



Introduction

Historically, an ecosystem-based approach was established by native Hawaiians in the use and conservation of both land and aquatic resources in the Hawaiian Islands (Kittinger et al. 2011, Kikoloi 2011, Andrade 2008 and McGregor 2007). This approach recognized the intimate relationship and natural connectedness of all living things from Mauka through Makai (from the mountains to the sea). Details of ecosystem-based practices of the native Hawaiian community and their perpetuation into the future of the Hawaiian Islands Humpback Whale National Marine Sanctuary (sanctuary) may be found in the report of the Native Hawaiian Working Group of the Humpback Whale National Marine Sanctuary Advisory Council (SAC). The purpose of noting them at the outset of the present document is to recognize and establish that these practices and this way of life form the foundation for any consideration and recommendation of a future ecosystem-based approach by the sanctuary.

The sanctuary was designated by the United States Congress in 1992 and the final management plan, produced in cooperation with the State of Hawai'i, was completed in 1997. The authorized mission of the sanctuary was to protect a single species, the North Pacific humpback whale (*Megaptera novaeangliae*) and its habitat in Hawaiian waters within designated sanctuary boundaries. The Hawaiian Islands are the principal breeding and calving grounds for North Pacific humpback whales (Calambokidis et al., 2008). Both sexes and all age classes of humpbacks may be found in the Hawaiian Islands during winter and spring months (e.g., Craig et al., 2003; Herman et al., 2011). Sanctuary boundaries in the Hawaiian Islands were established in part in consideration of scientific findings that the majority of humpback whales on the wintering grounds are found in waters of 100 fathoms or less (Herman et al., 1980; Mobley et al., 1999). Other than calves, humpback whales fast while in Hawaiian waters. Consequently, the activities of the sanctuary towards the protection of the humpback whale were limited; the sanctuary's mandate for education, outreach, research and resource protection activities did not include other species or habitats present in Hawaiian waters. However, in practice the Hawai'i community often relied on the sanctuary for assistance with other species such as sea turtles, Hawaiian monk seals, and various delphinid species.

In 2007, the sanctuary presented to the State of Hawai'i Governor Lingle a document for the consideration of additional species into the mandate of the sanctuary. In 2010, the sanctuary began the process of its required management plan review. As part of this process, pre-scoping and scoping meetings were held on the islands of Hawai'i Island, Maui, Moloka'i, Lāna'i, O'ahu, and Kaua'i and public comments were recorded at these meetings as well as through other communication channels. In response to this public input, working groups were established by the SAC to make recommendations to sanctuary leadership regarding particular topics of public concern. A major public concern was whether the sanctuary should remain focused exclusively on the humpback whale or should expand its focus. Thus, the SAC established an Ecosystem Protections Working Group (EPWG) to address this concern. At a SAC meeting on Maui, the SAC

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agreed upon a proposed working plan for the EPWG and began a series of meetings to address the challenge of crafting specific recommendations regarding options for change to the sanctuary's management scope and focus. This task required input from a range of experts and knowledgeable individuals, and involved extensive consultation with stakeholders and input from the public – a process that continues as the sanctuary undergoes its management plan review.

Our current working document reflects the progress of our group and partners thus far. The process that the EPWG utilized in accomplishing these tasks is described below. One of the most critical contributions in the eyes of the group members is the development of a Hawai'i-specific definition for ecosystem-based management. From this definition, preliminary guiding principles have been developed and more specific recommendations have been crafted, with subsequent work in these domains to follow. The recommendations contained in this report have been reviewed by our group members, and have taken into account testimony solicited from experts and extensive public comments. While substantive, these initial recommendations and supporting information on our process is not the end of the road. The EPWG worked closely with the Native Hawaiian working group to jointly decide upon a process for melding traditional and western knowledge forms and to develop more specific recommendations. This collaboration intends to deal in part with the critical "implementation gap," or the importance of designing effective governance systems (institutions, management arrangements and policies) that can successfully translate recommendations into prioritized actions (i.e., good principles and guidelines do not themselves result in success). Addressing the implementation gap will be a critical aspect of the sanctuary's future and is particularly important given the unique socio-cultural and ecological context of the Hawaiian archipelago.

Need for Action

The mission of the HIHWNMS is to protect the humpback whale (*Megaptera novaeangliae*) and its habitat in designated sanctuary waters. The sanctuary works to achieve this goal through scientific research, education, public outreach, and by facilitating observance of federal and state laws that prohibit disturbing these endangered marine mammals. The HIHWNMS is the only single species sanctuary in the National Marine Sanctuary system; all other U.S. sanctuaries are ecosystem-based. Aside from North Pacific humpback whales (who are resident in Hawaiian waters during winter and spring months), the islands comprise an isolated, sub-tropical ecosystem system host to a diverse assemblage of species with high levels of endemism. Spiritually, culturally, ecologically and economically, this uniquely Hawaiian seascape is critical for the vibrant island lifestyle, yet many of Hawaii's coastal marine resources have declined dramatically due to multiple anthropogenic stressors. The continued health and well being of Hawaii's ecosystem is a broad concern among Native Hawaiians and the general public (Appendix 1). Without authority to address ecosystem-wide issues, however, the sanctuary has little ability to engage with the public and agency partners to reverse the trend. Presently, the sanctuary is engaged in its required management plan review process and has stated its intention to move towards an ecosystem-based approach to management. In support of this process, the EPWG has taken on the following tasks: (1) consider management

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alternatives for the sanctuary; (2) evaluate which of these alternatives would be best suited given the sanctuary's role, mandate and capacity; and (3) provide recommendations for specific management actions the sanctuary should take to address ecosystem concerns.

Desired Outcome:

EPWG Ecosystem Protections Goal

The EPWG considered several definitions of ecosystem-based management, drawing on the published literature and existing natural resource management plans. The definition for ecosystem-based management (EBM) used by the working group was taken from the Scientific Consensus Statement on Marine Ecosystem-based Management: "an integrated approach to management that considers the entire ecosystem, including humans. The goal of EBM is to maintain an ecosystem in a healthy, productive and resilient condition so that it can provide the services humans want and need. EBM differs from current approaches that usually focus on a single species, sector, activity, or concern; it considers the cumulative impacts of different sectors" (McLeod et al. 2005). An ecosystem approach to management (EAM) – a closely related concept – is generally defined as extending existing management foci to include additional considerations consistent with ecosystem management characteristics, while EBM implies a management scheme primarily designed to address overall ecosystem considerations (Murawski 2007).

