



Final Recommendations on Water Quality
Hawaiian Islands Humpback Whale National Marine
Sanctuary Advisory Council
January 18, 2012

Recommendations on Water Quality



Photo: Noelle Shaughnessy

For the Hawaiian Islands Humpback Whale National Marine Sanctuary

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Hawaiian Islands Humpback Whale National Marine
Sanctuary Advisory Council
January 18, 2012**

The Hawaiian Islands Humpback Whale National Marine Sanctuary (sanctuary) Advisory Council (council) forwarded these final recommendations to sanctuary management at the January council meeting for consideration in the management plan review. This report is based on the work of a working group that was formed by the council in December 2010 to address one of the priority topics brought up during the 2010 public comment period. The working group met over the course of 12 months in 2011. A digital copy of this report can be downloaded at http://hawaiihumpbackwhale.noaa.gov/management/pdfs/waterquality_rec_report.pdf.

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Hawaiian Islands Humpback Whale National Marine
Sanctuary Advisory Council
January 18, 2012

Need for Action

Currently, the sanctuary has a regulation that prevents discharge within the sanctuary, if the discharge does not comply with existing state and federally-issued authorization¹. Although the sanctuary does not directly regulate water quality, the sanctuary plays a supporting role to improve water quality through volunteer, education, and outreach programs.

Water quality is the chemical, physical and biological integrity of the body of water. Water quality impacts all resources in Hawaii. Water quality in Hawaii is impacted by environmental and anthropogenic sources. Bacterial and sediment pollution exist in nearly every watershed and estuary in Hawaii. Pollution negatively impacts the resilience and sustainability of resources necessary to the quality of life in Hawaii, the Sanctuary and the Pacific region. Unimpaired water quality is essential to the health of the marine ecosystem and provides a direct benefit to everyone. Water quality in Hawai'i has been difficult to assess largely due to the absence of adequate monitoring programs designed for island coastal waters that captures the spatial and temporal variability of factors that affect it.

In addition to marine-based point sources of pollution, such as vessel discharges, marine debris and aquaculture effluent, both point source and non-point sources of land-based pollution have a huge impact on water quality. Some of these sources include wastewater disposal and storm water runoff which can all carry pollutants such as sediment, nutrients, pathogens, toxic substances (including heavy metals and pesticides), suspended solids and debris from residential, urban industrial, agricultural, and commercial activities.

Using chemistry alone to assess the impact of land-based pollutants on ocean water quality can be difficult due to the high variability of pollutant concentrations due to ocean stratification and mixing regimes. However, the presence or absence of certain native and invasive organisms, quantity of sediment, level of species diversity, and even habitat rugosity can provide insight into water quality and guidance for future management efforts.

Numerous multi-level governmental authorities manage and/or have an impact either directly or indirectly on water quality; the various laws that address this issue are complex. While the authority of the sanctuary is limited to the marine environment there may be opportunities for

¹ HINMSA Section 922.184 Prohibited Activities: (5) Discharging or depositing any material or other matter in the Sanctuary; altering the seabed of the Sanctuary; or discharging or depositing any material or other matter outside the Sanctuary if the discharge or deposit subsequently enters and injures a humpback whale or humpback whale habitat, provided that such activity: (i) requires a Federal or State permit, license, lease, or other authorization; and (ii) is conducted: (A) without such permit, license, lease, or other authorization, or (B) not in compliance with the terms or conditions of such permit, license, lease, or other authorization.



Final Recommendations on Water Quality
Hawaiian Islands Humpback Whale National Marine
Sanctuary Advisory Council
January 18, 2012

raising awareness and filling in existing management gaps, while avoiding duplication of existing conservation efforts.

Desired Outcome:

Good water quality is essential to the health of people, the watershed, and the marine ecosystem. There are diverse sources of human-caused and natural factors impacting water quality, such as stream diversions, polluted runoff, erosion, and contaminated groundwater via agriculture and wastewater injection wells. Since pollution affects coastal areas in various places and on various time-scales, coordinated management strategies and watershed-based management approaches are needed.

