UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105-3901

March 8, 2021

Compilation of EPA Programmatic Consultations for Continued Use of Five Designated Hawaii Ocean Dredged Material Disposal Sites

Beginning in 2018, EPA conducted informal programmatic consultations with the National Marine Fisheries Service (NMFS) under the Endangered Species Act (ESA) and the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA), and with the US Fish and Wildlife Service (USFWS) under the ESA, for the continued use of five existing EPA-designated Ocean Dredged Material Disposal Sites serving Hawaii. These consultations were completed in late 2020 and early 2021. This document compiles the EPA consultation packages (EPA Assessments) to each resource agency, and their responses and recommendations.

Included below are:

<u>NMFS Consultations</u>

- EPA's combined ESA and Essential Fish Habitat (EFH) final assessment (without Appendix 4, 2015 SMMP) dated October 8, 2020 (PDF pages 2-167)
- NMFS's ESA concurrence with EPA's assessment (without Appendix B) dated November 27, 2020 (PDF pages 168-186)
- NMFS's EFH response with Conservation Recommendations dated January 21, 2021 (PDF pages 187-199)
- EPA's response concerning the Conservation Recommendations dated February 25, 2021 (PDF pages 200-209)
- NMFS's response to EPA's response concerning the Conservation Recommendations dated March 5, 2021 (PDF pages 210 - 215)

<u>USFWS Consultation</u>

- EPA's ESA final assessment (without Appendix 2, 2015 SMMP) dated November 13, 2020 (PDF pages 216-318)
- USFWS's ESA concurrence with EPA's assessment dated January 28, 2021 (PDF pages 319-322)

Next, EPA will publish an updated Site Management and Monitoring Plan (SMMP) for the five Hawaii Ocean Disposal Sites that includes the relevant conservation measures discussed in the NMFS and USFWS consultations. The updated SMMP will be issued via a joint Public Notice by EPA and the Honolulu District, US Army Corps of Engineers.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
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75 Hawthorne Street
San Francisco, CA 94105-3901

Ann Garrett, Assistant Regional Administrator – Protected Resources
Gerry Davis, Assistant Regional Administrator – Habitat Conservation
National Marine Fisheries Service
Pacific Islands Regional Office
1845 Wasp Boulevard Building 176
Honolulu, Hawai'i 96818

Re: Programmatic ESA and EFH Consultation for Five Existing Hawai'i Ocean Dredged Material Disposal Sites

Dear Assistant Regional Administrators Garrett and Davis:

The U.S. Environmental Protection Agency Region 9 (EPA) manages five ocean dredged material disposal sites (ODMDS) offshore of the Hawaiian Islands to allow for safe disposal of suitable sediment generated from necessary dredging of harbors and other navigation-related facilities. Continued availability of appropriately managed ODMDS is a priority for EPA as it is necessary to maintain safe navigation. EPA originally designated these five sites via rulemaking in 1981, consulting with the National Marine Fisheries Service (NMFS) as required by the Endangered Species Act (ESA). At that time, consultation on potential impacts to Essential Fish Habitat (EFH) was not required by the Magnuson-Stevens Fishery Conservation and Management Act. Since the ODMDS sites were designated, conditions have changed, including new species and critical habitat listings. In order to provide for the continued protected of listed species and critical habitat, EPA reinitiated ESA consultation, including consultation regarding EFH, working closely with NMFS staff.

As described in the enclosed analysis, EPA has determined that the continued disposal of approved, suitable dredged material at these five ODMDS under an updated Site Management and Monitoring Plan may affect but is not likely to adversely affect certain species listed as threatened or endangered under the ESA. EPA has also assessed the potential impacts of continued disposal operations on EFH and similarly determined that the continued operations may affect EFH, however the effects are expected to be minimal. The enclosed analysis describes proposed and past use of the sites, as well as regulations and management measures in place to avoid impacts to marine organisms and the marine environment. Also discussed is the extensive monitoring that EPA has conducted at the sites, the results of which indicate that existing management practices have been successful at avoiding and minimizing adverse impacts. We respectfully request that NMFS concur with EPA's determination.

I greatly appreciate the assistance of your staff as EPA worked through our analysis and I look forward to our continued coordination. Please feel free to contact me or Brian Ross of my staff by e-mail (ross.brian@epa.gov) or by phone (415-972-3475) if you have any questions.

Sincerely,

Ellen M. Blake
Assistant Director, Water Division

Enclosure: EPA Analysis for ESA and EFH Consultation: Five Existing Hawaiʻi Ocean Dredged Material Disposal Sites

cc:
Mrs. Shelby Creager, Resource Management Specialist, NOAA NMFS
Mr. Stuart Goldberg, EFH Coordinator, NOAA NMFS

EPA Analysis for ESA and EFH Consultation:

Five Existing Hawai‘i Ocean Dredged Material Disposal Sites

US Environmental Protection Agency
Region IX
75 Hawthorne Street
San Francisco, CA 94105

October 8, 2020

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List of Acronyms and Abbreviations

BMP – Best Management Practice

EFH - Essential Fish Habitat

EIS – Environmental Impact Statement

ERL – Effects Range Low

ERM – Effects Range Median

ESA – Endangered Species Act

FEP – Fishery Ecosystem Plan

HAPC – Habitat Area of Particular Concern

MBES – Multibeam Echosounder Survey

MPRSA – Marine Protection, Research, and Sanctuaries Act

MSFCMA – Magnuson-Stevens Fishery Conservation and Management Act

MUS – Management Unit Species

NEPA – National Environmental Policy Act

ODMDS – Ocean Dredged Material Disposal Site

OTM – Ocean Testing Manual

PVP – Plan View Photography

SAP – Sampling and Analysis Plan

SDZ – Surface Disposal Zone

SMMP – Site Management and Monitoring Plan

SPI – Sediment Profile Imaging

TMDL – Total Maximum Daily Load

Overview of Consultation Document

This document contains the analysis to support the informal update to the programmatic Endangered Species Act (ESA) Section 7 consultation, as well as an Essential Fish Habitat (EFH) consultation, for the five existing Hawaiʻi ocean dredged material disposal sites (ODMDS), specifically for the transport and disposal of approved dredged material. Please note that this document does not cover impacts from individual dredging operations, as these impacts are separately evaluated, and project-specific consultations are conducted as necessary, by the US Army Corps of Engineers (USACE) during their permitting process.

The first three sections of this document (**Sections 1-3**) describe the use of the Hawaiʻi ocean disposal sites to date and the EPA regulations and management measures in place to avoid impacts to marine organisms and the marine environment. Also discussed is the extensive monitoring that EPA has conducted at the sites, the results of which indicate that existing management practices have been successful at avoiding and minimizing adverse impacts. These three sections contain information relevant to both the ESA and EFH analyses. Following these sections, analyses of potential impacts to ESA species and their critical habitat (**Section 4**) and to EFH (**Section 5**), are provided. Based on EPA's ocean disposal site selection process, rigorous pre-disposal sediment testing, and site management measures, EPA concludes that the continued use of the existing disposal sites, under management requirements that are similarly strict to those applied to date, may affect but is unlikely to adversely affect ESA species and habitat, and may affect EFH, however effects are expected to be minimal.

In addition, appendices are provided that include:

1. The consultation materials from the original designation of the five disposal sites in 1980;
2. The summary report from extensive monitoring of the two most heavily used disposal sites (South Oʻahu and Hilo) conducted by EPA in 2013;
3. The preliminary chemistry results from the monitoring survey of the Kahului, Nawiliwili, and Port Allen ocean disposal sites conducted by EPA in 2017; and
4. The 2015 Site Management and Monitoring Plan (SMMP) that includes site use and management requirements, including best management practices (BMPs) in the form of enforceable permit conditions (Note: EPA intends to update the SMMP again following completion of this programmatic consultation update).

1.0 BACKGROUND

Currently, five EPA-designated ocean dredged material disposal sites (ODMDS) serve the state of Hawaiʻi. These sites are off the islands of Oʻahu, Hawaiʻi, Maui, and Kauaʻi (**Figure 1**). They range from 4 to 6.5 nautical miles (nmi) offshore, in waters from 1,100 to 5,300 feet (330 to 1,610 meters) in depth (**Table 1**). Each site includes a small Surface Disposal Zone (SDZ) within which all disposal actions must take place, and a larger site boundary on the seafloor where most of the sediment is intended to deposit after falling through the water column.

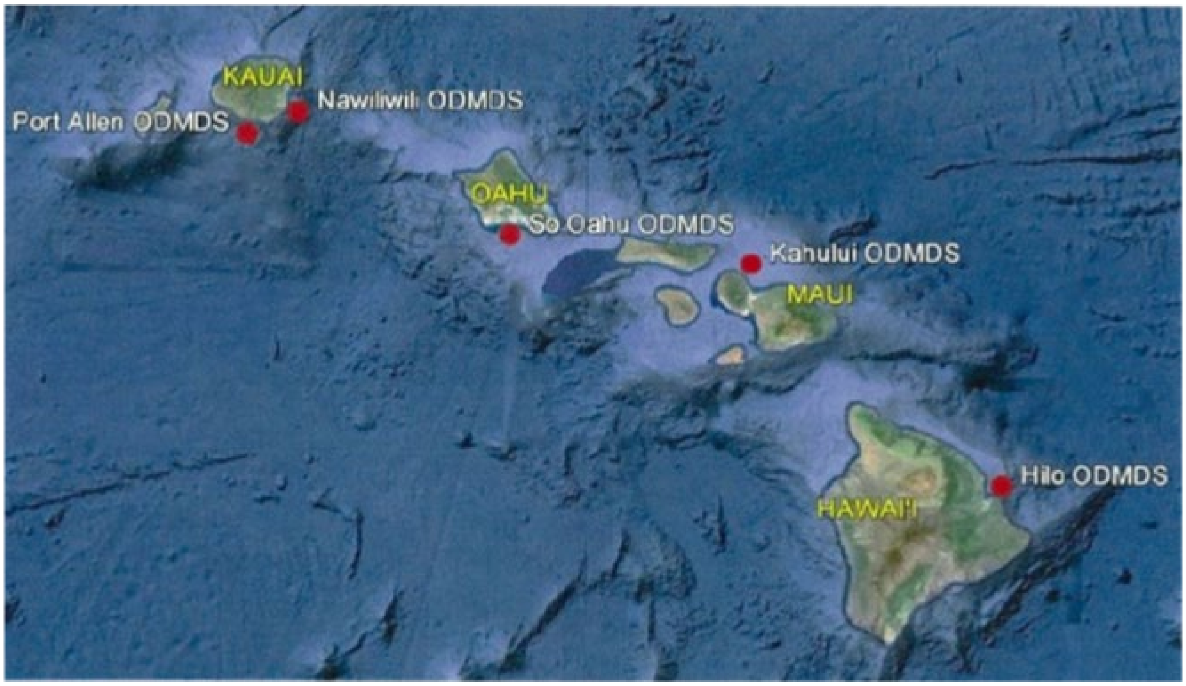

Figure 1. Vicinity map, showing the five existing Hawaiʻi EPA-designated ocean disposal sites.

Table 1. Dimensions and center coordinates for Hawaiʻi ocean disposal sites and their SDZs. The underlined text reflects an update to the 2015 Site Management and Monitoring Plan.

Disposal Site	Depth Range	Shape and Dimensions (Seafloor Footprint)	Surface Disposal Zone (SDZ) Dimensions	Center Coordinates (NAD 83)
South Oʻahu	375-475 m (1,230-1,560 ft)	Rectangular 2.0 (W-E) by 2.6 km (N-S) (1.08 by 1.4 nmi)	Circular 305 m (1000 ft) radius	21° 15’ 10” N, 157° 56‘ 50” W
Hilo	330-340 m (1,080-1,115 ft)	Circular 920 m (3000 ft) radius	Circular 305 m (1000 ft) radius	19° 48' 30" N 154° 58' 30" W
Nawiliwili	840-1,120 m (2,750-3,675 ft)	Circular 920 m (3000 ft) radius	<u>Circular, offset</u> 200 m (600 ft) radius: [21° 55' 15" N 159° 17' 13.8" W]	21° 55' 00" N 159° 17' 00" W
Port Allen	1,460-1,610 m (4,800-5,280 ft)	Circular 920 m (3000 ft) radius	Circular 305 m (1000 ft) radius	21° 50' 00" N 159° 35' 00" W
Kahului	345-365 m (1,130-1,200 ft)	Circular 920 m (3000 ft) radius	Circular 305 m (1000 ft) radius	21° 04' 42" N 156° 29' 00" W

The Hawai'i ocean disposal sites were designated together via rulemaking in 1981, based on a 1980 Final Environmental Impact Statement (EIS) completed by EPA Headquarters.[1] The National Marine Fisheries Service (NMFS) was consulted during the planning and selection stages for the designation of the ocean disposal sites for the purposes of dredged material disposal. This consultation included narrowing 14 proposed sites down to the five sites currently in use. The consultation focused specifically on three ESA-listed species: the humpback whale, the Hawaiian monk seal, and the green sea turtle. NMFS concluded that existing fisheries and endangered species under their jurisdiction would be unlikely to be adversely impacted by the proposed use of the sites, primarily because of the depths of the selected sites and the infrequent planned use of the sites. **Appendix 1** includes the portions of the EIS relevant to this consultation, including several letters from NOAA (Note: No tracking number is included, as EPA does not have a record of NOAA applying tracking numbers to discussions dating to this time period). Since that time, there have been additional species listed under ESA. All relevant ESA-listed species are discussed in this assessment (**Section 4**). In addition, Essential Fish Habitat (EFH) consultation was not required under Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) at the time of site designation, therefore EPA has included an EFH assessment herein as well (**Section 5**). EPA has determined that the five Hawai'i ocean disposal sites overlap with Essential Fish Habitat (EFH) for various life stages of several commercial fishery management unit species (MUS), including crustaceans, bottom fish, and pelagics.

Dredged material disposal volumes in Hawai'i are quite modest, with a long-term annual average of just over 220,000 cubic yards (cy) being disposed at all five sites combined (and even less since 2000; **Table 2**; USACE 2020a). As a comparison, the other seven ocean disposal sites managed by EPA Region 9 receive an average total of approximately 3 million cy each year. The Hawai'i sites also differ among themselves in use, reflecting the differing dredging needs of each island. The South O'ahu site, which serves US Navy facilities at Pearl Harbor as well as Hawai'i's main commercial port complex in Honolulu Harbor, is the most heavily used site, with at least some dredging and disposal occurring in 22 of the 40 years. On average, disposal at the South O'ahu site accounts for over 80% of all Hawai'i disposal. In recent years (since 2000), Hilo and Nawiliwili have been the next most frequently used sites (receiving ~9 and 8% of the total material, respectively), followed by Kahului (~2%). The Port Allen site has received no dredged material since 1999, however some disposal may occur in 2021.

The Marine Protection, Research and Sanctuaries Act (MPRSA) and EPA regulations call for careful alternatives analysis, design stipulations, and best management practices (BMPs) to reduce or eliminate potential adverse effects to marine resources (see **Section 3** for further details). For example, the regulations only allow suitable, non-toxic sediments to be discharged at EPA-designated ocean disposal sites; even when sediment is suitable for ocean disposal, it is only approved when there is no practicable alternative. In addition, the disposal site designation process itself is an important safeguard against any significant adverse impacts to marine resources, as EPA's site designation criteria explicitly lead EPA to identify disposal sites in locations removed from important habitat areas, fishing grounds, or other ocean uses, to the maximum extent practicable. Finally, ocean disposal sites are all managed under a Site Management and Monitoring Plan (SMMP) that enumerates any site-specific restrictions, limitations, or BMPs that may be needed to further minimize impacts of ocean disposal. While ocean disposal site designations themselves are completed

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[1] The 1980 FEIS and other referenced documents supporting this consultation are available via: https://www.epa.gov/ocean-dumping/managing-ocean-dumping-epa-region-9#hi

via formal rulemaking and are typically permanent, SMMPs are meant to be updated as needed based on the results of required, periodic site monitoring, or on changed conditions such as updated consultations.

Table 2. Disposal volumes (cy) at the five Hawaiʻi ocean disposal sites from 1981-2020 (Data source: EPA compliance tracking records and USACE Ocean Disposal Database (USACE, 2020a)).

Year	South Oʻahu	Hilo	Kahului	Nawiliwili	Port Allen	Total All Sites
1981						0
1982						0
1983	71,400			313,900		385,300
1984	2,554,600					2,554,600
1985	12,000					12,000
1986						0
1987	111,200					111,200
1988	57,400					57,400
1989	75,000					75,000
1990	1,198,000	80,000	58,000	343,000		1,679,000
1991	134,550					134,550
1992	233,000					233,000
1993				322,400		322,400
1994						0
1995						0
1996	27,800					27,800
1997						0
1998						0
1999	27,500		91,000	114,600	20,900	254,000
2000						0
2001						0
2002	53,500					53,500
2003	183,500					183,500
2004	540,000					540,000
2005		3,000				3,000
2006	160,400					160,400
2007	266,500					266,500
2008						0
2009	126,200					126,200
2010						0
2011	18,260	63,879				82,139
2012		70,981				70,981
2013	312,080					312,080
2014	351,920					351,920
2015						0
2016	53,900	118,300	57,200	64,700		294,100
2017						
2018						
2019	126,160			185,500		185,500
2020	235,000					235,000
Total 1981-2020	6,929,870	336,160	206,200	1,344,100	20,900	**8,837,230**
Average/year	182,365	8,404	5,155	33,603	523	**220,931**
Total 2000-2020	2,427,420	256,160	57,200	250,200	0	**2,990,980**
Average/year 2000-2020	121,371	12,198	2,724	11,914	0	**142,428**

EPA recently completed extensive monitoring surveys at each of the five Hawaiʻi ocean disposal sites. The South Oʻahu and Hilo sites (the most heavily used of the Hawaiʻi sites) were the first to be monitored, in 2013. The 2015 EPA synthesis report summarizing the results of that monitoring is included as **Appendix 2**. Based on the monitoring results, EPA updated the SMMP for all the Hawaiʻi sites in 2015 (**Appendix 4**). Similar monitoring surveys were also completed for the Nawiliwili, Port Allen, and Kahului sites in 2017,[2] and the SMMP for these sites will be updated again based on those monitoring results and on the outcome of this ESA and EFH consultation with your office.

2.0 THE FIVE HAWAIʻI OCEAN DISPOSAL SITES

This programmatic consultation update is being conducted for the five existing Hawaiʻi ocean disposal sites. Continued use of these existing disposal sites is critical to national defense and the maritime-related economy of the State of Hawaiʻi. The sites will continue to be used only for the disposal of suitable, non-toxic sediment dredged by USACE from the federally authorized navigation channels in Hawaiʻi's harbors, as well as for disposal of suitable, non-toxic dredged sediment from other permitted navigation dredging projects in Hawaiʻi, including by the US Navy (refer to **Section 3.2** for more details on sediment testing and suitability determination). Future disposal operations at the sites will continue to meet all criteria and factors set forth in the Ocean Dumping regulations published at 40 CFR Parts 228.5 and 228.6. Ocean disposal will also continue to occur under the terms of an SMMP that sets forth BMPs in the form of enforceable permit conditions, as well as site monitoring requirements and contingency actions should any adverse impacts be identified. Continued use of the five existing Hawaiʻi sites will not in and of itself increase the need for dredging or disposal in Hawaiʻi.

As identified by NMFS during pre-consultation coordination, ocean disposal of dredged material theoretically has the potential to cause short-term adverse effects to living marine resources in the water column and long-term effects to seafloor habitats and species. Various life stages of both ESA-listed species and different commercial fishery MUS could be affected by disposal-related stressors including turbidity and sedimentation, nutrients, and contaminants. However, EPA's ocean disposal site selection, rigorous pre-disposal sediment testing, and site management collectively help to ensure that adverse water column and seafloor effects to listed species, their habitats, and EFH are avoided or minimized.

3.0 NEGLIGIBLE IMPACTS TO DATE

EPA's disposal site selection, project evaluation, and site management processes are intended to ensure that ocean disposal produces no long-term, adverse impacts to the marine environment. Specifically, EPA requires evaluation of disposal sites prior to designation, determination of the need for ocean disposal, strict testing of sediments proposed for disposal, and management and monitoring of the sites to ensure that permit conditions are met, the sites are performing as expected, and no long-term adverse effects are occurring to the marine environment. These processes are described in more detail in the following paragraphs.

[2] A synthesis report is not yet available for the 2017 monitoring work, but the key results are discussed in this consultation document, and preliminary chemistry results are available in **Appendix 3**.

3.1 Disposal Site Designation

EPA's ocean disposal site designation process includes criteria for avoiding impacts to the aquatic environment and to human uses of the ocean to the maximum extent possible, within an economically feasible transport distance from the area where navigation dredging must occur. The site designation process and regulations (promulgated under the MPRSA and the National Environmental Policy Act (NEPA)) independently require evaluation of a variety of factors that minimize the potential effects of disposal on marine species and their habitat. The MPRSA regulations at 40 CFR Part 228.5 – 228.6, include the following disposal site selection criteria to avoid or minimize impacts on marine species and their habitats:

- Disposal activities must avoid existing fisheries and shellfisheries (228.5(a));
- Temporary water quality perturbations from disposal within the site must be reduced to ambient levels before reaching any marine sanctuary or known geographically limited fishery or shellfishery (228.5(b));
- The size of disposal sites must be minimized in order to be able to monitor for and control any adverse effects (228.5(d));
- Where possible, disposal sites should be beyond the edge of the continental shelf (228.5(e));
- The location of disposal sites must be considered in relation to breeding, spawning, nursery, feeding or passage areas of living resources in adult or juvenile phases (228.6(a)(2));
- Dispersal and transport from the disposal site be must considered (228.6(a)(6));
- Cumulative effects of other discharges in the area must be considered (228.6(a)(7));
- Interference with recreation, fishing, fish and shellfish culture, areas of special scientific importance and other uses of the ocean must be considered (228.6(a)(8)); and
- The potential for development or recruitment of nuisance species must be considered (228.6(a)(10)).

Taken together, the site selection criteria are intended to ensure that EPA's ocean disposal site designations avoid direct impacts to any important fishery or supporting marine habitat to the maximum extent practicable, before any actual dredged material disposal is permitted. Based on these site selection criteria, the five Hawaiʻi sites were identified as the environmentally preferred alternative locations serving each of the five main Hawaiʻi port areas.

3.2 Dredged Material Testing

In addition, EPA's regulations establish strict criteria for evaluating whether dredged material is suitable for ocean disposal (40 CFR Part 227.5-9). The regulations specify that certain prohibited constituents, such as industrial wastes or high-level radioactive wastes, may not be disposed in the ocean at all, while other constituents, such as organohalogen compounds or mercury, may only be discharged if they are present in no more than "trace" amounts that will not cause an unacceptable adverse impact after dumping. "Trace" is determined by passing a series of bioassays that address the potential for short- and long-term toxicity and bioaccumulation. EPA and USACE have jointly published national sediment testing guidance for conducting these evaluations in advance of dredging, called the "Ocean Testing Manual," (OTM) (EPA, 1991).

Sampling and Analysis Plans

EPA and USACE review and approve sampling and analysis plans (SAPs) in advance of each dredging project to ensure that the samples to be tested are representative of the material to be dredged. The number and location of required sediment samples is informed by the volume to be dredged and past testing history, but specific attention is focused on sampling near known or potential sources of contamination such as outfalls, storm drains, repair yards, and industrial sites. Individual samples may be composited for analysis only within contiguous areas expected to be subject to the same pollutant sources and hydrodynamic factors (e.g., a single berth in a harbor). Representative sediment collected pursuant to an approved SAP is then subjected to chemistry evaluations, toxicity bioassays (for short-term water column and longer-term benthic impacts), and bioaccumulation tests, as described below. The results are then compared to the same tests conducted with reference site sediment (Note: The approved reference sediment for the Hawaiʻi sites is specified in the SMMP).

Sediment Chemistry

An extensive list of potential contaminants of concern is measured in each sediment sample or composite, and in the reference sediment. Standard analytes and the associated recommended laboratory methods and target detection limits are listed in the SMMP. These include "conventional" properties such as grain size and organic carbon content, as well as heavy metals, organotins, hydrocarbons, pesticides, poly-chlorinated biphenyls, and dioxins/furans. EPA and USACE can add compounds to this standard list whenever deemed necessary. Sediment chemistry results can be compared against various sediment guidelines (such as NOAA's effects range low (ERL) and effects range median (ERM) values) to help inform the biological testing. However, there are no "bright-line" sediment quality standards in the way that there are for water quality standards. Therefore, sediment chemistry results alone are rarely adequate to determine whether a sediment "passes" or "fails" for ocean disposal suitability.

Water-Column Testing

In contrast to the seafloor where potential exposure to disposed sediment is long-term, exposure to disposal plumes in the water column is temporary. Nevertheless, to be "suitable" for ocean disposal, water column assessments must confirm that temporary exposure to the suspended sediment immediately following disposal will not exceed applicable marine water-quality criteria or cause toxicity to representative sensitive marine organisms after allowance for initial mixing and dilution. For each tested sediment sample, organisms are exposed to a series of concentrations of elutriate (water plus suspended particulates) to determine the toxic concentration (LC50). A 100-fold safety a factor is then applied, such that after initial mixing the water column plume may not exceed 1% of the LC50 for the most sensitive organism tested. Three separate water-column bioassays are conducted, with one species being a phytoplankton or zooplankton, one a larval crustacean or mollusc, and one a fish. Species must be chosen from among a list of sensitive standard test species listed in the national manual or specified in regional guidance.

All the Hawaiʻi disposal sites are offshore, in relatively deep water, where initial dilution is rapid and disposal plumes dissipate to background levels quickly. Although potential water column effects are assessed for every proposed project as described, water column testing alone has rarely, if ever, "failed" a project for ocean disposal at any of the Hawaiʻi sites. Therefore, the potential for direct effects to water column species, including planktonic species, filter feeders reliant on planktonic species, or pelagic prey species, is considered discountable. Similarly, cumulative water column effects are not expected because discharges from disposal vessels typically occur over only a few minutes, and individual disposal events are at least several hours apart, even in the most active circumstances.

Benthic Testing

For the benthic toxicity assessment, at least two "solid phase" bioassays are conducted. For these tests, sediment-associated species must be used that together represent key exposure routes including filter-feeding, deposit-feeding, and burrowing life histories. Again, the test species must be chosen from among a list of sensitive standard test species listed in the national manual (i.e., the OTM) or regional guidance. If organism mortality is statistically greater than in the reference sediment and exceeds reference sediment mortality by 10% (20% for amphipods), the sediment is considered potentially toxic and may not be approved for ocean disposal. Solid phase benthic toxicity is usually the cause when sediments "fail" for ocean disposal.

Bioaccumulation Testing

Bioavailability – the potential for contaminants to move from the sediment into the food web – must also be evaluated in advance for each dredging project. Bioaccumulative contaminants are selected and evaluated by EPA for each project based on their presence in the test sediment. Benthic organisms are then exposed to the sediment (usually for 28 days), and concentrations of the contaminants of concern taken into the tissues are measured. The tissue concentrations are then compared against concentrations in tissues of the same species exposed to the reference sediment. Depending on results, tissue concentrations may also be used in trophic transfer models, and/or compared against available benchmarks such as any relevant total maximum daily loads (TMDLs), state or local fish consumption advisories, and Food and Drug Administration (FDA) "Action Levels for Poisonous or Deleterious Substances in Fish and Shellfish for Human Food."

"Tier IV" Testing

In the rare circumstance when the standard testing described above is unable to support a suitability determination for ocean disposal, the presumptive conclusion is that the sediment is not suitable, and ocean disposal may not be approved. However, if the dredger wishes, additional non-standard testing may be approved by EPA and USACE. Described in the OTM as "Tier IV" testing, this can include any evaluations EPA deems necessary to generate adequate information. For example, Tier IV can involve more or different kinds of bioassays such as chronic sublethal tests or steady-state bioaccumulation tests, detailed site-specific risk assessments, or forensic toxicity testing procedures (TIEs, etc.). Because Tier IV testing is "open ended," it can be quite expensive, and there is no guarantee that it will result in sediment being approved for ocean disposal. Thus, it is rarely applied in practice.

3.3 Alternatives Analysis

EPA's regulations restrict ocean disposal of dredged material by outlining factors for evaluating the need for ocean disposal and requiring consideration of alternatives to ocean disposal (40 CFR Part 227.14-16). Alternatives to ocean disposal, including beneficial uses of dredged material, are considered on a project-by-project basis to ensure that the minimum necessary volume of dredged material is disposed at any of the ocean disposal sites. Generally, alternatives to ocean disposal in the islands are more limited than on the mainland. However, even sediments that have been adequately characterized and found by EPA and USACE to be suitable for ocean disposal will not be permitted for ocean disposal if there is a practicable alternative available. For example, clean sand that is otherwise suitable for ocean disposal generally will not be permitted for disposal if it can be feasibly used to nourish local beaches.

3.4 Disposal Site Management: Best Management Practices

In addition to careful site selection, extensive sediment testing prior to dredging, and evaluation of disposal alternatives, EPA actively manages ocean disposal sites to further minimize effects. Once a dredging project is approved for ocean disposal at one of the Hawaiʻi sites, additional management measures are taken to continue to minimize the potential for adverse effects. These management measures, outlined in the SMMP for the Hawaiʻi sites (2015; **Appendix 4**), include:

- a variety of disposal BMPs as enforceable permit conditions for each project;
- satellite tracking all disposal vessels to ensure that disposal activities occur only where and as required (**Figure 2**);
- sensors on all disposal vessels to ensure that there is no significant leakage or spilling of dredged material during transit to the disposal site, especially during transit through the nearshore zone where corals, seagrasses, and sensitive animals are most likely to be present; and
- tracking and sensor information reported online for each disposal trip.

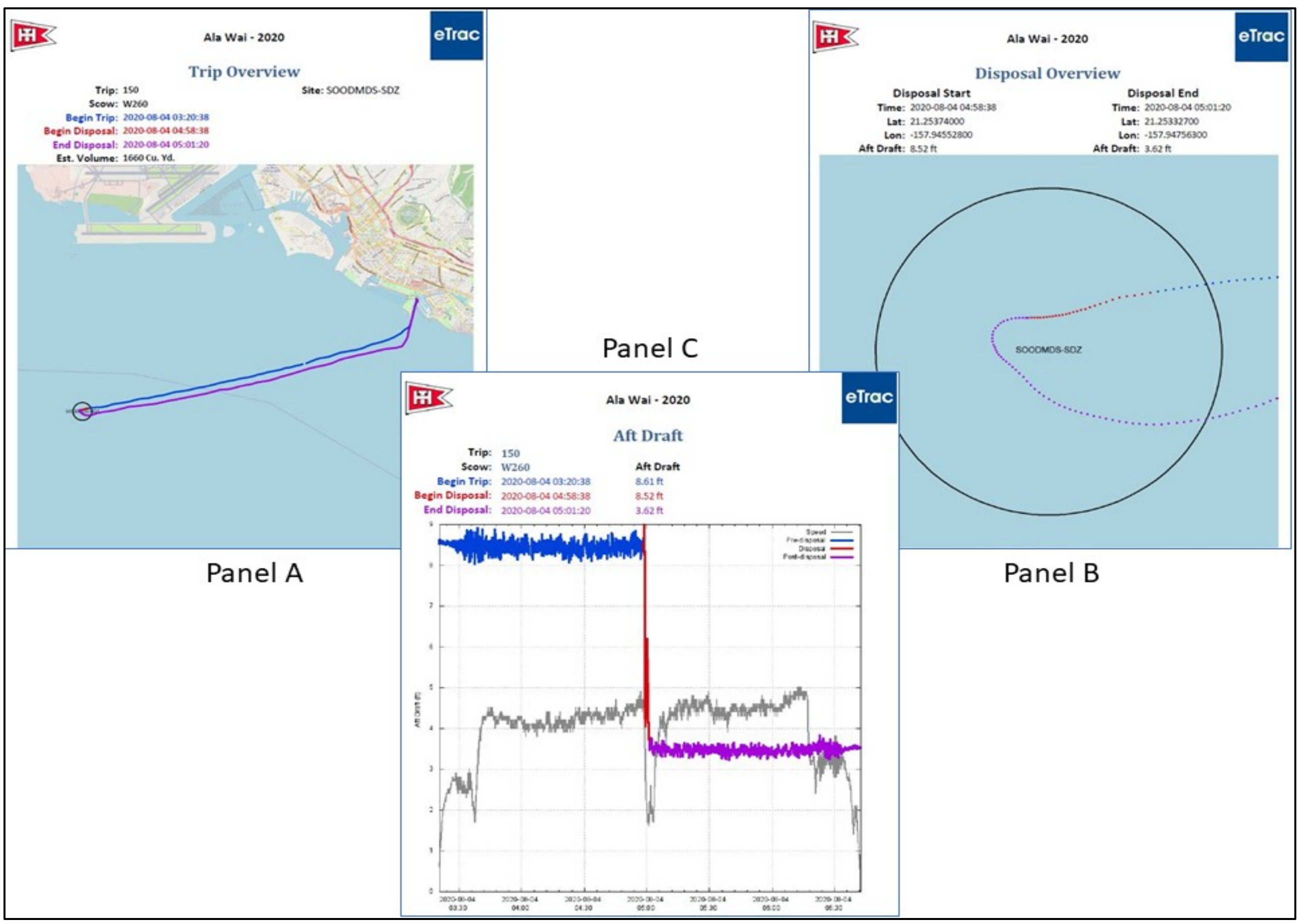

Figure 2. Example of a tracking report for an individual disposal trip. Panel A shows the vessel's route to and from the disposal site, with the blue line indicating the vessel is loaded and purple indicating it is empty following disposal. Panel B is a closeup of the disposal site's SDZ, showing the disposal (in red) occurring fully within the zone. Panel C shows the vessel's draft and speed throughout the trip, confirming no substantial loss of material from the vessel during transport.

Additionally, disposal vessels using the five Hawaiʻi ocean disposal sites already operate at slow speeds (generally 6 to 8 knots) consistent with NMFS recommendations for minimizing vessel strikes. As exemplified in **Figure 2**, tracking information collected from dredging vessels indicates that vessels generally operate at approximately 3 to 4 knots for the first half hour of transit from shore, only increasing speed slightly in deeper waters. These slower speeds help to reduce the potential for strike injuries to marine organisms.

3.5 Disposal Site Management: Site Monitoring

Monitoring Methods

As a critical component of site management, EPA periodically conducts surveys of disposal sites to confirm that only physical effects occur within site boundaries, and that no adverse, physical, chemical, or biological effects occur outside the disposal site. Research conducted by EPA and USACE since the inception of the MPRSA has shown that the greatest potential for environmental impact from dredged material is in the benthic environment. This is because deposited dredged material is not mixed and dispersed as rapidly or as greatly as the portion of the material that may remain in the water column, and bottom-dwelling animals live in, and feed on, deposited material for extended periods. Therefore, EPA monitoring of ocean disposal sites has focused primarily on the benthic environment, including the sediment chemistry, physical characteristics of the benthos, and the benthic community. EPA conducted extensive site monitoring surveys of the Hawaiʻi ocean disposal sites in 2013 and 2017 (see **Appendix 2** for the final report from the 2013 monitoring surveys). During these surveys, EPA used a variety of methods to achieve the monitoring objectives, including high-resolution multibeam echosounder surveys (MBES), sediment profile imaging (SPI) and plan view photography (PVP), and sediment grabs for sediment chemistry and benthic infauna sampling.

MBES surveys were successfully conducted for the Nawiliwili, Kahului, and Port Allen sites in 2017 to assist in selecting survey stations for the SPI-PVP and sediment grab sampling (**Figure 3**). MBES surveys were also planned for the South Oʻahu and Hilo sites in 2013, but they could not be executed due to equipment issues on the vessel. In the absence of the MBES survey data, analysis of the SPI-PVP imagery (described below) was used to map the horizontal and vertical extent of the dredged material footprint and to select stations for the sediment chemistry and benthic infauna sampling.

The SPI-PVP system provides a surface and cross-sectional photographic record of selected locations on the seafloor to allow a general description of conditions both on and off dredged material deposits (**Figure 4**). SPI-PVP surveys were conducted for each ocean disposal site to delineate the horizontal extent of the dredged material footprint both within and outside the site boundaries, as well as the status of benthic recolonization. With resolution on the order of millimeters, the SPI system is more useful than traditional bathymetric or acoustic mapping approaches for identifying a number of features, including the spatial extent and thickness of the dredged material footprint over the native sediments of the seabed, the level of disturbance and recolonization as indicated by the depth of bioturbation, the apparent depth of the redox discontinuity, and the presence of certain classes of benthic organisms. PVP is useful for identifying surface features in the vicinity of the SPI photos, thereby providing important surface context for the vertical profiles at each station.

Additionally, sediment samples were collected from a subset of stations at each disposal site using a stainless steel double Van Veen sediment grab capable of penetrating a maximum of 20 cm below the sediment surface. The samples were analyzed for sediment grain size, chemistry, and benthic community parameters.

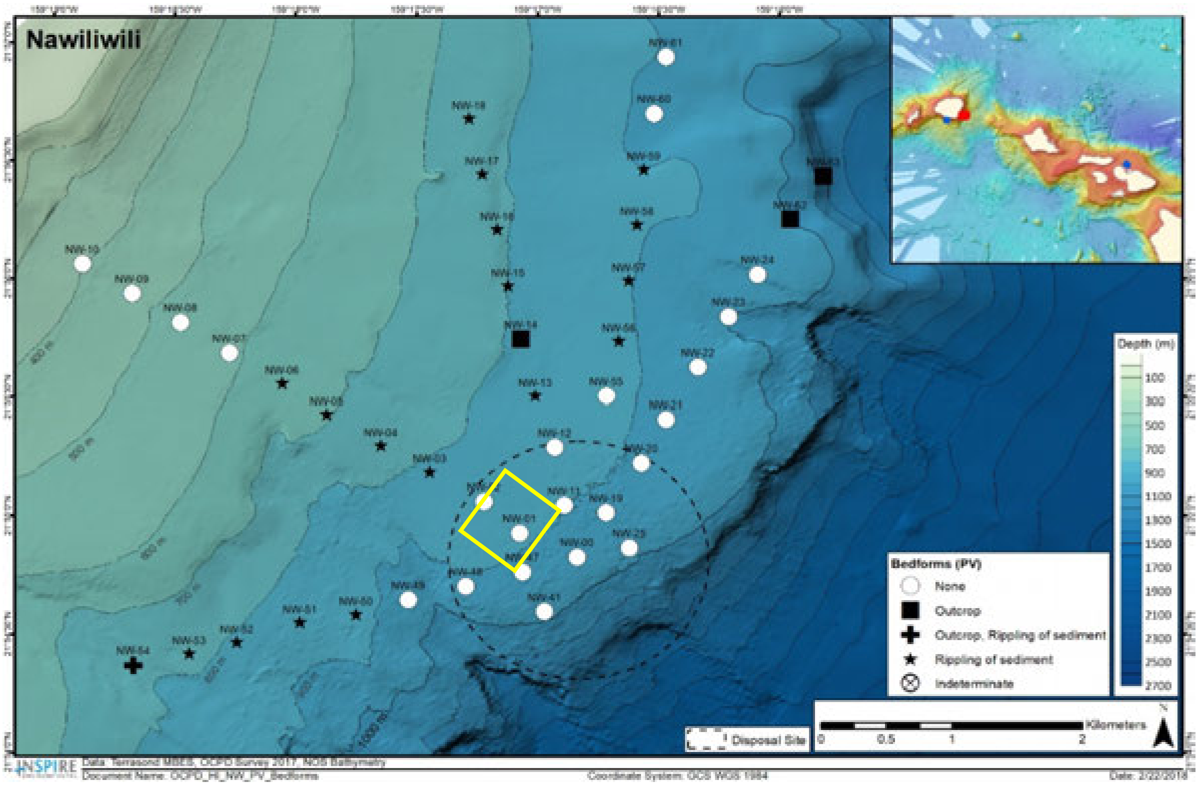

Figure 3. High-resolution bathymetry in the vicinity of the Nawiliwili disposal site. The hard-bottom habitat and a volcanic escarpment in the southeastern portion of the site precluded benthic sampling in that area. The yellow box indicates the target for the general area in which the SDZ would be repositioned (see **Figure 5** for final SDZ placement).