Relying on these definitions, the EPWG further defined an ecosystem-based approach to the management of marine resources specific to the Hawaiian Islands sanctuary. This definition was based on both traditional Native Hawaiian concepts of management and western ecological knowledge and includes protection of both human uses and ocean habitats and species. The working group definition for an ecosystem-based approach to management in Hawaiian waters includes these two primary and inseparable dimensions:

1. *Protect and Promote Sustainable Human Uses:* Protect and develop connections that humans have with the marine environment, their associated knowledge systems and socio-cultural traditions. Promote inter-generational cultural transmission of those knowledge systems and the preservation and perpetuation of local traditional and ecological knowledge that is place based. Promote sustainable use of marine resources; preserve and enhance ecosystem services (including ecological and socio-cultural services).
2. *Protect and Conserve Ocean Habitats and Species:* Protect areas of habitat complexity, areas of high biodiversity, endemism and cultural value, and key ecological species and functional groups. Protect a range of habitat types and critical biological zones (e.g. spawning grounds, juvenile nursery habitat), protect and recover if necessary populations of keystone or determinant species, such as habitat builders (e.g. reef-building corals) and key ecological functional groups (e.g. reef herbivores, top predators). Recover depleted

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populations of endemic species; and conserve species and places of high cultural value (e.g., underwater heiau, archeological sites, fishponds).

The EPWG defines “protect” to include the full suite of tools dictated by the National Marine Sanctuary Act (NMSA), including: education; public engagement; scientific research; monitoring; community engagement; working with stakeholders and community partners; and implementing and coordinating plans for protection and management with appropriate local, state, national and international agencies, native organizations and private and public interests (NMSA Sec 301 [16 U.S.C. 2431] (b) Purposes and Policies). The working group noted that it is important to emphasize that the NMSA specifies that the sanctuary act in a “manner that complements existing regulatory authorities” and avoids duplication of existing regulations.

With this foundation, the EPWG’s goals were to enable the HIIHWNMS to engage in, respond to, and fill gaps in the conservation and management of species, habitats, cultural and archeological resources and sustainable human uses in the main Hawaiian Islands by applying the best available science and coordinating with partner agencies and the public.

The ecosystem protections goal builds on current sanctuary management efforts by focusing on the interconnections among all the physical and biological features of the marine environment, as well as on strengthening the discourse and improving interactions among the various resource users and managers. Rather than targeting a single species, such as humpbacks, or a single sector or activity related to humpbacks, the ecosystem-based approach will enable the sanctuary to consider ecosystem services, structure and function, while identifying ways to increase compatibility among the many uses and protection efforts. The principles and justification for EBM are discussed in greater detail in Appendix 3. Ultimately, an ecosystem-based approach will provide the sanctuary with the ability to undertake a proactive role in the conservation of Hawaiian marine resources and island culture.

Recommendations:

Evaluation of management alternatives

The EPWG evaluated three management alternatives (listed below) by each member contributing to a table of pros and cons for each alternative. This table is presented in Appendix 2a. After reviewing the table, each member queried for their preferred alternative. Eight of the nine members recommended the ecosystem approach (alternative 3) involving the entire ecosystem. One member recommended the Status Quo (alternative 1) with the possible addition of Hawaiian monk seals. However, this member recommended that an ecosystem approach be taken with respect to these two species. In summary, there was majority opinion among working group members for Alternative 3. In addition, the letter to external technical experts contained the option to evaluate the three management alternatives; their input is similarly summarized in Appendix 2b. Five of five

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technical experts that responded specifically to this query considered the ecosystem-based approach to be the superior alternative.

Thus, the EPWG of the SAC recommends that the HIHWNMS future management plan adopt an integrated approach to management that considers the entire ecosystem, including humans within currently designated sanctuary boundaries.

Management Alternatives considered:

1. Status Quo – protect the humpback whale and its habitat in designated sanctuary waters
2. Adding some additional species – cetaceans, sea turtles and monk seals (based on the 2007 report entitled “Assessment of Additional Resources for Inclusion in the Hawaiian Islands Humpback Whale National Marine Sanctuary” and response from then Governor Linda Lingle)
3. Ecosystem-based approach – an integrated approach to management that considers the entire ecosystem, including humans (within currently designated sanctuary boundaries) (see Appendix 3).

Recommendations

A set of short-term (1-2 years), mid-term (3-5 years) and long-term (6-10 years) recommendations were developed by members of the EPWG taking into account advice from the detailed responses of the technical experts in western science and members of the public that attended EPWG meetings. Then, each member of the EPWG completed a ballot indicating whether they supported the recommendation (Y) or did not support it (N). The tally of votes for each recommendation is recorded below.

It is important to note that while these recommendations were evaluated by the working group individually, they were crafted as a whole. The working group emphasizes that a piece meal approach would not have the same results as treating the recommendations as a comprehensive suite of actions that build synergistically upon one another.

Short-term (1-2 years) recommendations

1. Develop and define a unique Hawaiian approach to ecosystem-based management of the sanctuary based on hybridization of traditional and western scientific knowledge.
 - (a) Host a workshop between members of the EPWG and NHWG and other key experts to define and develop the terms and components of such an approach along with specific recommendations for implementation in the sanctuary.
→Y: 8 N: 1 [Aha Moku System, already recognized and community based]

2. Increase science input into the sanctuary.
 - (a) Form a scientific advisory working group (or committee) for the sanctuary to provide leadership with the best available science (western & traditional) to inform management.
 - (b) Hire a staff member with a strong scientific background in the Hawai'i-based ecosystem that can help craft the sanctuary's management plan and Environmental Impact Statement
→Y: 9 N: 0

3. Research and review existing state and federal regulations to clarify responsibilities within overlapping areas of jurisdiction and to identify gaps in resource and habitat protections.
→Y: 8 N: 1 [not sure of advantage of SAC involvement in this aspect]

4. Reach out to the research community and external and national partners to build the National Ocean Service's Sanctuary's Sentinel Sites program within Hawaiian waters. The Sanctuary Sentinel Site program provides opportunity for contributing to local and national research needs about ecosystem change over time and can provide communities with access to real-time information and a sense of ownership of the health of "their" sanctuary waters.
→Y: 9 N: 0

Note: while developing Items 1-4, the sanctuary should continue taking the lead on matters dealing with the protection of humpback whales and their habitat.

Mid-term (3-5 years) recommendations

5. Work with the research community and external partners and in collaboration with other efforts (e.g. President's Ocean Council's coastal and marine spatial planning (CMPS) program) to establish and develop spatial planning products including:
 - (a) Develop a "Representative Areas Program": A bioregional assessment of the physical environment (e.g. habitat types, species distributions, areas of high biodiversity), and the socio-cultural and human dimensions of the Hawaiian Islands in a spatially explicit framework. Ideally this should follow the method utilized in the Great Barrier Reef (Day 2002; GBR: <http://www.gbrmpa.gov.au/zoning-permits-and-plans/rap>). We would strongly encourage the sanctuaries staff to engage directly with specialists at other marine reserves (e.g. Great Barrier Reef Marine Park, Florida Keys National Marine Sanctuary) who have implemented this approach to gain knowledge and lessons learned.
 - (b) Develop a spatially-explicit zoning model to aid in systematic reserve design and conservation planning based on best available decision support tools (reviewed in Center for Ocean Solutions 2011) (e.g., using MARXAN or similar decision-making

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tool, specifically developed for evaluating trade-offs in zoning a large, complex marine reserves).