Although the sanctuary does not directly regulate water quality, the sanctuary plays a supporting role to improve water quality through collaborations with volunteer, education, and outreach programs. The sanctuary supports and expands current and future efforts to improve water quality in the region. Additionally, the sanctuary can support watershed planning by training volunteers to assist with sampling efforts.

Current regulations for the sanctuary pertain directly to humpback whales and not the ecosystem as a whole. It will be important to transition from a sanctuary that is focused on only a single species, the humpback whale, to a sanctuary that is ecosystem-based, incorporating traditional ecological knowledge and management practices, and addresses issues related to water quality.

Recommendations:

Topic: Ecosystem-Based Sanctuary

Topic Description: Current regulations for the sanctuary pertain directly to humpback whales and not the ecosystem as a whole.

1. Transition from a single species sanctuary focused only on the humpback whale to an ecosystem-based sanctuary capable of supporting the aquatic habitat that houses the sanctuary waters, and thus strengthens the sanctuary's ability to address multiple water quality concerns.

Support = 19

Neutral = 1

Do Not Support = 1

No Response = 0

2. Support the designation of whale sanctuary waters as Class AA in the state water quality standards in order to offer the most protective standards and to specifically assign the use of conserving coral reefs within sanctuary waters.

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Final Recommendations on Water Quality
Hawaiian Islands Humpback Whale National Marine
Sanctuary Advisory Council
January 18, 2012

Support = 20

Neutral = 0

Do Not Support = 1

No Response = 0

Topic: Water Quality Monitoring

Topic Description: The ability to monitor water quality conditions comprehensively and accurately over time can assist in making effective management decisions.

1. Expand monitoring efforts throughout the sanctuary through collaboration (for instance with IOOS or watershed-based groups) and expansion of existing efforts (for example citizen science monitoring on Maui)².

Support = 20

Neutral = 1

Do Not Support = 1

No Response = 0

2. Establish a sanctuary-wide monitoring program to observe, track, and report water quality baselines, status and trends within the sanctuary waters³.

Support = 20

Neutral = 1

Do Not Support = 0

No Response = 0

3. Establish or enhance quality assurance and quality control programs by developing data quality objectives and quality assurance project plans for sponsored monitoring efforts.

Support = 19

Neutral = 2

Do Not Support = 0

No Response = 0

4. Develop a water quality monitoring database or collaborate to enhance existing data portal capability (see www.monitoring.coral.org).

Support = 18

Neutral = 1

Do Not Support = 2

No Response = 0

5. Support Maui's volunteer water quality monitoring program by funding a water quality scientist to work with the volunteer program at the sanctuary education center on Maui.

Support = 18

Neutral = 2

Do Not Support = 0

No Response = 1

² Develop "train the trainers" workshop and materials to train representatives of community groups who want to participate in Citizen Science Monitoring.

³ A monitoring program could include chemical, biological, and physical metrics and incorporate the idea of biological indicators.



Final Recommendations on Water Quality
Hawaiian Islands Humpback Whale National Marine
Sanctuary Advisory Council
January 18, 2012

Topic: Collaborations

Topic Description: A collaborative approach to identifying and resolving marine resource management issues and developing and implementing plans to protect sanctuary resources will increase the effectiveness of management activities.

1. Build collaborations that recognize and address watershed management as it relates to protecting marine resources and water quality.⁴

Support = 21 Neutral = 0 Do Not Support = 1 No Response = 0

2. Encourage, support and work cooperatively with county, state, and federal agencies to reduce sediment and protect surface and ground water quality by controlling point and non-point sources of pollution, including injection well effluent, cesspool and septic tank leachates, landfill and dumpsite leachates, and contaminated stormwater runoff from construction sites, agricultural, industrial and urban land uses.