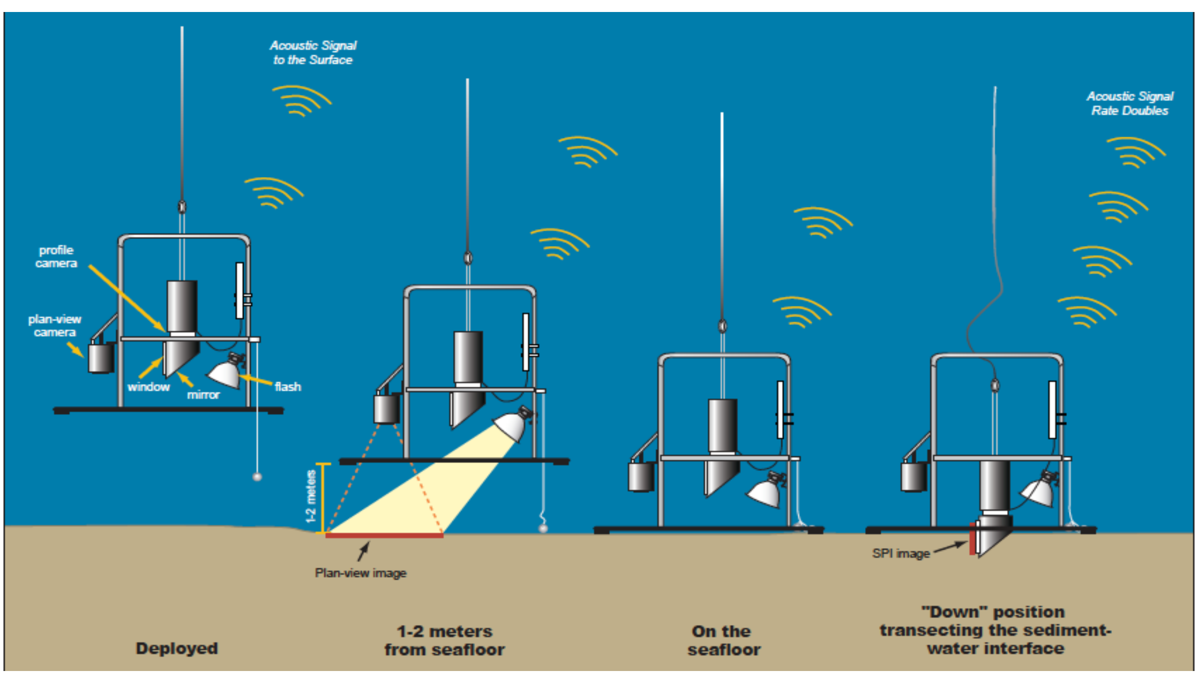

Figure 4. Schematic of deployment and collection of SPI-PVP photographs (**Appendix 2**).

Finally, a sub-bottom profiling survey was conducted at the South Oʻahu site. The primary purpose of this survey was to collect cross-sectional images of the native sediment layers and layers indicative of the dredged material deposit across a wide area surrounding the South Oʻahu ocean disposal site. This type of survey allowed EPA to separately estimate the cumulative volume of dredged material disposed at the South Oʻahu site, compared to volumes permitted for disposal. The South Oʻahu site was selected for the survey, because it receives the most dredged material out of the five Hawaiʻi ocean disposal sites.

Monitoring Results

Sediment chemistry. Sediment samples from both inside and outside each of the five Hawaiʻí disposal sites were collected successfully and analyzed for the same compounds evaluated during pre-disposal testing. The bulk chemistry data from the 2013 monitoring surveys showed generally low, but variable, concentrations of most chemical constituents at the South Oʻahu and Hilo sites (the most frequently used sites) (**Appendix 2**). The few concentrations above screening levels were relatively minor in magnitude and, in many cases, were seen at stations both inside and outside the sites. The few constituents that were at higher concentrations within the disposal sites reflect the contaminant levels in the dredged material approved for discharge. Because sediments that contain pollutants in toxic amounts, or elevated levels of compounds that may bioaccumulate in benthic organisms, are prohibited from ocean disposal, the chemical concentrations identified are not considered to represent a risk of environmental impacts in and of themselves. Instead, these low concentrations indicate that the pre-dredge sediment testing regime is adequately protecting the environment of the disposal sites by identifying and excluding more highly contaminated sediments from being disposed. Sediment chemistry was also collected at the Nawiliwili, Kahului, and Port Allen ocean disposal sites, and is currently being analyzed for results (preliminary results are available in **Appendix 3**; once the report is finalized, it will be made available to NMFS). Preliminary screening indicates that, similar to the South Oʻahu and Hilo sites, the majority of chemical concentrations fell below the ERL, and the few concentrations above screening levels were relatively minor in magnitude and, in most cases, were seen at stations both inside and outside the sites.

Physical substrate. Physical substrate was assessed primarily through SPI-PVP imagery. Monitoring confirmed that minor physical (substrate) changes have occurred at the disposal sites compared to pre-disposal baseline data from 1980. Results of the 2013 survey indicated that a detectable dredged material footprint extended outside of the South Oʻahu site, however there have been no documented "short-dumps" (i.e., discharge or loss of dredged material during transit to an ocean disposal site, prior to arrival at the site) since EPA required satellite-based tracking of all disposal scows in the early 2000s, with the exception of a single partial mis-dump that occurred in 2006. Thus, the footprint outside the South Oʻahu disposal site boundary would appear to be relic material deposited more than 10 years ago. At the Hilo site, the substantially smaller cumulative volume of dredged material disposed (**Table 2**) appeared to be more fully confined within the designated disposal site boundary.

The results of the 2017 survey indicated that recently disposed dredged material, including coral and pebble rubble, was present on the seafloor surface within and near the Nawiliwili ocean disposal site. However, the commonplace presence of coral rubble and other coarse materials and sands at the seafloor surface across the survey area confounded definitive delineation of the dredged material footprint. Surveys at Port Allen and Kahului also indicated that the dredged material footprint was primarily contained within the site boundary, yet some material was detectable beyond the designated boundary to some extent at both sites. Again, because EPA has required satellite-based tracking of all disposal scows since the early 2000s, and mis-dumping has not occurred at least since then, the dredged material observed outside the sites is also assumed to be relic material. Additionally, due to benthic activity, dredged material was witnessed to have been reworked into the sediment. For example, all material at the Port Allen ocean disposal site was observed to have been reworked into the sediment column by biota to some extent and no thick deposits were observed.

Benthic community. The benthic community was assessed through both SPI imagery and sediment grab samples. Overall, the changes in substrate may partially account for minor differences in infaunal assemblages found during the 2013 monitoring at the South O‘ahu and Hilo sites (the most heavily used of the Hawai‘i disposal sites). However, minor benthic community changes were also seen outside those disposal sites and so appear to be partially attributable to region-wide variability as well. In addition, there were no apparent adverse effects to the infaunal community associated with the presence of dredged material at the Kahului and Port Allen ocean disposal sites. The vast majority of stations across both survey areas supported stable benthic structure or advanced stages of infaunal recolonization. The presence of advanced recolonization at stations containing dredged material indicates that the benthic community has recovered at these locations post-disposal activity. Because the Nawiliwili site was so heterogeneous, benthic community grab samples were not successfully collected inside the site for comparison to the benthic community outside the site. However, the one SPI replicate that achieved sufficient penetration near the center of the Nawiliwili site indicated the presence of stage 3 (advanced) fauna. Additionally, as previously mentioned, disposal volumes at Nawiliwili are relatively low, and preliminary screening of chemistry results indicated that dredged material disposed did not appear to result in contaminant loading, as most of the contaminants were below the ERL, and the few concentrations above screening levels were found both inside and outside of the site. Therefore, all available results from Nawiliwili indicate that dredged material disposed did not adversely affect the benthic environment. In summary, monitoring at all five sites confirmed that recolonization begins soon after dredged material is deposited, and that similar infaunal and epifaunal communities occupy areas both inside and outside the disposal sites. Thus, long-term impact to benthic habitat quality are discountable and largely contained within the site boundaries.

3.6 Disposal Site Management: An Adaptive Approach

Ongoing use of the five existing Hawai‘i ocean disposal sites will not increase the need for dredging in Hawai‘i, nor the amount of ocean disposal of dredged material that occurs. It is therefore expected that there would similarly be a lack of significant impacts in the future, provided that the ocean disposal sites continue to be managed under the same or similar requirements. EPA proposes to continue managing the five existing Hawai‘i disposal sites under site use conditions and BMPs that are substantially the same as those currently in place (see **Appendix 4**). The only substantive change in site management is the recent relocation of the SDZ within the existing Nawiliwili site, as shown in **Figure 5**, and as incorporated in permit conditions for the site. [3] This change was made based on the results of the 2017 monitoring survey, which identified hard-bottom habitat (including a volcanic escarpment, marking the ancient shoreline) in the southeastern portion of the Nawiliwili site (**Figure 3**). The relocated SDZ will avoid future deposition of sediment on the hard-bottom habitat and facilitate future monitoring of dredged material discharges on the natural sediment habitat in the northwestern portion of the site. This relocation of the SDZ is an example of EPA’s adaptive approach to site management.

[3] The new SDZ will also be reflected in the updated SMMP, to be published following completion of these consultations.

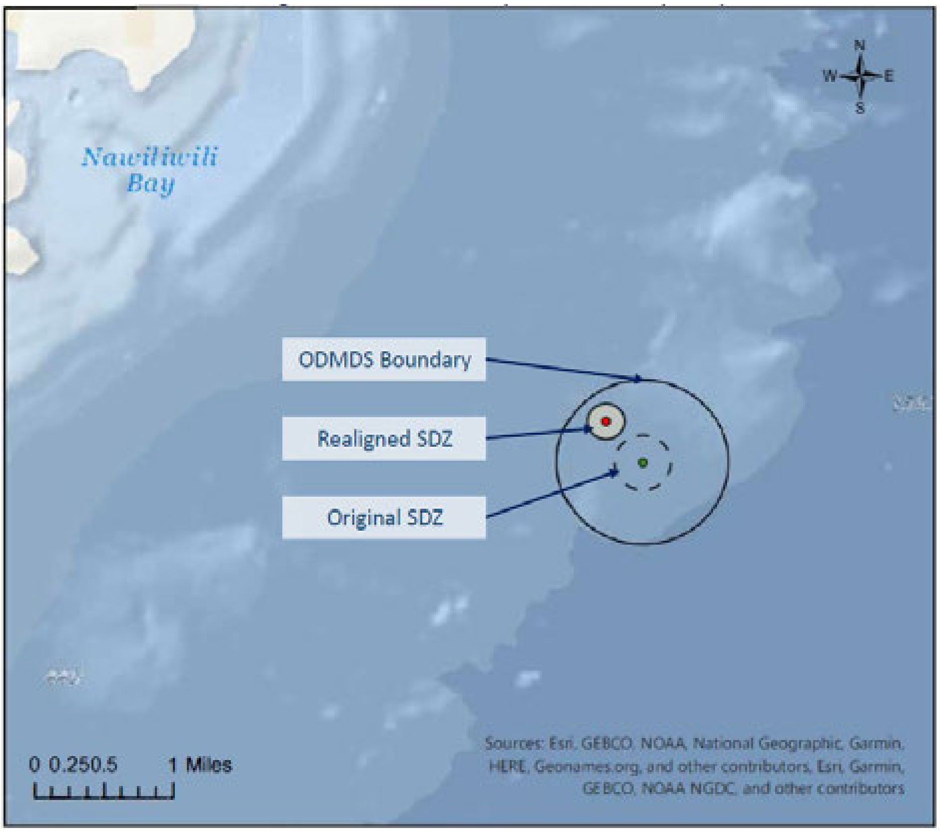

Figure 5. The Nawiliwili disposal site, showing the realigned SDZ. EPA has moved the SDZ to avoid deposition over hard-bottom habitat and facilitate monitoring of disposed sediments.

3.7 Enforcement

In addition to active, adaptive management of the five Hawaiʻi ocean disposal sites, EPA has strong enforcement authority under the MPRSA for any violations related to disposal operations. Violations may include dumping of unauthorized materials, dumping of materials in excess of authorized amounts, dumping outside of designated sites, and spills or leaks from hopper dredges or scows during transit to the ocean disposal sites. EPA authorities apply to violations of the MPRSA itself (for unpermitted dumping) or of an MPRSA permit, (including violations relating both to dumping and transportation for the purpose of dumping). If the provisions of a permit are violated, the permit may be revoked or suspended; even if the permit is not revoked, the MPRSA authorizes EPA to require ocean dumping activities to immediately cease when violations are imminent or continuing. EPA may even suspend the use of the ocean disposal site altogether, if necessary. In addition to ensuring that ongoing violations are stopped, EPA may impose monetary penalties when ocean dumping violations occur. Administrative penalties imposed by EPA under the MPRSA can be quite heavy and serve as an effective deterrent to ongoing ocean dumping violations. Consequently, it is rare that EPA is forced to refer an ocean dumping case for judicial or criminal penalties.

Although the MPRSA does not expressly authorize penalty assessments for natural resource damages, EPA considers the gravity of the violation (including effects to sensitive species or habitats), prior violations, and the demonstrated good faith of the person charged when determining a civil penalty amount. Finally, the MPRSA authorizes citizen suit enforcement as well. However, the MPRSA does not provide retain and use authority; under the Miscellaneous Receipts Act, fines and penalties are transmitted to the general treasury rather than for purposes of mitigating any damage in and around the ocean disposal site.

Additionally, the BMPs included in EPA's SMMPs become enforceable conditions when attached to the USACE's ocean disposal permits. Those conditions can include requirements that minimize the risk of impacts should a violation occur, such as seasonal limitations or specified transit routes to and from the disposal site. These kinds of specifications have not been applied to the Hawaii ocean disposal sites in the past, but where necessary and feasible they could be included in the SMMP.

4.0 ESA SPECIES ASSESSMENTS

The five Hawaiʻi ocean disposal sites have been in use since their designation in 1981. NMFS was consulted during the planning and selection stages for the designation of the sites. The consultation focused specifically on three ESA-listed species: the humpback whale, the Hawaiian monk seal, and the green sea turtle. NMFS concluded that existing fisheries and endangered species under their jurisdiction would be unlikely to be adversely impacted by the proposed use of the sites, primarily because of the depths of the selected sites and the infrequent planned use of the sites (**Appendix 1**). Since that time, there have been additional species listed under ESA. As part of this informal update to the programmatic consultation, EPA has assessed potential impacts to all relevant ESA-listed species in the following sections. Through these assessments, EPA has again determined that the continued use of the Hawaiʻi sites may affect, but is not likely to adversely affect, ESA-listed species.

4.1 Potential Impact Summary

NMFS has identified that ocean disposal of dredged material theoretically has the potential to cause short-term adverse effects to marine organisms in the water column, and long-term effects to seafloor habitats and species. Various listed species could potentially be affected by disposal-related stressors including turbidity, sedimentation, and contaminants. However, EPA's management measures, including ocean disposal site selection, rigorous pre-disposal sediment testing, and site use best management practices, are effective at preventing adverse impacts to water column species, and seafloor habitats and species.

Furthermore, marine mammals, sea turtles, and fishes, as well as corals, seagrasses, and other important habitats, are generally much more susceptible to potential impacts associated with dredging itself, rather than from open water disposal. Dredging typically occurs in relatively enclosed waterbodies that may have restricted movement pathways, limiting animals' ability to avoid or minimize exposure to noise or turbidity. If the sediment being dredged is contaminated, there may also be increased risk of exposure to resuspended contaminants, depending on the presence and effectiveness of dredging control measures such as silt curtains or timing restrictions. Dredging may also temporarily or permanently damage or remove organisms or important habitat features such as corals and seagrasses. Potential impacts from dredging itself are assessed by USACE on a project-specific basis, during the USACE permitting process.

In contrast, regardless of where or when the dredging occurs, placement of the sediment at any of the five Hawaiʻi offshore disposal sites has significantly less potential to adversely affect pelagic or benthic species at all life history stages for several reasons:

1. The sites were designated in locations originally selected to minimize impacts by avoiding any unique or limited habitats to the extent practicable (as described in **Section 3.1**).
2. Only "suitable" (non-toxic) dredged material is permitted to be disposed. Rigorous pre-dredging testing occurs to determine the suitability of material for disposal (as described in **Section 3.2**). The testing examines persistence, toxicity, and bioaccumulation to ensure that material disposed will not cause an unacceptable adverse impact after dumping. This testing therefore ensures that trophic cascades are unlikely. As confirmed by EPA monitoring and modelling, no short- or long-term contaminant exposure concerns are associated with the discharged sediment.
3. Each disposal vessel is closely tracked during transit through the nearshore zone. This tracking includes sensors to detect any substantial leaking or spilling of material that could increase turbidity and suspended sediment near sensitive habitats, such as corals and seagrasses. Disposal vessels that leak or spill must be removed from service and repaired before being approved for continued use (refer to **Section 3.7** on enforcement for more details on how violations may be addressed).
4. Individual disposal events only last two to four minutes at the surface, and upper water column plumes dissipate to background levels quickly. Sediments whose plumes would result in any toxicity to sensitive water column organisms after initial mixing (including a 100-fold safety factor) may not be permitted for ocean disposal. The short nature of the disposal, as well as the low toxicity in the water column (as described in **Section 3.2)** also ensure that filter feeders and other organisms in the water column are unlikely to be widely impacted by any contaminants in the dredged material disposed.
5. Discharge volumes from individual disposal events range from approximately 1,000 cy (which is typical for many harbor dredging projects not conducted by USACE, where clamshell-dredged material is placed into towed scows) to as much as 5,000 cy at a time (typical for USACE hopper dredging loads). Based on the average annual disposal volumes (142,428 cy) since 2000 (**Table 2**), this equates to an average of 28 to 142 individual disposal trips going to all five Hawaiʻi ocean disposal sites combined in any one year. As noted, this degree of ocean disposal activity is modest in comparison to other disposal sites located in Region 9.
6. EPA-required satellite tracking confirms that disposal vessels typically travel at maximum speeds of 6 to 8 knots when transiting the approximate 4 to 6.5 nmi from harbor dredging locations to the Hawaiʻi ocean disposal sites. These speeds are consistent with vessel speed limitations recommended by NMFS to minimize vessel strikes to whales (Refer to **Section 4.3** for a discussion on why these speeds are also likely to minimize strikes to sea turtles).
7. Vessels slow to nearly a stop during disposal activities. Additionally, the disposal sites are several miles offshore in deep water, where there is more space for species to avoid the vessels, and generally fewer foraging areas for certain listed species, such as turtles. Due to the low speed of the vessels and the depths of the sites, potential injuries such as crushing overhead injuries are very unlikely to occur.

For these reasons, it is appropriate to programmatically assess the potential impacts of disposal of suitable material at EPA-designated ocean disposal sites and to programmatically apply necessary avoidance and minimization measures in the SMMP. USACE then includes the disposal sites' programmatic disposal restrictions (as well as any dredging-related restrictions) as enforceable conditions in individual permits for dredging projects.

Monitoring conducted in and around the five Hawaiʻi ocean disposal sites has not identified any unacceptable adverse impacts resulting from previous disposal, and significant adverse effects are not expected in the future, due to sediment quality testing procedures and site management measures, including compliance requirements for vessel tracking. Based on the management and monitoring to date, EPA has again determined that the continued use of the five Hawaiʻi ocean disposal sites may affect but is unlikely to adversely affect the marine mammal, sea turtle, and fish species listed in **Table 3**, as discussed below.

Table 3. NMFS-managed Species under ESA in the Pacific Islands Region (NMFS list from 7/31/18).

	Species	Status	EPA Recommendation
Marine Mammals - Cetaceans	Blue Whale	Endangered	May affect, not likely to adversely affect
	Hawaiian Insular False Killer Whale	Endangered	May affect, not likely to adversely affect
	Hawaiian Insular False Killer Whale Critical Habitat		May affect, not likely to adversely affect
	Fin Whale	Endangered	May affect, not likely to adversely affect
	North Pacific Right Whale	Endangered	May affect, not likely to adversely affect
	Sei Whale	Endangered	May affect, not likely to adversely affect
	Sperm Whale	Endangered	May affect, not likely to adversely affect
Marine Mammals - Pinnipeds	Hawaiian Monk Seal	Endangered	May affect, not likely to adversely affect
	Hawaiian Monk Seal Critical Habitat		May affect, not likely to adversely affect OR No Effect
Sea Turtles	Green Turtle, Central North Pacific DPS	Threatened	May affect, not likely to adversely affect
	Hawksbill Turtle	Endangered	May affect, not likely to adversely affect
	Leatherback Turtle	Endangered	May affect, not likely to adversely affect
	Loggerhead Turtle, North Pacific DPS	Endangered	May affect, not likely to adversely affect
	Olive Ridley Turtle	Threatened	May affect, not likely to adversely affect
	Olive Ridley Turtle (Mexican Nesting Population)	Endangered	May affect, not likely to adversely affect
Fishes	Giant Manta Ray	Threatened	May affect, not likely to adversely affect
	Oceanic Whitetip Shark	Threatened	May affect, not likely to adversely affect

4.2 Marine Mammals

Blue Whale *(Balaenoptera musculus)*
The blue whale is ESA-endangered and protected throughout its range. This species is the largest to ever live on Earth. It feeds almost exclusively on krill. Blue whales can reach a weight of up to 330,000 pounds (165 tons) and a length of 110 feet. It can be found in very ocean except the Arctic. They spend summers feeding in polar waters and migrate towards the equator to winter in warmer waters. Along the western coast of the US, this species spends winters off Mexico and Central America and can be found summering as far north as the Gulf of Alaska and central North Pacific waters, but typically summer along the US West Coast. **Figure 6** shows the range of this species. Threats to this species include vessel strikes, entanglement, ocean noise, and commercial whaling (https://www.fisheries.noaa.gov/species/blue-whale#overview).

Conservation efforts are in place through the ESA to minimize vessel strikes, including speed reduction and avoiding migrations (https://www.fisheries.noaa.gov/species/blue-whale#conservation-management). There is a slight possibility of the blue whale being present within the disposal sites or the transit areas to the disposal sites. However, as noted above, disposal vessels using the five Hawai‘i ocean disposal sites already operate at slow speeds (6 to 8 knots) consistent with NMFS recommendations for minimizing vessel strikes. Given the relatively small number of disposal events each year, the temporary nature of disposal plumes in the water column, the non-toxic nature of materials disposed, the limited physical substrate changes within disposal site boundaries, and the slow speed of disposal vessels, EPA believes that continued operation of the five Hawai‘i ocean disposal sites may affect but is not likely to adversely affect this species.

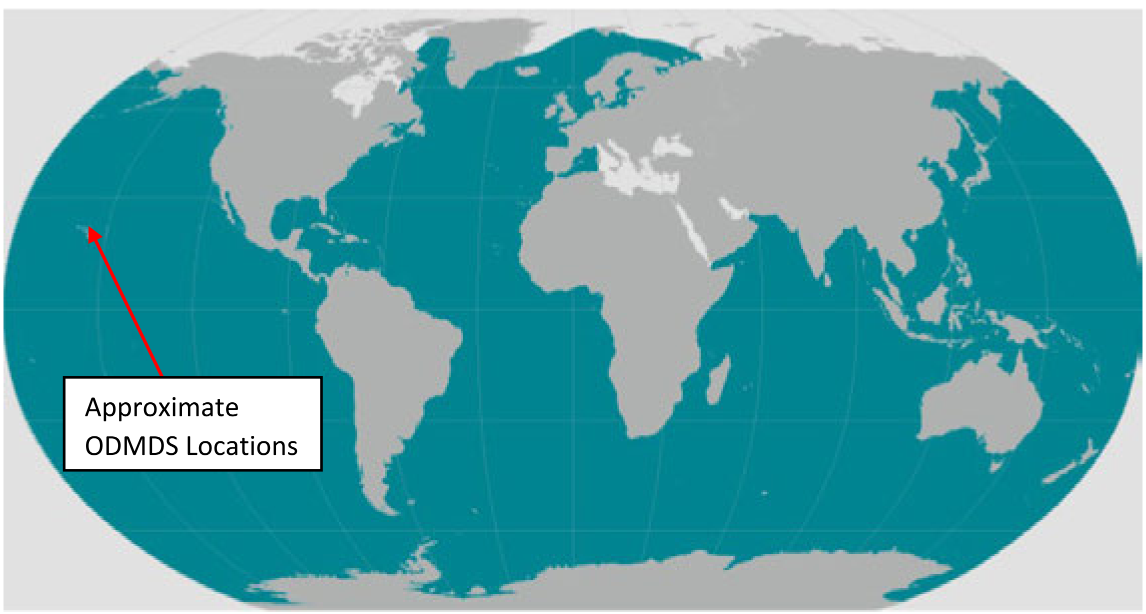

Figure 6. World map showing the approximate range of the blue whale (https://www.fisheries.noaa.gov/species/blue-whale).

False Killer Whale – Hawaiian Insular DPS *(Pseudorca crassidens)*
The Main Hawaiian Island Insular False Killer Whale (MHI IFKW) is ESA-endangered. This whale is technically a large member of the dolphin family. These social animals are found in all tropical and subtropical oceans and generally in deep offshore waters. Population size is estimated at around 150 individuals. Individuals of this species grow to around 3,000 pounds; males grow up to 20 feet and females grow to 16 feet. False killer whales are top predators; they hunt primarily pelagic fish and squid and can dive to depths of 1,600 feet (500 m). They hunt in small groups, and occasionally share prey. This species occurs in tropical, subtropical, and temperate waters of all ocean basins. A recovery plan outline for the MHI IFKW includes the following recommendations: continue satellite tagging and photo-identification efforts; research to reduce or eliminate injury and mortality from fishing gear; educate the public to mitigate or reduce interactions; acquire biopsy samples for research; and protect, maintain, and enhance habitat (NMFS, 2016). According to the recovery plan outline, the highest threats to the MHI IFKW are incidental take in fisheries (including hooking, entanglement, intentional harm) and the small population size of the DPS. However, other medium-level threats such as environmental contaminants, competition with fisheries for food, effects from climate change, and acoustic disturbance may also play a role in impeding recovery (NMFS, 2016). (**Figure 7** shows the range of this DPS (https://www.fisheries.noaa.gov/species/false-killer-whale).

The designated critical habitat for the MHI IFKW extends from waters 45 – 3,200 m deep surrounding the MHI. The physical or biological features of this critical habitat that are essential to the conservation of the DPS include: adequate space for movement and use within shelf and slope habitat; prey species of sufficient quantity, quality, and availability to support individual growth, reproduction, and development, as well as overall population growth; waters free of pollutants of a type and amount harmful to MHI IFKWs; and sound levels that will not significantly impair false killer whales' use or occupancy. The designated critical habitat for this species overlaps with each of the five ocean disposal sites (**Figure 8**). It is therefore likely that this species will at times be present in the water column around the disposal site locations. In addition, during their deepest dives these whales could forage throughout the water column over the South Oʻahu, Hilo, and Kahului disposal sites (the Nawiliwili and Port Allen sites are too deep for this species to reach the seafloor).

However, as previously mentioned (**Section 3.2**) exposure to disposal plumes in the water column is temporary. Further, for sediments to be determined "suitable" for ocean disposal, water column assessments must confirm that temporary exposure to the suspended sediment immediately following disposal will not exceed applicable marine water-quality criteria or cause toxicity to representative sensitive marine organisms after allowance for initial mixing and dilution. Three separate water-column bioassays are conducted on sensitive marine test species, with one species being a phytoplankton or zooplankton, one a larval crustacean or mollusc, and one a fish. These tests must confirm that disposal will not result in water column toxicity. Additionally, the Hawaiʻi disposal sites are offshore, in relatively deep water, where initial dilution is rapid and disposal plumes dissipate to background levels quickly. Cumulative water column effects are not expected because discharges from disposal vessels typically occur over only a few minutes, and individual disposal events are at least several hours apart, even in the most active circumstances. Finally, as noted above, disposal vessels using the five Hawaiʻi ocean disposal sites already operate at slow speeds (6 to 8 knots) consistent with NMFS recommendations for minimizing vessel strikes. Given the relatively small number of disposal events each year, the temporary nature of disposal plumes in the water column, the non-toxic nature of materials disposed, the limited physical substrate changes within disposal site boundaries, and the slow speed of disposal vessels, EPA believes that continued operation of the five Hawaiʻi ocean disposal sites may affect but is not likely to adversely affect the MHI IFKW. For these same reasons, the continued operation of the five sites may affect, but is not likely to adversely affect the extent or quality of false killer whale critical habitat.

Figure 7. World map showing the approximate range of the false killer whale (https://www.fisheries.noaa.gov/species/false-killer-whale#overview).

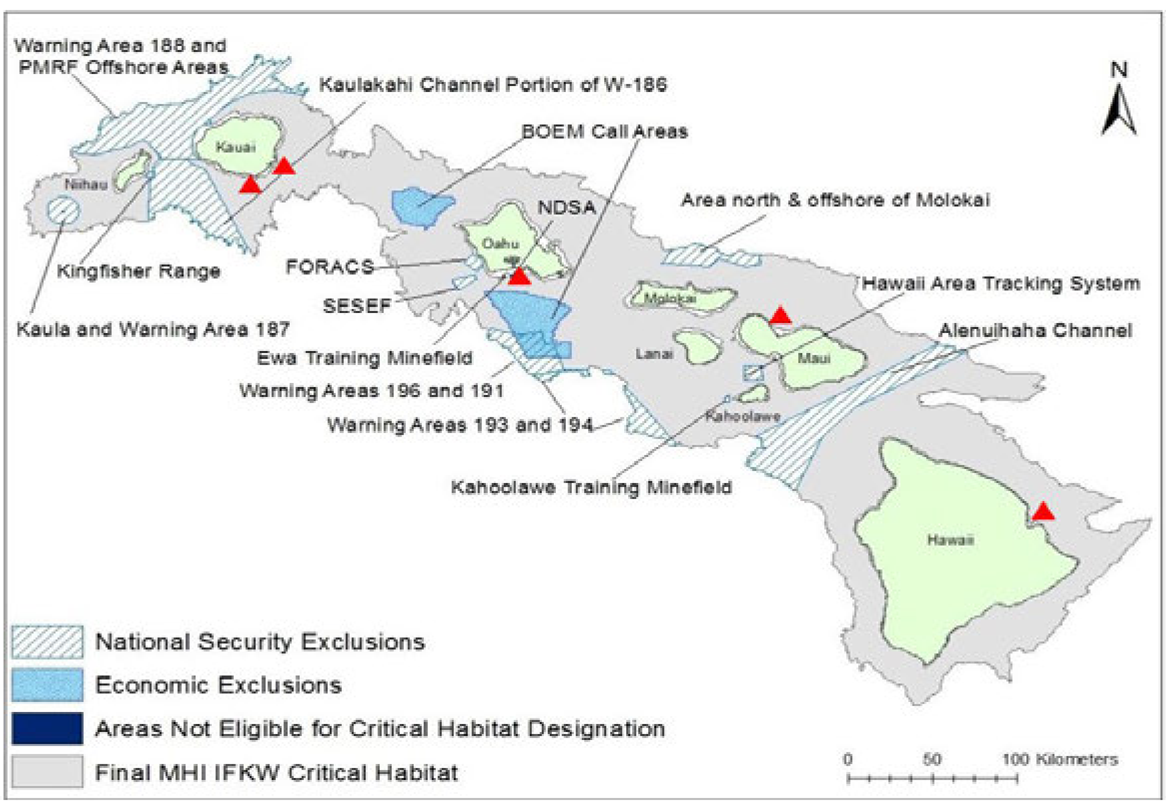

Figure 8. Map showing designated critical habitat for the endangered false killer whale around the Hawaiian Islands. Approximate locations of the five ocean disposal sites shown as red triangles (not to scale).

Fin Whale *(Balaenoptera physalus)*
The fin whale is ESA-endangered and protected throughout its range. It is the second-largest species of whale, reaching a weight of 40 to 80 tons (80,000 to 160,000 pounds) and a length of 75 to 85 feet. This fast swimmer feeds on krill, small schooling fish, and squid during the summer, where it is typically found in the Arctic and Antarctic. It fasts in the summer while migrating to warmer, tropical waters. This species is primarily found far offshore in open waters. **Figure 9** shows the approximate range of this species.

Threats to this species include entanglement, vessel strikes, lack of prey due to overfishing, and ocean noise; whaling is no longer a threat to this species (https://www.fisheries.noaa.gov/species/fin-whale). Conservation efforts are in place through the ESA to minimize vessel strikes, including speed reduction and avoiding migrations (https://www.fisheries.noaa.gov/species/fin-whale#conservation-management). There is a slight possibility of the fin whale being present within the disposal sites or the transit areas to the disposal sites. However, as noted above, disposal vessels using the five Hawaiʻi ocean disposal sites already operate at slow speeds (6 to 8 knots) consistent with NMFS recommendations for minimizing vessel strikes. Given the relatively small number of disposal events each year, the temporary nature of disposal plumes in the water column, the non-toxic nature of materials disposed, the limited physical substrate changes within disposal site boundaries, and the slow speed of disposal vessels, EPA believes that continued operation of the five Hawaiʻi ocean disposal sites may affect but is not likely to adversely affect this species.

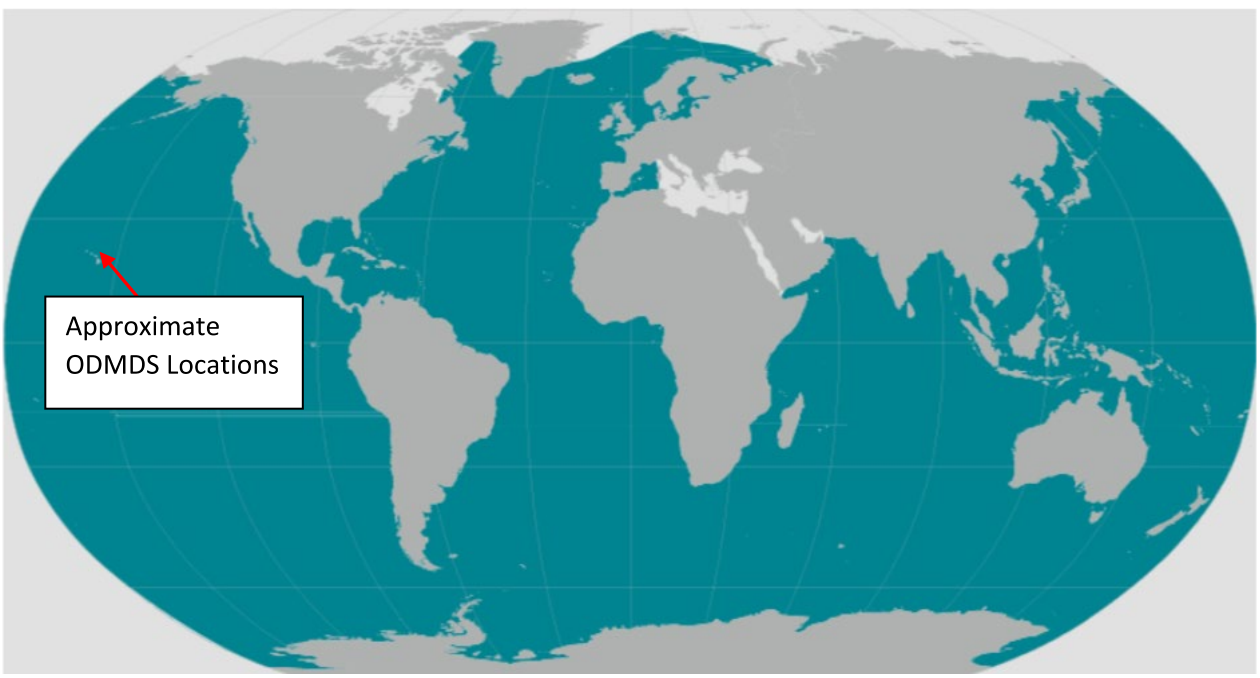

Figure 9. World map showing the approximate range of the fin whale (https://www.fisheries.noaa.gov/species/fin-whale).

<u>North Pacific Right Whale</u> *(Eubalaena japonica)*
The North Pacific right whale is ESA-endangered and protected throughout its range, which includes Alaska and the US West Coast. This whale is the rarest of all large whale species, with an estimated population in the low 100s. The North Pacific right whale can grow to 100 tons (200,000 pounds) and reach a length of 45 to 64 feet. It feeds on krill and small fish. Like other whales, it is suspected that this species winters in warmer, southern waters, and summer in far northern feeding grounds. **Figure 10** shows the range of this species.

Threats to this species include vessel strikes, entanglement, ocean noise, and harmful algal blooms. Mariners are educated about safe vessel speeds to reduce noise and risk of vessel strikes (https://www.fisheries.noaa.gov/species/north-pacific-right-whale). There is a very small possibility of the north Pacific right whale being present within the disposal sites or the transit areas to the disposal sites. However, as noted above, disposal vessels using the five Hawai‘i ocean disposal sites already operate at slow speeds (6 to 8 knots) consistent with NMFS recommendations for minimizing vessel strikes. Given the relatively small number of disposal events each year, the temporary nature of disposal plumes in the water column, the non-toxic nature of materials disposed, the limited physical substrate changes within disposal site boundaries, and the slow speed of disposal vessels, EPA believes that continued operation of the five Hawai‘i ocean disposal sites may affect but is not likely to adversely affect this species.

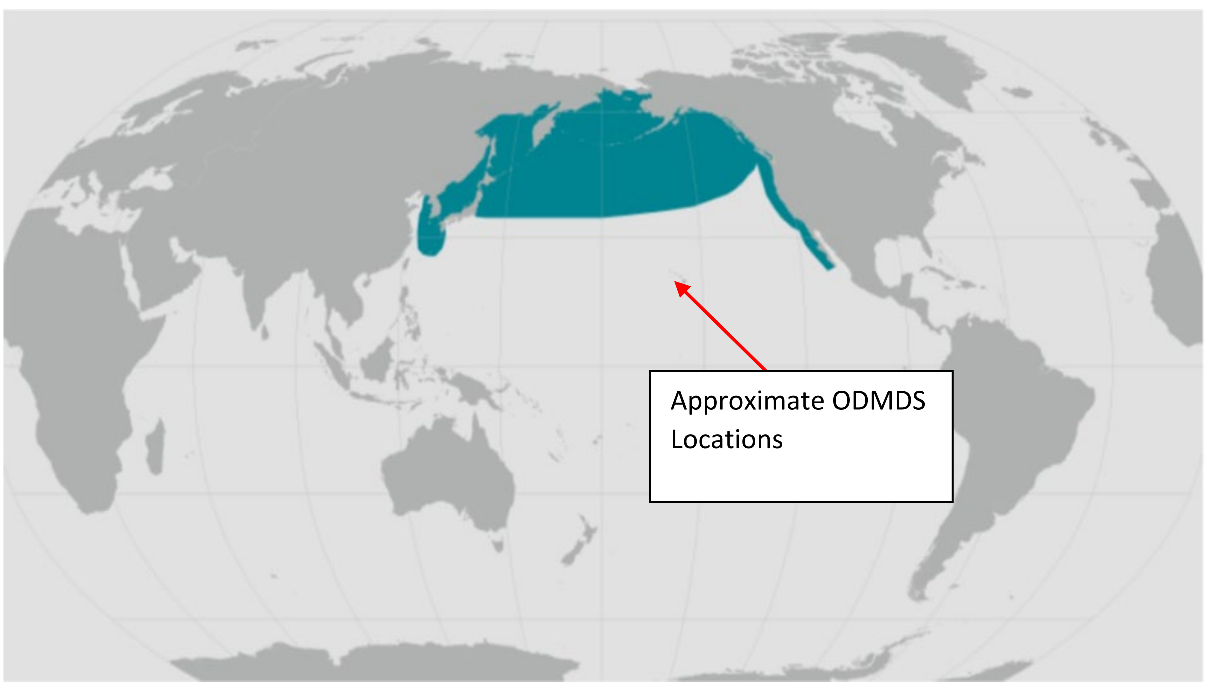

Figure 10. World map showing the approximate of the North Pacific right whale’s range (https://www.fisheries.noaa.gov/species/north-pacific-right-whale).