→ Y: 8 N:1 [no on b]

6. Work with the research community and external partners to establish a list of regularly re-visited priorities for action. An example of such an approach was applied to global marine turtle conservation (Wallace et al. 2011). Acknowledge that the implementation of an ecosystem-based approach to management is a step-wise process that requires the sanctuary to identify the more relevant issues as the priority for progress. Issues of lower priority can be included but should not distract from first addressing the priority issues. Thoughtful, stepwise, building out from the sanctuary's humpback model can be a very powerful approach to address wider ecologically based issues. Explore co-management with communities with high level of willingness and capacity. Begin with identifying pilot communities, building relationships with these communities, and developing a participatory approach to management that includes in the design, study and implementation the resource users, managers (local and at higher levels), and scientists working in these communities.

→Y: 9 N: 0

7. Identify the feasibility of the sanctuary through its unique community-engagement programs (i.e., Sanctuary Advisory Council) of acting as a coordinating body among other State and Federal agencies tasked with protecting one or more of Hawaii's aquatic resources. As NOAA is the co-federal lead in Pacific Islands for CMSP, the sanctuary should consider the development of their role as the institutional lead (coordinating body) for co-trusteeship (institutional collaboration and cooperative management) of Hawaiian seascapes
 - (a) Explore effective governance structure models for multi-agency collaboration, including, for example, a multi-agency coordinating body that meets periodically and has prescribed process and rotating leadership
 - (b) Establish multi-agency learning platforms that are topic / issue specific.

→Y: 8 N: 1 [NOAA is co-lead on CMSP and this should not be relegated to the sanctuary]

8. Explore co-management with communities with high level of willingness and capacity Begin with identifying pilot communities, building relationships with these communities, and developing a participatory approach to management that includes in the design, study and implementation the resource users, managers (local and at higher levels), and scientists working in these communities.

→Y: 8 N: 1 [define co-management; do sanctuaries have authority?]

9. Work with institutional partners and organizations to conserve ocean habitats and species and to protect areas of habitat complexity and areas of high biodiversity, endemism and cultural value. Ecosystem protections that should be considered include:
- (a) Protecting 20 – 30% of each habitat type as, for example, defined through a *Representative Areas Program* and biogeographic assessment process (described above); protection may include a diversity of strategies from rights-based fisheries management schemes, community-based conservation activities, to kapu zones (no-take areas based on traditional management methods) or other management strategies; such protections should be place-based, may include the protection of both ocean ecosystems and sustainable human uses, and should be culturally appropriate. This recommendation builds upon recent academic and current management practices, e.g., The U.S. Coral Reef Task Force has established the conservation objective to protect “a minimum of 20% of each coral reef and associated habitat type” as no-take areas (USCRTF 2009) (see also Fagatele Bay National Marine Sanctuary, U.S. Department of Commerce 2011 and the Great Barrier Reef, Day 2002) (Bohnsack et al. 2002, Balmford et al. 2005, MacLeod et al. 2005).
 - (b) Protecting and recover depleted populations of endemic species (Magnuson-Stevens Fisheries Conservation Act, Marine Mammal Protection Act and Endangered Species Act);
 - (c) Protect and restore species, habitats and places of high cultural value (e.g., underwater heiau, archeological sites, fishponds) (National Marine Sanctuary Act);
 - (d) Protect and recover populations of keystone or determinant species, such as habitat builders (e.g. reef-building corals) and key ecological functional groups (e.g. reef herbivores, top predators).
- Y: 8 N: 1 [no clear rationale; pre-decisional]

Long-term (6-10 years) recommendations

Reassess social and ecological conditions and modify policies, approaches and programs in an adaptive management approach. Adaptive management, as defined herein, means that “managing institutions purposefully formulate policy as an uncontrolled, non-replicated experiment, monitor the results of the strategy, and iteratively revise their approach in order to adapt to changing social and ecological conditions” (Kittinger et al. 2010)

Process

From the public comments received during the 90-day scoping period August to October 2010, ecosystem protection was identified as a priority issue after the staff binned the comments in November 2010. Over one-thousand comments (of 12,000 total received) were associated with the ecosystem protections issue bin. Comments focused on ecosystem protection addressed the need to increase the scope of the sanctuary beyond humpback whales and their habitat. Several

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comments suggested expanding sanctuary boundaries to further protect humpback and to include other species and their habitats. On the other hand, opposing comments suggested reducing the sanctuary's size or eliminating it entirely. Concerns were raised that protection for other species is already provided through various federal, state and non-profit organizations.

The EPWG was established in December 2010 to review the public comments and make recommendations to SAC on future management in Hawai'i. The working group comment review was jump started by the outstanding efforts of two interns, Anna Hall and Tim Kenny in January 2011. Anna and Tim read through every comment, 1,360 in total, and sorted them into six categories. Alex Sheftic continued the comment analysis with a summary report for the working group. To build on the great work Anna and Tim accomplished working group chair, Adam Pack, developed a work plan with staff assist from David Mattila and Lisa White. The work plan described the issue and served as a guide to the group recommendation development process. The work plan was approved by the SAC in April 2011. To implement the work plan Adam designed a road map for the group in June 2011. The road map outlined six topic areas with questions for the group to further explore in sub-groups. Based on the sixth topic, "Ecological and Social Principles of Ecosystem-based Management", group co-chair, Jack Kittinger, drafted a two-phase recommendation process document in July 2011. The two-phase process document gave further direction on how the group should address ecosystem management principles and for formulating constructive recommendations on the ecosystem approach.

The EPWG initially intended to take on the important task of explicitly integrating western and native Hawaiian ecosystem approaches to management with the idea of a workshop to be jointly hosted with the Native Hawaiian working group - a task considered fundamental to the management plan review process. The chairs of both groups met in August to discuss options and it was jointly decided that the integration of the two approaches deserved dedicated time and input, a project beyond the scope of the working groups as they were currently structured. It was jointed decided that the best value would come from each group focusing initially on an exploration of their own recommendations. Thus, the integration of the two approaches was deferred to a future effort (see Recommendation 1).

Under the direction of Adam and Jack and their guidance documents, the EPWG hosted nine Go-To meetings beginning 24 June 2011 with staff support from Lisa White and Sarah Mesnick. The meetings were open to members of the public; at the end of each call, time was allocated for comments from those who wished to speak.