Support = 20 Neutral = 1 Do Not Support = 0 No Response = 0

3. Encourage, support and work cooperatively with county, state, and federal agencies to build awareness of water quality impacts related to climate change, sea level rise, coastal land loss, shoreline hazards and coastal restoration projects from reaching sanctuary waters.⁵⁶

Support = 19 Neutral = 2 Do Not Support = 0 No Response = 0

⁴ The Clean Water Act provides a framework and tools. There's currently a lack of coordination between programs and laws. The laws, procedures, and policies are already in place, but there is a need to get over the divide between those that work with land resources and those that work with marine resources. There are other agencies that manage and have a permit system in place for land based sources of pollution (EPA, DOH, etc). Working with watershed-based plans under these programs can build agency and community collaborations. Build on the successes of other marine sanctuaries – Monterey Bay National Marine Sanctuary and Florida Keys National Marine Sanctuary.

⁵ For example, coordinate with State Department of Health (DOH), State Department of Land and Natural Resources (DLNR), and County agencies to develop a comprehensive surface and ground water management program by watershed. (This program could protect and restore natural water systems and manage built water conveyance systems to insure the highest water quality throughout the watershed).

⁶ For example, work with the US Fish and Wildlife Service so that sanctuary staff have input on antibiotic permits issued for fish treatment within sanctuary waters.

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**Final Recommendations on Water Quality
Hawaiian Islands Humpback Whale National Marine
Sanctuary Advisory Council
January 18, 2012**

4. Collaborate with watershed-based planning⁷ efforts within sanctuary waters by participating as a stakeholder and connecting more on stewardship efforts including monitoring and pollution load reduction strategies.

Support = 21

Neutral = 0

Do Not Support = 0

No Response = 0

5. Participate in stewardship efforts by convening agencies, non-profits, and stakeholders at an annual workshop/conference to collaborate on ecosystem priorities of watersheds within the sanctuary. Include, among others, Hawaiian traditional ecological knowledge (TEK) from ahupua`a resource management system, watershed planning strategies to address water quality-related issues, and monitoring and enforcement on matters outside the direct authority of the sanctuary.⁸

Support = 19

Neutral = 1

Do Not Support = 1

No Response = 0

6. Convene a water quality council, to develop a physical, chemical and biological water quality monitoring program relevant to island coastal waters within the Sanctuary⁹.

Support = 19

Neutral = 0

Do Not Support = 2

No Response = 0

⁷ Include both Clean Water Act (319) and other watershed planning processes

⁸ The presence or absence of certain native and invasive organisms, quantity of sediment, level of species diversity, and even habitat rugosity can provide insight into water quality and guidance for future management efforts. Clarify who is implementing what programs and regulations, what gaps exist and how best to fill them, and how programs, policies, or regulations can be more effectively and efficiently implemented. (*Ahupua`a and watershed land area units do not have the same boundaries or definition, although there are similarities in the resource management approaches.*)

⁹ For biological indicators, suggest exploring the use of marine indicators such as: presence/absence of native and invasive organisms (algae, invertebrates, corals, sea grass). For physical indicators, suggest the presence/absence/quality of ground water, presence/absence of sediment cover. Suggest exploring the connection between land management and marine water quality by correlating percent of impervious cover/land cover/natural ecosystems to marine water health. Make recommendations regarding appropriate monitoring (e.g., anything from visual assessment to tracking through satellite images). Develop a volunteer-friendly protocol for monitoring these indicators.

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Final Recommendations on Water Quality
Hawaiian Islands Humpback Whale National Marine
Sanctuary Advisory Council
January 18, 2012

Topic: Commenting on Activities that Could Affect Marine Resources

Topic Description: Opportunities often arise to provide comment on activities that could impact marine resources within the sanctuary. These activities often occur on land and may carry sediment and other pollutants to the marine environment through stormwater, groundwater, and runoff.

1. Provide review, analysis and written comment on decisions by other agencies that permit activities that may affect marine resources within the sanctuary.¹⁰

Support = 20

Neutral = 1

Do Not Support = 0

No Response = 0

2. Collaborate with appropriate local community-based management programs and watershed or place-based management groups when developing comments that could impact marine resources within the sanctuary or when implementing projects.