Sei Whale *(Balaenoptera borealis)*
The sei whale is ESA-endangered and protected throughout its range, which includes mid-latitude waters throughout the world. This whale is primarily observed in deeper waters far from the coastline. It feeds on plankton, small schooling fish, and cephalopods, and can reach a weight of 100,000 pounds (50 tons) and a length of 40 to 60 feet. **Figure 11** shows the sei whale's range.

Threats to this species include vessel strikes, entanglement, and ocean noise. NOAA Fisheries protects this species by minimizing the effects of noise disturbance, responding to stranded whales, educating the public about this species, and monitoring population abundance and distribution (https://www.fisheries.noaa.gov/species/sei-whale). There is very little chance of this species being found in nearshore waters. Further, as noted above, disposal vessels using the five Hawai‘i ocean disposal sites already operate at slow speeds (6 to 8 knots) consistent with NMFS recommendations. Given the relatively small number of disposal events each year, the temporary nature of disposal plumes in the water column, the non-toxic nature of materials disposed, the limited physical substrate changes within disposal site boundaries, and the slow speed of disposal vessels, EPA believes that continued operation of the five Hawai‘i ocean disposal sites may affect but is not likely to adversely affect this species.

Figure 11. World map showing the approximate range of the sei whale (https://www.fisheries.noaa.gov/species/sei-whale).

Sperm Whale (*Physeter macrocephalus*)
The sperm whale is ESA-endangered and protected throughout its range, which includes all deep oceans and latitudes. It is the largest of the toothed whales, with females growing to 15 tons (30,000 pounds) and 40 feet, and males growing to 45 tons (90,000 pounds) and 52 feet. Due to the significant amount of time spent in deep waters, its diet consists of larger species like squid, sharks, skates, and fish. Migration is not widely seen in this species. **Figure 12** shows the range of this species.

While whaling is no longer a threat to this species, vessels, entanglement, ocean noise, marine debris, and contaminants still pose a threat. Efforts to protect this species include limiting activities that cause excess noise or increased strike risk, responding to stranded or entangled whales, and educating the public about the species, and monitoring activities (https://www.fisheries.noaa.gov/species/sperm-whale#overview). There is very little chance of this species being found in nearshore waters. Further, as noted above, disposal vessels using the five Hawaiʻi ocean disposal sites already operate at slow speeds (6 to 8 knots) consistent with NMFS recommendations. Given the relatively small number of disposal events each year, the temporary nature of disposal plumes in the water column, the non-toxic nature of materials disposed, the limited physical substrate changes within disposal site boundaries, and the slow speed of disposal vessels, EPA believes that continued operation of the five Hawaiʻi ocean disposal sites may affect but is not likely to adversely affect this species.

Figure 12. World map showing the approximate range of the sperm whale (https://www.fisheries.noaa.gov/species/sperm-whale).

Hawaiian Monk Seal *(Neomonachus schauinslandi)*

The Hawaiian monk seal is one of the most endangered seal species in the world and endemic to the Hawaiian archipelago. It is ESA-endangered, and its range encompasses the Pacific islands. This seal can reach a weight of 400 to 600 pounds, and a length of 6 to 7 feet. It eats a varied diet, depending on what's available, commonly including fishes, squids, octopuses, eels, and crustaceans. They prefer warm, subtropical waters and spend 2/3 of their time at sea. They can dive to more than 1,800 feet (550 m) to forage at the seafloor; however, they more commonly dive an average of 6 minutes to depths of less than 200 feet (60 m). When on land, seals breed and haul-out to rest, give birth, and molt on sand, corals, and volcanic rock shoreline. They prefer sandy, protected areas surrounded by shallow waters for pupping. **Figure 13** shows their range and critical habitat. Threats to this species include food limitation, shark predation, entanglement, male aggression, habitat loss, disease, and human impacts (https://www.fisheries.noaa.gov/species/hawaiian-monk-seal).

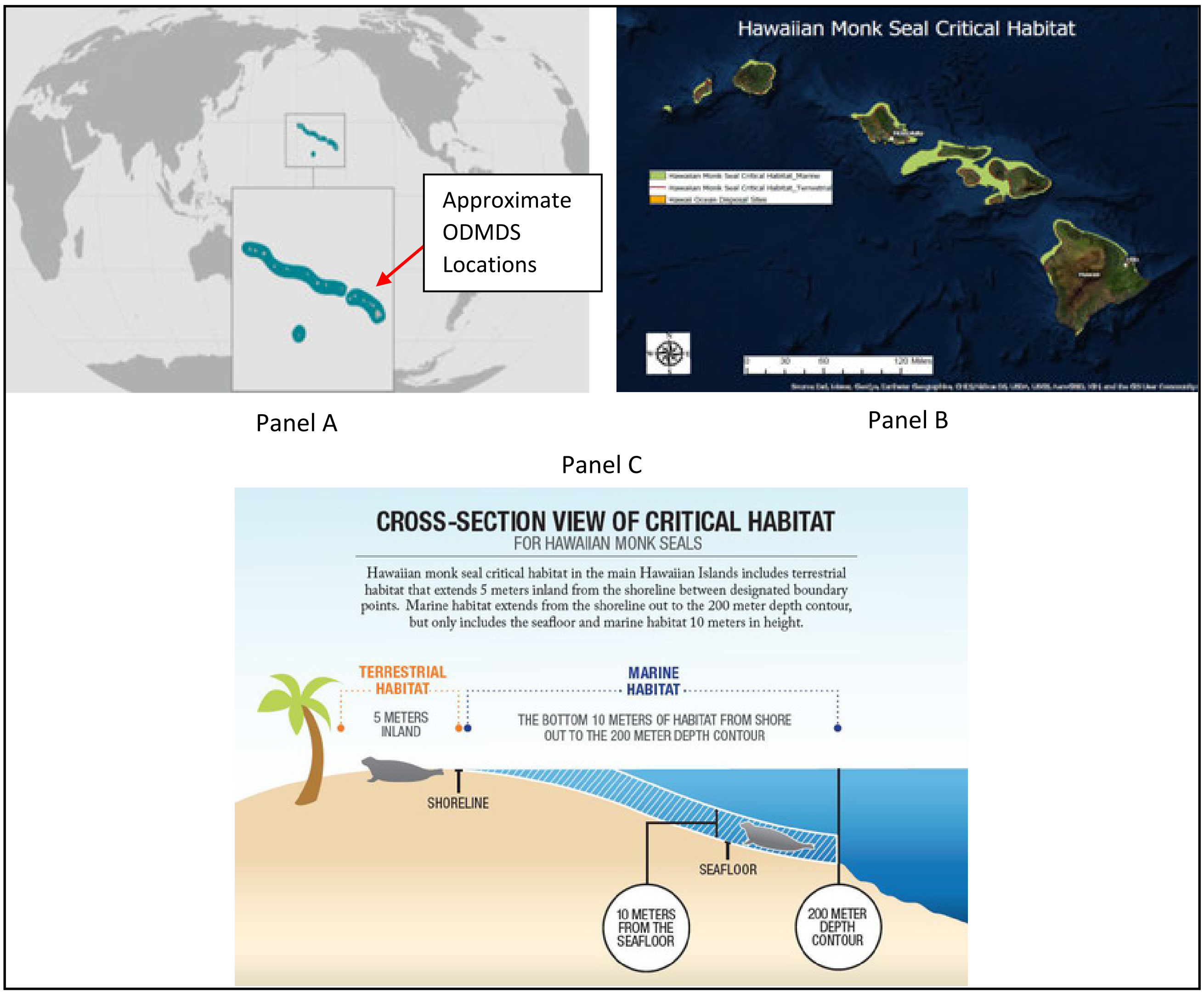

Figure 13. Graphics pertaining to Hawaiian Monk Seal range and habitat: Panel A shows the world map with the approximate range of monk seal (https://www.fisheries.noaa.gov/species/hawaiian-monk-seal); Panel B shows a map of the critical habitat; Panel C shows a shows a cross-section view of critical habitat.

It is likely that this species will at times be present in the water column around the ocean disposal locations. In addition, during their deepest dives these seals could potentially forage on the seafloor near the South O'ahu, Hilo, and Kahului disposal sites (the Nawiliwili and Port Allen sites are too deep for this species to reach). However, the Hawai'i disposal sites do not overlap with the critical marine habitat for this species, as they are all deeper than the 200-meter contour (**Figure 13**). Additionally, while disposal vessels may transit through critical habitat, they already operate at slow speeds overall (6 to 8 knots), consistent with NMFS recommendations for minimizing vessel strikes, and they operate at even slower speeds (less than 5 knots) in shallow waters surrounding the ports of departure. Consequently, given the relatively small number of disposal events each year, the slow speed of disposal vessels, the temporary nature of disposal plumes in the water column, the non-toxic nature of materials disposed, and the limited physical substrate changes within disposal site boundaries, EPA believes that continued operation of the five Hawai'i ocean disposal sites may affect but is not likely to adversely affect the Hawaiian monk seal and its critical habitat.

4.3 Sea Turtles

Central North Pacific Green Sea Turtle (*Chelonia mydas*)
The Green sea turtle is one of the largest hard-shelled sea turtles, with adults weighing between 300 and 350 pounds and reaching 3 to 4 feet in length. The Central North Pacific DPS is ESA-threatened. This species is herbivorous, feeding primarily on sea grasses and algae. They spend most of their time in surface waters, typically diving no more than approximately 70 feet (20 m). This species of turtle spends the majority of its time in nearshore waters and bays and lagoons, only entering the open ocean for migration between foraging and nesting areas (https://www.fisheries.noaa.gov/species/green-turtle#overview). **Figure 14** shows the range of the green sea turtle. Threats to this species include bycatch, direct killing of turtles and harvest of eggs, degradation and loss of foraging and nesting habitats, and vessel strikes.

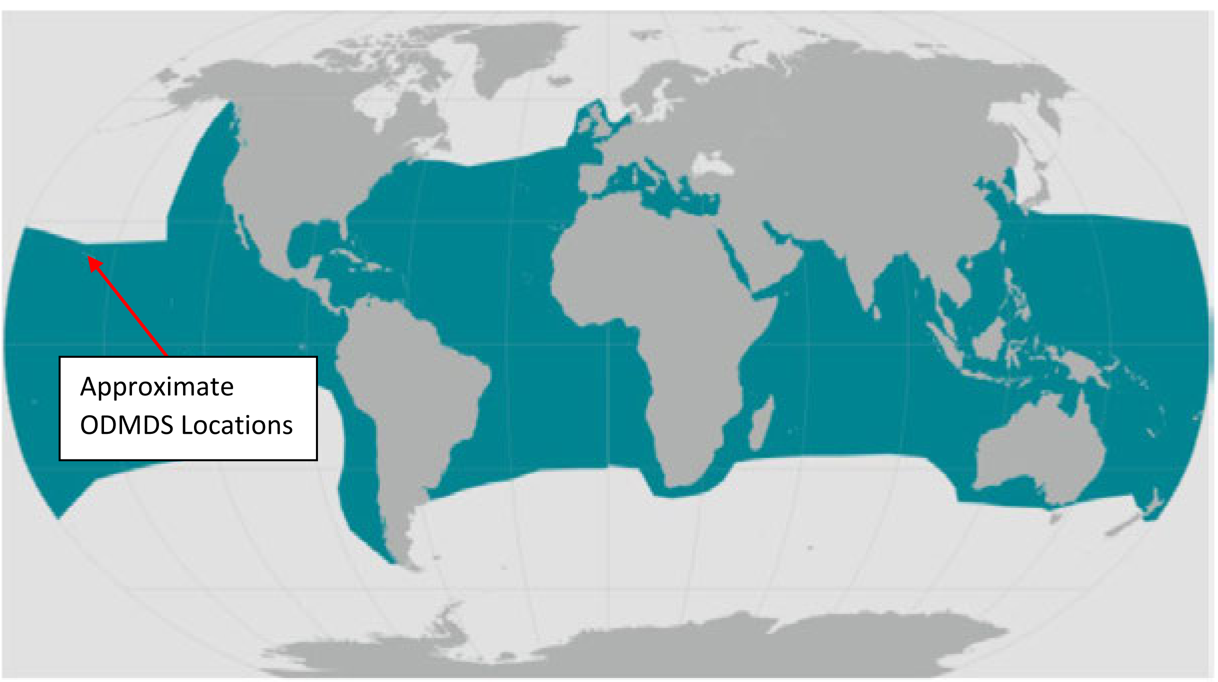

Figure 14. Range of the green sea turtle (https://www.fisheries.noaa.gov/species/green-turtle#overview).

This species is likely to be found within disposal sites or the transit areas to the disposal sites, especially in nearshore waters during transit of vessels between dredging locations and the offshore disposal sites. However, as noted above, disposal vessels using the five Hawaiʻi ocean disposal sites already operate at slow speeds (6 to 8 knots) consistent with NMFS recommendations for minimizing vessel strikes. Moreover, tracking information collected from dredging vessels indicates that vessels generally operate at approximately 3 to 4 knots for approximately the first half hour of transit from shore, only increasing to 6 to 8 knots in deeper waters. Research conducted by Hazel et al (2007) indicates that speed restrictions of 4 km/h (~2 knots) may be favorable to prevent vessel injuries in shallow waters. However, this study was conducted in green sea turtle foraging habitat, from a 6 m aluminum boat, in water shallower than 5 m. The authors selected these conditions to mimic recreational boating patterns in sea turtle foraging habitat. EPA does not believe that the vessel type, the depth of the study, and the habitat in which the study was conducted are representative of the transport and disposal operations conducted to, and in, the Hawaiʻi ocean disposal sites. In addition, the vessel traffic from dredged material disposal operations in Hawaiʻi is extremely low. Based on the percent of vessel traffic in Hawaiʻi that is comprised of disposal vessels, EPA has determined that the continued use of the Hawaiʻi ocean disposal sites may affect, but is unlikely to adversely affect, the green sea turtle. The analysis that led to this conclusion is outlined in the following paragraphs.

Determining the proportion of vessel traffic attributed to disposal vessels

To determine the potential for turtle strikes from disposal vessels transiting to and from the Hawaiʻi ocean disposal sites, EPA first attempted to estimate the percent of vessel traffic that is comprised of disposal vessels. Discharge volumes from individual disposal events range from approximately 1,000 cy (which is typical for many harbor dredging projects not conducted by USACE, where clamshell-dredged material is placed into towed scows) to as much as 5,000 cy at a time (typical for USACE hopper dredging loads). A total of 1.24 million cubic yards was disposed at the five Hawaiʻi sites combined, in the 10-year period from 2009 to 2018[4]. This equates to an estimated range of 495 to 2,475 total transits to and from the Hawaiʻi ocean disposal sites during that time (**Table 4)**.

Table 4. Volume of dredged material disposed, and minimum and maximum number of disposal vessel transits, to and from all Hawaiʻi ocean disposal sites from 2009-2018.

Ocean Disposal Site	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
South Oʻahu	126,200		18,260		312,080	351,920		53,900			862,360
Hilo			63,879	70,981				118,300			253,160
Kahului								57,200			57,200
Nawiliwili								64,700			64,700
Port Allen											0
Total All Sites	126,200	0	82,139	70,981	312,080	351,920	0	294,100			**1,237,420**
Min. # of Trips (both ways)	50	0	33	28	125	141	0	118	0	0	**495**
Max. # of Trips (both ways)	252	0	164	142	624	704	0	588	0	0	**2,475**

[4] Note: This specific ten-year period was selected for comparison to the most recent vessel transit data available on the USACE waterborne commerce database.

EPA then estimated total vessel traffic by examining commercial vessel traffic from the USACE waterborne commerce database (USACE, 2020b) and the Hawai‘i Department of Land and Natural Resources (DLNR) commercial fishing database (Hawai‘i DLNR, 2020). The USACE database includes transits from self-propelled and non-self-propelled dry cargo ships (including passenger vessels and cruise ships), self-propelled and non-self-propelled tankers, self-propelled towboats, and non-self-propelled tanker liquid barges. Vessel transits were compiled from all ports in Hawai‘i for which there are records in the database. Over the most recent ten-year period in the database (2009 to 2018) there were a total of 144,925 transits from the ports examined (**Table 5**; USACE, 2020b). The DLNR database contains fishing reports from licensed commercial fishermen, including the number of trips conducted per year by location. EPA compiled all trips reported from 2009 to 2018, and multiplied the number by two to account for total transits. In total, there were 125,966 transits (62,983 trips) conducted in Hawai‘i from 2009 to 2018 (**Table 6**; Hawai‘i DLNR, 2020).

To estimate the proportion of vessel traffic attributed to disposal vessels, EPA divided the total transits from disposal vessels by the total transits from commercial vessels reported in the two databases (270,981). Therefore, the ten-year estimate of 495 to 2,475 disposal vessel transits only constitutes 0.18% to 0.91% of the total commercial vessel transits.

It is important to note that this estimate of total vessel transits over a ten-year period is highly conservative, as the combined numbers from the USACE and DLNR databases do not include local and foreign military nor recreational vessels. Therefore, disposal vessels realistically account for an even lower percentage of vessel traffic than estimated in this document.

Table 5. Ten-year commercial vessel transits by port (USACE waterborne commerce database). These numbers of transits include receipt (incoming) and shipment (outgoing) transits, but do not include fishing vessels.

Port	2018	2017	2016	2015	2014	2013	2012	2011	2010	2009	Total
Barbers Point Harbor	1,482	1,661	2,415	2,327	2,074	1,938	2,049	1,614	1,784	1,860	19,204
Hana Harbor	0	0	0	0	0	0	0	0	0	0	0
Hilo	1,066	1,082	1,184	1,815	1,405	1,141	1,262	2,034	1,473	1,499	13,961
Port of Honolulu	4,207	5,147	5,689	8,435	6,653	4,870	5,716	8,013	6,881	7,029	62,640
Kahului	1,400	1,359	1,601	2,617	2,044	1,357	1,779	2,917	1,967	2,026	19,067
Kailua	0	0	0	0	0	0	0	0	0	0	0
Kalaupapa Harbor	0	0	0	0	0	0	0	0	0	0	0
Kaunakakai	11	142	252	230	245	246	303	227	411	430	2,497
Kawaihae Harbor	756	852	907	1,527	1,095	692	1,011	3,509	1,307	1,183	12,839
Nawiliwili	984	1,057	1,172	1,762	1,340	968	1,019	4,175	1,149	1,091	14,717
Pearl Harbor	0	0	0	0	0	0	0	0	0	0	0
Port Allen	0	0	0	0	0	0	0	0	0	0	0
Total	9,906	11,300	13,220	18,713	14,856	11,212	13,139	22,489	14,972	15,118	**144,925**

Table 6. Ten-year commercial fishing vessel trips and transits in Hawai‘i (DLNR commercial fishing database).

	2018	2017	2016	2015	2014	2013	2012	2011	2010	2009	Total
Total Trips	4,652	3,916	3,664	4,951	4,944	5,876	9,783	9,258	8,199	7,740	62,983
Total Transits	9,304	7,832	7,328	9,902	9,888	11,752	19,566	18,516	16,398	15,480	**125,966**

Estimating turtle mortalities and injuries due to vessels

To determine the potential number of turtle strikes caused by disposal vessels, EPA then estimated the total mortalities and injuries of green sea turtles in a given year in Hawai'i. EPA used turtle stranding data from the 2015 NMFS Hawai‘i sea turtle stranding report (the most recent year of complete data available) to estimate the number of green turtle strandings due to vessel strikes (NMFS, 2015). Because it is not possible to tell whether strike injuries occurred pre- or post-mortem, EPA conservatively considered all stranded green turtles with strike injuries to have been caused by vessel strikes, including strandings listed as caused by “shark/boat impact” (two strandings) and those listed as “unknown” but with signs of vessel strikes (two strandings). In sum, this constituted 23 reported strandings that were potentially caused by vessel strikes in 2015.

Because a high percentage of turtles stranded from vessel strikes subsequently die, EPA assumed that none of 23 turtles reported as stranded had survived. However, the number of reported strandings is likely a low estimate of the total turtle mortality due to vessel strikes within a given year; several studies have determined that the probability that a turtle that has died at sea subsequently strands ranges from 10 to 20% (Epperly et al. 1996; Hart et al. 2006). Therefore, using 10% as a conservative estimate, EPA estimates that a total of 230 turtles may have been killed by vessel strikes in 2015.

In addition to lethal vessel strikes, it is also likely that non-lethal vessel strikes occur. Although EPA was not able to find studies conducted in Hawai‘i that estimate the percent of lethal versus non-lethal turtle strikes, NMFS has estimated that approximately 75% of green turtle vessel strikes in the Gulf of Mexico would be lethal, and 25% would be non-lethal (NMFS, 2018). Using these percentages and the previous estimate of 230 lethal turtle strikes, EPA determined that there may have been approximately 77 non-lethal turtle strikes by vessels in Hawai‘i in 2015.

Estimating the number of mortalities and injuries caused by disposal vessels

By multiplying the number of green turtle strikes with the percent of traffic that is composed of disposal vessels, it can be suggested that disposal vessels may be responsible for less than one to as many as two vessel strike mortalities, and less than one non-lethal strike per year. However, it is important to remember that these numbers are likely largely overestimated, as they are based on numbers that are highly conservative: the vessel traffic data did not include any recreational or military vessel transits, the upper range of disposal vessel transits based on low dredged material holding capacity is conservative, and the percentage used to estimate total turtle strikes based on strandings is conservative. Therefore, the number of strikes attributed to disposal vessels is realistically even lower than the estimates presented here, and consequently EPA believes the potential for strikes from disposal vessels is discountable.

Furthermore, disposal vessels operate at much slower speeds than many other vessels operating in Hawaiian waters. For example, many Navy vessels operate at speeds of 10-15 knots, with certain vessels achieving speeds of up to 30 to 50 knots while conducting propulsion testing (NMFS, 2018). Many commercial vessels also operate at speeds exceeding 20 knots in open waters. For example, container ships typically reach a full speed of 24 knots (Agarwal, 2020). Because vessels operating at higher speeds are more likely to cause turtle strikes (Hazel, 2007), it can be expected that disposal vessels are even less likely to cause turtle strikes than other types of vessels that are operating at greater speeds in Hawaiian waters.

Moreover, vessel strikes are generally more likely to occur in areas with high turtle densities, such as in proximity to nesting beaches or in nearshore foraging areas. The majority of the transit paths followed by disposal vessels are offshore, in deep waters, where turtle density is likely to be lower. As noted, disposal vessels already operate at slower speeds in nearshore environments, where turtle density is likely to be higher. Tracking information collected from disposal vessels indicates that they generally operate at approximately 3 to 4 knots for approximately the first half hour of transit from shore, only increasing to 6 to 8 knots in deeper waters.

Therefore, due to the very low percentage of vessel traffic comprised of disposal vessels, the slow speed of disposal vessels, and the large majority of operations occurring in deep waters, this species may be affected but is not likely to be adversely affected by the continued use of the Hawaiʻi sites.

Hawksbill Turtle *(Eretmochelys imbricata)*

The hawksbill turtle is ESA-endangered throughout its range. The hawksbill turtle has a diverse foraging strategy, and its diet, consists primarily of sponges that live on coral reefs, as well as jellyfish and anemones. This species has a mixed migratory strategy. Some will migrate long distances between nesting beaches and foraging areas; Hawaiian hawksbills travel 50 to 200 miles between nesting and foraging grounds. Hawksbills are commonly found in shallow water (less than 60 feet (18 m) around coral reefs. Juveniles are typically found in the open ocean, and slightly older individuals migrate to shallower coastal feeding grounds. Adults reach a weight of 100 to 150 pounds and a length 25 to 35 inches. **Figure 15** shows the range of this species.

Threats to this species include entanglement, marine debris, disease, chemical pollution, noise, habitat degradation and loss, and harvest (https://www.fisheries.noaa.gov/species/hawksbill-turtle). Recovery actions include protecting turtles on nesting beaches, protecting nesting and foraging habitats, reducing bycatch, reducing the effects of entanglement and ingestion of debris, and supporting research and conservation projects (https://www.fisheries.noaa.gov/species/hawksbill-turtle#conservation-management).

It is likely that this species will be present at times in the disposal sites or transit area to the ocean disposal sites, especially in nearshore waters. However, as discussed above, the low speed and very low traffic associated with dredged material disposal at the five ocean disposal sites also help to ensure that strikes are avoided. Given the information presented, this species may be affected but is not likely to be adversely affected by the continued use of the Hawaiʻi ocean disposal sites.

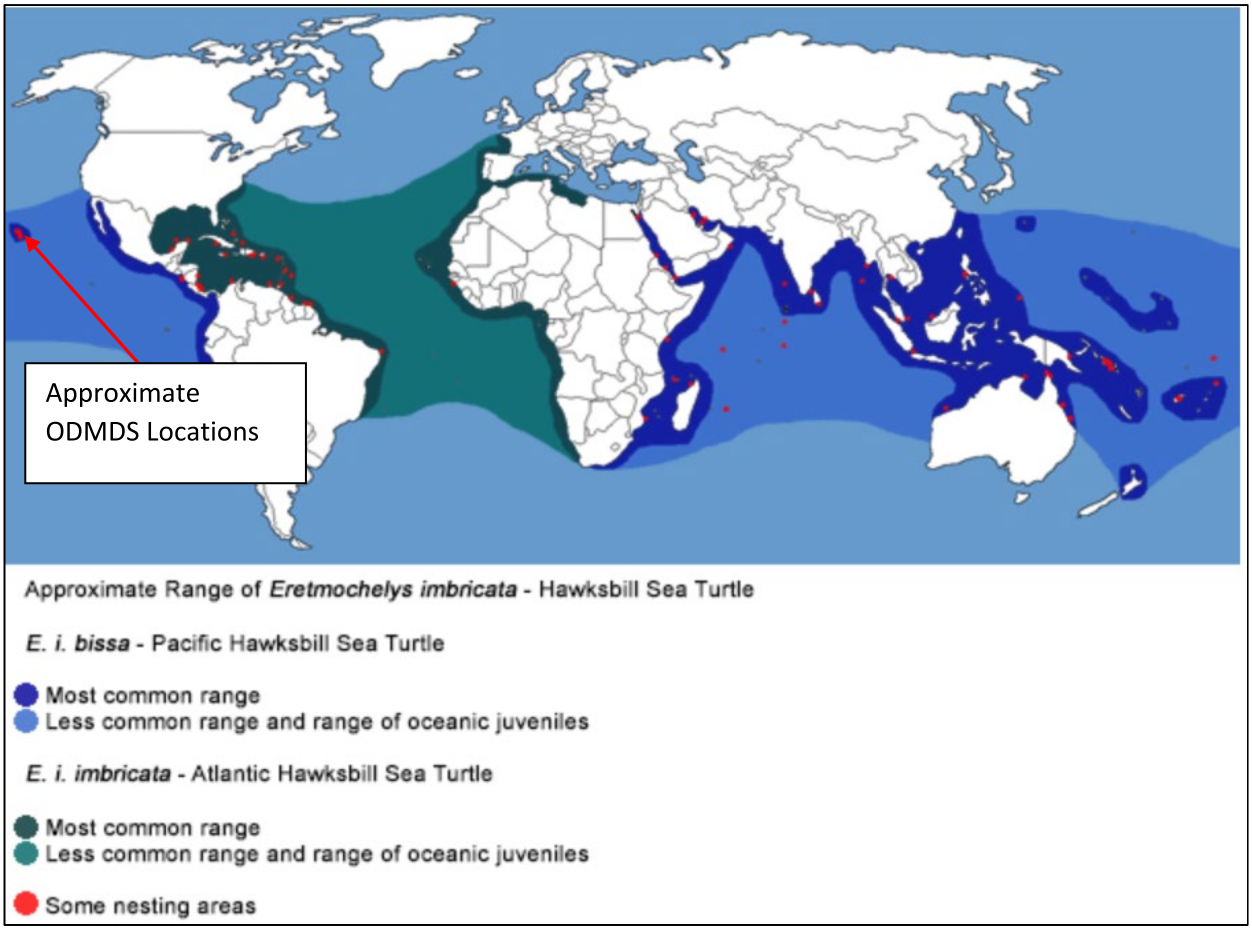

Figure 15. World map showing the approximate range of the hawksbill sea turtle (http://www.californiaherps.com/turtles/pages/e.i.bissa.html).

Leatherback Sea Turtle *(Dermochelys coriacea)*

The Leatherback sea turtle is the largest turtle in the world, growing to 4.5 to 5.5 feet long and weighing up to 2,200 pounds. This is the only species of turtle that lacks a hard shell and scales and is instead covered in a leathery skin. This species is highly migratory, swimming up to 10,000 miles a year between nesting and foraging grounds. The leatherback spends most of its life in the water, with females beaching only to lay eggs. It preys on soft water column species, like jellyfish and salps (https://www.fisheries.noaa.gov/species/leatherback-turtle). Although leatherbacks on average dive to about 540 feet (150 m), they can dive to as much as 4,100 feet (1,250 m), and thus could forage all the way to the seafloor at the South O'ahu, Hilo, Kahului, and Nawiliwili sites (only Port Allen is too deep). **Figure 16** shows the approximate range of this species.

It is likely that this species will be present at times in the disposal sites or transit area to the ocean disposal sites. However, as noted above, disposal vessels using the five Hawai'i ocean disposal sites already operate at slow speeds (6 to 8 knots) consistent with NMFS recommendations for minimizing vessel strikes. In addition, given the relatively small number of disposal events each year, the non-toxic nature of materials disposed, the turtle's water column foraging behavior and the temporary nature of disposal plumes in the water column, EPA believes that continued operation of the five Hawai'i ocean disposal sites may affect but is not likely to adversely affect the leatherback sea turtle.

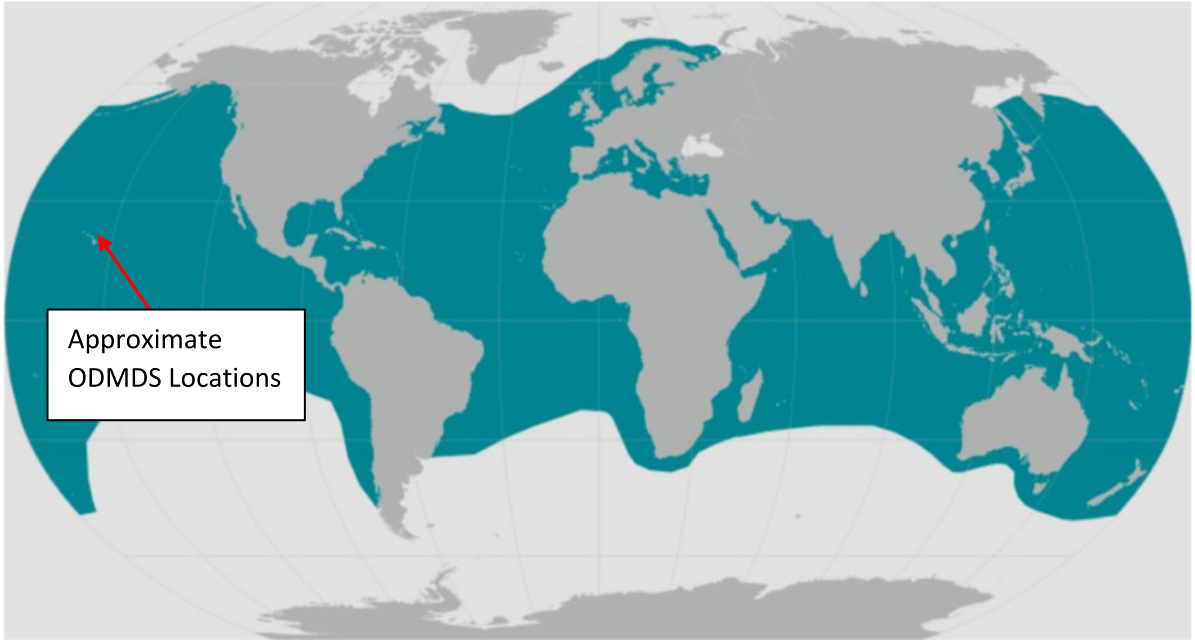

Figure 16. World map showing the leatherback's range (https://www.fisheries.noaa.gov/species/leatherback-turtle).

Loggerhead Turtle (*Caretta caretta*)
The North Pacific DPS of this species is ESA-endangered. It can weigh up to 250 pounds and reach a length of 3 feet. Loggerheads are primarily carnivores; feeding on bottom-dwelling invertebrates like whelks, mollusks, horseshoe crabs, and sea urchins. This DPS nests only on the coasts of New Caledonia and Australia, where there are high-energy waves and relatively narrow, steeply sloped, coarse-grained beaches. It migrates long distances to forage for food and can dive for as long as 10 hours. The deepest reported dive for a loggerhead was 1,100 feet (340 m), although mean dive depths are 50 m or less.

Threats to this species include harvest, entanglement, marine debris, disease, chemical pollution, noise, and habitat degradation and loss (https://www.fisheries.noaa.gov/species/loggerhead-turtle#overview). Conservation efforts for this species include protecting turtles on nesting beaches; protecting nesting and foraging habitats; reducing bycatch; reducing the risk of entanglement; working internationally to protect endangered species; and supporting research and conservation efforts (https://www.fisheries.noaa.gov/species/loggerhead-turtle#conservation-management). **Figure 17** shows the range of the loggerhead.

It is likely that this species will be present at times in the disposal sites or transit area to the ocean disposal sites. However, as noted above, disposal vessels using the five Hawai'i ocean disposal sites already operate at slow speeds (6 to 8 knots) consistent with NMFS recommendations for minimizing vessel strikes. In addition, during their deepest dives these turtles could forage on the seafloor near the South O'ahu, Hilo, and Kahului disposal sites (the Nawiliwili and Port Allen sites are too deep for this species to reach). However, given the small number of disposal events each year, the slow speed of disposal vessels, the temporary nature of disposal plumes in the water column, the non-toxic nature of materials disposed, and the limited physical substrate changes within disposal site boundaries, EPA believes that continued operation of the five Hawai'i ocean disposal sites may affect but is not likely to adversely affect the North Pacific DPS of the loggerhead turtle.

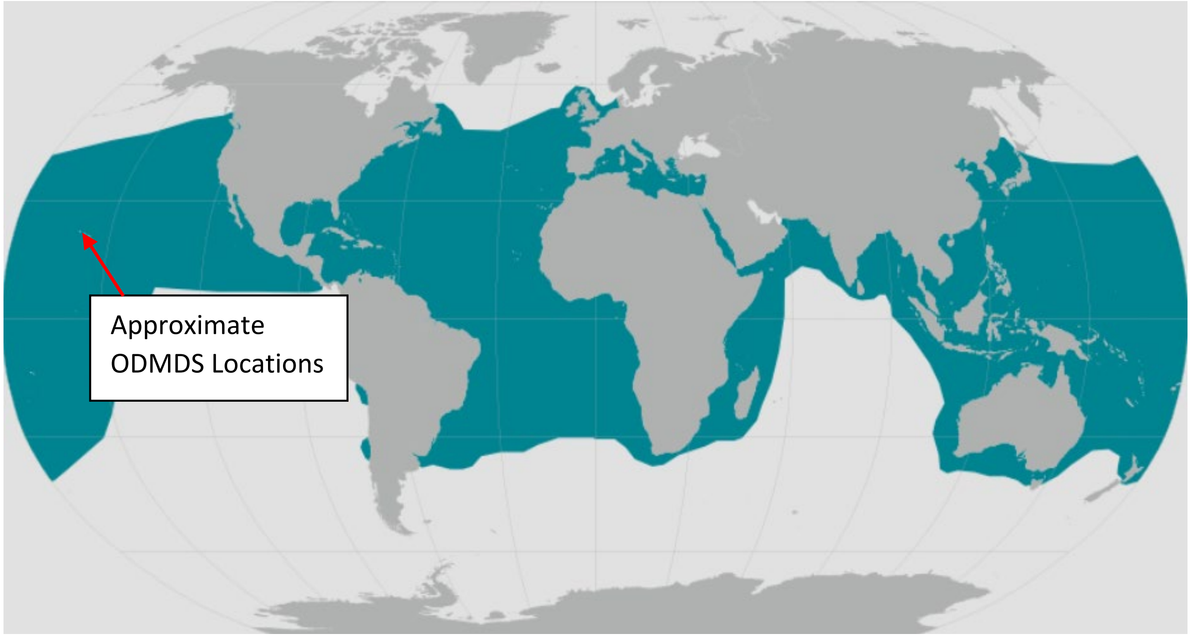

Figure 17. World map showing the approximate range of the loggerhead turtle (https://www.fisheries.noaa.gov/species/loggerhead-turtle#overview).

Olive Ridley Sea Turtle (*Lepidochelys olivacea*)
The olive ridley sea turtle is among the smallest of the world's sea turtles, growing up to 100 pounds and reaching a length of 22 to 31 inches. The Mexican nesting population of the olive ridley is endangered under the ESA, all other populations of the olive ridley sea turtle are threatened. Individuals from multiple populations may occur in Hawaiʻi. This turtle spends most of its life in the open ocean, beaching only to nest. Olive ridleys have been recorded to dive up to 820 feet (250 m); all the Hawaiʻi disposal sites are in deeper water than this. They are omnivorous, feeding on algae, crustaceans, tunicates, mollusks, and fish. Threats to this species include bycatch, harvest, entanglement, pollution, and habitat degradation and loss (https://www.fisheries.noaa.gov/species/olive-ridley-turtle). **Figure 18** shows the range of this species.

While rare in Hawaiʻi, olive ridley sea turtles have occasionally been killed by commercial fishing vessels (NMFS-USFWS, 1998). The entanglement of juveniles and adults in marine debris around the Hawaiian islands is reported from multiple islands, including Hawaiʻi, Molokai, Maui, and Oahu (Balazs, 1985). Threats to olive ridleys in the oceans surrounding the main Hawaiian islands are predominantly marine debris (entanglement or ingesting) and incidental take by fisheries in domestic and international waters (NMFS-USFWS, 1998). Conservation actions for olive ridley sea turtles in Hawaiʻi are focused on cooperating with jurisdictions where nesting occurs to restore nesting habitat and working to reduce marine debris (Hawaiʻi DLNR, 2013). While it is likely that this species will be present at times in the disposal sites or the transit areas to the disposal sites, olive ridley sea turtles are generally less common in Hawaiian waters. For example, out of the 141 sea turtle strandings on the island of Maui in 2019, only one olive ridley turtle was reported stranded (in this case due to entanglement in a fishing net) (MOC Marine Institute, 2020). As mentioned in the analysis of effects to green sea turtles, disposal vessel traffic consists of a very low percentage of the total vessel traffic in around the main Hawaiian islands. Further, disposal vessels using the five Hawaiʻi ocean disposal sites already operate at slow speeds (6 to 8 knots) consistent with NMFS recommendations for minimizing vessel strikes. In addition, given the non-toxic nature of materials disposed, the temporary nature of disposal plumes in the water column, and that the disposal sites are all in water deeper than this species dives, EPA believes that continued operation of the five Hawai‘i ocean disposal sites may affect but is not likely to adversely affect the endangered and threatened populations of the olive ridley sea turtle.