During the calls, the working group discussed and decided upon:

- (1) In order to engage scientific expertise, the working group crafted a letter and sent it out to a list of 35 experts on Hawaiian ecosystems, biodiversity, evolution and conservation, both marine and terrestrial. Names of PhD scientists were suggested by the working group and

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- sanctuary staff to broadly include aspects of the physical and natural environment. Letters were mailed on 16 September 2011 and responses compiled by sanctuary staff and reviewed by email and during the final two Go-To meetings. The letter requested input on (a) recommendations for the sanctuary, (b) data gaps and (c) evaluation of the three management alternatives (Appendix 4). As of 26 October 2011, the working group received eight responses and will continue to compile responses as others respond.
- (2) In order to evaluate the working group's support for each of the three management alternatives, the co-chairs constructed a "pro/con" table and solicited input from members on each of the three alternatives. Sanctuary staff compiled and synthesized responses and the final table was reviewed by working group members by email and on the Go-To meetings. During the 11 October 2011 meeting, each member was queried individually for their preferred alternative. Members not in attendance were personally queried by phone and their preferences recorded.
 - (3) The text of the working group draft was compiled by the co-chairs with input from sanctuary staff in early September and reviewed by working group members by email and during each of the subsequent Go-To meetings. Edits from the working group were submitted and incorporated into the document. At times, additional input was requested by the working group during the Go-To meetings and sanctuary staff was requested to report back to the working group on: EBM approaches from other MPAs and regulations matrix. Discussion during working group meetings covered every section of the draft report.
 - (4) As above, the co-chairs crafted a set of draft recommendations in early September and incorporated into the draft report. These were reviewed by working group members by email and during the subsequent Go-To meetings. After the 11 October 2011 Go-To meeting, the co-chairs revised the draft recommendations and sent them out via email and requested a record of "yes" or "not" (along with comments) from each working group member for each recommendation. The vote tally was discussed during the 25 October 2011 Go-To meeting and recorded. Members not present were personally queried by phone and their vote recorded.

Contributing Members, Staff and Technical Experts

Active members

Co-chairs

Adam A. Pack, PhD, _ University of Hawai'i, Hilo

Jack Kittinger, PhD, – Stanford University, Center for Ocean Solutions

Members

Hannah Bernard – Hawai'i Wildlife Fund

Maka'ala Kaaumoana – Hanalei Watershed Hui

Eric Kingma - Western Pacific Fishery Management Council

Judy Lemus, PhD – University of Hawai'I, Manoa



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Teri Leicher - Jack's Diving Locker
Alex Sheftic – Hawaii County SAC seat

HIHWNMS / DLNR staff support

Sarah Mesnick, PhD – Hawaiian Islands Humpback Whale National Marine Sanctuary, National Ocean Service, NOAA (staff support)
Lisa White – Department of Land and Natural Resources, State of Hawai`i

Technical advisors

Frank Parrish, PhD – Director, Protected Resources Division, Pacific Islands Fisheries Science Center, NMFS, NOAA
Ken Kaneshiro, PhD - Director, Center for Conservation Research and Training (PBRC), University of Hawai`i at Manoa
Mariska Weijerman* - coral ecology researche, JIMAR / Coral Reef Ecosystem Division, Pacific Islands Fisheries Science Center, NMFS, NOAA (*personal opinion)
Kimberly Puglise (and the mesophotic coral working group), Center for Sponsored Coastal Ocean Research, National Centers for Coastal Ocean Science, NOAA's National Ocean Service
Sam Kahng, PhD - Assistant Professor of Oceanography, Hawai`i Pacific University
Donald Kobayashi, PhD - Research Fishery Biologist, Ecosystems and Oceanography Division, Pacific Islands Fisheries Science Center, NMFS, NOAA
John Rooney, PhD – Researcher, Coral Reef Ecosystem Division, Pacific Islands Fisheries Science Center, NMFS, NOAA
Jen Smith, PhD – Assistant Professor, Center for Marine Biodiversity and Conservation, Scripps Institution of Oceanography, University of California, San Diego
Rachel Sprague, PhD – Pacific Islands Regional Office, National Marine Fisheries Service, NOAA

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Appendix 1. Summary of public comment (compiled by interns Hall and Kenny)

Public comments recorded during the scoping process have been organized as follows by the Ecosystem Protection Working Group:

PERCEIVED THREATS

Pollution/Run Off, Acoustics/Sonar, Boats /Vessels, Invasive Species, Overfishing, Climate Change, Marine Debris, and some miscellaneous items.

The first three of these items were mentioned most frequently. Pollution was identified in a variety of comments and included agriculture/golf course run off and injection wells.

SPECIES TO PROTECT

Coral Reefs, Spinner Dolphins, Monk Seals, Sea Turtles, Humpback Whales, and a smattering of others.

All of these had various levels of support but the comments asking that ALL species be protected (ecosystem approach) were dramatically more numerous.

SPECIES NOT TO PROTECT

Essentially the same species were noted in this category. The interesting factor here is that the individual species were mentioned in approximately the same frequency. However the ALL category had a greatly reduced number of comments asking for no protection.

FEED BACK

There were numerous comments both for and against Sanctuary Boundary expansion as well as expressed concerns for the impact on local cultures and fishermen. There was expressed opposition to adding new species. A plan to reduce the size and scope of the sanctuary as species were removed from the endangered list was also requested.

PROPOSED SOLUTIONS

Conduct Research regarding the Environment, Status of Marine Species and Ecosystem Health, and Sustainability of Species. Education and Outreach were frequently cited as solutions. Enforcement of Existing Regulations, Speed Limits, No Take Zones (add, eliminate rotate) were also cited. Support for Boundary Expansion and Opposition to Boundary Expansion were mentioned in similar terms.

Summary of Comment Analysis prior to Working Group review

Of the over 12,000 comments the sanctuary received during the 90-day public comment period, 1,360 comments were assigned to the ecosystem protections category by staff group discussion. The comments were further categorized by two interns.

Anna Hall and Tim Kenny, sanctuary interns, organized the comments by reading through them to

attain a general feel for the types of comments presented and creatively compose a list of ways in which the comments could be categorized. After looking over the comments, the categories emerged as 1) perceived threats 2) identification of species to be protected 3) identification of species not to be protected 4) proposed solutions 5) species classification 6) feedback. The six categories were made into columns on excel. Each comment was thoroughly read and then was placed into one, multiple, or none of the above categories. Comments that did not fit into one of the defined groups were collected into a seventh category of 7) other (Figure 1).

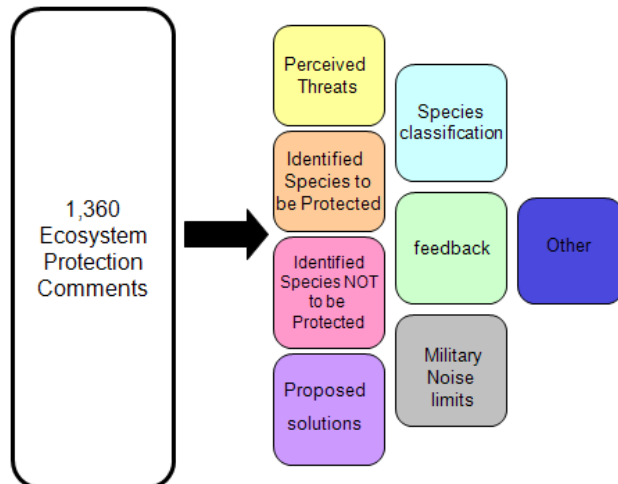


Figure 1. Categories identified by interns during ecosystem comment analysis.