Support = 21

Neutral = 0

Do Not Support = 0

No Response = 0

Topic: Point and Non-Point Sources of Pollution

Topic Descriptions: Both point sources and non-point sources of land-based and ocean-based pollution have a significant impact on water quality. Some sources of pollution include wastewater disposal and contaminated stormwater runoff which can all carry pollutants such as sediment¹¹, nutrients and pathogens¹², toxic substances¹³ (including heavy metals and

¹⁰ Including, among others, National Pollutant Discharge Elimination System (NPDES) permits, Underground Injection Control (UIC) permits, Environmental Assessments (EA), Environmental Impact Statements (EIS), Special Management Area (SMA) permits, County ordinances, Army Corps of Engineers (USACE) permits, rule-making related to water quality and stormwater management, land use permit request, and aquaculture permits. Many activities are announced in the Office of Environmental Quality Control (OEQC) bulletin. A sanctuary staff person could work as a liaison to various stakeholders to inform them and seek their input on water quality issues.

¹¹ Sedimentation has been identified as a potential threat that can smother/kill coral reefs and alters marine habitats. Causes may include the clearing of land for development; barren lands; dirt roads; domestic and feral animal activity, eroding slopes or unstable stream banks.

¹² Nutrient-loading has been identified as a potential threat that can cause increases in harmful algae. Causes may include fertilizers from lawns, golf courses, and farms; animal feeding operations, land-based wastewater disposal such as sewage outfalls and injection wells; ocean-based wastewater disposal from vessels; and fish food and waste from aquaculture operations is a concern.

¹³ Toxics (heavy metals and hazardous wastes) have been identified as a potential threat that may cause disease in humans and marine species. Urban runoff and industrial stormwater runoff; industrial wastewater, sewage disposal

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Hawaiian Islands Humpback Whale National Marine
Sanctuary Advisory Council
January 18, 2012

pesticides)¹⁴, pharmaceuticals¹⁵, and debris¹⁶ from urban, rural, agricultural, industrial and commercial activities.

1. Identify, establish and/or support watershed planning and monitoring programs to identify the sources, pollutant discharge concentrations, and pollutant loads discharging to the sanctuary from point and non-point sources of pollution.

Support = 20 Neutral = 0 Do Not Support = 0 No Response = 0

2. Support the implementation of best management and ecological restoration practices that slow the speed of water upon the land to prevent erosion and sedimentation as recommended by sources including the Environmental Protection Agency, the American Society of Civil Engineers and international permaculture earthwork techniques.^{17,18} Techniques include, among others, vegetated riparian corridors around streams, dams, canals, fishponds, swales, gabions, silt traps, diversion drains, road tracks, contour banks, level spills, and terraces.

Support = 21 Neutral = 0 Do Not Support = 0 No Response = 0

3. Support water quality-based regulation or prohibitions of discharges of sediments, nutrients, toxic substances, endocrine disruptors and other emerging constituents of concern (antibiotics, therapeutic chemicals, growth hormones, genetically modified organisms,) in the sanctuary waters or within watersheds discharging to sanctuary waters.

Support = 17 Neutral = 1 Do Not Support = 3 No Response = 0

¹⁴ Pathogenic microorganisms (bacteria and viruses) have been identified as a potential threat that may cause disease in humans and marine species. Causes may include land-based wastewater disposal such as sewage outfalls and injection wells; and domestic and feral animal activity. Aquaculture practices have been identified as a concern.

¹⁵ Pharmaceuticals, endocrine disruptors and other emerging constituents of concern have been identified as a concern with unknown effects on the marine environment. Causes may include the improper disposal of pharmaceuticals, residuals in human and animal waste. Antibiotics, such as florfenicol, have been used in mariculture operations within the sanctuary.

¹⁶ Debris that enters the marine environment via wind and runoff, among other modes of transport, has been identified as a threat. Examples include, among others, marine wildlife entanglement and ingestion.