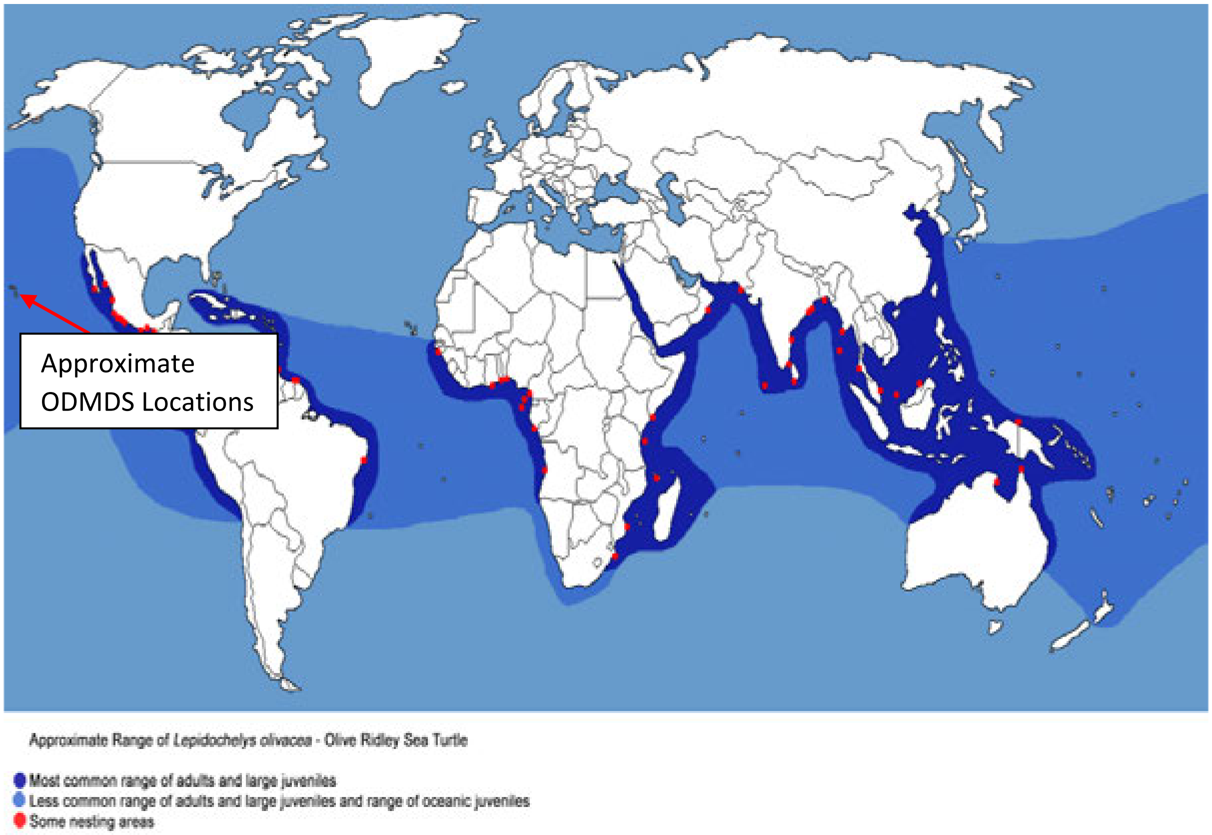

Figure 18. Approximate range of the Olive Ridley sea turtle (http://www.californiaherps.com/turtles/maps/xlolivaceaworldrangemap4.jpg).

4.4 Fishes

Giant Manta Ray (*Manta birostris*)

The giant manta ray is the world’s largest ray, with a wingspan of up to 29 feet, a length of up to 23 feet, and a weight of up to 5,300 pounds. It is ESA-threatened throughout its range, which includes New England/Mid-Atlantic, the Pacific Islands, and the Southeast. This filter-feeding species consumes large quantities of zooplankton. While manta rays typically feed in shallow waters, they can dive as deep as 3,300 feet (1,000 m). They are highly migratory, and are commonly found offshore, in oceanic waters, and near productive coastlines. Trends show that this species migrates based on prey availability (https://www.fisheries.noaa.gov/species/giant-manta-ray#overview). **Figure 19** shows the range of manta rays.

It is likely that this species will be present at times in the disposal sites or the transit areas to the disposal sites. However, as noted above, disposal vessels using the five Hawai‘i ocean disposal sites operate at slow speeds (6 to 8 knots) consistent with NMFS recommendations for minimizing vessel strikes. In addition, for sediments to be “suitable” for ocean disposal, water column assessments must confirm that temporary exposure to the suspended sediment immediately following disposal will not exceed applicable marine water-quality criteria or cause toxicity to representative sensitive marine organisms after allowance for initial mixing and dilution (see **Section 3.2**). Three separate water-column bioassays are conducted on sensitive marine species, with one species being a phytoplankton or zooplankton, one a larval crustacean or mollusc, and one a fish. These tests must confirm that disposal will not result in water column toxicity. Moreover, exposure in the water column is temporary, and all the Hawai‘i disposal sites are offshore, in relatively deep water, where initial dilution is even more rapid and disposal plumes dissipate to background levels quickly. Therefore, the potential for adverse effects to water column species, including the filter-feeders like the giant manta ray, and their planktonic food sources, is considered discountable. Finally, the disposal volumes are relatively low and infrequent across the five Hawai‘i sites. Given the relatively small number of disposal events each year, the non-toxic nature of materials disposed, the ray's water column foraging behavior and the temporary nature of disposal plumes in the water column, EPA believes that continued operation of the five Hawai‘i ocean disposal sites may affect but is not likely to adversely affect this species.

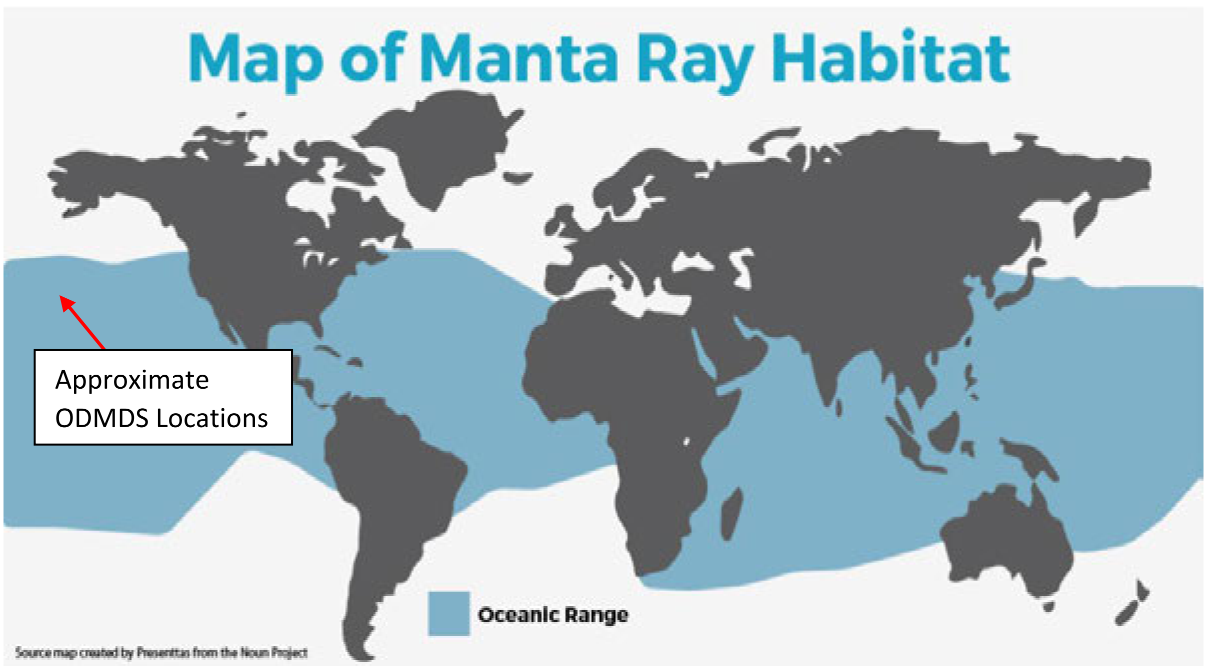

Figure 19. World map showing the approximate range of manta rays (https://seethewild.org/manta-ray-habitat-map/).

Oceanic Whitetip Shark (*Carcharhinus longimanus*)

The oceanic whitetip shark is ESA-threatened throughout its range, which includes New England/Mid-Atlantic, the Pacific Islands, Southeast, and the US West Coast. It is found in tropical and subtropical oceans throughout the world (https://www.fisheries.noaa.gov/species/oceanic-whitetip-shark#overview). This species is pelagic, remaining typically offshore in the open ocean, but can also be found on the outer continental shelf or around oceanic islands in water depths greater than 600 feet, occupying the upper water column from the surface to about 500 feet. This pelagic species is a top predator and is an opportunistic hunter. It feeds primarily on bony fishes and cephalopods, but can be noted feeding on pelagic sportfish, sea birds, other sharks and rays, marine mammals, and even garbage. Threats to this species include bycatch and harvest for international trade. **Figure 20** shows the range of this species.

It is likely that this species will be present at times in the disposal sites or the transit areas to the disposal sites. However, as noted above, disposal vessels using the five Hawai‘i ocean disposal sites already operate at slow speeds (6 to 8 knots) consistent with NMFS recommendations for minimizing vessel strikes. In addition, to be “suitable” for ocean disposal, water column assessments must confirm that temporary exposure to the suspended sediment immediately following disposal will not exceed applicable marine water-quality criteria or cause toxicity to representative sensitive marine organisms after allowance for initial mixing and dilution (see **Section 3.2**). Three separate water-column bioassays are conducted on sensitive marine species, with one species being a phytoplankton or zooplankton, one a larval crustacean or mollusc, and one a fish. These tests must confirm that disposal will not result in water column toxicity. Moreover, exposure in the water column is temporary, and all the Hawai‘i disposal sites are offshore, in relatively deep water, where initial dilution is even more rapid and disposal plumes dissipate to background levels quickly. Therefore, the potential for adverse effects to water column species, including pelagic feeders like the oceanic whitetip shark and their food sources, is considered discountable. Finally, the disposal volumes are relatively low and infrequent across the five Hawai‘i sites. Given the relatively small number of disposal events each year, the non-toxic nature of materials disposed, the shark’s water column foraging behavior and the temporary nature of disposal plumes in the water column, EPA believes that continued operation of the five Hawai‘i ocean disposal sites may affect but is not likely to adversely affect this species.

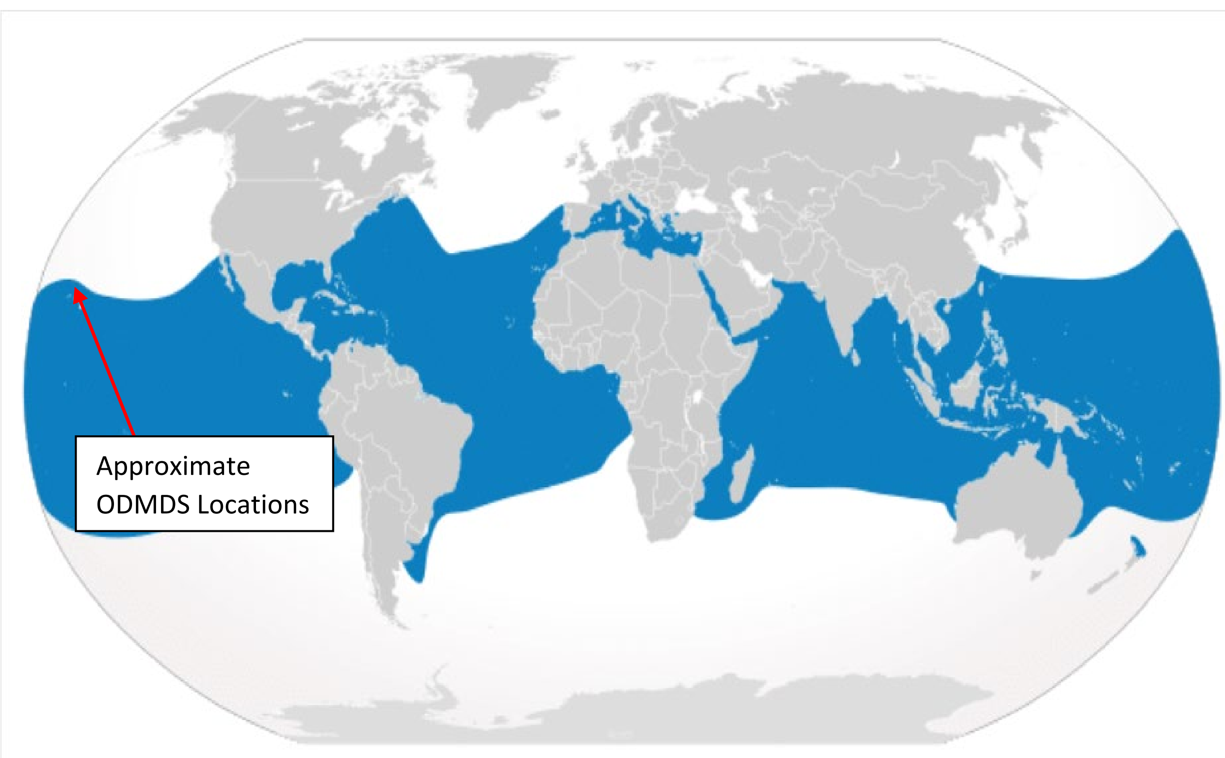

Figure 20. World map showing the approximate range of the oceanic whitetip shark (https://www.epicdiving.com/oceanic-whitetip-shark/).

5.0 EFH ASSESSMENT

5.1 Assessment of EFH overlap with Hawai‘i Ocean Disposal Sites

EFH consultation under the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) was not required at the time of the original designation process for the five Hawai‘i ocean disposal sites. Assessment of current EFH designations indicates that the Hawai‘i ocean disposal sites each overlap with designated EFH for life stages of multiple commercial fishery MUS (**Table 7**). The water column above the five Hawai‘i ocean disposal sites intersect with EFH for the crustacean (Kona crab egg/larval life stage), bottomfish (eggs and post-hatch pelagic of the shallow, intermediate, and deep stocks), and pelagic (egg/larval and juvenile/adult life stages) MUS. In addition, the South O‘ahu, Hilo, Kahului sites intersect with the benthic EFH for the bottomfish deep stocks MUS (post-settlement and sub-adult/adult life stages). None of the sites intersect with EFH for the precious coral MUS. Additionally, EPA has determined that the Hilo ocean disposal site overlaps with HAPC designated for bottomfish stocks (**Table 8**). Based on the assessment below, EPA has determined that continued use of the five Hawai‘i ocean disposal sites may adversely affect EFH, however the effects are expected to be minimal.

Table 7. EFH Designations for Managed Commercial Fisheries in Hawai‘i (source: Draft PIRO EFH Designations, 2019).

MUS	Stock/ Stock Complex	Life Stage(s)	EFH Designation	Intersection with ODMDS
Crustacean	Kona crab	Egg/larval	The water column from the shoreline to the outer limit of the EEZ down to a depth of 150 m (75 fm)	All ODMDS
		Juvenile/adult	All of the bottom habitat from the shoreline to a depth of 100 m (50 fm)	None
	Deepwater shrimp	Egg/larval	The water column and associated outer reef slopes between 550 and 700 m	None
		Juvenile/adult	The outer reef slopes at depths between 300-700 m	None
Bottomfish	Shallow stocks: *Aprion virescens*	Egg	Pelagic zone of the water column in depths from the surface to 240 m, extending from the official US baseline to a line on which each point is 50 miles from the baseline	All ODMDS
		Post-hatch pelagic	Pelagic zone of the water column in depths from the surface to 240 m, extending from the official US baseline to the EEZ boundary	All ODMDS

MUS	Stock/ Stock Complex	Life Stage(s)	EFH Designation	Intersection with ODMDS
		Post-settlement	Benthic or benthopelagic zones, including all bottom habitats, in depths from the surface to 240 m bounded by the official US baseline and 240 m isobath	None
		Sub-adult/adult	Benthopelagic zone, including all bottom habitats, in depths from the surface to 240 m bounded by the official US baseline and 240 m isobath.	None
	Intermediate stocks: *Aphareus rutilans, Pristipomoides filamentosus, Hyporthodus quernus*	Eggs	Pelagic zone of the water column in depths from the surface to 280 m (*A. rutilans* and *P. filamentosus*) or 320 m (*H. quernus*) extending from the official US baseline to a line on which each point is 50 miles from the baseline	All ODMDS
		Post-hatch pelagic	Pelagic zone of the water column in depths from the surface 280 m (*A. rutilans* and *P. filamentosus*) or 320 m (*H. quernus*), extending from the official US baseline to the EEZ boundary	All ODMDS
		Post-settlement	Benthic (*H. quernus* and *A. rutilans*) or benthopelagic (*A. rutilans* and *P. filamentosus)* zones, including all bottom habitats, in depths from the surface to 280 m (*A. rutilans* and *P. filamentosus*) or 320 m (*H. quernus*) bounded by the 40 m isobath and 100 m (*P. filamentosus),* 280 m (*A. rutilans*) or 320 m (*H. quernus*) isobaths	None
		Sub-adult/adult	Benthic (*H. quernus*) or benthopelagic (*A. rutilans* and *P. filamentosus)* zones, including all bottom habitats, in depths from the surface to 280 m (*A. rutilans* and *P. filamentosus*) or 320 m (*H. quernus*) bounded by the 40 m isobath and 280 m (*A. rutilans and P. filamentosus*) or 320 m (*H. quernus*) isobaths	None
	Deep stocks: *Etelis carbunculus, Etelis coruscans,*	Eggs	Pelagic zone of the water column in depths from the surface to 400 m, extending from the official US baseline to a line on which each point is 50 miles from the baseline	All ODMDS

MUS	Stock/ Stock Complex	Life Stage(s)	EFH Designation	Intersection with ODMDS
	Pristipomoides seiboldii, Pristipomoides zonatus	Post-hatch pelagic	Pelagic zone of the water column in depths from the surface to 400 m, extending from the official US baseline to the EEZ boundary	All ODMDS
		Post-settlement	Benthic zone, including all bottom habitats, in depths from 80 to 400 m bounded by the official US baseline and 400 m isobath	South O‘ahu, Hilo, Kahului
		Sub-adult/adult	Benthic (*E. carbunculus* and *P. zonatus*) or benthopelagic (*E. coruscansi*) zones, including all bottom habitats, in depths from 80 to 400 m bounded by the official US baseline and 400 m isobaths	South O‘ahu, Hilo, Kahului
	Seamount Groundfish	Eggs and post-hatch pelagic	Pelagic zone of the water column in depths from the surface to 600 m, bounded by the official US baseline and 600 m isobath, in waters within the EEZ that are west of 180°W and north of 28°N	None
		Post-settlement	Benthic or benthopelagic zone in depths from 120 m to 600 m bounded by the 120 m and 600 m isobaths, in all waters and bottom habitat, within the EEZ that are west of 180°W and north of 28°N	None
		Sub-adult/adult	Benthopelagic zone in depths from 120 m to 600 m bounded by the 120 m and 600 m isobaths, in all waters and bottom habitat, within the EEZ that are west of 180°W and north of 28°N	None
Pelagic	Tropical and temperate	Egg/larval	The water column down to a depth of 200 m (100 fm) from the shoreline to the outer limit of the EEZ	All ODMDS
		Juvenile/adult	The water column down to a depth of 1,000 m (500 fm)	All ODMDS
Precious Coral	Deep-water	Benthic	Six known precious coral beds located off Keāhole Point, Makapu‘u, Ka‘ena Point, Westpac bed, Brooks Bank, and 180 Fathom Bank	None
	Shallow-water	Benthic	Three beds known for black corals in the MHI between Miloli‘i and South Point on the Big Island, the Au‘au Channel, and the southern border of Kaua‘i	None

Table 8. HAPC for Managed Commercial Fisheries in Hawai‘i.

MUS	Stock/ Stock Complex	HAPC	Intersection with ODMDS
Crustaceans	Kona crab	All banks in the NWHI with summits less than or equal to 30 m (15 fm) from the surface	None
Precious Coral	Deep-water	Makapu‘u, Wespac, and Brooks Bank bed	None
	Shallow-water	Au‘au Channel bed	None
Bottomfish	All bottomfish stocks	Discrete areas at Ka‘ena Point, Kāne‘ohe Bay, Makapu‘u Point, Penguin Bank, Pailolo Channel, North Kaho‘olawe, and Hilo	Hilo ODMDS
	Seamount groundfish	Congruent with EFH (See Table 7).	None
Pelagic	All pelagic fisheries	Water column from the surface down to a depth of 1,000 m (500 fm) above all seamounts and banks with summits shallower that 2,000 m (1,000 fm) within the EEZ	None

5.2 Avoidance and Minimization of Impacts to EFH

NMFS has identified that disposal of dredged material may cause adverse effects to EFH resources, including benthic infauna and various life stages of multiple MUS, by potentially increasing turbidity and sedimentation, nutrients, and contaminants. Whether EFH is present or not, EPA's site designation, pre-disposal testing, management, and monitoring processes independently require evaluation of a variety of factors that minimize the potential effects of disposal on EFH. The EPA processes to minimize impacts to benthic and water column EFH are discussed in the following paragraphs.

<u>Ocean Disposal Site Selection</u>

As discussed in **Section 3.1**, MPRSA regulations at 40 CFR Part 228.5 – 228.6 include disposal site selection criteria which help directly avoid or minimize impacts to water column EFH (i.e., for the crustacean, bottomfish, and pelagic MUS at all of the Hawai‘i ocean disposal sites) and benthic EFH (i.e., for bottomfish deep stocks at the South O‘ahu, Hilo, and Kahului sites). Importantly, these site criteria require that, to the extent possible:

- Disposal activities must avoid existing fisheries and shellfisheries (228.5(a));
- Temporary water quality perturbations from disposal within the site must be reduced to ambient levels before reaching any marine sanctuary or known geographically limited fishery or shellfishery (228.5(b));
- The size of disposal sites must be minimized in order to be able to monitor for and control any adverse effects (228.5(d));
- Where possible, disposal sites should be beyond the edge of the continental shelf (228.5(e));
- The location of disposal sites must be considered in relation to breeding, spawning, nursery, feeding or passage areas of living resources in adult or juvenile phases (228.6(a)(2));
- Dispersal and transport from the disposal site must be considered (228.6(a)(6));
- Cumulative effects of other discharges in the area must be considered (228.6(a)(7));
- Interference with recreation, fishing, fish and shellfish culture, areas of special scientific importance and other uses of the ocean must be considered (228.6(a)(8); and
- The potential for development or recruitment of nuisance species must be considered (228.6(a)(10)).

Taken together, the site selection criteria are intended to ensure that EPA's ocean disposal site designations avoid and minimize both direct and indirect impacts to any important fishery or supporting marine habitat to the maximum extent practicable, even before any dredged material is permitted to be disposed. Based on the consideration of the site selection criteria, the locations of the five Hawai'i sites were identified as the environmentally preferred alternative locations serving each of the five main Hawai'i port areas.

Pre-Disposal Testing

Although the five Hawai'i ocean disposal sites intersect with water column EFH for the crustacean, bottomfish, and pelagic MUS, the conservative sediment elutriate testing and modeling conducted prior to dredging must confirm that exposure to the disposal plume, including the dissolved oxygen and turbidity levels, will not cause toxicity to sensitive marine organisms in the water column (refer to **Section 3.2** for more details on the pre-disposal testing regime). Chemistry testing is conducted, and modeling to screen for water quality standards compliance assumes that 100% of all contaminants are released to the water column. Elutriate bioassays are performed, and a 100-fold safety factor is applied such that, after initial mixing, the water column plume may not exceed 1% of the toxic concentration (LC50) for the most sensitive organism tested. Further, due to the depths and offshore locations of the Hawai'i sites, dilution of the disposal plumes is rapid.

Additionally, although the South O'ahu, Hilo, Kahului sites intersect with the benthic EFH for the bottomfish MUS deep stocks (post-settlement and sub-adult/adult life stages), the detailed sediment testing process also includes two solid phase bioassays and bioaccumulation testing to ensure the material disposed will not be toxic to benthic organisms and does not include pollutants likely to bioaccumulate in the food web to levels of biological concern.

Management of the Hawai'i Ocean Disposal Sites

EPA additionally uses an active, adaptive approach to managing ocean disposal sites (see **Sections 3.4** and **3.6**). More specifically, once a dredging project is approved for ocean disposal at one of the Hawai'i sites, a variety of disposal BMPs are included as enforceable permit conditions for the project. For example, satellite tracking is conducted for all disposal vessels, and sensors are placed on all disposal vessels to ensure there is no significant leakage or spilling of dredged material during transit to the site. These additional BMPs ensure that direct and indirect effects to water column and benthic EFH are avoided or minimized. Moreover, EPA periodically monitors the sites (as described in the following section), and uses those results to ensure that the sites are behaving as expected, or to inform additional, protective management measures if any unexpected adverse effects are found.

Monitoring at the Hawai'i Ocean Disposal Sites

The South O'ahu, Hilo, Kahului sites intersect with the benthic EFH for the bottomfish MUS deep stocks. Physical effects are generally anticipated at any disposal site, simply because dredged sediment's physical characteristics (e.g., grain size and organic carbon content) often differ from that of the native seafloor in the deep ocean. Nevertheless, these effects are expected to be primarily confined to the disposal site, and benthic communities are anticipated to recover rapidly following disposal. Furthermore, the volumes disposed at the five Hawai'i sites are very low, particularly in comparison to other dredged material disposal sites in EPA Region 9. The low volume of disposed dredged material further reduces impacts to benthic EFH, and helps ensure that the dredged material can be more rapidly assimilated into the benthos following disposal. EPA conducted monitoring in 2013 and 2017 to confirm that the sites were behaving as expected and no long-term impacts were occurring to the marine community from dredged material disposal.

EPA's site monitoring surveys in 2013 and 2017 confirmed that sediment quality remains as expected, and that there have been no significant changes to sediment chemistry that would adversely affect on-site or off-site habitat quality in the long term (see **Section 3.5; Appendix 2**). This indicates that the pre-disposal sediment testing program is effective at limiting ocean disposal to only "suitable" sediment. However, physical effects are still anticipated at any disposal site, and monitoring confirmed that minor physical substrate changes have occurred compared to pre-disposal baseline data from 1980. It is possible that these substrate changes may partially account for minor differences in infaunal assemblages found during the 2013 monitoring at the South Oʻahu and Hilo sites (the two most heavily used of the Hawaiʻi disposal sites). However, minor benthic community changes were also seen outside those disposal sites and so appear to be partially attributable to region-wide variability as well. In addition, monitoring at all five sites confirmed that recolonization begins soon after dredged material is deposited, and that similar infaunal and epifaunal communities occupy both on-site and off-site areas. Thus, impacts to benthic habitat quality are considered minimal and largely contained within the disposal site boundaries.

Because disposal of toxic sediments is not allowed, disposal events are short and infrequent, and the overall quantities of disposed material are low, effects on water column and benthic EFH are considered minimal.

5.3 Overlap with Habitat Areas of Particular Concern

In addition to evaluating the broader potential for impacts to water column and benthic EFH, EPA has also assessed the potential for effects to the HAPC for bottomfish designated off the coast of the Island of Hawaiʻi. This HAPC extends for 11 miles along the coast, out from the Hilo Bay, and overlaps with the Hilo ocean disposal site (**Table 8**). The EFH within the Hilo HAPC consists of 336 km^2 covering the water column and bottom habitat extending from the baseline to 400 m. The Hilo HAPC for bottomfish was designated in 2016, because it is an ecologically important juvenile *P. filamentosus* nursery area and also has rare physical pillow lava habitat (WPRFMC, 2016). While nursery areas for *P. filamentosus* are usually flat, open soft substrates (Haight et al, 1993), the camera deployments recorded juveniles over very hard, rugose volcanic substrate (**Figure 21**). The uniqueness of this nursery habitat contributed to the designation of the area as HAPC for bottomfish. Nevertheless, due to the depth and substrate composition of the Hilo ocean disposal site, EPA does not believe that ocean disposal will adversely impact juvenile *P.filamentosus* EFH and the pillow lava habitat (i.e., the two reasons for the designation of the HAPC), as discussed below.

<u>Potential Effects to *P. filamentosus*</u>

Because it is an intermediate bottomfish stock, EFH for *P. filamentosus* encompasses the water column and bottom habitat in depths from the surface to 280 m. Juvenile *P. filamentosus* are specifically known to occupy areas much shallower than their adult counterparts, ranging in depth from approximately 40 m to 100 m (WPRFMC, 2016). However, the Hilo ocean disposal site ranges from 330-340 m deep, therefore any potential effects on *P. filamentosus* would likely be restricted to water column effects and not substrate changes. Yet, as previously mentioned, exposure to disposal plumes in the water column is temporary, and elutriate testing and modeling are required to ensure that exposure to the disposal plume will not cause toxicity to sensitive marine organisms in the water column. This includes any potential reductions in dissolved oxygen levels, which would be short-term and generally restricted to the immediate vicinity of the initial plume generated from the disposal activity in the upper water column. Further, the Hilo ocean disposal site is offshore, in relatively deep water with higher water flow patterns, therefore the initial dilution is rapid and disposal plumes dissipate to background levels quickly. Finally, management measures, such as the specification of an SDZ and scow tracking, have been put in place to ensure that dredged material is contained within the boundaries of the Hilo site to the maximum extent possible and does not adversely affect nearby habitats. Consequently, the potential for adverse effects to *P. fialmentosus* is considered to be minimal.

Potential Effects to Pillow Lava Substrate

EPA monitoring at the Hilo site indicates that, apart from an accumulation of small rock and coral rubble at the center of the site from previous dredged material deposits, the native sediments within the site consist of predominantly sandy substrate (77% sand, 22% silt and clay, and only 1% gravel; **Appendix 4**; **Figure 22)**. Monitoring outside of the Hilo ocean disposal site boundaries did identify pillow lava, however these stations were far outside of the site boundaries (**Figures 23, 24**); No pillow lava was identified within the site boundaries. Therefore, because of its depth and substrate composition, the Hilo ocean disposal site does not appear to encompass the environments for which the Hilo HAPC was designated.

Effects to other EFH in the Hilo HAPC

The Hilo HAPC was primarily designated due to the presence of juvenile *P.filamentosus* (i.e., an intermediate stock bottomfish species) and pillow lava formations, however due to its depth and predominantly sandy substrate, the Hilo ocean disposal site does not appear to represent the area for which the HAPC was designated. In addition to the specific overlap with HAPC, EPA recognizes that water column EFH for crustacean, all bottomfish stocks, and pelagic MUS overlap with the Hilo ocean disposal site (as previously mentioned in **Section 5.1**). Additionally, benthic EFH for bottomfish deep stocks overlaps with the Hilo ocean disposal site. Nevertheless, as previously described (**Section 5.2**), EPA requires conservative sediment elutriate testing and modeling prior to dredging to confirm that exposure to the disposal plume, including the dissolved oxygen and turbidity levels, will not cause toxicity to sensitive marine organisms in the water column (refer to **Section 3.2** for more details on the pre-disposal testing regime). The detailed sediment testing process also includes two solid phase bioassays and bioaccumulation testing to ensure the material disposed will not be toxic to benthic organisms and does not include pollutants likely to bioaccumulate in the food web to levels of biological concern. EPA additionally uses an active, adaptive approach to managing ocean disposal sites (see **Sections 3.4** and **3.6**), which includes incorporating a variety of disposal BMPs as enforceable permit conditions for each approved project. These additional best management practices ensure that direct and indirect effects to water column and benthic EFH are avoided or minimized. Moreover, EPA periodically monitors the ocean disposal sites, and uses those results to ensure that the sites are behaving as expected, or to inform additional, protective management measures if any unexpected adverse effects are found. Consequently, EPA's site designation, pre-disposal testing, management, and monitoring processes comprise a comprehensive management regime that minimizes the potential direct and indirect effects of disposal on both water column and benthic EFH.

Furthermore, the Hilo site has only received 336,160 cy of material in the 40 years since the site was designated (**Table 2**). In comparison to the volumes received along the California Coast in EPA Region 9, this is considered minimal. For example, the San Francisco Deep Ocean Disposal Site has received over 18 million cy, and the Humboldt Open Ocean Disposal Site has received over 33 million cy of material, since these sites were designation in 1995. Individual disposals are also short in nature, occurring over approximately two to four minutes. Because individual disposals discharge from approximately 1,000 cy to 5,000 cy at a time, this equates to between 67 to 336 disposals total, over the 40 years since the site has been designated. Moreover, these disposal events have only occurred in five individual years, providing the benthic community time to recover between the disposal events and assimilate the disposed material. Due to the lack of lava pillow formations in the

Hilo disposal site, the depth of the site, the comprehensive management regime, and the low disposal volumes that are targeted to the center of the site through an SDZ, EPA believes that continued use of the Hilo site would not adversely affect the bottomfish HAPC.

Figure 21. P. filamentosus juveniles recorded by the BotCam remote drop camera system over volcanic pillow lava formations off Hilo, Hawai'i (WPRFMC, 2016).

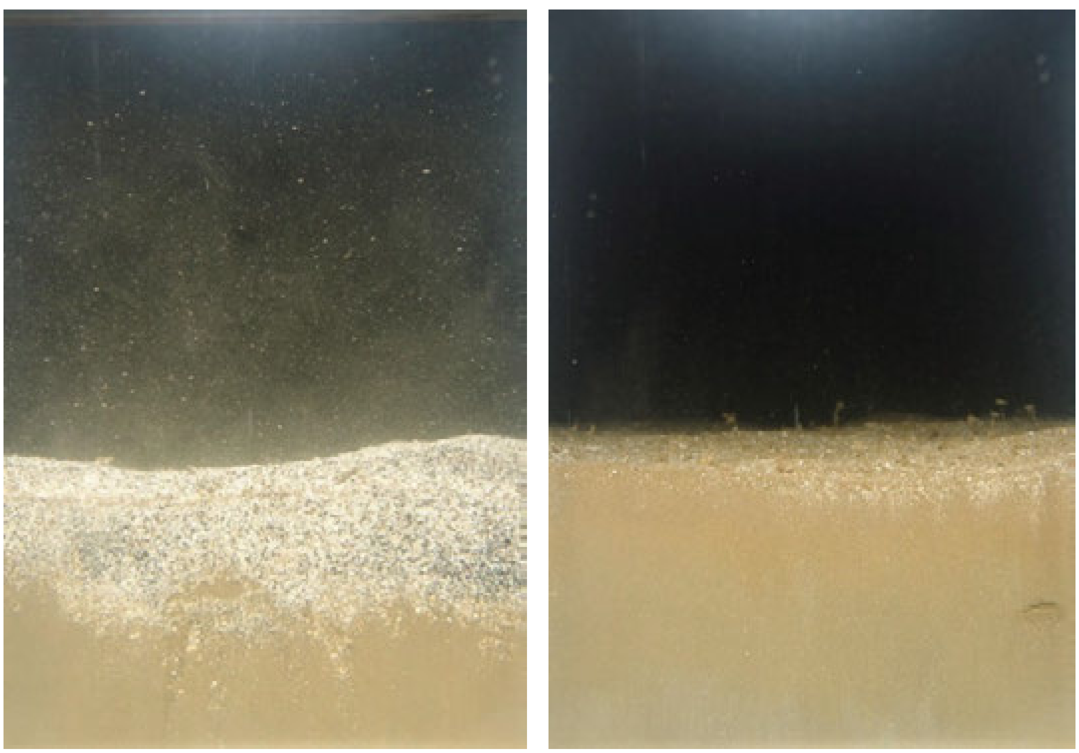

Figure 22. Profile images from two Hilo stations showing a surface layer of disposed coarse white dredged sand that thins from the center of the site (left) to only trace amounts near the site boundary. Scale: width of each profile image = 14.4 cm (**Appendix 2**).

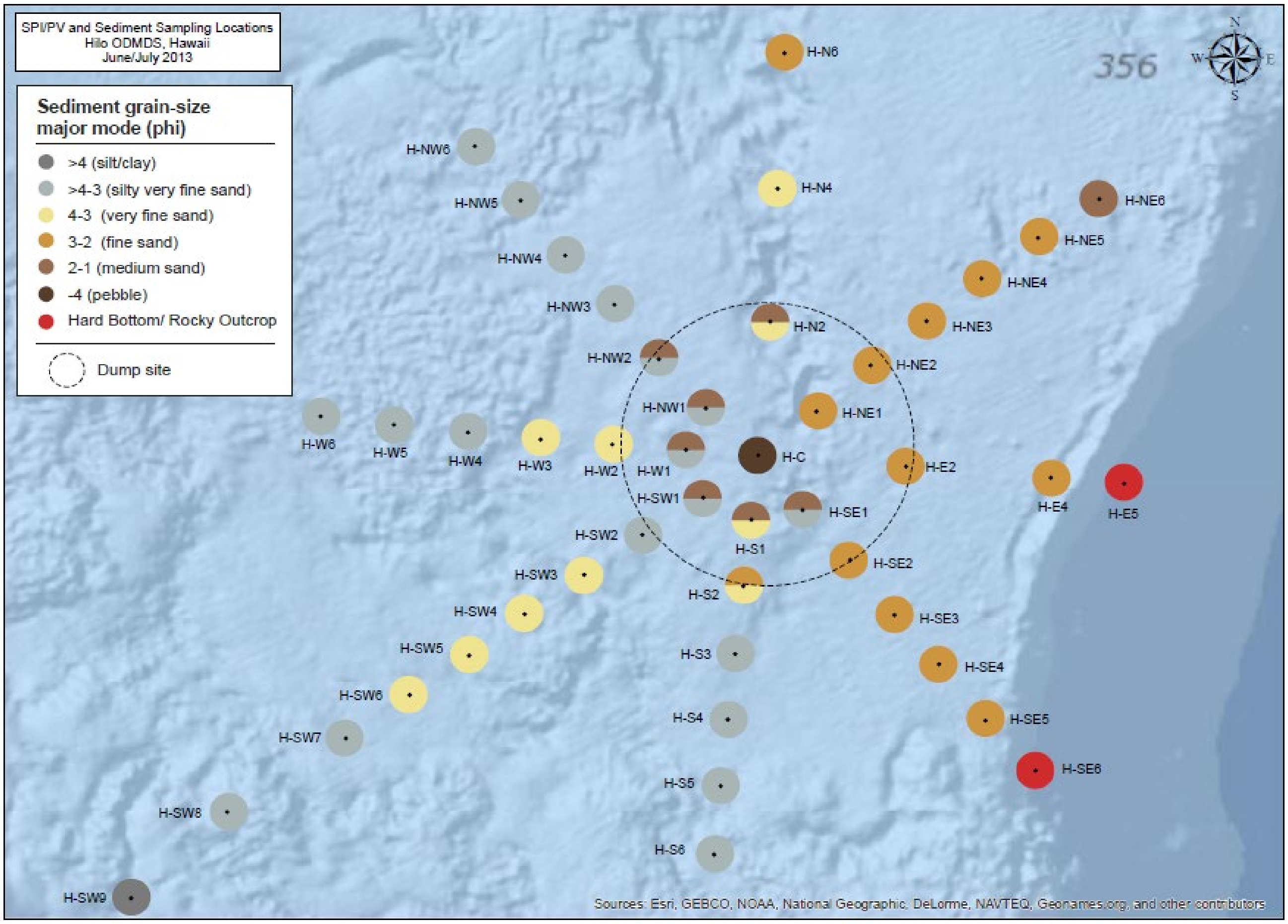

Figure 23. Spatial distribution of sediment grain-size major mode (phi units) at and around the Hilo ocean disposal site.

Figure 24. Deposits of pillow lava in PV image from Station SE6. Scale: width of PV image = 4.1 m.

5.4 Conservation Measures: Hawai‘i FEP Habitat Conservation and Enhancement Recommendations (FEP, 2009):

EPA believes that any potential adverse effects to EFH will be minimal, based on the complementary nature of EPA's management measures to the habitat conservation and enhancement recommendations, as outlined in the 2009 Fishery Ecosystem Plan for the Hawai‘i Archipelago. The recommendations and EPA's associated actions are described in more detail below.