A system was created to further distinguish the comment within each of the categories. In the first category, perceived threats, the comment's concern was recorded. This category is subcategorized by pollution, vessels, collisions, run off, nutrient flux, climate change, ocean acidification, temperature flux, over fishing, invasive species, habitat destruction, too much restriction (seen as threat to livelihood of local cultures), food supply, and acoustic disturbances. The second and third categories, the identification of species or resources that should and should not be protected by the sanctuary, were given the same key, 1 - coral and reefs, 2 - spinner dolphins, 3 - monk seals, 4 - sea turtles, 5 - humpback whales, 6 - other species (including whales – false killer whales, sperm whales, sharks, birds, maritime heritage, specific resource is recorded when indicated within comment), and 7 - all (ecosystem approach, protecting species, resources, and habitat). The third category is proposed solutions and was also given a specific key to record the comment's suggestion. The key for proposed solutions is B - boundaries, RS - research, RG - regulations, E - education and outreach, EF - enforcement, and ER - marine animal assessment and response. Some comments indicated specific solutions that did not directly fit into one of the aforementioned categories, or was not as general as the categories, in these cases the solution was recorded. For example, no take zones, seasonal/rotation harvesting, etc. The next category was created in order to collect the over general feedback of comments that do not provide specific detail, but are instead simply stating a position on the expansion of the sanctuary visions, in this column the words yes, no, and unsure were used to indicate the position. Lastly, the seventh category is a



broad bin created in order to collect all comments that do not fit into another specific category.

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Appendix 2a. Evaluation by the members of the EPWG of three alternatives for the future direction of the HHHWNMS

Alternative	Pros	Cons
<p>1. <u>Status Quo Approach</u>: Continue the sanctuary's focus on humpback whales and their habitat</p>	<p>1. The sanctuary is already doing this and has an established positive track record of accomplishment in education, outreach, public awareness and support of research, and protection issues.</p> <p>2. The sanctuary's current budget at present time is barely sufficient to cover its current mission</p> <p>3. Sanctuary staff resources are currently a good fit for its current mission</p> <p>4. Despite their increasing numbers, there is still much about humpback whale biology and behavior that is not known or well understood. Effective management and protection proceeds best from information and knowledge. The sanctuary can assist in furthering our knowledge of humpback whales.</p> <p>5. This is option is a publicly accepted scenario.</p> <p>6. As whale population increases to k (carrying capacity), will need continued management due to increasing amount of whale/human overlap and potential threats.</p>	<p>1. A single species sanctuary does not reflect the traditional native Hawaiian ecosystem approach, does not reflect the ecosystem-based approach of all other U.S. sanctuaries, and does not reflect the approach of the President's National Ocean Policy.</p> <p>2. Increases in resources are less likely to come to the sanctuary if it moves towards an approach that is more in line with other sanctuaries and government initiatives</p> <p>3. Humpback whales in Hawaiian waters provide a large and significant biomass that other species depend on, and also socially interact with other cetacean species. As such, humpback whales are an integral part of the Hawaii marine ecosystem. Consequently, to manage and protect humpback whales implies greater considerations of ecosystem management than are currently being applied.</p> <p>4. Current sanctuary</p>

	<p>Efforts to protect whales will be needed, including the need to create additional educational materials, expand research efforts on entanglement/disentanglements, etc.</p> <p>7. Need to repeat SPLASH</p> <p>8. Does not interfere with existing federal mandates for NMFS related to MMPA and ESA</p>	<p>boundaries reflect the historical concentrations of humpback whales in Hawaiian waters at the time the sanctuary's designation was agreed upon by the State of Hawai'i. Since that time, there has been a significant expansion of the numbers of humpback whales as well as their "footprint" in Hawaiian waters. The status quo would imply no change in boundaries and thus would not reflect the expansion in habitat use by humpback whales.</p> <p>5. Not effective ecologically, economically, culturally to focus on single species. Doesn't address needs of communities who want to expand resource protection.</p> <p>6. Limit sanctuary's role in the management of marine resources within sanctuary boundaries; status quo does not address the problems facing the other inhabitants of this same environment and the problems they are facing.</p> <p>7. There is public support for changing the sanctuary's mission to an ecosystem based-approach.</p>
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<p>2. <u>Select Additional Species Approach</u>: Add one or more additional species to the current mission of the sanctuary (species designated in the report and response from Governor Lingle)</p>	<p>1. Already evaluated and accepted by former governor and possibly WESPAC.</p> <p>2. Sanctuary management of these species may benefit education and outreach related issues such as 1) increasing monk seal population in MHI and potential for increased human/seal interactions and 2) education and outreach related to dolphin-watch tourism</p>	<p>1. It is not at all evident which species should be added to the sanctuary's responsibility. Under what criteria would some species be included and others excluded?</p> <p>2. Depending on the trophic level of a species, its inclusion for protection by the sanctuary could imply protection of many other species. Thus, the addition of one or more species could result in much of the marine ecosystem being protected beyond that species.</p> <p>3. There are currently barely enough staff and financial resources to support the present sanctuary mission. It is unclear how the sanctuary would be able to manage the addition of resources for protection without a substantial increase in its own resources</p> <p>4. There are currently other Federal and State agencies that have the responsibility for the management and protection of Hawai'i's marine species. Adding one or more of these species to the responsibility of the</p>
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		<p>sanctuary would seem duplicative and unnecessary.</p> <p>5. The current boundaries of the sanctuary may not reflect key habitats of added species</p> <p>6. Not as effective as ecosystem approach nor inclusive to other species of concern e.g., hawksbill sea turtles, false killer whales, etc.. Not responsive to communities who wish to add additional resources of concern.</p> <p>7. With these additional species, it is unclear what role the sanctuary could play in terms of management, as all of the species identified above are protected by existing MMPA and ESA statues and regulations and managed by NMFS</p> <p>8. Difficult to ascertain a way to consistently decide which species to add and why. Adding only such species as monk seals, dolphins (and/or other cetaceans), and turtles just turns the sanctuary into the “charismatic megafauna” sanctuary with no reason for excluding species such as sharks, ulua, corals, eels,</p>
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		etc.
<p>3. <u>Holistic Ecosystem Approach</u>: Adopt an integrated approach to management that considers the entire ecosystem, including humans</p>	<ol style="list-style-type: none"> 1. Through an ecosystem approach, the sanctuary would be more in-line with the Native Hawaiian foundation for ecosystem protection, the approach taken by all other U.S. sanctuaries, and the President's National Ocean Policy 2. Although other Federal and State agencies are charged with responsibilities for management and protection of marine resources in Hawaii, and are assisted by a variety of private organizations, there appears to be no single entity with the responsibility of coordinating these efforts using a holistic ecosystem approach that is place-based for the individual marine ecosystems within the Hawaiian Islands. 3. The sanctuary is unique among Federal agencies in that it directly involves the community (through Sanctuary Advisory Councils) in management plans and decisions. Through such councils the sanctuary is best positioned to coordinate the management and protection of Hawaii's marine resources at the ecosystem level. 4. The sanctuary has 	<ol style="list-style-type: none"> 1. There are currently barely enough staff and financial resources to support the present sanctuary mission. It is unclear how the sanctuary would have sufficient staff and financial resources to effectively manage transition from single species to an ecosystem approach. 2. Currently, there are other Federal and State agencies with the responsibility for the management and protection of Hawaii's marine species. Adding the protection of the marine ecosystem to the responsibilities of the sanctuary would seem duplicative and unnecessary. 3. Current sanctuary boundaries reflect the historical concentrations of humpback whales in Hawaiian waters at the time the sanctuary's designation was agreed upon by the State of Hawai'i. Depending upon the role of the sanctuary in an ecosystem-based approach, sanctuary boundaries may or may not need to be altered.