¹⁷ Hawaiians used these systems in their taro and river systems by making use of the water flow and slowing the water flow before it reaches the ocean. The longer the water stays on the land the better. This is in direct contrast to the way things are done by government today, where they straighten river beds and concrete river beds accelerate the flow of water to the ocean. These practices should be evaluated as watershed BMPs to quantify their effectiveness in protecting water quality.

¹⁸ For example, expand education and outreach efforts relating to the interconnectedness of everyday choices that people make and potential impacts they could have on marine resources environment.

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Final Recommendations on Water Quality
Hawaiian Islands Humpback Whale National Marine
Sanctuary Advisory Council
January 18, 2012

Comments: I'm in favor of the Sanctuary supporting water quality-based regulations and prohibitions of known dangerous and harmful materials. I don't think, however, it's appropriate to included things like antibiotics, GMO's, hormones, and therapeutics for a couple of reasons. First, it's impossible to regulate things like antibiotics and hormones. They are everywhere and the technology doesn't exist to accurately and quickly identify their presence in marine waters. A recommendation that could never be enforced or advanced is of little value and may harm the process by distracting attention from attainable, valuable, and tractable recommendations.

Second, the term GMO has nothing to do with water quality and, I feel, has been added to this recommendation simply as a buzzword. Even it was related to water quality, it's so blunt a term that prohibition of GMOs would ban most every plant grown in Hawaii. How is GMO defined? Industrial GMO? Cloned plants? Manufactured organisms? Hybridized plants and cultivars that were bred for certain traits? Hybridization is a form of genetically modifying an organism. Is that really something the marine sanctuary wants to get involved with?

4. Support monitoring of receiving water (ocean) to assess attainment of state water quality standards and designated uses.

Support = 19

Neutral = 0

Do Not Support = 2

No Response = 0

Topic: Outreach and Education

Topic Description: The sanctuary has proven successful in providing humpback whale and broader ocean-related information through diverse venues such as outreach events, focused trainings and workshops, and programs in schools. Formal education programs occur mostly in classrooms, while informal education takes place on a regular basis at the visitor center or in the field. Outreach activities disseminate information through public events and lectures. In addition, the sanctuary uses a variety of media including print, web content, social media, and exhibits, to deliver content to a wide audience.

1. Develop Hawai'i-specific education and outreach materials¹⁹ relating to building awareness about the sanctuary²⁰, and incorporating information from both traditional ecological

¹⁹Education and outreach is one of the Sanctuary's main strengths and can help in preventing land-based pollution. A water quality awareness month and improvements on monitoring could be helpful in achieving better water quality within the sanctuary.

²⁰ For example on O'ahu, target leeward communities, shopping malls etc... rather than Hanauma Bay or the Waikiki Aquarium.

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Final Recommendations on Water Quality
Hawaiian Islands Humpback Whale National Marine
Sanctuary Advisory Council
January 18, 2012

knowledge and management and western science relating to water quality, land-based pollution, climate change, ocean acidification, and coastal hazards.

Support = 19 Neutral = 1 Do Not Support = 1 No Response = 0

2. Work with educators to develop materials for all ages; target stakeholders such as local decision-makers and communities with limited access to water quality awareness; train volunteers to engage visitors and develop materials to train community trainers.

Support = 19 Neutral = 1 Do Not Support = 1 No Response = 0

3. Include messages in education and outreach efforts to illustrate the connection between everyday choices that people and communities make and potential impacts on marine resources environment.

Support = 20 Neutral = 1 Do Not Support = 0 No Response = 0

Topic: Precautionary Principle²¹

Topic Description: A precautionary approach should be utilized when considering the compatibility of human-uses within the sanctuary and the goals of resource protections.

1. Utilize a Precautionary Principle when considering proposed activities within the sanctuary. The application of the precautionary principle to management of water quality means prohibiting a discharge or practice that presents a reasonable potential to cause or contribute to degradation of water quality or impairment of uses of the sanctuary waters.