General Recommendations (pg 206)**:**

"Activities that may result in significant adverse effects on EFH should be avoided where less environmentally harmful alternatives are available."

EPA's regulations (40 CFR Part 227.14-16) restrict ocean disposal of dredged material by outlining factors for evaluating the need for ocean disposal and requiring consideration of alternatives to ocean disposal (see **Section 3.3**). Alternatives to ocean disposal (including beneficial uses) are considered on a project-by-project basis to ensure that the minimum necessary volume of dredged material is disposed at any of the ocean disposal sites. Even sediments that have been adequately characterized and found by EPA and USACE to be suitable for ocean disposal will not be permitted for ocean disposal if there is a practicable alternative available (including a beneficial use option).

"If there are no alternatives, the impacts of these actions should be minimized. Environmentally sound engineering and management practices should be employed for all actions that may adversely affect EFH."

The EPA-designated Hawai‘i ocean disposal sites were originally located to minimize impacts by avoiding any unique or limited habitats to the extent practicable (see **Section 3.1**). Further, the quantities of dredged material disposal at Hawai‘i sites are modest, with a long-term annual average of just over 220,000 cubic yards (cy) being disposed at all five sites combined (and under 150,000 cy per year since 2000) (**Table 2**). Once a project is approved for ocean disposal at one of the Hawai‘i sites, additional management measures are taken to further minimize the potential for adverse impacts. These management measures, outlined in the SMMP, include:

- applying a variety of disposal BMPs as enforceable permit conditions for each project (**Section 3.4**);
- satellite tracking of all disposal vessels to ensure that disposal activities occur only where and as required;
- sensors on all disposal vessels to ensure that there is no significant leakage or spilling of dredged material during transit to the disposal site, especially during transit through the nearshore zone where corals, seagrasses, and sensitive animals are most likely to be present;
- tracking and sensor information is reported online for each disposal trip so any problems are identified quickly, and corrective action can be initiated;
- periodically monitoring the disposal site (**Section 3.5**) to confirm that only physical effects occur within the site boundaries and that no significant adverse physical, chemical, or biological effects occur outside the disposal site; and
- adaptively managing the site if monitoring identifies any adverse impacts (**Section 3.6**).

"Disposal or spillage of any material (dredge material, sludge, industrial waste, or other potentially harmful materials) that would destroy or degrade EFH should be avoided."

Section 3.1 describes EPA's site designation criteria (40 CFR Part 228.5 – 228.6), which require that disposal activities must avoid existing fisheries and shellfisheries (228.5(a)); temporary water quality perturbations from disposal within the site must be reduced to ambient levels before reaching any known geographically limited fishery or shellfishery (228.5(b)); and the location of disposal sites must be considered in relation to breeding, spawning, nursery, feeding or passage areas of living resources in adult or juvenile phases (228.6(a)(2)). Additionally, once a site is designated, EPA's regulations establish strict criteria for evaluating whether dredged material is suitable for ocean disposal (**Section 3.2**), in order to protect marine resources (40 CFR Part 227.5-9).

EPA further includes management measures (**Section 3.4**) to prevent spillage of any materials on transit to the ocean disposal site. Each disposal vessel is closely tracked during transit through the nearshore zone. This tracking includes sensors to detect any substantial leaking or spilling of material that could increase turbidity and suspended sediment near sensitive habitats such as corals and seagrasses. Disposal vessels that leak or spill must be removed from service and repaired before being approved for continued use.

<u>Specific Dredging and Habitat Loss and Degradation Conservation Measures</u> (pgs 207-208; 210)

"Sediments should be tested for contaminants as per the EPA and U.S. Army Corps of Engineers requirements."

Sediment testing requirements are described in detail in **Section 3.2**. EPA and USACE have jointly published national sediment testing guidance that describes how this testing is to be done (the 1991 OTM). Dredging project proponents (including USACE) wishing to dispose of material at any Hawaiian ocean dredged material disposal site must first develop an SAP that describes the specific physical, chemical, and biological testing to be done for the project in accordance with the OTM. EPA and USACE must approve the adequacy of the SAP and review the subsequent testing results. Only projects having sediments that pass the tests, and that have no feasible disposal or reuse alternatives, may be permitted for ocean disposal.

"To the extent possible, fill materials resulting from dredging operations should be placed on an upland site. Fills should not be allowed in areas with subaquatic vegetation, coral reefs, or other areas of high productivity."

EPA prioritizes alternatives to ocean disposal (**Section 3.3**). Even sediments that have been adequately characterized and found by EPA and USACE to be suitable for ocean disposal will not be permitted for ocean disposal if there is a practicable alternative available (including a beneficial use option). Moreover, the ocean disposal sites have been carefully selected according to a disposal site selection process designed to protect marine resources. EPA's site designation criteria (**Section 3.1**) explicitly lead EPA to identify disposal sites in locations removed from important habitat areas, fishing grounds or other ocean uses, to the maximum extent practicable. In addition, dredged material proposed to be placed as fill in wetland or nearshore locations is separately regulated under Section 404 of the Clean Water Act (CWA). CWA Section 404 has similar, strict requirements for avoiding impacts to "special aquatic sites" (including areas with submerged aquatic vegetation and coral reefs) to the maximum extent practicable.

"The disposal of contaminated dredge material should not be allowed in EFH."

Contaminated dredged material is not permitted for ocean disposal (**Section 3.2**). Any dredged material that contains levels of chemical contaminants in other than "trace" amounts, that exhibits toxicity in either suspended or solid phase tests, or that includes pollutants that are likely to bioaccumulate in the food web to levels of concern, is not considered suitable for ocean disposal.

"When reviewing open-water disposal permits for dredged material, state and federal agencies should identify the direct and indirect impacts such projects may have on EFH."

This EFH consultation is in direct support of this conservation measure. The potential for *disposal-related* impacts is a function of the locations of the ocean disposal sites in relation to EFH, the quality (suitability) of the dredged material allowed to be disposed at them, the site use requirements and BMPs applied to each project, and site management and monitoring activities. Each of these factors is discussed at length in **Section 3** of this consultation. Because these factors are similar for each project, it is appropriate to evaluate them programmatically for each of the Hawai‘i ocean disposal sites.

In contrast, potential *dredging-related* impacts to EFH vary greatly on an individual project basis. Marine fishes, sea turtles, and marine mammals are generally much more susceptible to potential impacts from activities associated with dredging itself, rather than from open water disposal. Dredging typically occurs in relatively enclosed waterbodies that may have restricted movement pathways that can limit animals' ability to avoid or minimize exposure to noise, turbidity, or physical disturbance. If the sediment being dredged is contaminated, there may also be increased risk of exposure to resuspended contaminants, depending on the presence and effectiveness of dredging control measures such as silt curtains or timing limitations. Dredging may also temporarily or permanently damage or remove important habitat features such as corals or seagrasses. These effects may occur independently of whether the dredged material is subsequently disposed at an ODMDS. For these reasons potential impacts of dredging itself cannot be assessed programmatically and will instead continue to be evaluated on a project-specific basis during USACE's permitting process.

"When practicable, benthic productivity should be determined by sampling prior to any discharge of fill material. Sampling design should be developed with input from state and federal resource agencies."

As required by the MPRSA, EPA undertakes site surveys prior to designation to identify baseline characteristics of the site and surrounding areas. Following designation, EPA endeavors to monitor sites according to a ten-year schedule, in accordance with the review schedule for the site's SMMP. Most recently, EPA conducted the 2013 monitoring surveys at South O‘ahu and Hilo to assess the benthic community recovery following disposal events in 2011 and 2012, as well as prior to disposal events scheduled for 2016. The Nawiliwili and Kahului surveys were conducted following disposal events in 2016 to assess recovery at the sites. Port Allen was also surveyed, but it has not received dredged material since 1999. The design of the 2013 monitoring surveys is described in **Appendix 4**; a similar design was employed in 2017.

"The areal extent of the disposal site should be minimized. However, in some cases, thin layer disposal may be less deleterious. All non-avoidable impacts should be mitigated."

EPA's site designation criteria require that the size of disposal sites be minimized in order to be able to monitor for and control any adverse effects (40 CFR Part 228.5(d)). Thin-layer placement is often useful for beneficial use applications such as nearshore placement of sand to support beach nourishment, but it is generally not useful for disposal at deep water sites. As discussed throughout this assessment, avoidance and minimization measures are built into both the site designation process and the individual project permit review process. Remaining unavoidable impacts, primarily physical substrate changes within the disposal site boundaries, are considered minimal.

“All spoil disposal permits should reference latitude–longitude coordinates of the site so that information can be incorporated into GIS systems. Inclusion of aerial photos may also be required to help geo-reference the site and evaluate impacts over time.”

If material is authorized for ocean disposal, a number of conditions are incorporated into the permit. For example, EPA permit conditions require disposal to occur within a small surface disposal zone (SDZ) specified within each of the Hawai‘i ocean disposal sites. No more than one vessel may be present in the SDZ at one time. Further, EPA permit conditions include a requirement for Disposal Vessel Instrumentation and Tracking: Each disposal vessel must have a primary navigation/tracking system functioning for each disposal trip, calibrated for accuracy at a minimum at the beginning of each ocean disposal project, that automatically indicates and records important information throughout transportation to, disposal at, and return transportation from each of the Hawai‘i ocean disposal sites. The system must record: the position, speed, and heading of the disposal vessel; the fore and aft draft of the vessel; and the time and location of each disposal event. The system must record these data at a maximum 5-minute interval while outside the disposal site boundary, and at a maximum 15-second interval while inside the disposal site boundary and the SDZ. The primary system must also include a real-time display, located in the wheelhouse or otherwise visible to the helmsman, showing the position of the disposal vessel relative to the boundaries of the Hawai‘i ocean disposal site and its SDZ, superimposed on the appropriate navigational chart so that the operator can confirm proper position of the disposal vessel within the SDZ before discharging the dredged material.

6.0 CONCLUSIONS

Ocean disposal of suitable (non-toxic) dredged material has the potential to cause short-term adverse effects to living marine resources in the water column and long-term effects to seafloor habitats and species. Life stages of both listed species and different commercial fishery MUS could be affected by disposal-related stressors including turbidity and sedimentation, nutrients, and contaminants. In this informal consultation package, EPA has described the continued use of the Hawai‘i ocean disposal sites, as well as the use of the sites to date and the EPA regulations and management measures in place to avoid impacts to marine organisms and the marine environment. EPA also presented the extensive monitoring that the agency has conducted at the sites, the results of which indicate that existing management practices have been successful at avoiding and minimizing adverse impacts. In summary, EPA’s ocean disposal site selection, rigorous pre-disposal sediment testing, and site management measures help to ensure that adverse water column and seafloor effects to both listed species and EFH are avoided and minimized.

Based on the analysis provided in the sections above, EPA has determined that the continued use of the five Hawai‘i ocean disposal sites may affect but is not likely to adversely affect ESA protected species, and it may adversely affect EFH, yet effects are expected to be minimal. We have used the best scientific and commercial data available to complete this analysis.

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Appendix 1 to EPA Consultation with NMFS

for Continued Use of Five Existing Ocean Dredged Material Disposal Sites (ODMDS)

in Waters Offshore of Hawai‘i

Original ESA Consultation for the Five Hawai‘i ODMDS
(1980)

United States
Environmental Protection
Agency

Oil and Special Materials
Control Division
Marine Protection Branch
Washington DC 20460

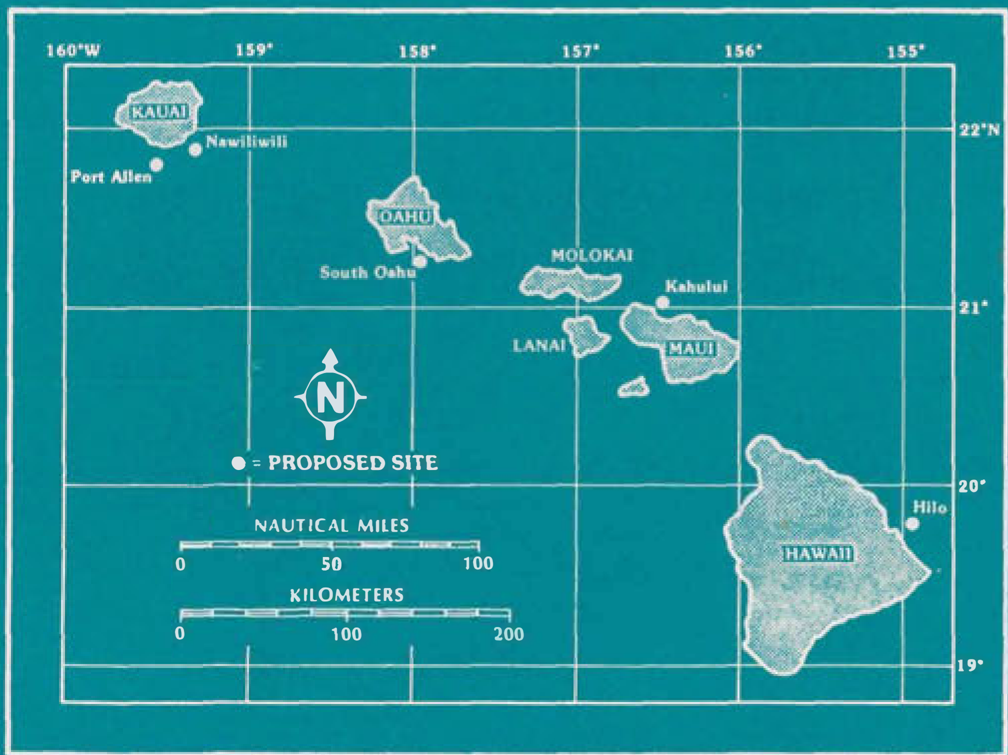
September 1980

Water

EPA

Environmental Impact Statement (EIS) for Hawaii Dredged Material Disposal Sites Designation

Final

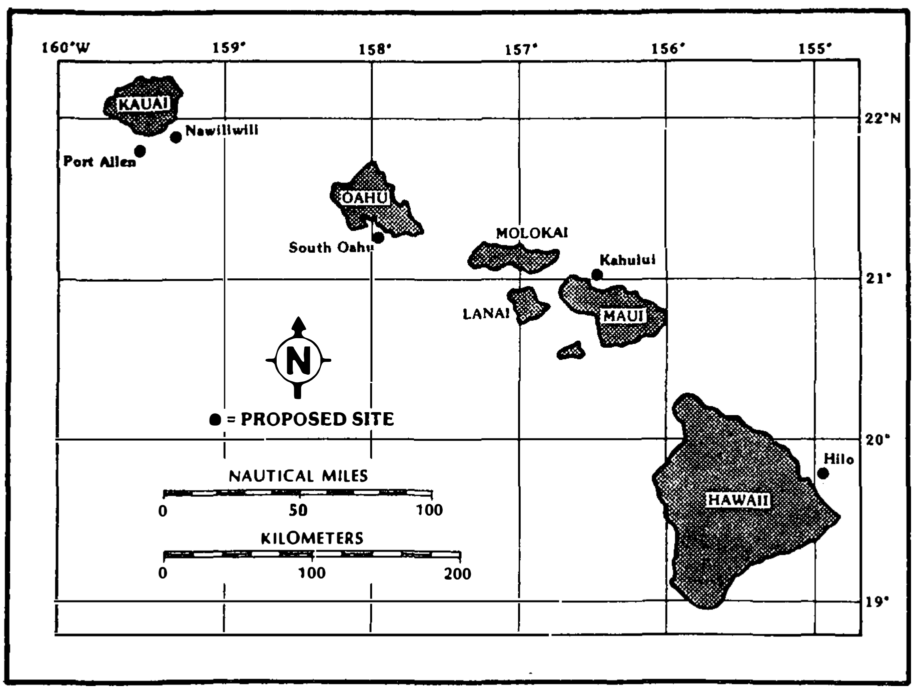


United States Environmental Protection Agency
Oil and Special Materials Control Division
Marine Protection Branch
Washington DC 20460
September 1980
Water

EPA

Environmental Impact Statement (EIS) for Hawaii Dredged Material Disposal Sites Designation

Final



ENVIRONMENTAL PROTECTION AGENCY

FINAL

ENVIRONMENTAL IMPACT STATEMENT FOR THE DESIGNATION OF FIVE HAWAIIAN DREDGED MATERIAL DISPOSAL SITES

Prepared by: U.S. Environmental Protection Agency
Oil and Special Materials Control Division
Marine Protection Branch
Washington, D.C. 20460

CONTENTS

CONTENTS (continued)

CONTENTS (continued)

CONTENTS (continued)

FIGURES

TABLES

NOTE: Each appendix is preceded by its own Table of Contents

TABLE 3-11
PARAMETERS FOR SHRIMP (Heterocarpus ensifer)
CAUGHT AT THE PROPOSED SITES

Parameter	South Oahu	Nawiliwili	Port Allen	Kahului	Hilo
Mean Number Per Trap	52* 283	81	104	141	35
Mean weight (g)	3.8	8.5	8.3	9.7	8.7
Mean Carapace Length (cm)	1.8	2.7	2.7	2.7	2.6

Sources: Goeggel, 1978
*Chave and Miller, 1977b

(Table 3-10). All Bryozoa are erect foliose forms, a type of growth form that requires a hard, stable surface for attachment. All cnidarians (corals), chitons, and probably some of the bryozoans were dead when collected. These organisms may indicate immigrant materials (e.g., transport of skeletons by currents from shallow water, or residual materials from submerged reefs).

THREATENED AND ENDANGERED SPECIES

Threatened and endangered species of the Hawaiian Islands include the humpback whale (Megaptera novaeangliae), Hawaiian monk seal (Monachus schauinslandi), and the green sea turtle (Chelonia mydas). The humpback whale breeding grounds are in nearshore Hawaiian Island waters from November until May. Calving occurs mainly between January and March. Areas frequented by the humpback whale during these months are shown in Figure 3-2.

The monk seal is endemic to the extreme Northwestern Hawaiian Islands.

The green sea turtle is the only common offshore reptile in Hawaiian waters. Green turtle breeding (nesting) grounds are entirely in the Northwestern Hawaiian Islands, primarily at French Frigate Shoals.

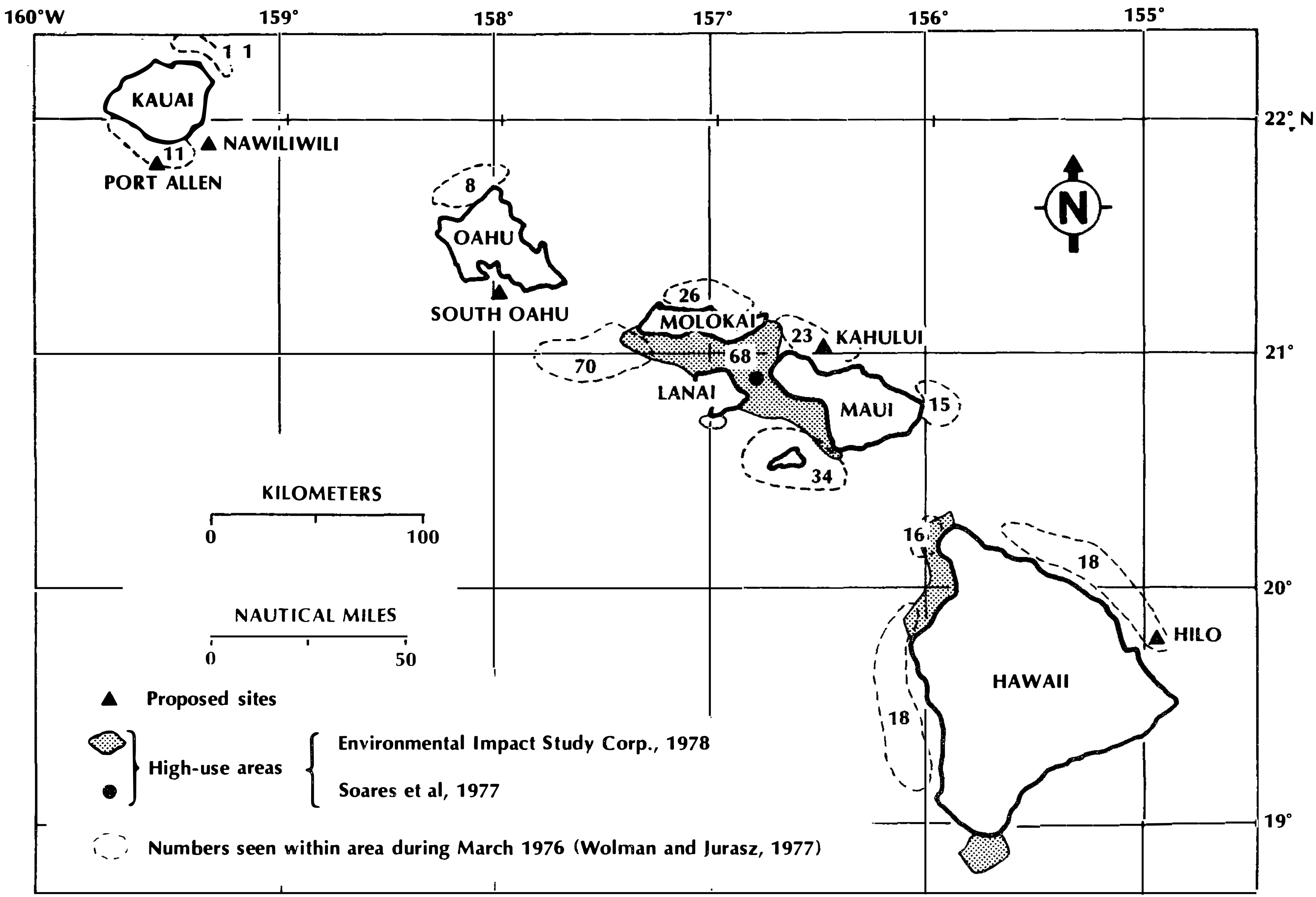


Figure 3-2. Humpback Whale (Megaptera novaeangliae) Distribution in Hawaii

bottom is directly related to its ability to swim and the size of each plankton. Great pressures and temperature differentials must also be considered.

Potentially, a single dump of dredged material could trap and carry to the bottom 1% of the phytoplankton biomass, 0.3% of the zooplankton biomass, and 0.2% of the micronekton biomass in the proposed South Oahu Site. Most of these organisms move with the currents, and the water in the proposed South Oahu Site will be replenished between each dump, thus there will be no significant adverse impact on the local planktonic community due to trapping of organisms by the descending dredged materials. Other proposed and alternative sites are similar to the proposed South Oahu Site, therefore the same water column trapping effects would occur.

EFFECTS ON THREATENED AND ENDANGERED SPECIES

The Hawaiian Islands provide a critical habitat for three threatened and endangered marine organisms: the green sea turtle, Hawaiian monk seal, and humpback whale. Green sea turtle nesting grounds are confined entirely to the northwestern Hawaiian Islands. The distribution of the monk seal is centered primarily on the northwestern Hawaiian Islands. Dredged material disposal produces localized environmental effects which are not expected to affect these populations. However, the effects on the humpback whale and green sea turtle, of short-term turbidity resulting from dredged material disposal, are not known at this time.

During breeding season, humpback whales are sensitive to human presence and activities. Dredged material disposal, conducted at a time when whales are actually present within the site vicinity, would most likely induce avoidance behavior. Out of the breeding season, humpbacks have been reported to be undisturbed by boat and ship traffic which is not directed towards them (Norris and Reeves, 1978). Figure 3-2 in Chapter 3 shows that none of the proposed disposal sites are within areas frequently visited by the whales. However, dumping operations will be scheduled and conducted in a manner which minimizes the potential for disturbing humpbacks during breeding season (November to May).

In the future, Federal, State, or county "humpback parks" or critical humpback whale habitats may be established. Dredged material disposal activities must not conflict with these areas or the goal of protecting humpback whales in their wintering grounds.

EFFECTS ON BENTHOS

Principal effects of dredged material disposal are upon bottom life. Bottom impacts evaluated include organism trapping, benthic smothering (burial), alteration of sediment distribution size, associated benthic community change, and mounding. The intake potential of toxic materials by organisms was previously discussed for plumes and sediments.

BENTHOS SMOTHERING

As distance from shore and water depth increase, the benthic biomass dramatically decreases (Moiseev, 1971; Rowe and Menzel, 1971; Thiel, 1975). Pequegnat et al., (1978) reported that, on a worldwide basis, the average deep-ocean biomass is about 0.01% of life on the continental shelf. Nevertheless, while abundance is low, some organisms in the direct path of disposal will be buried.

The ability of organisms to survive burial is related to habitat and body or shell morphology. Organisms of similar lifestyle and morphology react similarly when covered with sediment (Hirsch et al., 1978). For example, all epifaunal organisms (animals living above the bottom) are usually killed when trapped under deposited dredged material, while infaunal organisms (those living in the sediments) migrate in varying degrees. Hirsch et al. (1978), report studies which determined that mud crabs and amphipods (which have morphological and physiological adaptations for crawling through sediments) were able to migrate vertically through deposits tens of centimeters thick. Similarly, Maurer et al. (1978) reported that the majority of animals tested were able to migrate vertically, with as much as 32 cm of dredged material piled on top of them.

Chapter 5

COORDINATION

PREPARERS OF THE EIS

The preparation of this EIS was a joint effort employing members of the scientific and technical staff of Interstate Electronics Corporation and the Pacific Ocean Division of the Army Corps of Engineers. The preparers and the sections of the EIS for which they were responsible are presented in Table 5-1.

TABLE 5-1. LIST OF PREPARERS

Author	Summary	Chapter						Appendix				
		1	2	3	4	5	6	A	B	C	D	F
M.D. Sands	X	X	X	X	X	X					X	
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M. Lee		X	X	X	X	X	X	X	X	X	X	

M. DALE SANDS

Mr. Sands, the principal author of this EIS, possesses a B.S. degree in chemistry and biological sciences and an M.S. degree in environmental health sciences (environmental chemistry). He prepared the Summary, Chapters 1, 2, 3, 4, and 5, and Appendix D of the EIS. As EIS coordinator, he directed writing efforts on other sections of the EIS, edited all chapters, and maintained liaison with EPA headquarters and the Pacific Ocean Division of the Army Corps of Engineers.

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Mr. Donat holds a B.S. degree in chemical oceanography. He assisted with the writing of Chapters 1, 2, 3, 4, 5, and 6 and Appendixes A, B, C, and F.

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Appendix F

COMMENTS AND RESPONSES TO COMMENTS ON THE DRAFT EIS

The Draft EIS (DEIS) was issued on 9 November 1979. The public was encouraged to submit written comments. This appendix contains copies of written comments received by EPA on the DEIS. There was a great variety of comments received, thus EPA presents several levels of response:

- Comments correcting facts presented in the EIS, or providing additional information, were incorporated into the text and the changes were noted.

- Specific comments which were not appropriately treated as text changes were numbered in the margins of the letters, and responses prepared for each numbered item.

Some written comments were received after the end of the comment period. In order to give every consideration to public concerns, the Agency took under advisement all comments received up to the date of Final EIS production.

The EPA sincerely thanks all those who commented on the DEIS, especially those who submitted detailed criticisms that reflected a thorough analysis of the EIS.

COMMENT

UNITED STATES DEPARTMENT OF COMMERCE
The Assistant Secretary for Science and Technology
Washington, D.C. 20230
(202) 377 3xxx 4335

February 4, 1980

Mr. Henry L. Longest, II
Deputy Assistant Administrator
for Water Program Operations
U.S. Environmental Protection Agency
Washington, D. C. 20460

1 Dear Mr. Longest:

This is in reference to your draft environmental impact statement entitled, "The Designation of Five Hawaiian Dredged Material Disposal Sites." The enclosed comment from the Maritime Administration is forwarded for your consideration.

Thank you for giving us an opportunity to provide this comment which we hope will be of assistance to you. We would appreciate receiving eight (8) copies of the final environmental impact statement.

Sincerely,

Sidney R. Galler
Deputy Assistant Secretary
for Environmental Affairs

Enclosure

Memo from: George C. Steinman
Chief, Division of Environmental Activities
Office of Shipbuilding Costs
MarAd

RESPONSE

EPA gratefully acknowledges the letter from the Deputy Assistant Secretary for Environmental Affairs, United States Department of Commerce.

UNITED STATES DEPARTMENT OF COMMERCE
Maritime Administration

December 28, 1979

MEMORANDUM FOR: Dr. Sidney R. Galler
Deputy Assistant Secretary for Environmental Affairs

2 Subject: Environmental Protection Agency Draft Environmental Impact Statement for the Designation of Five Hawaiian Dredged Material Disposal Sites (DES CN 7911.10)

The subject document has been reviewed for comment as requested by your memorandum of November 15, 1979. The proposed action amends the 1977 interim designation of the EPA Ocean Dumping Regulations and Criteria by altering the locations of three dump sites, adding two new dump sites, and making final designations of all five sites. All the sites are located close to shore but in deep water where open ocean conditions prevail. The dredged material, which is mostly terrestrial silt and clay mixed with sand, is dispersed rapidly at all five proposed sites. Currents generally flow alongshore or offshore.

We concur with the analyses and conclusions contained in the DEIS and have no critical comments to submit. Please send us a copy of the FEIS.

Barrick W. Ludecke

for GEORGE C. STEINMAN
Chief, Division of Environmental Activities
Office of Shipbuilding Costs

2 EPA thanks the Chief of the Division of Environmental Activities, Office of Shipbuilding Costs, Maritime Administration, United States Department of Commerce, for reviewing the Draft EIS.

UNITED STATES DEPARTMENT OF COMMERCE
The Assistant Secretary for Science and Tec
Washington, D.C. 20230
(202) 377-

February 12, 1980

Mr. Henry L. Longest, II
Deputy Assistant Administrator
for Water Program Operations
3 U. S. Environmental Protection Agency
Washington, D. C. 20460

Dear Mr. Longest:

This is reference to your draft environmental impact statement entitled, "The Designation of Five Hawaiian Dredged Material Disposal Sites." The enclosed comments from the National Oceanic and Atmospheric Administration are forwarded for your consideration.

Thank you for giving us an opportunity to provide these comments, which we hope will be of assistance to you. We would appreciate receiving eight (8) copies of the final environmental impact statement.

Sincerely,

Sidney R. Galler
Deputy Assistant Secretary
for Environmental Affairs

Enclosures

Memos from:

Mr. James W. Rote
National Marine Fisheries Service
F/HP - NOAA

Mr. Robert B. Rollins
National Oceanic Survey
OA/C5 - NOAA

Mr. R. Kifer
OCZM - NOAA

3 EPA gratefully acknowledges the letter and enclosed memos from the Deputy Assistant Secretary for Environmental Affairs, United States Department of Commerce.

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southwest Region
Western Pacific Program Office
P. O. Box 3830
Honolulu, Hawaii 96812

January 9, 1980 F/SWR1:JJN

Mr. T. A. Wastler
Chief, Marine Protection Branch
Environmental Protection Agency
Washington, D. C. 20460

Dear Mr. Wastler:

The National Marine Fisheries Service (NMFS) has reviewed the draft environmental impact statement (DOC DEIS No. 7911.10) for The Designation of Five Hawaiian Dredged Material Disposal Sites dated October 1979.

In order to provide as timely a response to your request for comments as possible, we are submitting the enclosed comments to you directly, in parallel with their transmittal to the Department of Commerce for incorporation in the Departmental response. These comments represent the views of the NMFS. The formal, consolidated views of the Department should reach you shortly.

Sincerely yours,

Doyle E. Gates
Administrator

Enclosure

cc: Gary Smith, F/SWR3, w/encl.
Office of Habitat Protection, F/HP
(4 copies) w/encl.

Comments on DEIS No. 7911.10 - The Designation of Five Hawaiian Dredged Material Disposal Sites

General Comments

The National Marine Fisheries Service (NMFS) was consulted during the planning and selection stages for the designation of deep-ocean disposal sites in the Hawaiian Islands for continued disposal of dredged material. This included narrowing an original fourteen proposed sites down to the five sites considered in the subject DEIS.

4-1 The NMFS feels that existing fisheries and endangered species under our jurisdiction will probably not be adversely impacted by the proposed action, primarily because of the depths of the selected sites and the planned infrequent use of these sites. However, because of the importance of the nearshore waters surrounding the main Hawaiian Islands to two marine animals on the endangered species list, we feel the DEIS should include sections in chapters 3 and 4 specifically dealing with endangered species. The two species of concern are the endangered humpback whale (Megaptera novaeangliae) and the threatened green turtle (Chelonia mydas). This section should include a caveat indicating that the effects of short-term turbidity, such as occurs during dredged material disposal, on humpback whales and green turtles, is not known at this time.

Specific Comments

Chapter 2. ALTERNATIVES INCLUDING THE PROPOSED ACTION.

"Interference with Shipping, Fishing ....

4-2 Page 2-20, paragraph 1. This paragraph states that the only fishing which occurs near the proposed disposal sites is midwater trolling. Midwater trolling should be changed to surface trolling. In addition, some bottom handlining for deep water snappers and midwater handlining for akule and large tunas occurs near several of the proposed sites.

Chapter 3. AFFECTED ENVIRONMENT

BIOLOGICAL CONDITIONS

Nekton

4-3 Page 3-14, paragraph 4. Scientific names should be used for these pelagic nektonic predators the first time they appear in the text. Common names preceding the scientific name should be the same throughout the DEIS. As an example, in this paragraph yellowfin tuna and skipjack tuna are used while on page 3-27 the Hawaiian names ahi and aku are used respectively for these tuna.

4-1 The suggested information on the two endangered species has been incorporated into Chapters 3 and 4 under sections entitled "Threatened and Endangered Species. The "caveat" concerning effects of short-term turbidity on these endangered species has been included under the same section in Chapter 4.

4-2 The suggested changes have been incorporated into the text and appear in Chapter 2 of the Final EIS under the section "Detailed Basis for Selection of the Proposed Sites, subsection "Interference with Shipping, Fishing...

4-3 These changes have been incorporated into the text of the Final EIS and appear in Chapter 3 under the section "Recreational, Economic and Aesthetic Characteristics, subsection "Fisheries.

Page 3-14, paragraph 5. As presented in General Comments above, the discussion of endangered and threatened species should be expanded and placed in a separate section in this chapter of the DEIS.

This paragraph states that "the green sea turtle is the only common offshore reptile, whose breeding grounds are on the leeward side of the islands." Although it is the only common marine reptile in Hawaiian
4-4 waters, green turtle breeding (nesting) grounds at present are entirely in the Northwestern Hawaiian Islands, primarily at French Frigate Shoals. In addition, the Hawaiian monk seal (Monachus schauinslandi) is indeed endemic to the Hawaiian Archipelago. However, it is rarely found in the main islands thus dredged material disposal at the proposed sites will not adversely impact this endangered seal.

Page 3-16, Table 3-9. Common Hawaiian Marine Mammals. There are several errors in this table as follows: 1. There is no known pilot whale, Delphinus melas. The pilot whale found in Hawaiian waters is Globicephala macrorhynchus. 2. The common name for Stenella attenuata is spotted
4-5 dolphin. 3. The common dolphin, Delphinus delphis, and the Pacific white-sided dolphin, Lagenorhynchus obliguidens, are unconfirmed in Hawaiian waters; therefore they are certainly not common Hawaiian marine mammals. 4. Only one species of bottlenose dolphin occurs in Hawaii, Tursiops gilli.

Fisheries

Page 3-23, paragraph 4. This paragraph states that "commercial fishing (in Hawaii) is confined to surface or pelagic offshore fishing, with little bottom fishing." This statement is misleading. Bottomfishing for
4-6 demersal snappers and groupers is an important segment of Hawaiian commercial fishing, even though the catch is relatively small compared to the pelagic fisheries.

Page 3-27, paragraph 3. The paragraph discusses fisheries in Mamala Bay and indicates that fishing for aku is the major fishery at the dredged material disposal site. Actually the majority of aku are taken well
4-7 seaward of the proposed disposal site. Ulua should be followed by (Caranx and Carangoides spp.)

Chapter 4. ENVIRONMENTAL CONSEQUENCES

Fishing

4-8 Page 4-3, paragraph 3. Again the statement is made that "little or no demersal (bottom) fishing" occurs in Hawaii. This should be corrected.

Page 4-5, paragraph 4. This paragraph discusses recreational fishing
4-9 from charter boats and states that mahimahi, swordfish and billfish are caught. Swordfish are not taken by recreational charter boats which fish

4-4 This information has been added to Chapter 3 of the Final EIS under the section "Threatened and Endangered Species.

4-5 Table 3-9 in the Final EIS has been changed to reflect these comments.

4-6, 4-7 This passage has been amended in the Final EIS to include this information and appears in Chapter 3 under the section "Recreational, Economic, and Aesthetic Characteristics, subsection "Fisheries.' The family name Carangidae is used in the final EIS for ulua instead of the two species names suggested.

4-8, 4-9 These changes have been made and appear in Chapter 4 of the Final EIS under the section "Effects on Recreational, Economic, and Aesthetic Values, subsection "Fishing" by surface trolling. Long-line fishing is not commonly conducted as a recreational fishing method.

We hope these comments will be of assistance to you. Please send us a copy of the final EIS as soon as it becomes available.

Rec'd PP/EC

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SURVEY
Rockville Md 20852

OA/C52x7:SKM

TO: PP - Richard L. Lehman

FROM: OA/C5 - Robert B. Rollins /

SUBJECT: DEIS #7911.10 - The Designation of Five Hawaiian Dredged Material Disposal Sites

The subject statement has been reviewed within the areas of the National Ocean Survey's (NOS) responsibility and expertise and in terms of the impact of the proposed action on NOS activities and projects.

The following comments from the Ocean Dumping and Monitoring Division, NOS, are offered for your consideration.

The letter enclosed with the DEIS is most important. It indicates that the DEIS is for site designation only. It contains information of use to determining acceptability of given dredged material for ocean dumping but it is not to be considered a final argument for such acceptability.

The EPA Ocean Dumping Regulations are specific on what needs to be considered for site designation. Those regulations are Appendix F of the DEIS and 11 specific considerations are on page F-10. These constitute the cookbook for a site designation DEIS.

On pages 2-14 to 2-21, the 11 considerations are separately discussed and this is the heart of the DEIS. The basic conclusion of the DEIS is that the five sites should be designated as dredged material disposal sites because they are locations of low resource value where any suspended or dissolved remnant of a dump will be carried seaward or parallel to the shore while being mixed with surrounding water. I have no data or information which will cause me to disagree with that conclusion.

Specific Comments:

5-1 P. xii, paragraph 4: Mention is made of a huge assimilative capacity at the disposal sites, yet a definition of assimilative capacity is not given in the DEIS. What does huge mean? Relative to what? What does "assimilative capacity" mean?

5-1 The sentence in question has been changed in the Final EIS to read: "The proposed disposal sites can receive dredged materials without jeopardizing the life-support systems of marine biota due to the extent of dilution which occurs (approximately 1:1,000,000).

P. xii: THE EIS is riddled with confusion, three examples of which
are found on this page. In paragraphs 2 and 3, the word "significant"
appears twice as an adjective and in both cases it is completely unclear
5-2 as to its meaning. What is "significant dilution and transport"? In the
last sentence on the page, what are "suspended particulates"? Particulate
sediments? Organisms?

P. 2-18, paragraph 1: The discussion of dilution and dispersion of
spoil plumes is too brief to be sufficient. What does "sufficiently
diluted and dispersed" mean? By what standards, and relative to what?
5-3 The same comments apply to paragraph 2 on page 2-19. In both cases, all
quantitative comments about plume behavior should be supported by a reference
to the original source of the information, even though in these cases,
the references are discussed in more detail in later chapters.

Page 3-3: First word on first line, "Goeggel" should not be there.

Page 3-7: The paragraph about currents includes not one reference to original sources of information. The references should be included.

Page 3-9: Under Trace Metals, some elements "below minimum detec-
table levels" - what are those levels? Also, the Zn and Hg concentrations
5-4 are given and said to be 10 to 1000 times higher than listed average con-
centrations. If the data are to be given, then some explanation of why
the measured concentrations are so high should also be present.