	<p>developed place-based education/learning centers that engage the public in ways that are unique among Federal and State agencies and can be of great benefit to the communities of Hawaii by providing opportunities for individuals to become involved in the management and protection of their own communities marine ecosystems.</p> <p>5. Through an ecosystem approach, the sanctuary can use its education programs to connect the public to the ecosystems of its sister sanctuaries. Through innovative educational programs involving the network of ecosystem-based sanctuaries, Hawai'i residents and visitors can better understand the Hawaii marine ecosystem in a broader more meaningful context and better appreciate the effects of changes in climate on a more global scale.</p> <p>6. Currently, there are no Federal or State agencies that integrate traditional Hawaiian ecosystem management practices with western governance of ecosystem management.</p> <p>7. Much more effective ecologically, culturally and</p>	<p>4. Determining boundaries of sanctuary more challenging. For true ecosystem approach, they should be defined by habitat and eco-regional criteria. They will likely be determined based on present community buy-in of current boundaries plus additional areas that are self-identified for inclusion.</p> <p>5. It is unclear what management gaps do exist in Hawaii. For example, the State of Hawaii DLNR/DAR manages fisheries and other marine resources from 1-3/and the Western Pacific Management Council manages fisheries from 3-200nm The WPFMC has an existing Hawaii Archipelago Fisheries Ecosystem Plan that requires annual catch limits for the hundreds of coral reef and bottomfish species. NMFS and FWS manage protected species such as marine mammals and sea turtles while FWS manages seabirds. Clean water act permitting is handled by the EPA and the USACE has authority related to construction activities that occur in the ocean</p>
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	<p>economically. Scientifically and culturally more defensible. More likely to support communities who have self-identified regional resources of concern. Includes all endangered and protected species, not just a few, therefore management actions can be cohesive and comprehensive rather than isolated and/or piecemeal.</p> <p>8. Sanctuary ecosystem-based management could help provide resources to identify gaps in management as well as indicators of changing conditions that require management response.</p> <p>9. Utilizing the ecosystem based approach could have the positive effect of addressing the well-being of all components of the ecosystem, including humans. Fishermen would see more bountiful and varied harvests. Tour industry operators and other ocean users would have the pleasure of a more colorful and satisfying relationship with the sea.</p> <p>10. This approach would add to the unique nature of a Hawaiian Islands Marine Sanctuary and put it in the position of being a national leader in integration of indigenous knowledge and</p>	<p>6. There is much opposition to any new regulations that restrict access, fishing, etc. across the MHI. Even if the sanctuary does not propose new regulations, moving to an ecosystem-based framework will potentially give the sanctuary rule-making authority in the future – thus opening the door to future regulations in the eye of many constituents.</p>
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	<p>management with Western science and conservation. HI could also be a model for other sanctuaries in community engagement and involvement at a local, resource protection level. The sanctuary also has an infrastructure of education and outreach behind it that is lacking from many of the other organizations tasked with resource protection (like NMFS).</p>	
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Appendix 2b. Evaluation by technical experts of three alternatives for the future direction of the HIHWNMS

Alternative	Pros	Cons
<p>1. <u>Status Quo Approach</u>: Continue the sanctuary's focus on humpback whales and their habitat</p>	<p>1. The increase in humpback whales suggests the status quo is a success with little need for change assuming that the level of anthropogenic impacts remains constant. It would be good to better define what benefit the whales get from the Hawaii visit and if there are any specific habitat issues.</p> <p>2. I am a pragmatist and believe in protecting the ecosystem and its functional components. I do not share in the single-minded obsession to protect and conserve every single species on earth at all cost.</p> <p>3. This is the easiest alternative; simply adapting the status quo. Given the recovery of the whales since the sanctuary was established it is likely to continue to be successful.</p> <p>4. The sanctuary as it is has been very successful for protecting Humpback Whales and for educating the public about marine conservation.</p>	<p>1. Humpbacks appear to be doing well so focus should probably be on other species whose populations are less successful.</p> <p>2. How can one do an adequate job of protecting the target species without a full understanding of what comprises its ecosystem? This is not a viable option!</p> <p>3. The sanctuary framework provides a valuable tool for managing the heavily utilized marine resources in the main Hawaiian Islands. The State of Hawaii lacks the resources and political will to make some of the decisions that would be in the best long-term interests of preserving and maintaining these resources and other federal agencies lack the necessary authority to make decisions regarding state waters. The sanctuary management plan review process and statutory authority provide a unique opportunity to address some of these needs.</p> <p>4. If there is an opportunity to expand the current management approach for</p>

		<p>the sanctuary with appropriate resources for enforcement, etc. then it would be a shame to not take advantage of this opportunity to do more.</p>
<p>2. <u>Select Additional Species Approach:</u> Add one or more additional species to the current mission of the sanctuary (species designated in the report and response from Governor Lingle)</p>	<p>1. Including other cetaceans should be considered as there have been impacts identified and questions about their population viability. As sea turtles, and monk seals are increasing in the Main Islands the sanctuary could provide a forum and venue for improve education and public outreach. The place-based nature of the site also supports the inclusion and monitoring of unique habitats (e.g. mesophotic corals).</p> <p>2. As discussed above, understanding not only the biotic communities but as much of the physical features of the ecosystem are mandatory for developing an ecosystem-based management program.</p> <p>3. More species will benefit from protection</p> <p>4. Yes, add all other species particularly other cetaceans.</p> <p>5. As discussed in the</p>	<p>1. Inclusion of too many species will distract and dilute the effectiveness of the sanctuary at meeting its goals. To avoid this, build-out the ecosystem based components, starting from the current model (e.g. shift humpback whales to cetacean to marine mammals to protected species) and (shift place-based to submarine land bridge to bank summits with site-specific habitats).</p> <p>2. Monk seals and sea turtles are already protected through the endangered species act so I don't know what the additional benefit is.</p> <p>3. This approach does not take full advantage of the management tool and opportunity the sanctuary framework and review process represents.</p> <p>4. It would be more difficult to enforce.</p>