Support = 17 Neutral = 2 Do Not Support = 1 No Response = 1

Topic: Vessel Discharge

Topic Description: Concerns have been raised among community members about the possible effects of vessel discharge on marine wildlife and human health and safety.

²¹ This environmental management principle is different than the scientific concept of “proof”. By the time cause and effect relationships between sources and pollutants can be proven scientifically, resources maybe irreversibly damaged.

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Final Recommendations on Water Quality
Hawaiian Islands Humpback Whale National Marine
Sanctuary Advisory Council
January 18, 2012

1. Establish a no dump/no discharge zone in sanctuary waters including phasing out the use of two cycle engines which discharge oil into the water²².

Support = 21 Neutral = 0 Do Not Support = 0 No Response = 0

2. Support pump-out stations at appropriate locations within the sanctuary and encourage commercial tour operators statewide to pump out holding tanks in pump-out facilities where available.

Support = 21 Neutral = 0 Do Not Support = 0 No Response = 0

Topic: Offshore Development

Topic Description: Concerns have been raised that offshore development activities may have the potential to affect environmental resources, including water quality, but potential environmental impacts have not been thoroughly evaluated. Enhancing the knowledge and understanding of possible ecological impacts of proposed offshore development activities will support the sanctuary in decision-making processes to achieve sanctuary goals.

1. Support water quality monitoring to establish a baseline for water chemistry, aquatic habitats, and biological characteristics prior to installation; and monitoring of physical, chemical, and biological indicators of water quality and aquatic ecosystem health during and after the installation of offshore developments projects.

Support = 21 Neutral = 0 Do Not Support = 0 No Response = 0

2. Prohibit new open ocean finfish mariculture operations in sanctuary waters that present a reasonable potential to cause or contribute to degradation of water quality or impairment of uses of the sanctuary waters.

Support = 19 Neutral = 0 Do Not Support = 2 No Response = 0

3. Require monitoring of existing open ocean aquaculture operations for impacts to sanctuary resources within sanctuary waters.

Support = 20 Neutral = 1 Do Not Support = 0 No Response = 0

²² Encourage incentive programs to replace two cycle motors. Research any existing programs at other national marine sanctuaries.

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**Final Recommendations on Water Quality
Hawaiian Islands Humpback Whale National Marine
Sanctuary Advisory Council
January 18, 2012**

Comments: This is already happening with all open ocean aquaculture operations in the state. This recommendation is redundant.



Final Recommendations on Water Quality
Hawaiian Islands Humpback Whale National Marine
Sanctuary Advisory Council
January 18, 2012

The Water Quality Working Group supports the following information and associated recommendations that were provided by the Native Hawaiian Cultural Working Group.

Water Quality

Good water quality is essential to the health of the marine ecosystem. There are diverse sources of human-caused and natural factors impacting water quality, such as polluted run-off, erosion and injection wells. Since pollution affects coastal areas in various places and on various time-scales, coordinated management strategies and place-based management approaches may be useful.

Hawaiian Issues as Related to Water Quality

Issues:

- Water quality impacts all resources in Hawaii.
- Water quality in Hawaii is impacted by environmental and anthropogenic sources.
- Bacterial and sediment pollution exists in nearly every watershed and estuary in Hawaii.
- Pollution negatively impacts the resilience and sustainability of resources necessary to the quality of life in Hawaii, the sanctuary and Pacific region.

Action Needed:

1. Support and facilitation for the convening of expertise to develop list of needed information related to the impacts of polluted water on the resilience of the resources of the sanctuary ecosystem.
2. Research of scientific information and best management practices to address water quality issues and impacts.
3. Research of traditional ecological knowledge (TEK) related to water quality, resource resilience and traditional management practices.
4. Support opportunities for TEK strategies and practices to reduce impacts of pollution.