Pages 3-10 to 3-12: The discussion and tables dealing with metal
contents of sediments and organisms are meaningless as they stand. The
5-5 figures should be presented in relation to what is known of chemical
dynamics and toxicities of the metals.

Pages 3-12 to 3-20: The summary of biological conditions should be
presented in a comparative manner to demonstrate similarities and dif-
ferences, if any, between the regions discussed and surrounding areas.
5-6 The section is incomplete without this broader, regional perspective.
This section could also be improved by expanding the descriptions of
the various communities with names and number of species occupying them.
The last paragraph on page 3-16, for example, could be improved greatly
by inclusion of a few numbers. What does "dominated in abundance and
diversity" mean? How many are "several"? What does "fewer numbers"
mean?

Page 4-12: It is unlikely that dredged material would be declared
acceptable only on basis that Hg and Cd levels in site sediments would
5-7 increase by 50 percent or less. This criteria would be sufficient if,
for some reason, bioassays were deemed unnecessary.

The example on the bottom of the page is not comprehensible. If
5-8 dredge material could be uniformly distributed in the water column, one
would be seeking other disposal sites.

5-2 The word "significant" has been deleted from the two cited paragraphs in the Final EIS. The phrase "suspended particulates" has been changed to "suspended particulate matter.

5-3 The discussion of dilution and dispersion of the dredged material plume is a summary of more detailed information found in Appendices A and C of the Draft and Final EIS. However, appropriate references have been included as suggested. The word "sufficiently" has been deleted from the cited phrase.

5-4 The detection limits and an explanation of the high zinc and mercury values have been included in the Final EIS in Chapter 3 under the section entitled "Chemical Conditions" subsection "Trace Metals" The detection limits for silver, cadmium, chromium, and copper were 1 µg/liter. The detection limits for lead and nickel were 5 µg/liter and 4 µg/liter, respectively. The high values for mercury and zinc occurred due to sample contamination (K. Chave, personal communication, 1980). (See Comment and Response #9-3.)

5-5 The information contained in these tables is presented as background description for characterization of the disposal sites. Toxic concentrations of metals in sediment have not been established.

5-6 Complete biological studies were conducted (see Chapter 3 for references) at the South Oahu Site only. Chapter 3 of the DEIS described differences between the pelagic communities at this site and communities in other regions of the Hawaiian Islands. Chapter 3 discussed members of the site biota which could be potentially impacted by dredged material dumping. Regarding use of qualitative descriptors of abundances in the DEIS text, reference to an accompanying table had been omitted inadvertently. This table (3-10) had been included in the DEIS and is included in the Final EIS.

5-7 The tables and discussion using the 50% increase criterion have been deleted from this section of the Final EIS. The section entitled "Toxin Accumulation" has been rewritten as a result of Comment #25-10, and is now entitled "Trace Metal and Organohalogen Accumulation.

5-8 The example cited in the section entitled "Trace Metal and Organohalogen Accumulation" may be viewed as an extreme case, since, in reality, the metals contained in the dredged material do not readily enter solution. The example is merely illustrating that, given the volume of the disposal site and assuming that all metals contained in the dredged material entered solution completely, the increases in metal concentrations of the water column are extremely minimal.

Rec'd PP/EC
07 JAN 1980

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
[redacted] OCZM
Washington, D.C. 20235

DATE: January 7, 1980

TO: PP/EC - R. Lehman

FROM: CZM - R. Kifer

SUBJECT: DEIS 7911.10 - The Designation of Five Hawaiian Dredge Material Disposal Sites - CZM Comment

Thank you for the opportunity to review and comment upon the Draft Environmental Impact Statement (EIS) for The Designation of Five Hawaiian Dredged Material Disposal Sites.

The Sanctuary Programs Office of the Office of Coastal Zone Management (OCZM) is concerned about potential impacts of the proposed action on the marine environment in general and on the particularly sensitive resources of areas which have been suggested for possible marine sanctuary status. At the present time, there are no marine sanctuaries nor active candidates for marine sanctuary designation within the proposed disposal areas. However, the interisland waters of Maui County, including waters of the Pailolo Channel near Kahului Harhor and Kahului Disposal Site, appear on the Marine Sanctuary List of Recommended Areas (44 FR No. 212 October 31, 1979). Moreover, the recent Hawaiian Humpback Whale Workshop (Maui: December 12-14, 1979) convened by OCZM recommended the establishment of a Humpback Whale Marine Sanctuary to encompass all waters within the 100-fathom isobath surrounding the High Hawaiian Islands (from Kaula Island in the northwest to the Island of Hawaii in the southeast). OCZM is discussing the outcome of the workshop with various government, scientific and environmental entities and is evaluating the recommended site according to Marine Sanctuary Regulations (44 FR No. 148 July 31,
6-1 1979) for possible selection as an Active Candidate for marine sanctuary designation. While the boundaries of the recommended marine sanctuary and proposed dredge disposal sites do not overlap, they are within close proximity of each other. It is therefore recommended that appropriate monitoring studies be undertaken to determine to what extent the marine environment within these especially sensitive areas would be affected by disposal operations, especially the likelihood of dredged materials moving into a marine sanctuary (40 CFR SS 228.10[b]) should one be designated.

6-1 Modeling studies on dredged material dispersion were discussed at length in Appendix C of the DEIS, subsection entitled "Previous Mathematical Studies. Future environmental studies to provide additional dredged material dispersion data were recommended in Appendix D of the DEIS, which included thorough characterizations of the dredged materials, turbidity and/or nephelometry profiles of the disposal site water column, and total suspended solids load. These studies will be performed at the discretion of the District Engineer (or EPA Regional Administrator), who will determine the optimal conditions for success. When any marine sanctuary near a disposal site appears to be influenced by dredged material disposal operations, the study plan will be reviewed and amended as needed.

OCZM is particularly concerned about the welfare of the endangered
humpback whale (Megaptera novaeangliae) in relation to any disposal
activity. Figure 3-2 (p 3-17) in the DEIS acknowledges the presence of
humpback whales within the proposed disposal areas. This concurs with
the findings of whale surveys conducted by the National Marine Fisheries
Service (NMFS: 1976-79) and several independent scientific surveys
(1976-78). While the effect of dredge disposal on humpbacks has not yet
been ascertained, it is strongly recommended that, should disposal be
carried out as planned, extreme caution be exercised to avoid disposal
if and when humpbacks are reported at or near the disposal sites. Since
6-2 humpback residency is seasonal (winter/early spring), it is suggested
that disposal be avoided during this time, especially during what are
believed to be important calving, nursery, and possible courtship and
breeding periods, until it is certain that dumping operations do not
interfere with these key life history events. Further consultation with
NOAA (NMFS and OCZM) is recommended to coordinate scheduling of disposal
operations to avoid adverse impacts on the whales during their winter
residence in Hawaii.

As acknowledged in the DEIS, "an effective monitoring program is
usually based on a comprehensive predisposal baseline survey of the site"
6-3 (p 2-22) and of the proposed dredge operation site. OCZM therefore
recommends that the following environmental parameters and consequences
be given full consideration prior to dredge and disposal operations:

- relationship between and compatibility of sediments at disposal sites and those to be dredge/disposed, especially since regulations specify that "... material proposed for dumping is substantially the same as the substrate ..." at the disposal site. On page 4-19 it is stated that "the bulk of dredge material proposed for dumping at the South Oahu Site is composed of sand and gravel, and presents no great variation in disposal site substrate." No such evaluation is provided for other proposed sites and intended dredge materials. Table 4-5 (p 4-19) does, however, present grain size distribution comparisons. Sediment compositions given in this table appear to be significantly different. For example, sediment at the proposed Nawiliwili Site has a 2% silt-clay composition whereas sediment to be dredged from the Nawiliwili Harbor has a 92% silt-clay composition. Since "there is evidence that the dredged material may consist of considerable fractions of silt and clay" (p C-10), OCZM recommends further study to determine if dredged materials are compatible with sediments of the disposal site.
- the physical and chemical relationship between measured harbor sediments and sediments in the dredge vessel hoppers before release,
- the effect of turbidity on marine mammals,

6-2 Subsections entitled "Threatened and Endangered Species, relative to humpback whales and other Hawaiian waters species, have been added to the Final EIS in Chapters 3 and 4. Several factors would mitigate disposal effects on these mammals: (1) the sites are not greatly frequented by humpback whales (see Figure 3-2, Chapter 3), (2) as described in Chapter 4, humpback whales are apparently undisturbed by surface traffic not specifically directed at them (Norris and Reeves, 1978), and (3) the proposed dredged material disposal would be a short-term infrequent activity. Due to potential effects of disposal on the whales, advanced planning schedules will attempt to avoid breeding and calving seasons (November to May) until additional data are available. (See Comment and Response #15-2.)

6-3 Some of the future study subjects recommended by the Office of Coastal Zone Management (OCZM) are already included in Appendix D (e.g., physical/chemical characterization of sediments in dredged vessel hoppers, measurement of benthic biomass, and recruitment/recovery rates). Other OCZM-recommended studies are subjects for research (e.g., effects of turbidity on marine mammals, cumulative effects of organic carbon loading, and dredged material plume effects on holoplankton and meroplankton). The remaining study recommended by OCZM, "Determination of Sediment Composition,' is listed in the Ocean Dumping Regulations for testing candidate materials for dumping. Except for the studies prescribed by the Ocean Dumping Regulations, all recommended studies will be given full discretionary consideration by the District Engineer (or EPA Regional Administrator).

- the organic content of dredged material,
- the cumulative effect of organic carbon loading on the ocean bottom and in overlying waters (from organic content of dredged material, biotic trapping and benthic smothering) and the potential impact of simultaneous increase in oxygen demand and reduction in primary productivity due to turbidity and phytoplankton trapping;
- the effects of suspended and settling sediment on the plankton and on recruitment/settlement of planktonic larvae and juveniles;
- measurement of benthic biomass and recruitment/recovery rates at the disposal sites and at the dredged sites,
- bioassays of key organisms at disposal sites and at dredge sites.

Thank you for considering these recommendations.

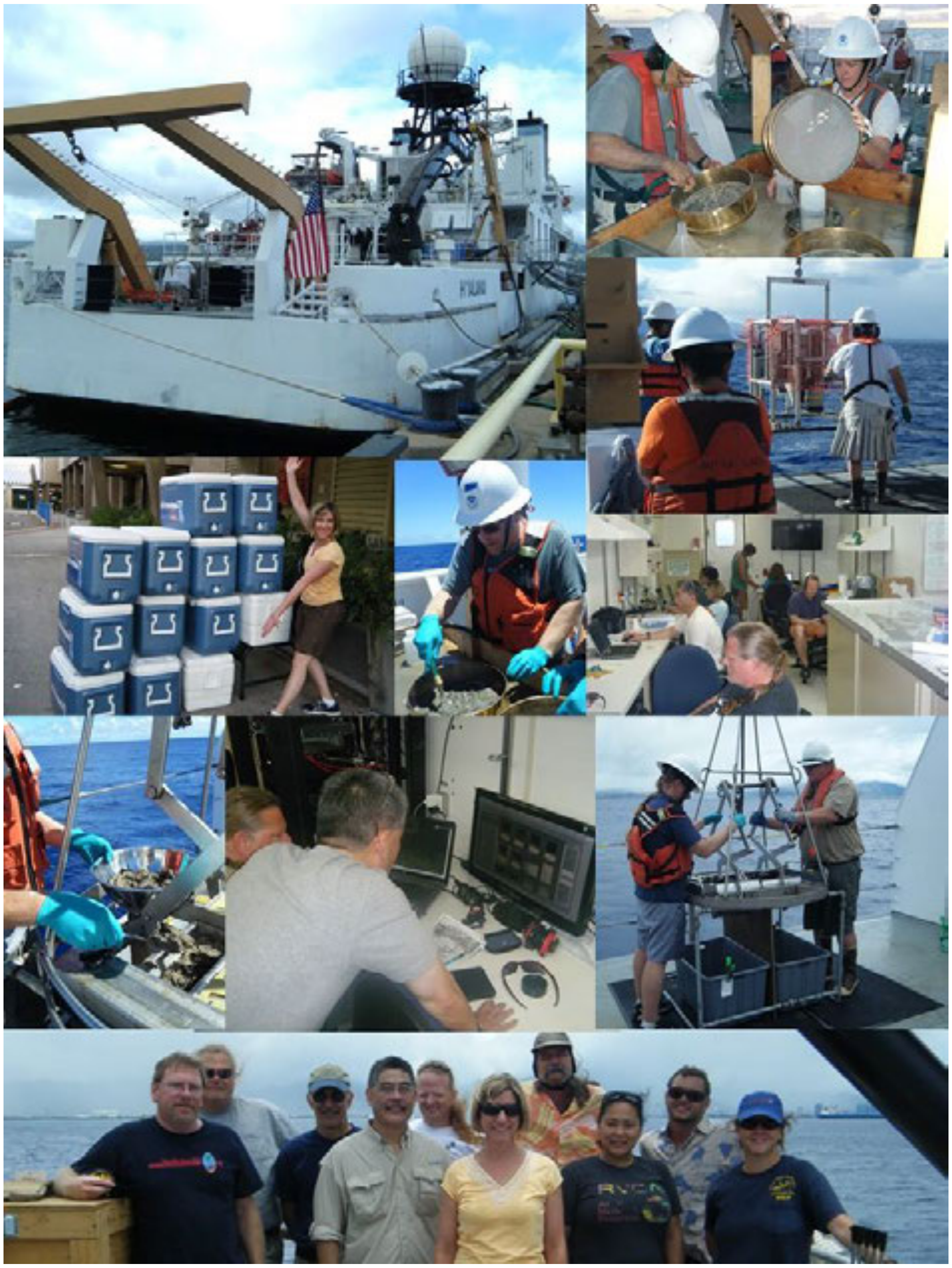
Appendix 2 to EPA Consultation with NMFS

for Continued Use of Five Existing Ocean Dredged Material Disposal Sites (ODMDS)

in Waters Offshore of Hawaii

Site Monitoring Synthesis Report for the South O'ahu and Hilo Ocean Disposal Sites (EPA 2015)

2013 HAWAII OCEAN DISPOSAL SITE MONITORING
SYNTHESIS REPORT



Prepared by:
Dredging and Sediment Management Team
USEPA Region 9
San Francisco, CA

April 27, 2015

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2013 HAWAII OCEAN DISPOSAL SITE MONITORING SYNTHESIS REPORT

EXECUTIVE SUMMARY

In 1981, the US Environmental Protection Agency (EPA) designated five ocean dredged material disposal sites (ODMDS) offshore of Hawaiian Island ports and harbors. In 1997, EPA and the US Army Corps of Engineers (USACE) published a Site Monitoring and Management Plan (SMMP) covering all five of these disposal sites. But since that time, due to lack of available funding, the sites have not been comprehensively monitored and the SMMP has not been updated. Therefore, when funding became available for 2013, EPA identified the Hawaii sites as the highest priority to monitor of all the disposal sites in Region 9. Since only the South Oahu and Hilo sites had received any disposal activity since the late 1990s, EPA conducted surveys at only these two sites. Ship and equipment problems resulted in a reduction in the planned survey scope and in the overall number of samples collected. However, sufficient sampling was completed to provide an adequate basis to confirm environmental conditions at these sites and to update the SMMP. Based on analyses of sub-bottom profiling, sediment profile and plan view imaging, and sediment grain size, chemistry, and benthic community sampling, it appears that the pre-disposal sediment testing program has protected these sites and their environs from any adverse contaminant loading. The bulk of the dredged material disposed in the last decade or more appears to have been deposited properly within the site boundaries. There are minor and localized physical impacts from dredged material disposal, as expected, but no significant adverse impacts are apparent to the benthic environment outside of site boundaries. Continued use of the disposal sites, under an updated SMMP, is recommended.

I. INTRODUCTION AND BACKGROUND

Ocean dredged material disposal sites (ODMDS) around the nation are designated by the Environmental Protection Agency (EPA) under authority of the Marine Protection, Research and Sanctuaries Act (U.S.C. 1401 et seq., 1972) and the Ocean Dumping Regulations at 40 CFR 220-228. Disposal site locations are chosen to minimize cumulative environmental effects of disposal to the area or region in which the site is located, and disposal operations must be conducted in a manner that allows each site to operate without significant adverse impacts to the marine environment. Many ocean disposal sites are located near major ports, harbors, and marinas and are very important for maintaining safe navigation for commercial, military, and private vessels.

EPA and the US Army Corps of Engineers (USACE) share responsibility for managing ocean disposal of dredged sediments. First, there is a pre-disposal sediment testing program that is jointly administered by the agencies to ensure that only clean (non-toxic) sediments are permitted for ocean disposal. EPA must concur that sediments meet ocean dumping suitability requirements before USACE can issue a permit for ocean disposal. Post-disposal site monitoring then allows

EPA and USACE to confirm the environmental protectiveness of the pre-disposal testing. The agencies also jointly manage the ocean disposal sites themselves. All sites are operated under a site management and monitoring plan (SMMP), and the Agencies cooperate on updating the SMMPs if needed, based on the results of periodic site monitoring. EPA is also responsible for enforcement of potential ocean dumping violations at each site.

The site use requirements in SMMPs for each specific ODMDS can be based on any issues of concern identified in the original site designation environmental impact statement (EIS) or environment assessment (EA), and/or on the results of subsequent (post-disposal) monitoring. Each SMMP typically incorporates a compliance monitoring component to ensure that individual disposal operations are conducted properly at the site, as well as a requirement for periodic monitoring surveys to confirm that the site is performing as expected and that long term adverse impacts are not occurring.

EPA designated five ODMDS offshore of Hawaiian Island ports and harbors in 1981 (Figure 1). With the exception of the South Oahu site, these disposal sites are used infrequently (generally only every 5-10 years or so) when USACE conducts maintenance dredging of the federal channels serving each harbor. Baseline surveys were conducted in the 1970s to support the original site designation action, but only limited monitoring work has occurred since then at most of the sites. The USGS, while doing other coastal mapping work in 1994 and 1995, conducted acoustic backscatter surveys at all five sites for EPA, to map dredged material deposits on the sea floor. They also collected sediment chemistry samples at the South Oahu site. Based on the USGS survey results, EPA and USACE published an SMMP in 1997 covering all five Hawaii disposal sites. Since that time, due to lack of available funding, the sites have not been comprehensively monitored and the SMMP has not been updated. When increased funding became available for 2013, EPA therefore identified the Hawaii sites as the highest priority to monitor of all the disposal sites in Region 9. However, because only the South Oahu and Hilo sites had received any disposal at all since 1999 (Table 1), EPA planned comprehensive monitoring at only these two sites.[1]

The South Oahu site (Figure 2) is located approximately 3 nautical miles offshore of Pearl Harbor in water depths ranging from about 1,300 to 1,650 feet (400 to 500 meters). It is a rectangular ocean disposal site 2 kilometers wide (west-east) and 2.6 kilometers long (north-south), and occupies an area of about 5.2 square kilometers on the sea floor. Although the overall site is rectangular, all disposal actions must take place within a 1,000 foot (305 meter) radius Surface Disposal Zone at the center of the site. Its center coordinates are 21 degrees 15.167 minutes North Latitude, 157 degrees 56.833 minutes West Longitude (NAD 83).

The Hilo site (Figure 3) is located approximately 4 nautical miles offshore of Hilo in water depths averaging about 1,150 feet (350 meters). It is a circular ocean disposal site with a radius of 3,000 feet (920 meters) and an area of about 2.7 square kilometers on the sea floor. As at South Oahu, all disposal actions must take place within a 1,000 foot (305 meter) radius Surface Disposal Zone at the center of the site. The center coordinates of the Hilo site are 19 degrees 48.500 minutes North Latitude, 154 degrees 58.500 minutes West Longitude (NAD 83).

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[1] USACE is again planning to dredge and dispose at all five Hawaii ODMDS in 2016. Future monitoring of the other sites will be addressed in an updated SMMP for all the Hawaii ODMDS, which is currently in preparation.

Figure 1. **Five ocean dredged material disposal sites serve Hawaii ports and harbors**.

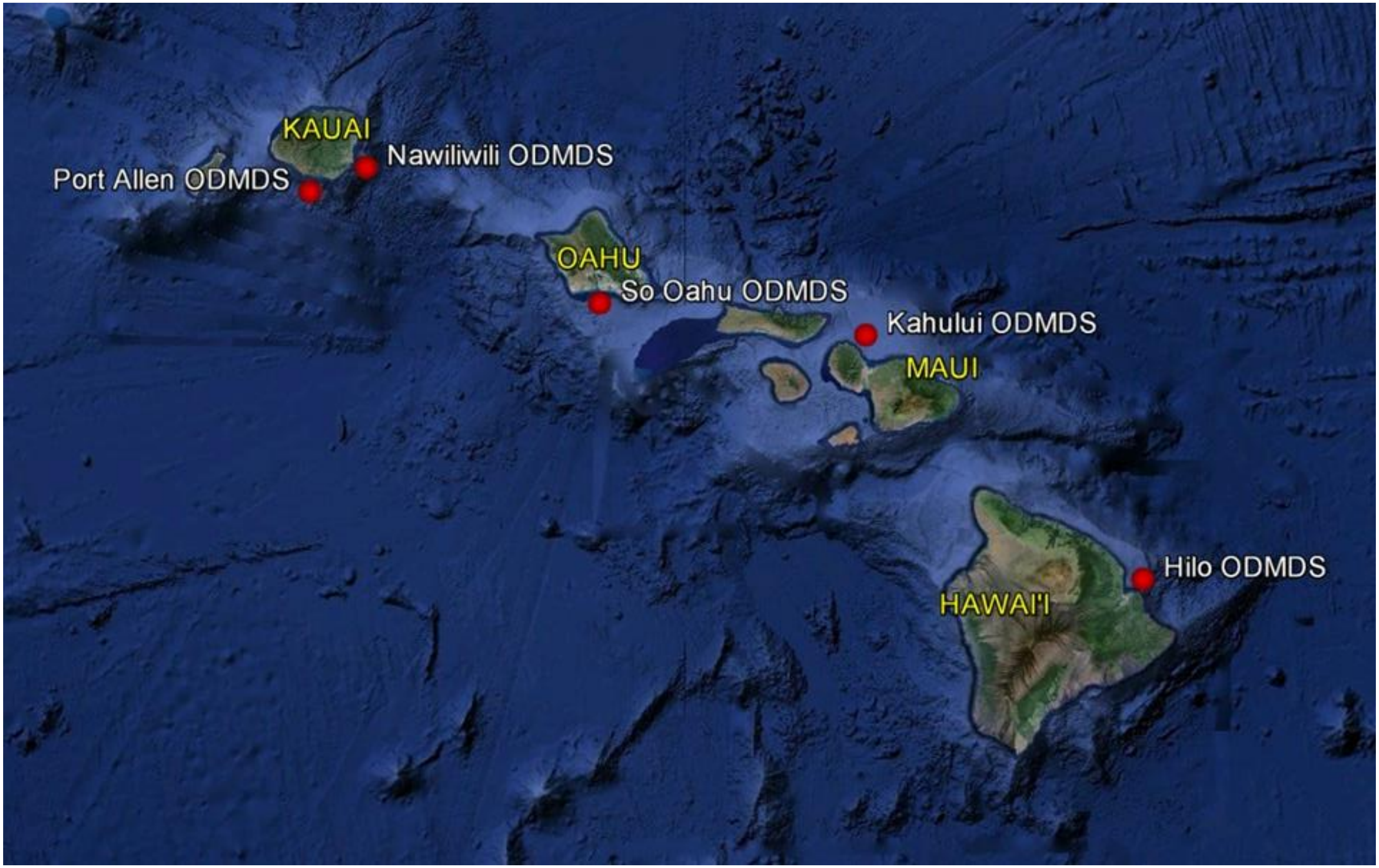


Figure 2. **General location of the South Oahu Ocean Dredged Material Disposal Site**, showing overall site (yellow box) and Surface Disposal Zone (red circle).

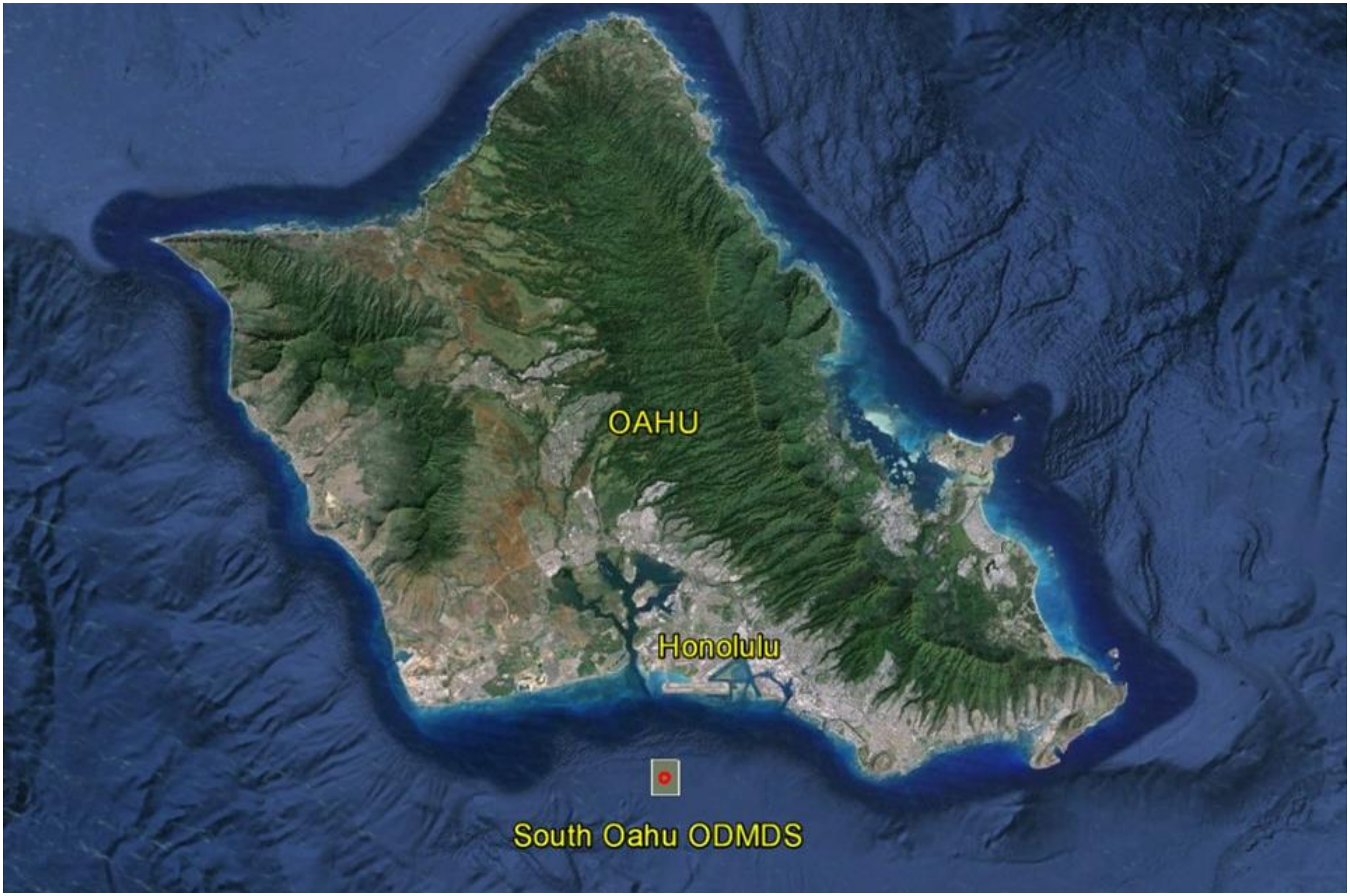
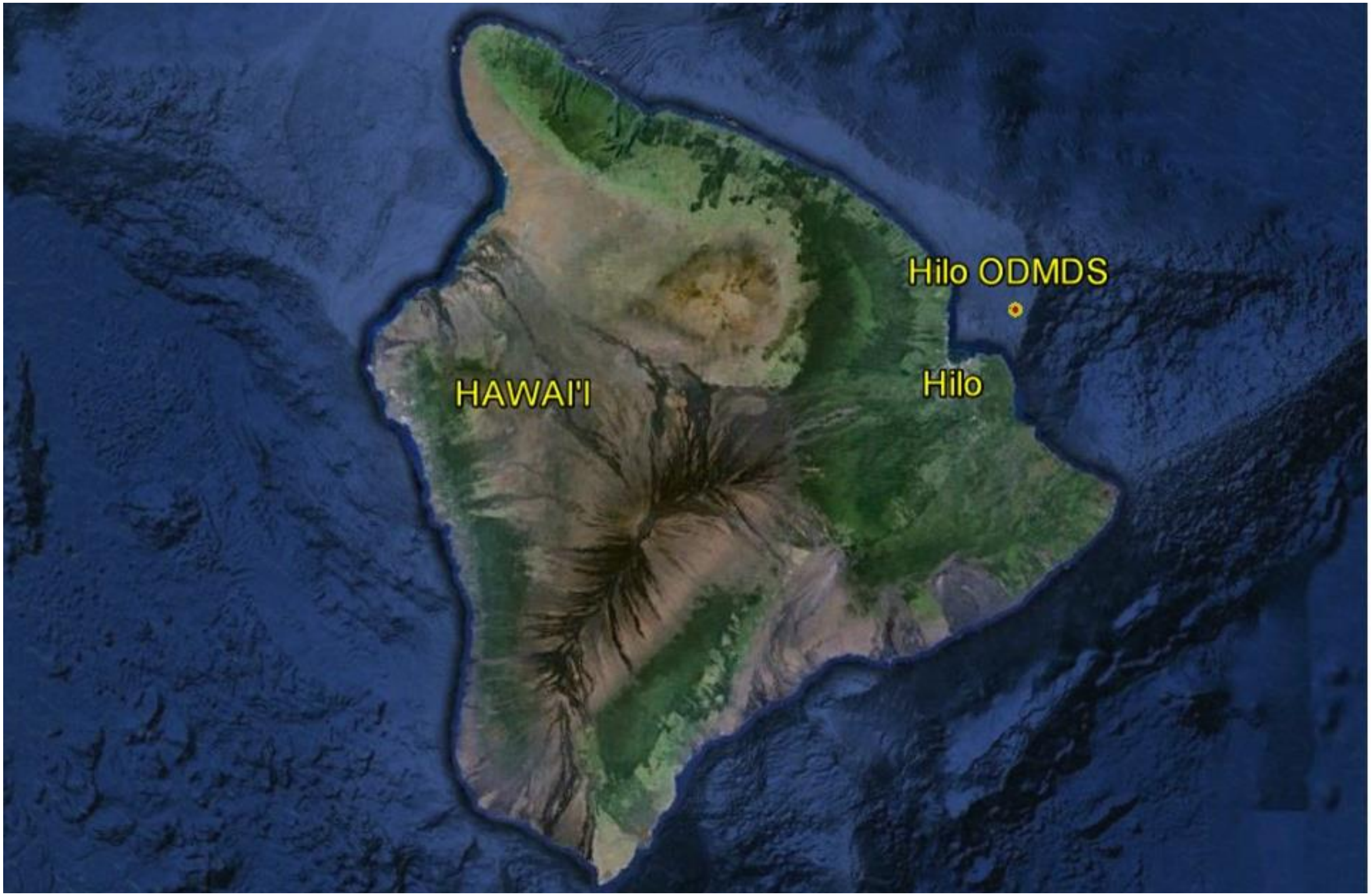


Figure 3. **General location of the Hilo Ocean Dredged Material Disposal Site**, showing overall site (yellow circle) and Surface Disposal Zone (red circle).



As shown in Table 1, the South Oahu site has received by far the greatest volume of dredged material of all 5 Hawaii sites, both historically and more recently. (Table 1 does not include volume disposed at historic Mamala Bay sites prior to 1981.) This material is generated from construction and maintenance dredging by the U.S. Navy in Pearl Harbor and maintenance dredging of the Honolulu Harbor federal channel by USACE, as well as berth maintenance dredging by Honolulu Harbor and other minor dredging by private marinas. The Hilo site has received lesser volumes of dredged material, which in recent years was generated from US Coast Guard maintenance dredging and from terminal improvement projects in Hilo Harbor.

Table 1. **Disposal volumes (cubic yards) at the 5 Hawaii ODMDS following designation in 1981.** Source: EPA compliance tracking records and USACE Ocean Disposal Database.

Year	South Oahu	Hilo	Kahului	Nawiliwili	Port Allen	Total All Sites
1981						0
1982						0
1983				313,900		313,900
1984	2,554,600					2,554,600
1985	12,000					12,000
1986						0
1987	111,200					111,200
1988	57,400					57,400
1989	75,000					75,000
1990	1,198,000	80,000	58,000	343,000		1,679,000
1991	134,550					134,550
1992	233,000					233,000
1993				322,400		322,400
1994						0
1995						0
1996	27,800					27,800
1997						0
1998						0
1999	27,500		91,000	114,600	20,900	254,000
2000						0
2001						0
2002	53,500					53,500
2003	183,500					183,500
2004	540,000					540,000
2005		3,000				3,000
2006	160,400					160,400
2007	266,500					266,500
2008						0
2009	126,200					126,200
2010						0
2011	18,260	63,879				82,139
2012		70,981				70,981
2013	506,870					506,870
Total 1981-2013	**6,286,280**	**217,860**	**149,000**	**1,093,900**	**20,900**	**7,767,940**
Average/year	**190,493**	**6,602**	**4,515**	**33,148**	**633**	**235,392**
Total 2000-2013	**1,855,230**	**137,860**	**0**	**0**	**0**	**1,993,090**
Average/year 2000-2013	**132,516**	**9,847**	**0**	**0**	**0**	**142,363**

II. SUMMARY OF SITE MONITORING ACTIVITIES

EPA Region 9 developed an overall survey plan and quality assurance project plan (QAPP) for the South Oahu and Hilo ODMDS monitoring (EPA, 2013); supplemental QAPPs were also written by sub-contractors. The surveys were conducted in late June and early July 2013. A summary of the survey design and planned vs actual sampling activities is provided in the Appendix to this report.

The main objective of site monitoring is to support any necessary updates to the SMMP by collecting data and samples adequate to determine whether the sites are performing as expected under existing site management practices. The overall site management goal is that there should be only minor physical impacts inside the disposal site and no adverse impacts outside the disposal site. Consequently, the Hawaii site monitoring surveys were designed to:

1. determine the horizontal extent of the dredged material deposit ("footprint") relative to site boundaries;
2. identify any adverse impacts of disposal of dredged material on or off site; and
3. confirm the protectiveness of pre-disposal sediment testing in avoiding disposal of contaminated sediments.

Specific survey activities specified in the QAPP included: sediment profile and plan-view imaging to map the dredged material footprint; sediment sampling and analyses for chemistry and benthic community structure to identify any chemical or biological effects beyond localized physical impacts; and a geophysical survey (sub-bottom profiling) to determine wide area distribution of native sea bed features and deposits of dredged material. EPA contracted with the National Oceanic and Atmospheric Administration (NOAA) to use its vessel Hi'ialakai, stationed in Pearl Harbor, for the sediment imaging and sampling surveys at both disposal sites, and with Sea Engineering for the separate sub-bottom profiling survey.

The surveys conducted from the Hi'ialakai were originally scheduled to occur over 8 days (plus mobilization and demobilization), but problems associated with readiness of the NOAA ship and its equipment caused some delays. The surveys were ultimately conducted over a 5-day period (not including transit between the South Oahu and Hilo sites and the return transit from Hilo to Pearl Harbor), during which field operations were conducted continuously over a 24-hour period using two scientific crews working 12-hour shifts. Even though not as many stations were sampled as originally planned due to the reduced survey time, sufficient sampling was completed to confirm the performance of each site and to provide an adequate basis to update the SMMP, as described below.

2.1 Sediment Profile Imaging (SPI) and Plan View Photography (PVP)

The SPI-PVP system provides a surface and cross-sectional photographic record of selected locations on the seafloor to allow a general description of conditions both on and off dredged material deposits. Detailed methods for the SPI-PVP survey are provided in the supplemental QAPP prepared by Germano and Associates (2013 a).

SPI-PVP surveys (Figures 4 and 5) were conducted for each ODMDS to delineate the horizontal extent of the dredged material footprint both within and outside the site boundaries, as well as the status of benthic recolonization on the deposited material. With resolution on the order of millimeters, the SPI system is more useful than traditional bathymetric or acoustic mapping approaches for identifying a number of features, including the spatial extent and thickness of the dredged material footprint over the native sediments of the seabed, and the level of disturbance and recolonization as indicated by the depth of bioturbation, the apparent depth of the redox discontinuity, and the presence of certain classes of benthic organisms (Figure 6). PVP is useful for identifying surface features in the vicinity of where the SPI photos are taken, thereby providing important surface context for the vertical profiles at each station. For each station, a minimum of four SPI photos were taken, coupled with at least a single PVP photo.

The SPI-PV camera system was deployed at a total of 86 stations (40 at South Oahu and 46 at Hilo), compared to the planned 98 (49 at each site). The planned vs actual survey stations around the South Oahu ODMDS are shown in Figure 7, while the Hilo ODMDS survey stations are shown in Figure 8. (Specific coordinates for each station are available in the Appendix.)

***Figure 4.* SPI-PVP camera system being deployed from the Hi'ialakai.**

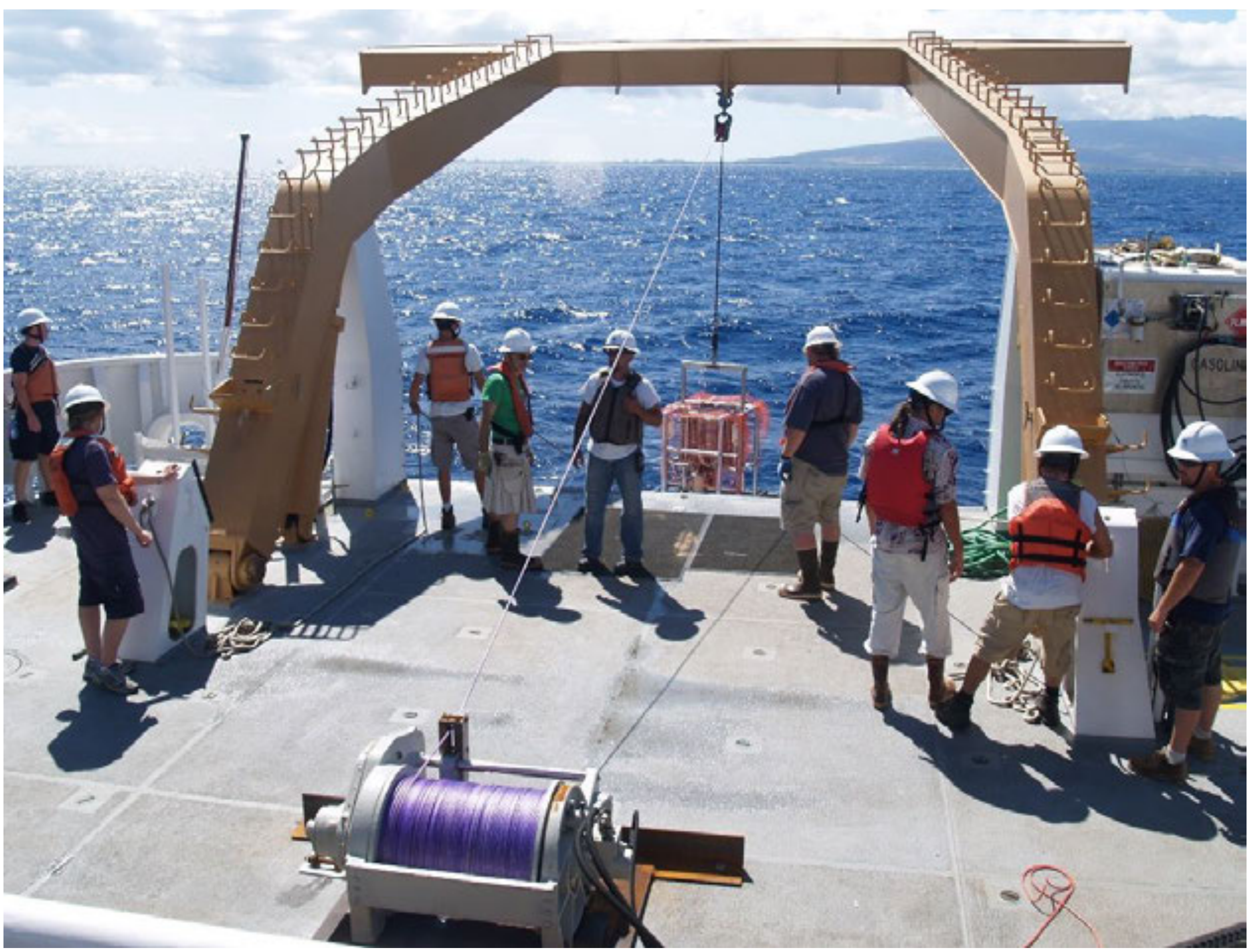


Figure 5. **Schematic of deployment and collection of plan view and sediment profile photographs.** (Germano and Assoc., 2013 b).