	<p>previous question, the sanctuary framework provides a valuable tool for managing the heavily utilized marine resources in the main Hawaiian Islands, and the management plan review process provides a unique opportunity to take advantage of those tools to better managed heavily utilized resources. Adding some additional species but not the entire marine ecosystem is a more easily manageable approach that would be easier to get stakeholder support for. I recommend considering the addition of mesophotic coral ecosystem (MCE) species to the list of covered organisms, as HIHWNMS waters host the most extensive and best developed MCE complex within the U.S. affiliated Pacific Islands region.</p> <p>6. Many of these species are already protected so by including them in the sanctuary designation wouldn't require a lot of additional effort.</p>	
<p>3. <u>Holistic Ecosystem Approach</u>: Adopt an integrated approach to management that considers the entire ecosystem, including humans</p>	<p>1. Given the sanctuary is situated at a population center it is necessary to include the human dimension. Include parts of the ecosystem in the</p>	<p>1. Addressing the entire ecosystem simultaneously is costly, often intractable and can distract from achieving prioritized goals. 2. Time consuming as you</p>

	<p>sanctuary mandate using a prioritized step-wise approach working out from the inception based on the identified objectives. Also as a place-based management structure it should look at what resources are uniquely tied to that location.</p> <p>2. Should be the mandatory approach.</p> <p>3. Obviously this is by far the best approach: the management of natural resources is only successful if you can manage (limit) human disturbances. With an ecosystem approach you can evaluate ecological and economical tradeoffs of alternative management scenarios and pick and choose strategies to get the optimum outcome (ecological or economical or a bit of both – depending on your criteria)</p> <p>4. Of course I strongly believe this.</p> <p>5. This is the best approach for taking maximum advantage of the sanctuary framework and review process as an opportunity to better manage marine resources within the main Hawaiian Islands both in</p>	<p>need to get buy-in of the (coastal) communities and politicians, and the development of such a model takes time as well.</p> <p>3. There is likely to be significant public controversy and, in some cases resistance, to this approach. Trying to manage the entire ecosystem is a formidable challenge.</p> <p>4. The only downfall of this type of activity is the amount of time and effort that it would likely take to develop an effective management scheme. Ideally this process would be iterative and adaptive.</p>
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	<p>State and Federal waters.</p> <p>6. This is a great opportunity for the Hawaiian Islands. While it may take significant effort to do this effectively it would allow the sanctuary to build significantly upon the current management scenario in Hawaii. With many anthropogenic impacts currently affecting Hawaii's coral reefs and with the well documented declines in coral cover that have occurred over the past several decades there is a need to develop more aggressive management strategies in Hawaii.</p>	
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Appendix 3. Principles and Justification of an Ecosystem Approach to Marine Resource Management with Specific Reference to the Hawaiian Islands Humpback Whale National Marine Sanctuary

Introduction

Ecosystem-based management (EBM) is generally defined as “an integrated approach to management that considers the entire ecosystem, including humans. The goal of EBM is to maintain an ecosystem in a healthy, productive and resilient condition so that it can provide the services humans want and need. EBM differs from current approaches that usually focus on a single species, sector, activity, or concern; it considers the cumulative impacts of different sectors”(McLeod et al. 2005)¹.

The scientific basis for EBM has been established (Christensen et al. 1996; Ecosystem Principles Advisory Panel 1999; Browman et al. 2004), and general guiding principles have been proposed (Brodziak and Link 2002; Link 2002; Leslie and McLeod 2007; Crowder and Norse 2008; Ruckelshaus et al. 2008; Foley et al. 2010). See additional references in Murwaski 2007 and Sissenwine & Murawski 2004.

EBM is now evolving from the initial establishment of its scientific basis and articulation of guiding principles and concepts, to operational implementation by management institutions. Operative approaches to marine EBM are now being proposed in the literature (Arkema et al. 2006; Barnes and McFadden 2008; Gaichas 2008; Olsson et al. 2008), but implementation by managing agencies is still being explored in a variety of forms.

In the U.S., the ecosystem-based approach for natural resource management planning on federal lands became policy over a decade ago (Council on Environmental Quality et al. 1995). The new U.S. National Ocean Policy designates ecosystem-based management as a priority objective for ocean management in the (Interagency Ocean Policy Task Force 2010), which enshrined into policy the recommendations made by two expert ocean policy commissions (Pew Oceans Commission 2002; USCOP 2004).

For the HIHWNMS, the policy mechanism for applying the ecosystem approach includes the iterative updating and implementing of the sanctuary’s management plan. Moving towards an ecosystem-based approach will require the sanctuary to shift from a single

“focal” species (humpback whales) approach to considering the entire ecosystem, including humans, in a systematic manner (Kittinger et al. 2009).

¹EAM – a closely related concept - is generally defined as extending existing management foci (e.g., fisheries) to include additional considerations consistent with ecosystem management characteristics, while EBM implies a management scheme primarily designed to address overall ecosystem considerations (Murawski 2007).

The EPWG has been tasked with considering the key ecological principles specific to an ecosystem-based approach to protecting Hawai'i marine ecosystems. A principal component of this effort is defining, bounding and characterizing the ecosystems and ecosystem constituents specifically targeted for management in the management plan review (MPR). In addition, the relevant human dimensions- including the economic, cultural and social factors - that need to be considered for marine ecosystem-based management in Hawai'i. One of the principal goals of the working group is to establish these social and ecological principles to a Hawai'i-specific context, which could then guide the process and rationale for an ecosystem-based approach to the sanctuary MPR. Below, we outline the key ecological principles and the human dimensions relevant to EBM for the sanctuary and provide a brief review of overarching considerations.

Key Ecological Principles of an Ecosystem-based approach to Management

The following are key ecological principles summarized from Foley et al. (2010) with references to Hawaiian seascapes:

(1) Maintain native species diversity

Hawaii contains high levels of endemism and has been designated as a marine conservation hotspot (Roberts et al. 2002). In some areas, endemism can exceed 50% of biomass in reef environments (Kay and Palumbi 1987; DeMartini and Friedlander 2004; Friedlander et al. 2009). Endemic species are threatened by human activities, including the introduction of invasive species, and also are culturally important to Native Hawaiians.