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Final Recommendations on Water Quality
Hawaiian Islands Humpback Whale National Marine
Sanctuary Advisory Council
January 18, 2012

Potential Sanctuary Action:

1. Provide venues and facilitate community process to identify needed expertise to address water quality in the sanctuary ecosystem.
2. Provide funding and support for the collection of TEK and other key information related to water quality in the sanctuary ecosystem.
3. Fund appropriate research to address water quality for the sanctuary ecosystem.
4. Provide facilitation and funding support for development of best management practices in the sanctuary ecosystem.

The Water Quality Working Group supports the following recommendations that were provided by the Humpback Whale Protections Working Group.

1. Sanctuary should continue to partner with existing stranding network (NOAA Fisheries-Pacific Islands Regional Office, Hawaii Pacific University) to identify diseases and pollutants of concern in tissues of humpback whales.
2. Sanctuary can provide education and outreach opportunities to share findings from joint agency efforts.
3. Sanctuary should expand water quality testing through partnerships with agencies (Department of Health, Department of Land and Natural Resources), university, and communities, to include additional pathogens.
4. Based on study results and testing, sanctuary to consider encouraging commercial tour operators statewide to pump out holding tanks in pump-out facilities.
5. Support Division of Conservation and Resource Enforcement (DOCARE) / NOAA Office of Law Enforcement (OLE) partnerships to enforce regulations in sanctuary.
6. Evaluate effectiveness and adaptability of water quality programs in other sanctuaries.
7. Sanctuary to support beach cleanups, marine debris removal projects and management of marine debris in sanctuary waters in partnership with NOAA and others.

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**Final Recommendations on Water Quality
Hawaiian Islands Humpback Whale National Marine
Sanctuary Advisory Council
January 18, 2012**

Water Quality Working Group Process

The Water Quality Working Group of the Hawaiian Islands Humpback Whale National Marine Sanctuary Advisory Council communicated via e-mail and the Go-To-Meeting internet meeting technology combined with regularly scheduled conference calls. Between meetings, members completed various tasks as assigned. Whenever possible, arrangements were made for working group members, and members of the public interested observing the meeting, or participating in a designated public comment period, to gather at island-specific sanctuary offices.

The working group members reviewed public comments that were received by the sanctuary during the 90-day public comment and scoping period that was held from mid July to mid October 2010 (HIHWNMS, 2011). Additionally, the working group reviewed various sanctuary-related reports (HIHWNMS, 2011; HIHWNMS, 2002; ONMS, 2010; and ONMS, 2009); Acts (HINMSA, 1997 and NMSA, 2000); presentations (Asuncion, 2011; Donahue, 2011; Hoover, 2011; and Schou, 2010); management plans and programmatic information from other national marine sanctuaries and marine national monuments (links below).

The working group discussed issues facing water quality in Hawai'i, began identifying gaps in current resource protection efforts, considered water quality programs in other national marine sanctuaries, and developed potential management recommendations to be presented in this report to the full sanctuary advisory council for consideration, discussion, and ultimately presented to sanctuary management following a full meeting of the council scheduled for January 2012.

Following the completion of draft recommendations for full council consideration, each working group member was given the opportunity to express their support, neutrality, or lack of support for each individual draft recommendation. In some cases additional comments were submitted relating to a specific draft recommendation. Both the number of working group members supporting a particular recommendation and any associated comments received appear directly underneath each recommendation.

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Final Recommendations on Water Quality
Hawaiian Islands Humpback Whale National Marine
Sanctuary Advisory Council
January 18, 2012

