Communities, International Waters Experience Notes, World Fish Centers Lessons Learned 1804, GBR 2009 Baseline, and GEF's capacity building programs.

Strategies for Cultivating Local Leaders

To more effectively practice the ecosystem approach, the following six core competencies are necessary for practitioners:

- Competency in facilitation, mediation, stakeholders engagement, and public education;
- Competency in strategic design/improvement of stewardship initiatives;
- Competency in design and implementation of monitoring and evaluation in support of adaptive learning and acting;
- Competency in analysis of long-term changes in condition and use of ecosystems;
- Competency in analysis of governance structures and processes; and,
- Competency in building leadership required to influence political will.

Traditional approaches of peer-to-peer exchanges, learning journeys, and further investment in professional development is a worthwhile investment for leadership development. We recommend specific criteria to guide, encourage and reward emerging leaders. While a wide range of literature exists, the following set of leadership characteristics is useful to consider (NRC, 2008):

- Critical and reflective thinking and a willingness to challenge the status quo and invite inquiry into potential new ways of doing and seeing;
- Ability to see the big picture, as well as the parts and their interrelationships;
- Skillful and honest communication, including listening skills and the ability to speak and write with clarity, vision and purpose;
- Openness to the diversity of world views and perspectives and ability to make choices, especially when a decision goes against popular thought or opinion; and,
- Ethical foundation of word and action to navigate the political arena without susceptibility to corruption.

Principles for Building Adaptive Capacity

- Issues Drive Need for Building Capacity. Building adaptive capacity needs to be directed at a set of issues, as described in this and earlier reports on coupled social biophysical issues relating to coral reef health. There should be direct links between the issues and this strategy. Issues should matter most to the people of the place and represent both challenges and opportunities. Issues change and may become more or less important over time and new ones will form in the coming years, some through crisis and others gradually over time. Therefore an adaptive strategy is needed to respond to the range of issues associated with management of coral reefs.

- **Define the Audience:** Once the issues are identified, an assessment of capacity needs should follow that is directed at the appropriate "levels" in the management system (field operations, managers, decision makers). Capacities can be directed at an individual, groups, teams, organizations, and across networks. What matters most is defining who currently needs the capacity and who may need such capacity in the future.
- **Focus on the Purpose of Building Capacity:** Once the audience has been identified, the questions center around defining what capacity is needed and what it will accomplish. Identifying the competencies that are desired in precise terms is essential and best accomplished with clear and unambiguous goals.
- **Context is Key:** There is no "one" strategy to build capacity, and if one strategy works well in one location, it may or may not work well elsewhere. Given the complexities in coral reef management, bundles of capacity building strategies are needed that fit in the local context, are timely, appropriate and balanced across audiences. While basic capacity building needs in Hawaii are mostly similar across the territory, issues play out differently across the mosaic of contexts on Hawaii.
- **Long-Term and Sustained Action, Built on Success:** A long-term and sustained commitment to building capacity must address frequent staff turnover, shifts in the social, political and environmental issues, ongoing learning and the need for adaptation. Fortunately, such a long-term perspective seems to be evidenced across current federal, territorial and NGO partners. A long-term strategy must be built on successes within Hawaii to keep momentum strong.
  - Evoke purpose: "To build capacity to cope with and adapt to the long-term pace of ecosystem change that's likely ahead and still have functional reefs to support a tourism economy, fishing communities and a unique way of life."
  - Must understand current governance structures – what does exists – and what does not yet exist but may be needed.
  - Great progress has been made in developing a range of management responses to coral reef condition but the proper fit, interplay and scale of governance response to ecosystem change will be an issue into the future. We recommend using a range of effective diagnostic methods[1] to periodically assess the capacity to manage coral reefs and the governance structures within which they fit as a central feature of a long-term strategy.
  - Periodically review the issues (every three to four years) and the degree to which the issues are important to key stakeholders. Such an assessment should include a review of the power relationships, effectiveness of enforcement and compliance, best management practices and the degree to which there is formal commitment and supportive and constituencies for sustained coral reef management. Excellent facilitation is needed to host the dialogue and invite other key stakeholders from across civil society, market forces such as tourism and other forms of government to engage.

[2] The methods used for this capacity building assessment could serve as a baseline from which to measure future changes, particularly if analysis of governance structures is featured as a unit of analysis.