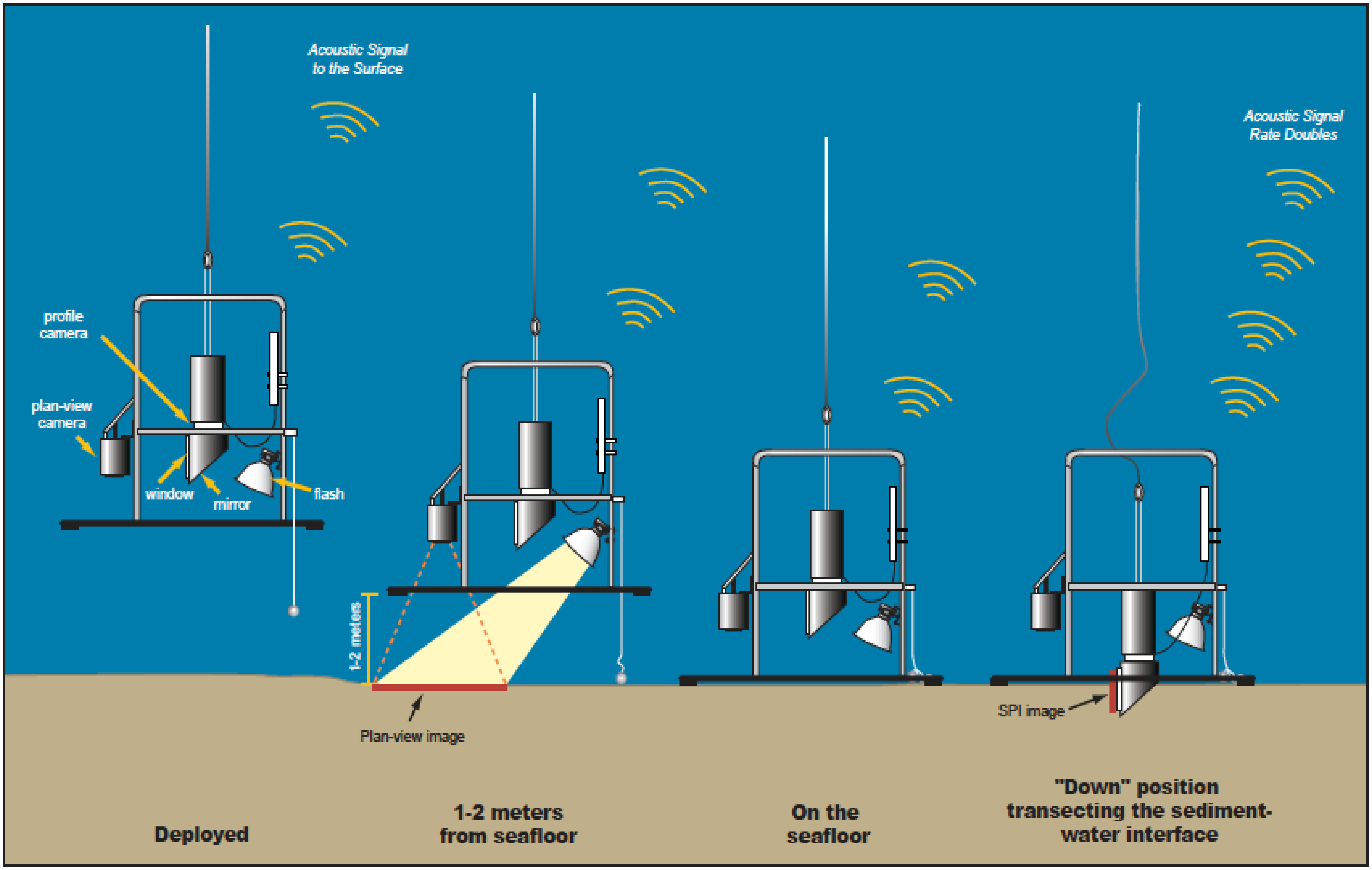


Figure 6. **Soft-bottom benthic community response to physical disturbance (top panel) or organic enrichment (bottom panel).** From Rhoads and Germano (1982).

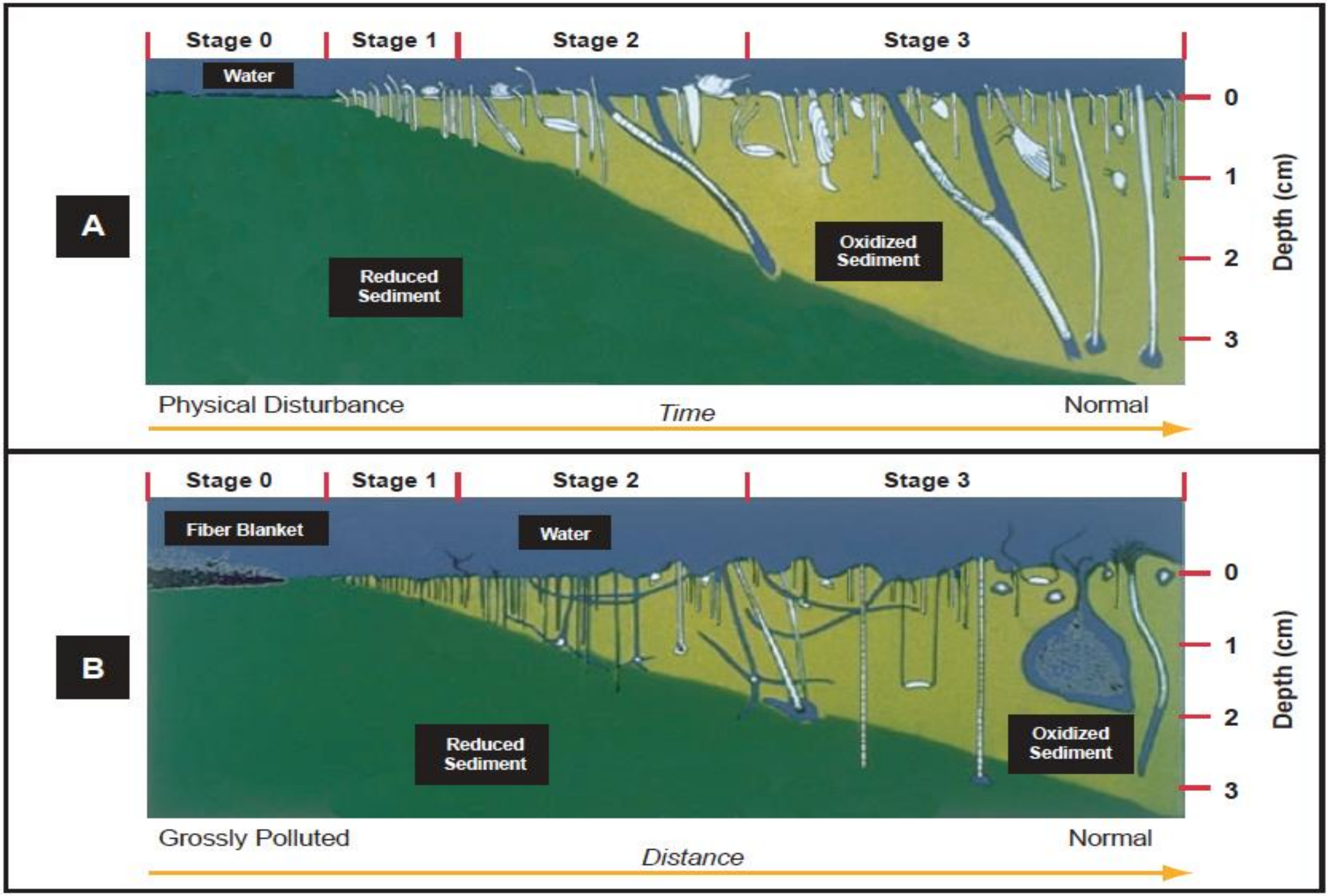


Figure 7. **Planned (yellow squares) and actual sample station locations at the South Oahu ODMDS.** (The circle at the east side of the map shows the location of a historic disposal site used before 1981.)

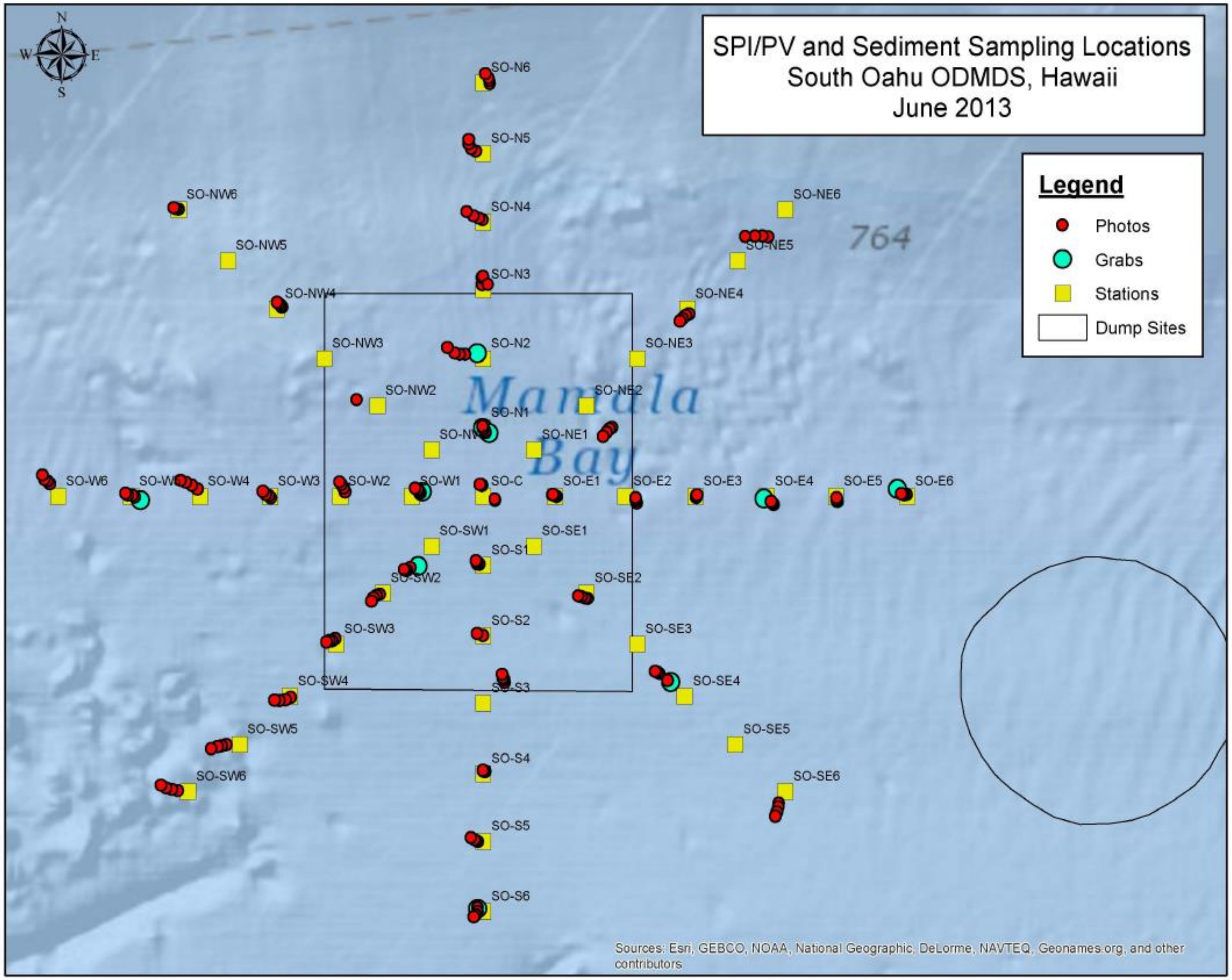
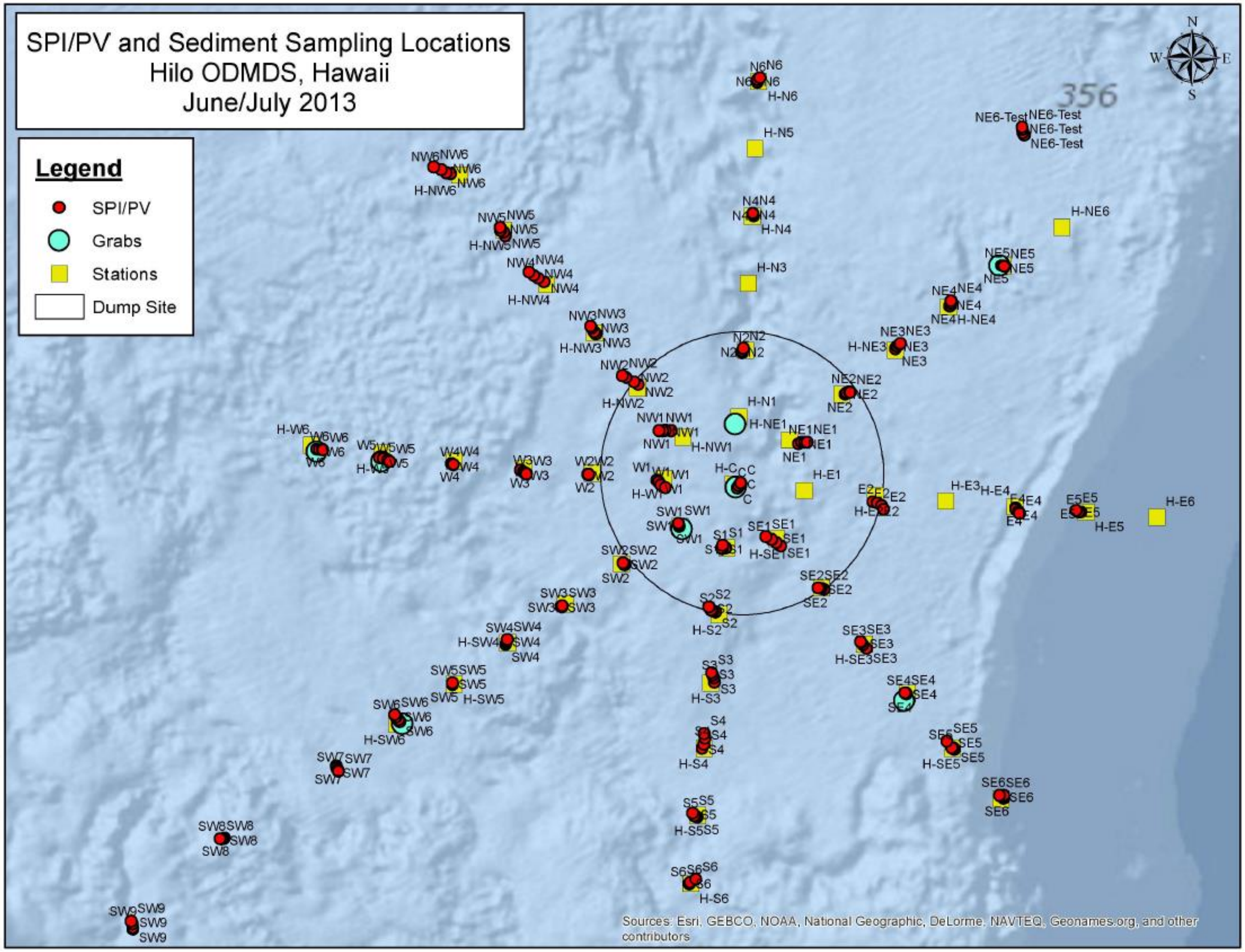


Figure 8. **Planned (yellow squares) and actual sample station locations at the Hilo ODMDS.**



2.2 Sediment Sampling for Chemistry and Benthic Communities

Sediment samples were collected from a subset of stations at each disposal site for sediment grain size, chemistry, and benthic community analysis. Samples were collected using a stainless steel double Van Veen sediment grab (Figure 9, showing side-by-side configuration) capable of penetrating a maximum of 20 centimeters below the sediment surface. Detailed methods for performing the sediment sampling for chemistry and benthic community analyses are described in the QAPP (EPA, 2013 a).

After each acceptable grab sample was measured for depth of penetration and photographed, a subsample for chemistry was extracted from one side of the grab sampler with a stainless steel spoon (Figure 10). This subsample was homogenized and divided into separate jars (Figure 11) for chemistry analyses (grain size, metals and organics). After the chemistry subsample was extracted, the entire volume of the other side of the grab was processed to create a benthic community sample for that station (Figure 12). A 500 micron sieve was used to separate organisms from the sediment, and the separated organisms were placed into bottles where they were initially preserved with formalin. A total of 18 sediment grab sample stations were sampled in the two survey areas combined: 10 at South Oahu, and 8 at Hilo (see Figures 7 and 8, respectively). Chemistry subsamples were collected from all 18 stations and benthic community samples were collected at 14 of the 18 stations (the lower number of benthic community samples was due to some grabs being used for field and laboratory chemistry duplicates, and one station where QAPP metrics were not met for an acceptable benthic sample).

Figure 9. **Double Van Veen sediment sampler deployed from the Hi'ialakai.**

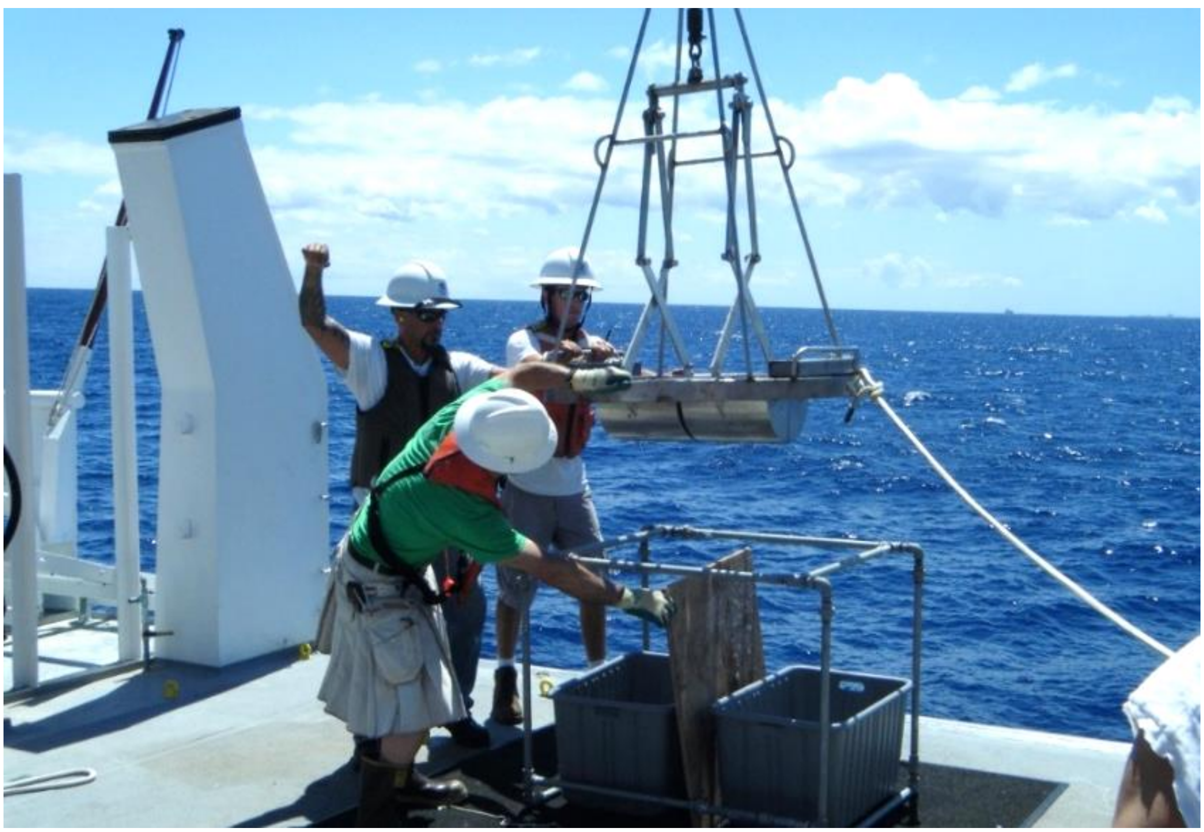


***Figure 10*. Subsampling from the Van Veen grab for sediment chemistry.**

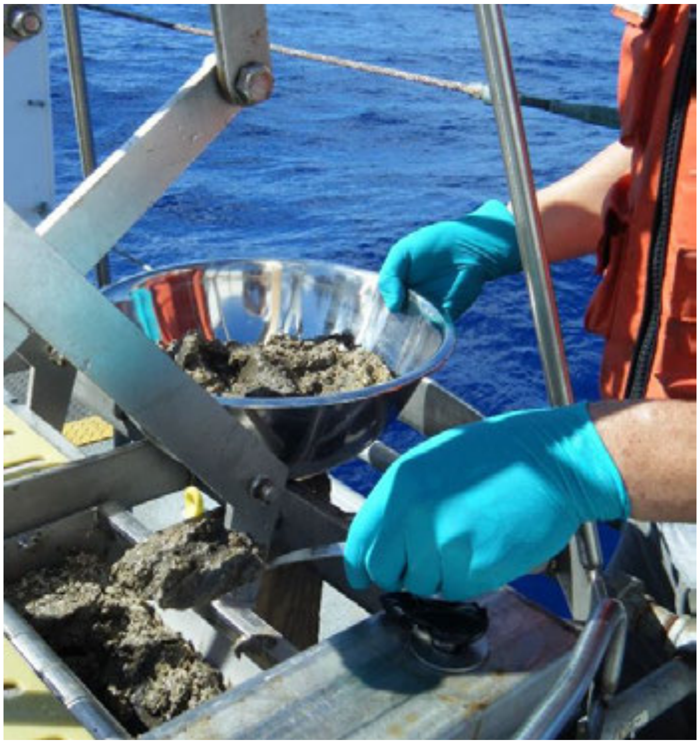


***Figure 11*. Processing a sediment sub-sample for chemical analysis.**

Figure 12. **Processing a sediment sample for benthic community analysis.**

2.3 Sub-Bottom Profiling Survey of the South Oahu ODMDS

The primary purpose of this survey was to collect cross-sectional images of the native sediment layers and layers indicative of the dredged material deposit across a wide area in the environs of the South Oahu ODMDS. (The Hilo site was not surveyed in this manner during this round of surveys because much smaller volumes of dredged material have been disposed there over time which may not be detectable in terms of thickness and contrast.)

This type of survey allows EPA to separately estimate the cumulative volume of dredged material disposed at the South Oahu site, compared to volumes permitted for disposal. The survey was sub-contracted to Sea Engineering, who conducted the work aboard a separate vessel specially rigged for this type of survey with an acoustic sub-bottom profiler system (Figure 13). Figure 14 shows the grid of transects surveyed. Detailed methods for the sub-bottom survey are provided in the supplemental QAPP prepared by Sea Engineering (2013).

Figure 13. **Sub-bottom profiler equipment – used only at the South Oahu site.**

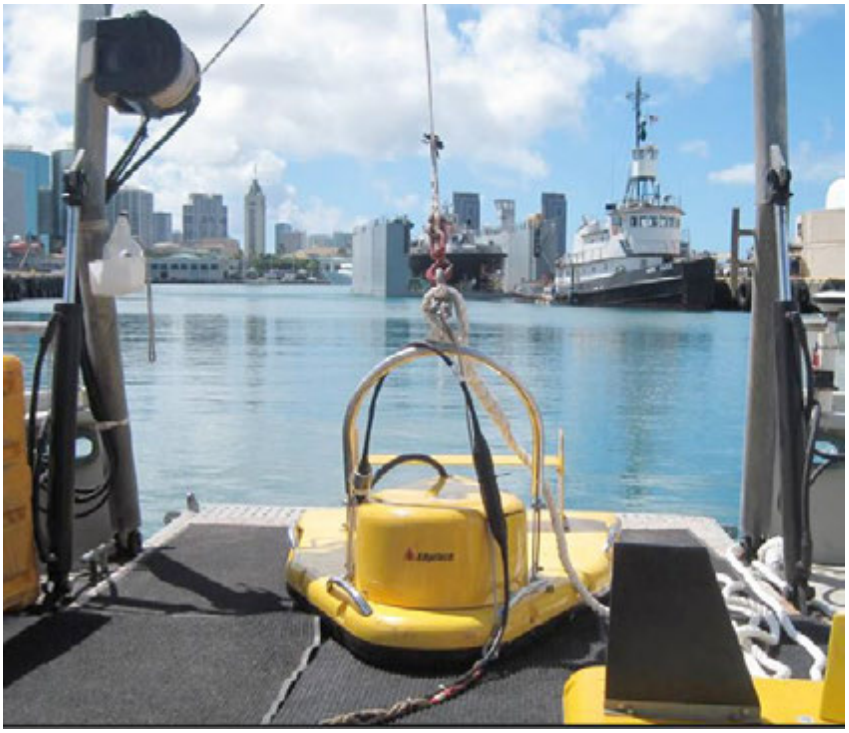
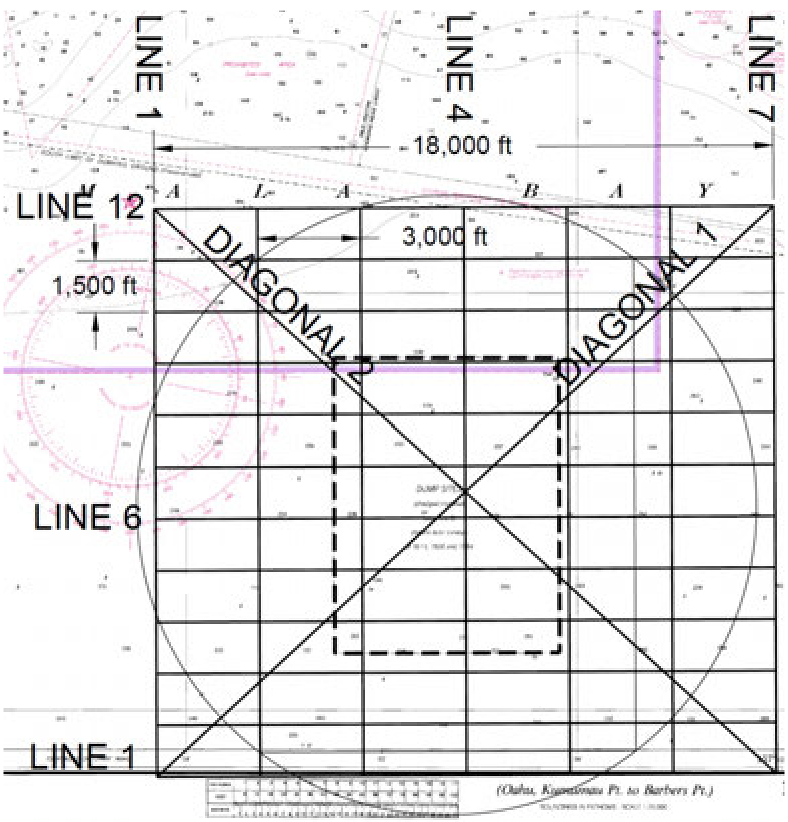


Figure 14. **Planned transect lines for the sub-bottom profiling survey around the South Oahu ODMDS** (from Sea Engineering, Inc., 2014).



III. SURVEY RESULTS

3.1 SPI – PVP Survey Results

3.1.1 Dredged Material Footprint Mapping

The presence and extent of the dredged material footprint was successfully mapped at both Hawaii disposal sites. SPI images of typical native sediments (outside of any dredged material deposit) around the South Oahu and Hilo sites are shown in Figure 15. Dredged material is usually evident because of its unique optical reflectance and/or color relative to the native pre-disposal sediments. The presence of dredged material layers can be determined from both plan view images (Figure 16) and from SPI images (Figure 17). In most cases, the point of contact between the two layers is clearly visible as a textural change in sediment composition, facilitating measurement of the thickness of the newly deposited layer.

Two off-site stations around the South Oahu site had native hard-bottom habitat (N6 and SW5, Figure 7); otherwise the native sediment was fairly uniformly muddy fine sand. The overall dredged material footprint extended well beyond the current disposal site boundary (Figure 18; also see Figure 28). Given the lack of natural fine grained sediment around the South Oahu site, dredged material would be expected to remain visible on the seafloor for a substantial amount of time (decadal scale). Similarly, given the proximity of historic disposal sites to the current designated site in Mamala Bay and the large cumulative volume of disposed sediments over the years (Table 1), it is not surprising that traces of dredged material are found outside of the current designated site boundary. However, the thickest off-site deposits were just north (shoreward) of the site boundary indicating that "short-dumping" (disposal from scows before they reached the Surface Discharge Zone at the middle of the site) probably occurred in the past. EPA has required satellite-based tracking of all disposal scows since the early 2000s, and there have been no "short-dumps" since a single partial mis-dump occurred in 2006. Thus the footprint outside the disposal site boundary would appear to be relic material deposited more than 10 years ago.

Compared to South Oahu, native sediments around the Hilo site were finer. Two off-site stations (E5 and SE6, Figure 8) were on rocky lava outcrops. Even though this area is primarily a silty, very fine to fine sandy bottom, there are periodic lava deposits or rock outcrops creating some topographic diversity. The substantially smaller cumulative volume of dredged material disposed at Hilo appeared to be more fully confined within the designated disposal site boundary (Figure 19). Except at the center of the site where rubble has accumulated (Figure 20), dredged material thickness was only 3 cm or less within the site boundary, and less than 1 cm thick outside the boundary.

3.1.2 Bioturbation Depth

The depth to which sediments are biologically mixed is an important indicator of the status of recovery of the infaunal community following disturbance (e.g., by dredged material disposal). Biogenic particle mixing depths can be estimated by measuring the depths of imaged feeding voids in the sediment column. This parameter represents the particle mixing depths of head-down feeders, mainly polychaetes. This depth is also related to the apparent redox potential discontinuity (aRPD) depth. In the absence of bioturbating organisms, the aRPD (in muds) will

Figure 15. Profile images from the ambient bottom at the Hilo ODMDS (left, Station S3) and the South Oahu site (right, Station S6). The ambient seafloor at Hilo has a higher silt-clay content, allowing greater camera penetration than at South Oahu. Scale: width of each profile image = 14.4 cm. (Germano & Assoc., 2013)

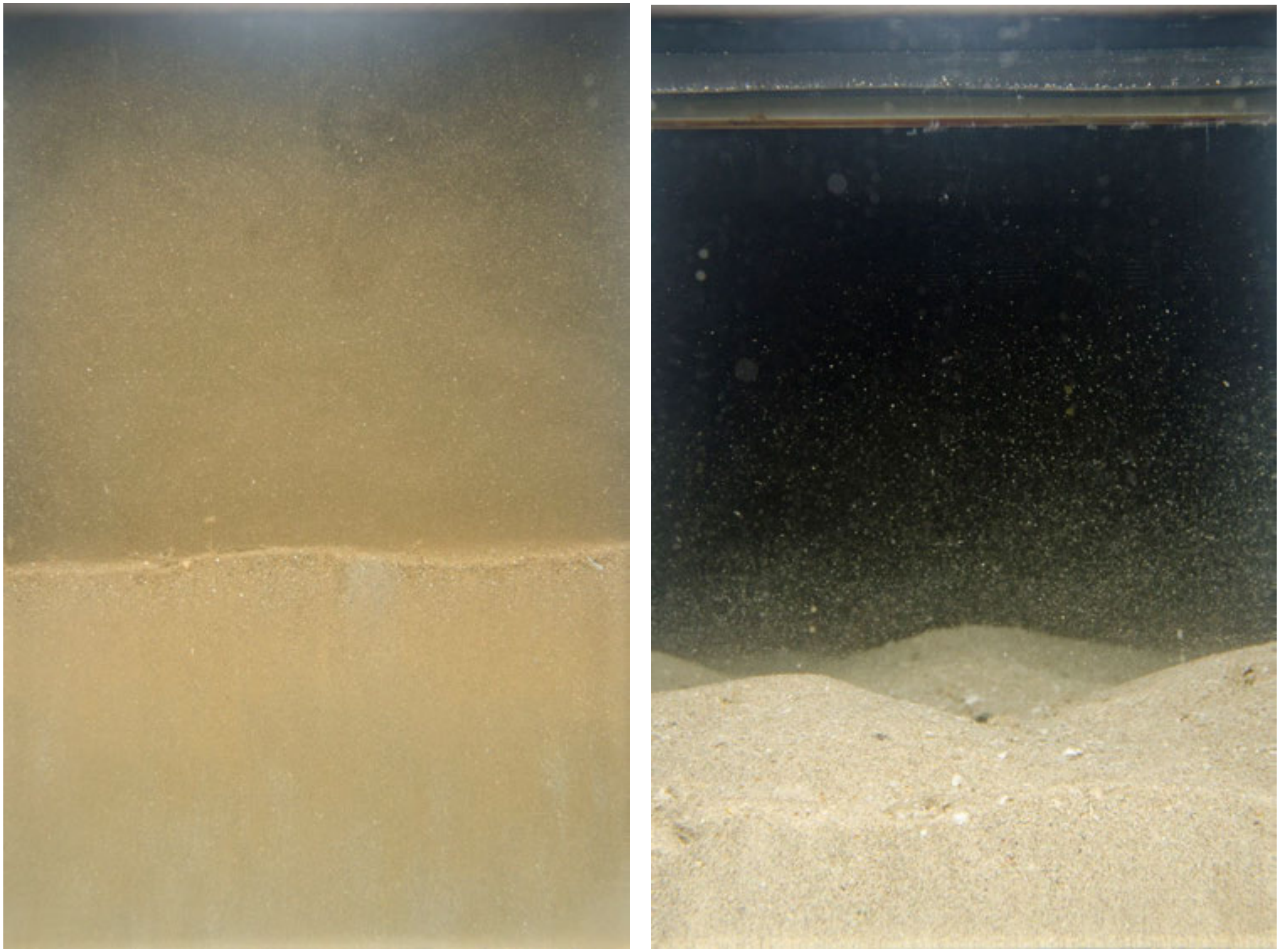


Figure 16. Plan view images of the dredged material deposit compared to the native seafloor at South Oahu. Station C1 on dredged material (top) shows the visual difference in both sediment color and surface texture/features of dredged material compared to the ambient bottom at Station NW6 (bottom). Scale: width of each PV image is approximately 4 m. (Germano & Assoc., 2013)

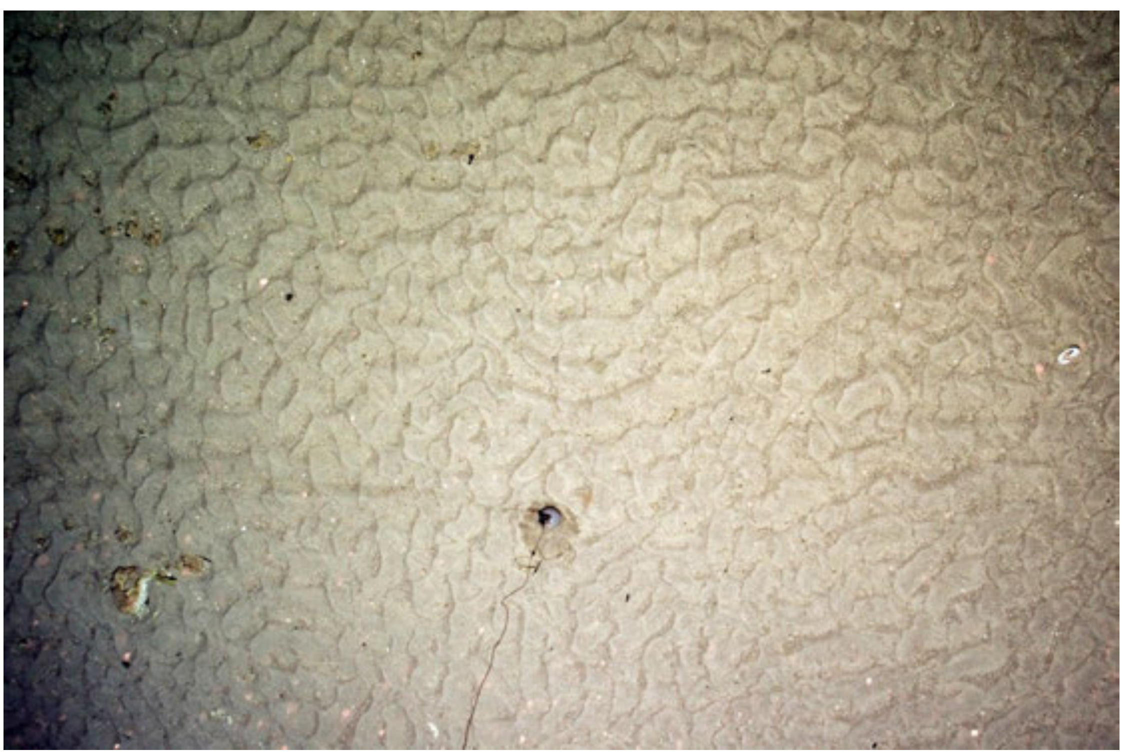


Figure 17. Profile images from two Hilo Stations showing a surface layer of disposed coarse white dredged sand that thins from NW1 (left) near the center of the disposal site to only trace amounts at NW3 (right). Scale: width of each profile image = 14.4 cm. (Germano & Assoc., 2013)