Appendix (A): Contributing Members

Robin Newbold: Maui County Seat, Sanctuary Advisory Council and Maui Nui Marine Resource Council
Doug Cole: Ocean Recreation Seat, Sanctuary Advisory Council and North Shore Community Land Trust
Solomon Pili Kaho`ohalahala: Lāna'i Island Representative, Sanctuary Advisory Council
Walter Ritte: Moloka'i Island Representative, Sanctuary Advisory Council
Richard Davison: Commercial Shipping Seat, Sanctuary Advisory Council and Star of Honolulu Cruises and Events
Maka'ala Kaaumoana: Conservation Seat, Sanctuary Advisory Council and Hanalei Watershed Hui
Gordon LaBedz: Ocean Recreation Alternate, Sanctuary Advisor Council and Surfrider Kaua'i Chapter
Carol Wilcox: Malama Maunalua
Chris Ostrander: Director, PaclOOS at UH
Irene Bowie: Exec Dir, Maui Tomorrow Foundation
Iuri Herzfeld: Oceanographer and Ecologist University of South Florida St. Petersburg
Jay Carpio: Fisherman
Maile Carpio: HOLON, LLC
Larry Stevens: Maui Clean Water Working Group
Lucienne DeNaie: Sierra Club
Marvin Heskett: Surfrider O'ahu Chapter
Mary Jorgensen: Senior Planner, County of Maui, Department of Planning
Mike Moran: Pump Don't Dump
Rob Parsons: Environmental Coordinator, County of Maui
Robin S. Knox: Watershed Coordinator for Southwest Maui Watershed Plan, Water Quality Consulting, Inc.
Wendy Wiltse: EPA-PICO
Myron Honda: DOH
Suzanne Shriner: Pono Aquaculture Alliance and Food and Water Watch, Hawai'i Island

Appendix (B): Contributing Technical Experts

Sean Morton: Superintendent, Florida Keys National Marine Sanctuary
Scott Donahue: Deputy Superintendent, Florida Keys National Marine Sanctuary
Paul Michel: Superintendent, Monterey Bay National Marine Sanctuary
John Hunt: Deputy Superintendent, Monterey Bay National Marine Sanctuary
Bridget Hoover: Water Quality Program Director, Monterey Bay National Marine Sanctuary

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Final Recommendations on Water Quality
Hawaiian Islands Humpback Whale National Marine
Sanctuary Advisory Council
January 18, 2012

Appendix (C): Sources of Information Reviewed:

Asuncion, B. 2011. Comments for Working Groups (presentation).

Clean Water Act (CWA). 1972. 33 U.S.C. Section 1251 *et seq.* (1972).

Donahue, S. 2011. Florida Keys National Marine Sanctuary's Water Quality Protection Program (presentation).

HIHWNMS (Hawaiian Islands Humpback Whale National Marine Sanctuary). 2011. Public Scoping Comments Report, Community Engagement in the Management Plan Review Process.
http://hawaiihumpbackwhale.noaa.gov/management/mpr_documents.html

HIHWNMS (Hawaiian Islands Humpback Whale National Marine Sanctuary). 2002. Hawaiian Islands Humpback Whale National Marine Sanctuary Management Plan. 154pp. Electronic document available from: <http://hawaiihumpbackwhale.noaa.gov/documents/management.html>

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Final Recommendations on Water Quality
Hawaiian Islands Humpback Whale National Marine
Sanctuary Advisory Council
January 18, 2012

Additional sources of programmatic information and management plans for other national marine sanctuaries and marine national monuments can be found at the links below:

Cordell Bank National Marine Sanctuary: <http://cordellbank.noaa.gov/welcome.html>

Channel Islands National Marine Sanctuary: <http://channelislands.noaa.gov/>

Florida Keys National Marine Sanctuary: <http://floridakeys.noaa.gov/>

Fagatele Bay National Marine Sanctuary: <http://fagatelebay.noaa.gov/>

Gulf of the Farallones National Marine Sanctuary: <http://farallones.noaa.gov/>

Gray's Reef National Marine Sanctuary: <http://graysreef.noaa.gov/>

Hawaiian Islands Humpback Whale National Marine Sanctuary:
<http://hawaiihumpbackwhale.noaa.gov/>

Monterey Bay National Marine Sanctuary: <http://montereybay.noaa.gov/>

Papahānaumokuākea Marine National Monument: <http://www.papahanaumokuakea.gov/>

Olympic Coast National Marine Sanctuary: <http://olympiccoast.noaa.gov/>

Stellwagen Bank National Marine Sanctuary: <http://stellwagen.noaa.gov/>

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