(2) Maintain habitat diversity and heterogeneity

Habitat diversity and heterogeneity increase the spatial resilience of habitats to human stressors (Nyström and Folke 2001; Bengtsson et al. 2003; Elmqvist et al. 2003). Spatial sources of resilience in dynamic seascapes include "ecological memory," including biological legacies, mobile link species, and support areas (e.g. nursery habitat) and functional diversity (the replication of ecosystem functions via multiple mechanisms). In Hawaii, many different types of marine habitats exist, which support different reef biota. The entire mosaic of habitats comprises a dynamic seascape that supports resilience if habitats and their biota are intact. Habitat rugosity, for example, is associated with increased abundance and diversity of reef fish (Friedlander and Parrish 1998; Friedlander et al. 2003; Wedding 2010)

(3) Maintain populations of key species or functional groups

Includes protecting populations of key species or key functional groups that are critical for the preservation of ecosystem function and structure. For example, in coral reef environments, herbivores play a key role in maintaining reef-building corals by suppressing algal communities. The loss of herbivores can result in loss of resilience and increased risk of ecosystem collapse (Hughes et al. 2007a; Hughes et al. 2007b). In Hawaii, herbivores are generally overfished in coral

reef environments, which alters coral-algal dynamics and the prevalence of invasive species (Stimson et al. 2001; Smith 2003; Friedlander et al. 2007a; Friedlander et al. 2007b)

(4) Maintain connectivity

The geographic scales for implementing EBM have been largely based on generalizations about geographic proximity, taxonomy or life history characteristics, which provide little predictive power in determining overall patterns of connectivity, and therefore offer little in terms of delineating boundaries for marine spatial management areas. A multi-species approach can provide concordant patterns of connectivity and thus better inform the appropriate spatial scales for implementing EBM (Toonen et al. 2010). In Hawaii, connectivity patterns among 27 taxonomically and ecologically diverse reef species suggest that individual islands should be considered as separate management units (Bird et al. 2007; Toonen et al. 2010).

Assessing Human Dimensions and Social Impacts in Ecosystem-Based Management

For the purposes of this working group, we refer to “*human dimensions*” as the ways through which individuals, groups, and society interact with, affect, and are affected by the natural environment and environmental change through time. This definition recognizes three key elements, including: 1) *reciprocity* in relationships between society and ecosystems; 2) the *scale* of the system being considered (both social and ecological); and, 3) the role of *dynamism and complex interactions* as critical in determining the past and future trajectories of social-ecological relationships.

In Hawai‘i, individuals and communities engage in a broad array of ocean activities, which can be mapped and characterized in a spatial manner. Characterizing the full range of activities and the ways in which ocean users use the marine environment will help the WG estimate potential costs for how ocean users may be affected by new rules and regulations. Social assessments could be undertaken to gather human dimensions data, focusing on available secondary data, and identifying gaps that could be filled by primary data. Such assessments have proven to be important in other large EBM initiatives (e.g. CA’s Marine Life Protection Act, e.g. Sholz et al. 2004). This information could be used in turn to identify and prioritize areas for resource protections and to tailor the type of protections to both the ecological and the social characteristics of the place.

Overarching Guidelines

A. *Accounting for context*: contextual factors such as unique biogeography of habitats or species, as well as the type, distribution, frequency and intensity of existing and contemplated ocean uses. Context also includes the socio-cultural and socio-economic contexts of Hawaiian communities.

B. *Dealing with uncertainty*: ecosystems are characterized by complex interactions and non-linear dynamics that are not fully understood, resulting in uncertainty regarding future responses to perturbations and management interventions. In the face of uncertainty, it is also critical to build

redundancies (especially among key species, groups, and drivers of ecosystem structure) and buffer areas into the MSP framework that are akin to creating an insurance policy for environmental changes.

C. *Mind the “implementation gap”*: Implementation of an ecosystem-based approach to management will be a step-wise process that requires iterative identification of the more relevant issues as the priority for progress. Many ecosystem-based management plans strive to be inclusive detailing all parts and uncertainties of the ecosystem without identifying the priorities to support good management. Prioritization is important because it avoids the common problem of developing a nice concept plan that includes everything but addresses nothing specific for implementation. Once the priorities are organized the performance measures can be identified as individual steps in the timeline to achieve management objectives. Similarly, is the critical importance of designing effective governance systems (institutions, management arrangements and policies) that can successfully translate priorities into actions (i.e., good principles and guidelines do not themselves result in success).

First acknowledge that the implementation of an ecosystem-based approach to management is a step-wise process that requires us to identify the more relevant issues as the priority for progress. Issues of lower priority can be included but should not distract from first addressing the priority issues.

Justification: Many ecosystem-based management plans strive to be inclusive detailing all parts and uncertainties of the ecosystem without identifying the priorities to support good management. Prioritization is important because it avoids the common problem of developing a nice concept plan that includes everything but addresses nothing specific for implementation. Once you have the priorities organized the performance measures can be identified as individual steps in the timeline to achieve the objectives.

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Appendix 4. Query letter sent to technical experts

THANK YOU

We thank you in advance for your time and input. Your expertise provides valuable guidance to sanctuary management as they continue the management review process.

WE WOULD APPRECIATE YOUR RESPONSE BY 3 OCTOBER 2011

We welcome your input in the management review process at any time. To include your comments in our report to the full Sanctuary Advisory Committee, we would greatly appreciate receiving your thoughts on the questions below by 3 October 2011.

HOW WILL THIS INFORMATION BE USED?

The working group will carefully consider input from the scientific experts as they form recommendations to be presented for consideration to the full SAC. Those adopted will be provided to sanctuary management. Responses from advisors will be aggregated in the final report. We will be happy to keep your responses entirely anonymous. Alternatively, we can include your name and/or affiliation in the acknowledgments. Please let us know which you prefer (see below).

Please use as much space as needed to answer the following questions:

Question 1. What recommendations do you have for our working group and sanctuary management as to how implement an ecosystem-based approach to management? Recommendations should ideally be actionable measures or strategies that are based on the best available science in your field or related fields of expertise.

Based on your research and the best available science in your field:

Recommendation 1:

Justification:

Key supporting citations:

Recommendation 2:

Justification:

Key supporting citations

Recommendation 3:

Justification:

Key supporting citations:



Question 2. What are the most critical gaps in our understanding of natural processes that would hinder the ability of sanctuary management to implement an ecosystem-based approach?

Based on your research and the best available science in your field:

Research need 1:

Rationale:

Key supporting citations:

Research need 2:

Rationale:

Key supporting citations:

Research need 3:

Rationale:

Key supporting citations:

Question 3.

Please provide your beliefs on the pros and cons for each of the following management alternatives for the sanctuary

4. Status Quo –protect humpback whales and their habitat

a. Pro:

b. Con:

5. Adding some additional species – The Hawaiian Islands National Marine Sanctuary Act mandated the sanctuary to identify and evaluate other resources and ecosystems of national significance for possible inclusion in the sanctuary. In a 2007 report to the Governor of Hawaii, the sanctuary considered including these additional resources for protection: cetaceans, monk seals and sea turtles along with maritime heritage sites (To view the full report visit:

<http://hawaiihumpbackwhale.noaa.gov/management/pdfs/2007assessmentreport.pdf>)

a. Pro:

b. Con:

II. Ecosystem approach – an integrated approach to management that considers the entire ecosystem, including humans

a. Pro:

b. Con:



All responses will be kept separate from the list of names and organizations that contributed expert opinions in our report of recommendations to the sanctuary.

Please check one:

- A. Please keep my responses and my affiliation anonymous*
- B. You may state that my organization provided expert opinion but do not use my name*
- C. You may list both my name and affiliation among the list of experts providing input*

If you have any other comments, recommendations or ideas please feel free to include them. Thank you.

Sarah.Mesnick@noaa.gov