Appendix H: Collaboration Evaluation and Improvement Framework (CEIF) for Improving High Quality Collaboration

Phase #1 Operationalize Concepts of Collaboration: Collaboration can be characterized by specific attributes and variables to better observe, measure and document the existence, development, quantity, quality and contextual effects of collaboration in support of improved coral reef management. These attributes include essential pre-requisite of a shared purpose of improved coral reef management in Hawaii. Collaboration for improved coral reef management is developmental, evolves in stages over time, and varies in terms of level and degree of integration. Building literacy on collaboration across the coral reef community can be done by building a simple library of relevant literature within the library at DLNR (or other locations), to build a source for print and electronic copies of literature that relates to the development of high quality collaboration that includes the levels of integration, stages of development, and cycles of inquiry. One strategy would be to develop a mapping tool that shows the many different meetings, forums and locations for where coral reef management takes place in a collaborative fashion and use that as a base from which to target collaboration capacity building.

Phase #2 Identify and Map Communities of Practice of Coral Reef Management: For more effective management, it's important to gain a more accurate picture of high-leverage groups working together. Specifically what teams, committees, federal partners, state agencies, local governments, NGOs, university projects, legislative groups etc. are carrying out the tasks and activities most central to coral reef management. A simple inventory and mapping product can be generated to reveal:

- Teams and committees that make up key strategic alliances within the coral reef management community;
- The purpose and primary task of each group;
- The members of the group and any criteria for membership;
- How often, where, and through what medium each group meets;
- How long each group has been in existence; and
- Relative importance of the group to the purpose of coral reef management in Hawaii.

Phase #3 Monitor Stages of Development: Collaboration moves through predictable stages of development. One stage may go faster than another, or a group can get stuck in one stage for a long time. A team may find itself moving in and out of one stage. Knowing the stages and how to navigate and emerge from each stage of development is critical to building higher quality collaboration. Partnerships first assemble and then develop norms for how they act together as an early stage. Success often hinges on how well they are able to invoke clarity of purpose and then define the decision-making structures, strategies, leadership roles and clear tasks. A code of conduct with clear roles and responsibilities as well as defining what high quality dialogue, decision-making, action and reflection really looks like is extremely useful at this stage. Once the group has assembled and begins to wrestle with purpose and governance, the next stage in development is typically marked by enthusiasm centered around the shared purpose which tends to evoke feelings of urgency, defining the resources, establishing turf boundaries,

understanding where the expertise resides and who's really willing to take on tasks. A third stage is the transition to actually performing, often marked by implementing toward the common purpose as well as building and safeguarding resources, strengthening the validity of the collaboration, and infusing energy in pursuit of the shared purpose. A final stage of collaboration is marked by an end of the current collaboration or transformation to another form of collaboration. This typically happens after some milestones have been reached and the group has faced a series of both planned and unplanned events moving to a decision of how to refine, reconfigure or dissolve their collaboration. Knowing where collaborations are in the stages of development is a high leverage capacity that could be applied to coral reef management in Hawaii to improve the overall quality of collaboration.

Phase #4 Define Levels of Collaboration: A fundamental principle of collaboration is that there are levels of integration that exist between and within organizations. More integration is not necessarily better. Better integration is better and the degree should vary according to the purpose and goals. A simple rubric has been developed to gauge integration over time that is based on a total of five levels that moves from no integration to fully integrated and unified toward a common goal. These levels range from independent (no integration) to networking (lowest level of integration such as exploring shared interest) to cooperating (working together rarely simply to ensure that tasks are done) to partnering (using shared resources to address common issues and to reach common goals) to unifying (merging resources to create something new – often requires commitment over long-term period to achieve short- and long-term outcomes).

Phase #5 Model and Identify High Quality Collaboration: The characteristics of the four core elements of collaboration (dialogue, decision-making, action and reflection) can each be defined through using low, medium or high quality levels. Each collaborative alliance should define what they consider to be the ranges of each. This information is used to inform decisions about how to further develop and strengthen the collaborative process.

SustainaMetrix supports innovation and adaptation in the complex and dynamic realm of ecosystem change. We believe that building more resilient communities requires adaptive and collaborative capacities. This is a long-term process that requires clear goals, supportive and informed constituencies, and formal commitment for an ecosystem approach. It is our mission to work collaboratively across sectors to conceptualize, design and test tools, methods and new frameworks to build the enabling conditions for adaptive and collaborative response to ecosystem change.

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