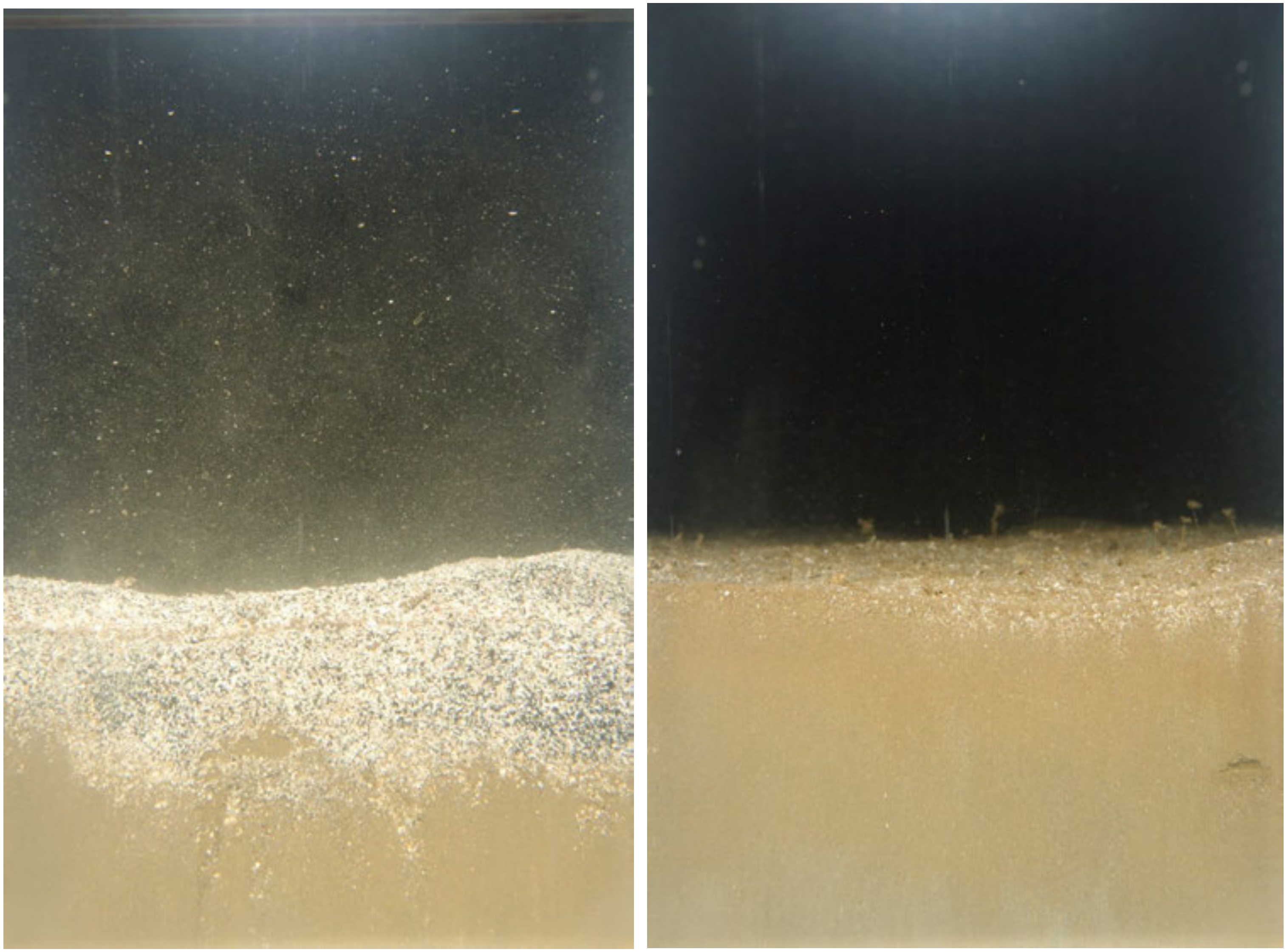


Figure 18. **Dredged material footprint identified at the South Oahu site.**

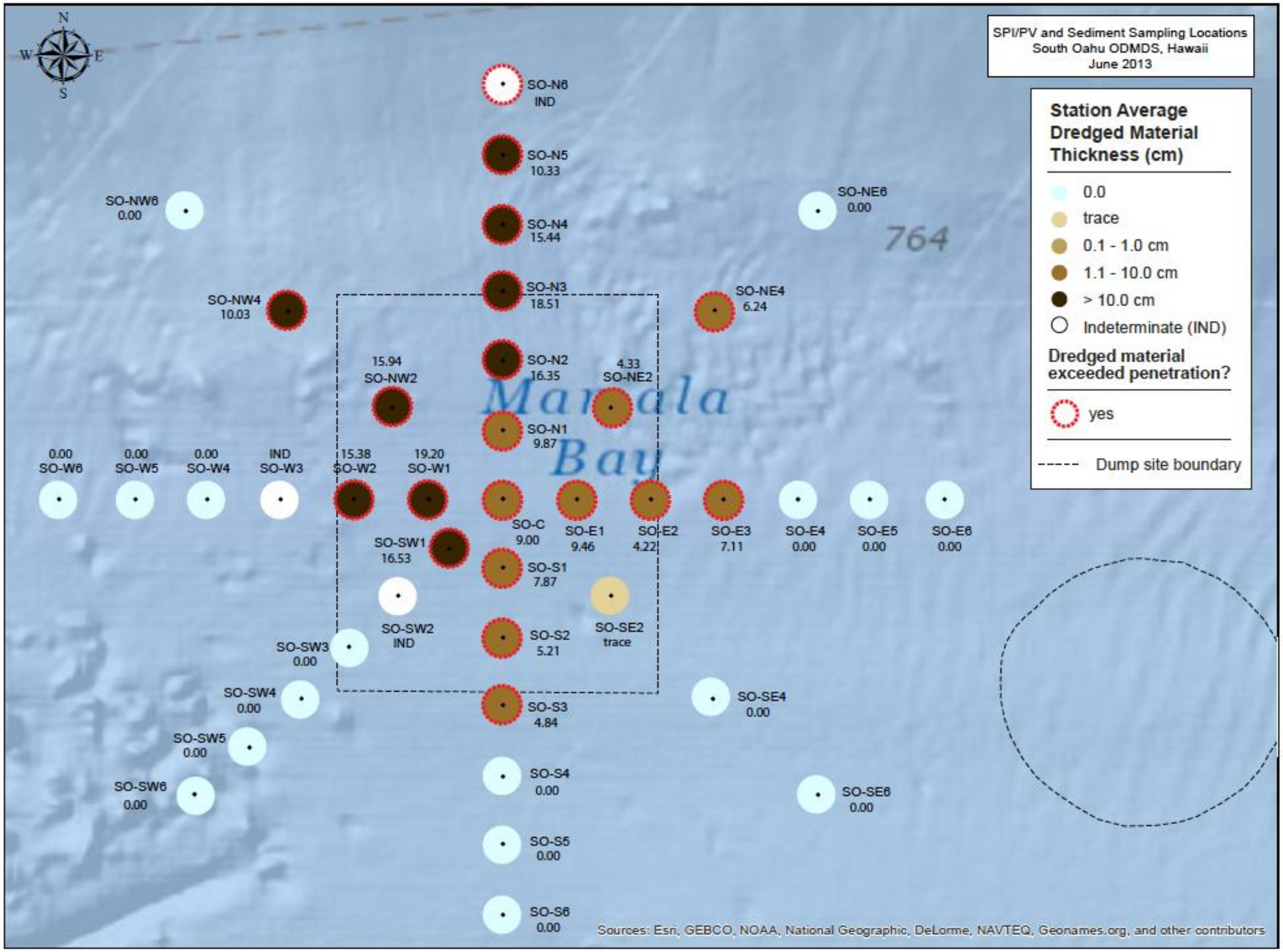


Figure 19. **Dredged material footprint identified at the Hilo site.**

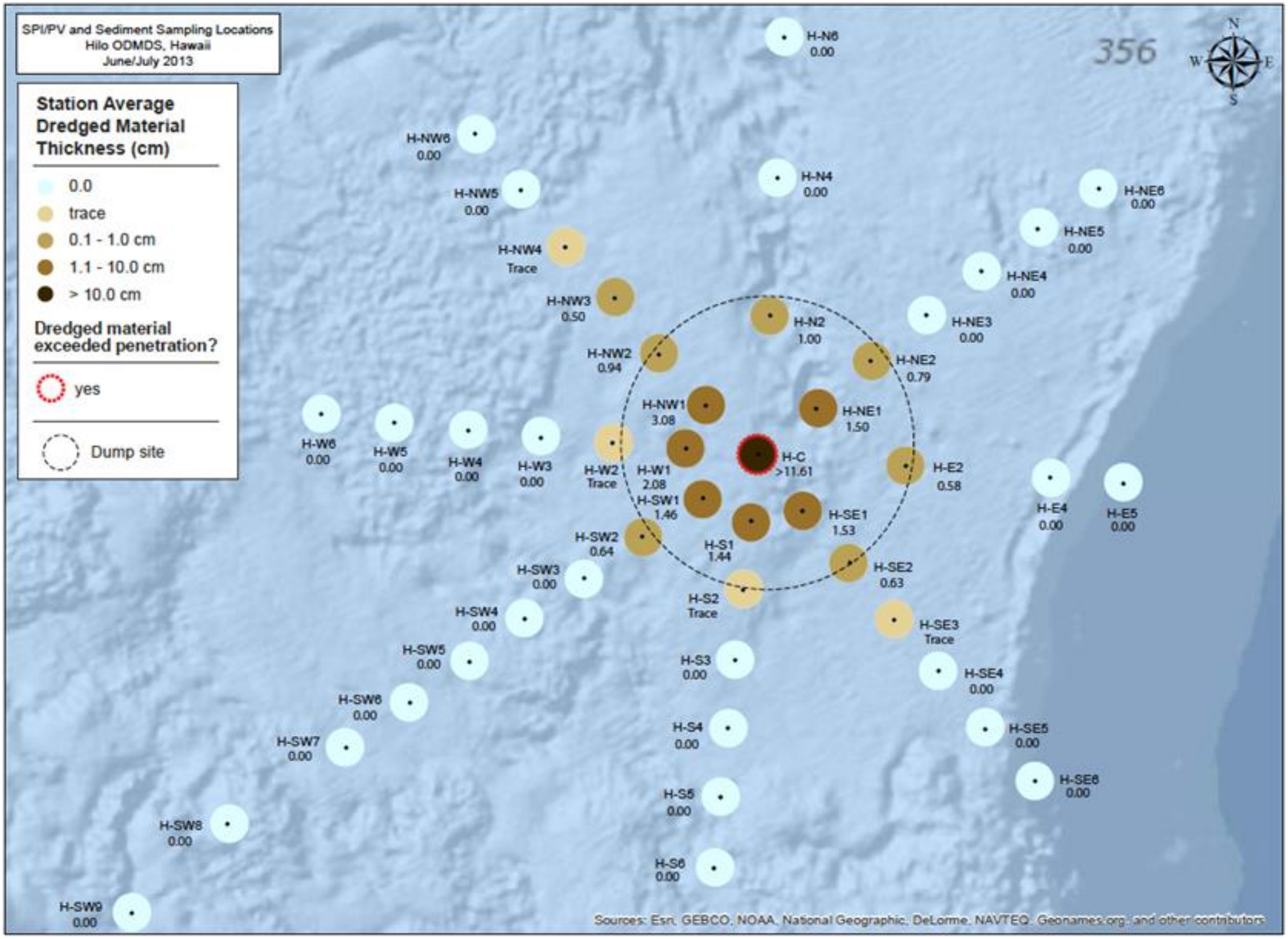
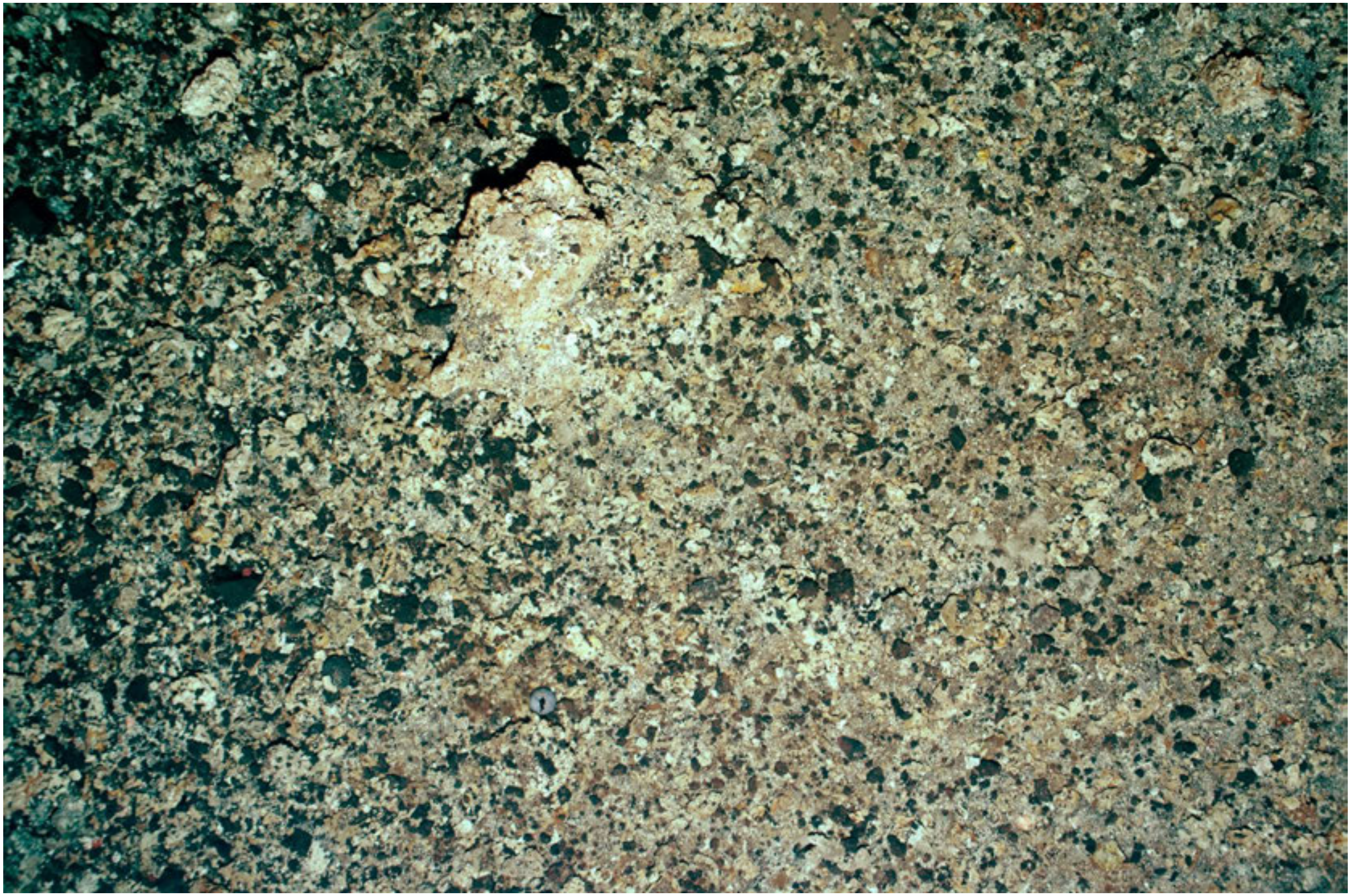


Figure 20. Plan view image from the center station of the Hilo ODMDS shows a high density of small rock and coral rubble. Rubble falls rapidly through the water column with minimal dispersal, and thus has accumulated only at the center of the site. Scale: width of PV image is approximately 4 m. (Germano & Assoc., 2013)



typically reach only 2 mm below the sediment-water interface (Rhoads 1974). However, it is quite common in profile images to see evidence of biological activity (burrows, voids, or actual animals) well below the mean aRPD (Germano and Assoc., 2013 b).

At the South Oahu site, the maximum bioturbation depths (>15 cm) were generally found at the stations that also had the thickest deposits of dredged material (including the off-site stations to the north with relic dredged material deposits) (Figure 21). A similar pattern was seen for average feeding void depth, and for the aRPD depth (see Germano and Assoc., 2013 b). This is to be expected, since dredged material is generally finer, less consolidated, and therefore more conducive to supporting a richer community of burrowing organisms compared to the native, consolidated fine sand around the disposal site. Stations with a native fine sand substrate exhibited lower camera penetration, shallower aRPD depths, and shallower average feeding void depths.

At the Hilo site, where much less dredged material has been discharged and where the native seafloor is more heterogenous, the pattern was different (Figure 22). Although dredged material was thickest at the center of the site, a high concentration of gravel and coral rubble prevented full camera penetration there, so that bioturbation depth and aRPD could not be determined fully. Other on-site stations showed fairly uniform bioturbation depths of 7-10 cm. Many off-site stations also had bioturbation depths in this range, although bioturbation depths of 10-18 cm were also common. Since the native seafloor around the Hilo site is finer-grained than around the South Oahu site, greater bioturbation depths, and less difference between on-site and off-site stations, would be expected.

3.1.3 Infaunal Successional Stage

The mapping of infaunal successional stages is readily accomplished with SPI technology. Mapping of successional stages is based on the theory that organism-sediment interactions in fine-grained sediments follow a predictable sequence after a major seafloor perturbation (Germano and Assoc., 2013). This continuum of change in animal communities after a disturbance (primary succession) has been divided subjectively into four stages: Stage 0, indicative of a sediment column that is largely devoid of macrofauna, occurs immediately following a physical disturbance or in close proximity to an organic enrichment source; Stage 1 is the initial community of tiny, densely populated polychaete assemblages; Stage 2 is the start of the transition to head-down deposit feeders; and Stage 3 is the mature, equilibrium community of deep-dwelling, head-down deposit feeders (see Figure 6).

After an area of bottom is disturbed by natural or anthropogenic events, the first invertebrate assemblage (Stage 1) appears within days after the disturbance. Stage 1 consists of assemblages of tiny tube-dwelling marine polychaetes that reach population densities of 10^4 to 10^6 individuals per m^2. These animals feed at or near the sediment-water interface and physically stabilize or bind the sediment surface by producing a mucous "glue" that they use to build their tubes.

If there are no repeated disturbances to the newly colonized area, then these initial tube dwelling suspension or surface-deposit feeding taxa are followed by burrowing, head-down deposit feeders that rework the sediment deeper and deeper over time and mix oxygen from the overlying water into the sediment. The animals in these later-appearing communities (Stage 2 or 3) are larger, have lower overall population densities (10 to 100 individuals per m^2), and can rework the sediments to depths of 3 to 20 cm or more.

Figure 21. **Bioturbation depth at the South Oahu site** – deeper values here are reflective of an active benthic community reworking deposited dredged material. (Germano & Assoc., 2013)

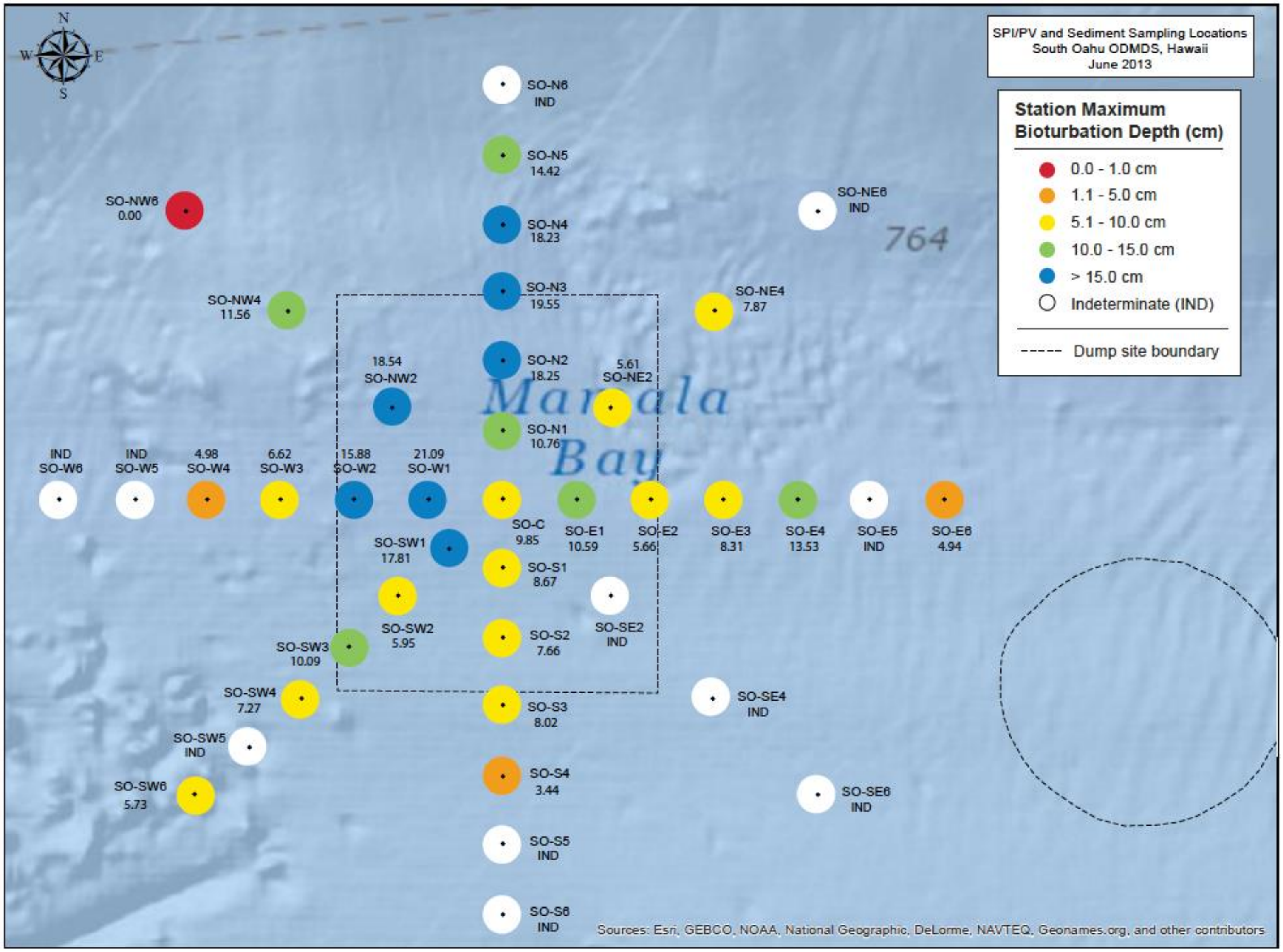
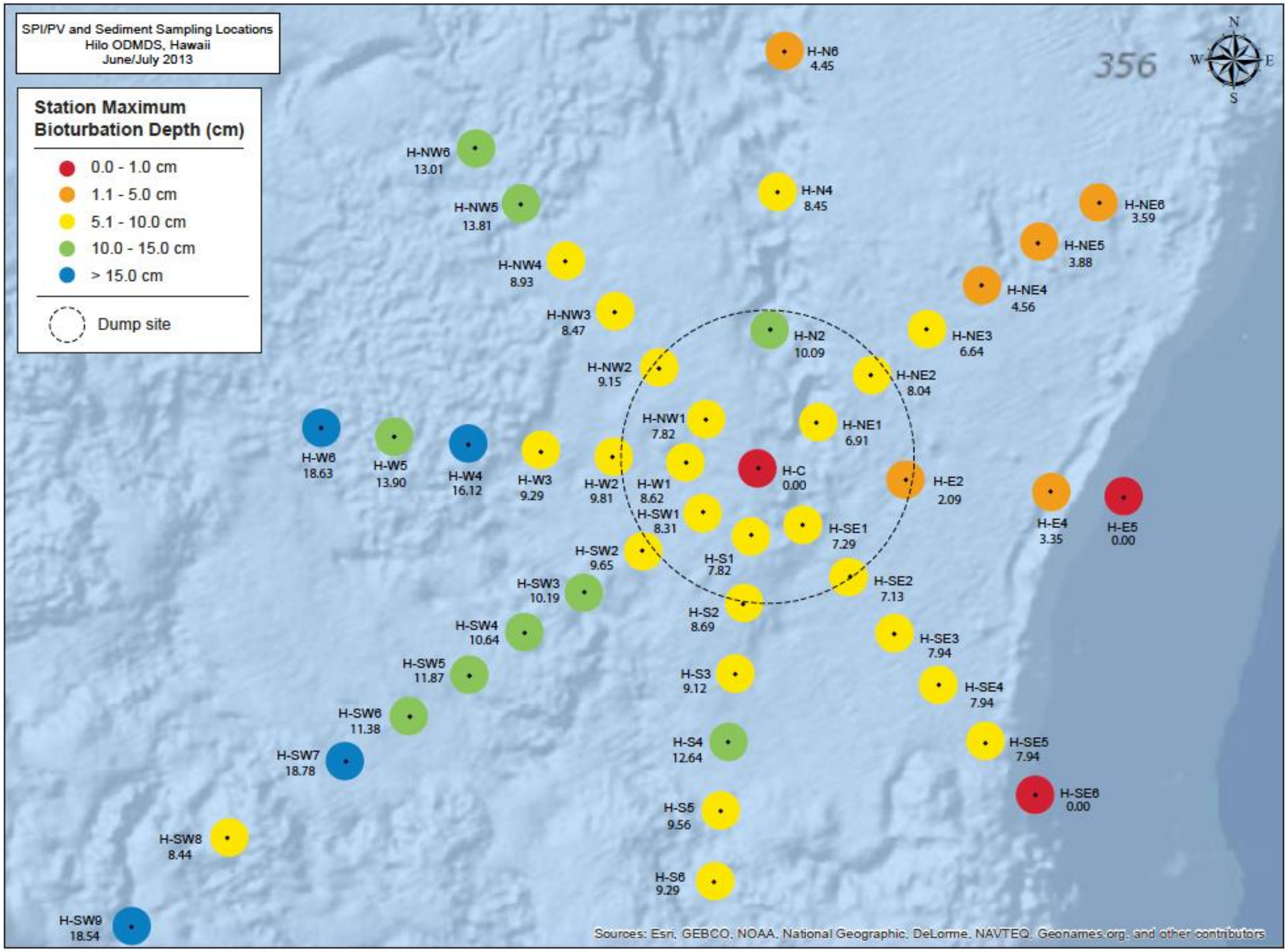


Figure 22. **Bioturbation depth at the Hilo site:** on-site and off-site stations show similar depths (much less material has been disposed here than at South Oahu). (Germano & Assoc., 2013)



Various combinations of these basic successional stages are possible. For example, secondary succession can occur (Horn, 1974) in response to additional labile carbon input to surface sediments, with surface-dwelling Stage 1 or 2 organisms co-existing at the same time and place with Stage 3, resulting in the assignment of a "Stage 1 on 3" or "Stage 2 on 3" designation

The distribution of successional stages in the context of the mapped disturbance gradients is one of the most sensitive indicators of the ecological quality of the seafloor (Rhoads and Germano 1986). The presence of Stage 3 equilibrium taxa (mapped from subsurface feeding voids as observed in profile images) can be a good indication of relatively high benthic habitat stability and quality. A Stage 3 assemblage indicates that the sediment surrounding these organisms has not been disturbed severely in the recent past and that the inventory of bioavailable contaminants is relatively small.

At the South Oahu site, infaunal community successional stage was readily apparent on the dredged material deposit, but was generally unmeasurable (indeterminate) on the native sandy sediments off-site (Figure 23). Successional stage on the dredged material mound, including the relic off-site material to the north, was fairly uniformly Stage 1 on 3. While this indicates relatively rapid recolonization and a well-established infaunal community in the finer, more carbon-rich dredged sediments, it is clearly a different community than would be supported by the native fine sand at this location in the absence of dredged material disposal.

At the Hilo site, differences between stations with and without dredged material were less apparent (Figure 24). Since far less dredged material has been discharged at this site than at the South Oahu site, less disturbance to the native sediments around the site has occurred. Both on-site and off-site stations were dominated by Stage 1 on 3 communities, but more heterogenous communities were present to the east and northeast of the site as well. These stations had either no apparent dredged material, or only trace thicknesses of dredged material; therefore the different community structure at these stations may reflect natural heterogeneity of benthic habitat types in this area rather than any particular effect from dredged material deposition.

3.1.4 Plan-View Photography

Unusual surface sediment textures or structures detected in any of the sediment profile images can be interpreted in light of the larger context of surface sediment features (for example, is a surface layer or topographic feature a regularly occurring feature and typical of the bottom in this general vicinity or just an isolated anomaly?). The scale information provided by the underwater lasers allows accurate density counts (number per square meter) of attached epifaunal colonies, sediment burrow openings, or larger macrofauna or fish which may be missed in the sediment profile cross-sections.

Except for the two stations on hard bottom, the native seafloor around the South Oahu site is a muddy carbonate sand with rippled bedforms and relatively low abundance of epifauna. Other than the occasional hermit crab or other decapods such as shrimp or Brachyurans, the presence and abundance of epifauna was directly proportional to the amount of rock/rubble/outcrop present on the flat sandy bottom. Anything that provided a hard surface or additional vertical relief for niche/topographic diversity became a suitable substratum to which organisms could attach (tunicates, cnidarians, bryozoans) or hide within (echinoderms), which subsequently attracted more fish to that particular location.

Figure 23. **Community structure at the South Oahu site:** presence of Stage 3 organisms is indicative of healthy benthic community. (Germano & Assoc., 2013)

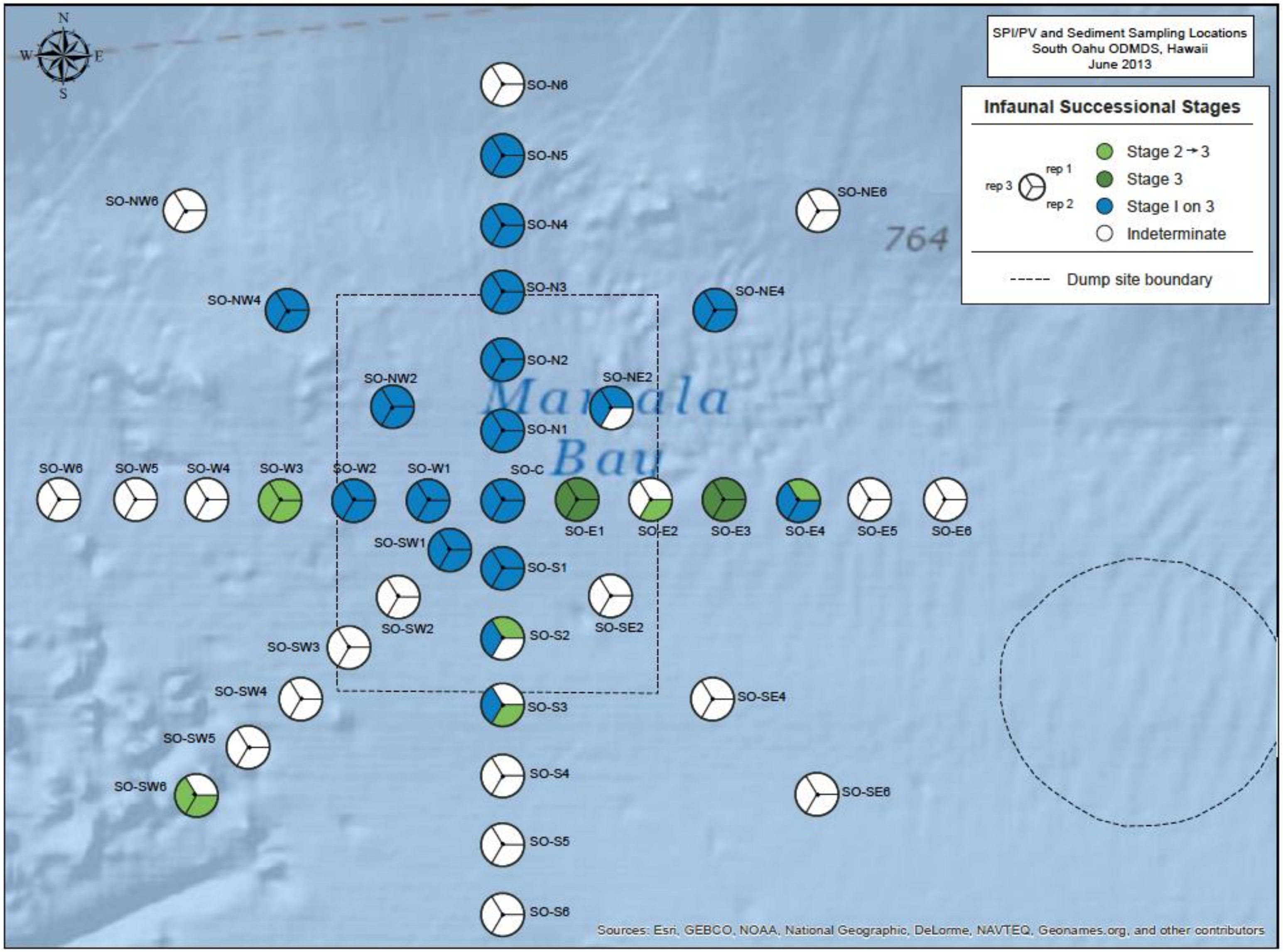
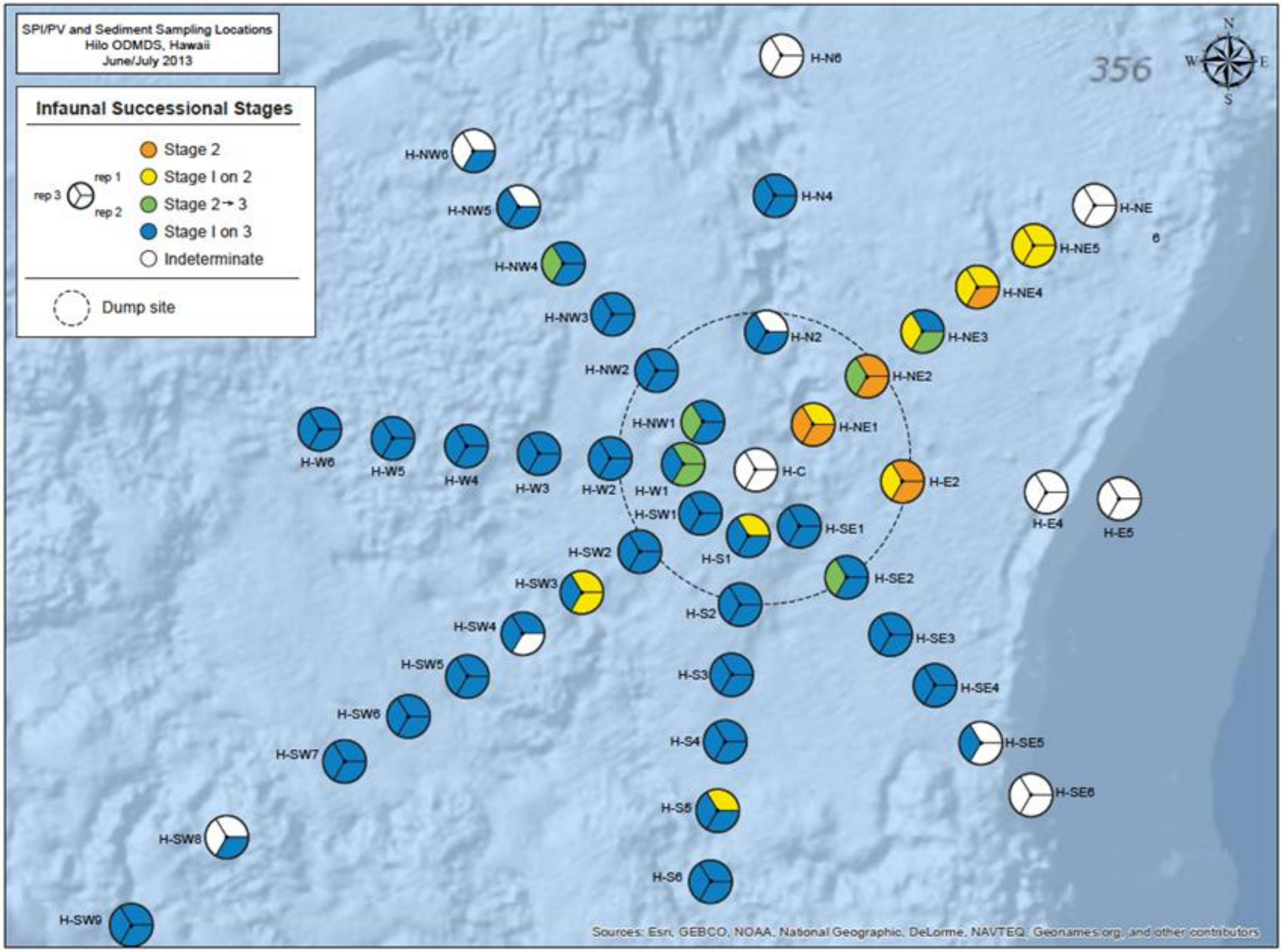


Figure 24. **Community structure at the Hilo site:** presence of Stage 3 organisms is indicative of healthy benthic community. (Germano & Assoc., 2013)



In contrast, the native Hilo sediments had a higher percentage of fine sediments (attracting higher densities of small prey, evidenced by burrow holes in plan view images) along with more frequent occurrence of rocky outcrops (creating habitat heterogeneity) both inside and outside the site boundaries. These characteristics attracted a generally more abundant and varied epifauna and fish assemblage. Unlike the South Oahu site, the areas of the highest accumulation of dredged material (near the site center where the surface was a continuous cover of rubble) appeared to have the lowest faunal attractiveness. But higher densities of fish and anthozoans as well as more frequent evidence of burrowing infauna were seen throughout the area as a whole, compared to South Oahu.

3.1.5 Discussion: SPI – PVP Surveys

Minor and localized physical impacts are expected within the site as a result of disposal operations. However, historical and more recent disposal activity appear to have had little lasting adverse impact on benthic infauna, or epibenthic organisms, at either site. With the exception of the center station at the Hilo site where an accumulation of disposed rubble has most likely altered the resident infaunal community on a localized scale, the disposal of dredged material, in general, has not impeded benthic recolonization or the re-establishment of mature successional stages. At the South Oahu site, it appears the larger cumulative volume of fine grained, higher carbon content dredged material deposited over the native coarser grain carbonate sands may have actually enhanced the secondary benthic production by promoting the settlement and persistence of subsurface deposit feeders that would not normally exist in the native carbonate sand bottom here.

The prediction in the original EIS (EPA 1980) that disposal of dredged material at both the Hilo and South Oahu ODMDS will have no lasting adverse impact on the benthic community inside or outside of site boundaries is supported by the results of the SPI-PVP survey. Stage 3 taxa have successfully recolonized all but the center station at the Hilo ODMDS, and secondary production appears to be enhanced at the South Oahu ODMDS within the dredged material footprint. Also epifauna, in general, are similar on-site and off-site (though different between South Oahu and Hilo overall.

Based on the results of the SPI-PVP surveys, the authors predicted that the traditional benthic sampling results would also show a higher species diversity and infaunal abundance in samples from the Hilo site versus those from the South Oahu site, because of the increased amount of fines and evidence of increased subsurface burrowing in the images from the Hilo site. (See discussion of Benthic Community Analysis Results, below.)

3.2 Sediment Physical and Chemical Survey Results

Full physical and chemical analytical results are provided in ALS Environmental (2013) and EPA (2013 b). Due to vessel and equipment problems, less than half the originally-targeted benthic grab stations were sampled. But by using the SPI survey results to help select the chemistry (and benthic community) stations at each site, a sufficient number of samples were collected within and outside of site boundaries and the dredged material footprints to characterize the native (ambient) seafloor compared to seafloor areas physically impacted by dredged material disposal. Nevertheless, only qualitative (vs statistical) analysis of the physical and chemical results was conducted given that only four “on site” and five “offsite” stations were ultimately sampled at South Oahu, and only three “on site” and four “offsite” stations were sampled at Hilo.

3.2.1 Physical Results

Minor and localized physical impacts are expected within the site boundary as a result of disposal operations. Tables 2 (South Oahu) and 3 (Hilo) compare areas within the disposal sites that have dredged material deposits (indicated as "Inside") and off site areas without any dredged material deposits (indicated as "Outside"). Physical on-site differences are most apparent at the South Oahu site, which has received an order of magnitude more dredged material over the years than the Hilo site. At South Oahu (Table 2), "inside" stations have substantially more gravel, more fines (silt and clay), and higher organic carbon content than the "outside" stations that represent ambient or native seafloor conditions. This reflects the character of dredged material typically disposed at this site, which often includes grave-size coral rubble, and fines from land-side runoff that settles in harbors, berths, and navigation channels. In contrast, native sediments around the South Oahu site are uniformly sandier, with lower carbon. These on-site physical changes are expected to be persistent, but are not considered to be a significant or adverse impact.

Physical characteristics of the off-site ambient or native sediments around the Hilo site are more variable (Table 3) reflecting the more heterogeneous nature of the seafloor in the area, which includes a mixture of hard bottom features (submerged reef and terraces) coupled with areas of accumulated finer grained sediments (USGS, 2000). The dredged material disposed at the Hilo site has not substantially altered the physical nature of the disposal site in part due to this natural variability, and in part because only a relatively small volume of material has been disposed at Hilo (especially compared to disposal volumes at South Oahu).

3.2.2 Chemical Results

Although physical differences are expected as a result of disposal operations, pre-disposal sediment testing is intended to minimize any degradation to the site which might be caused by introduction of contaminants which are bioavailable and/or pose a toxicity risk to the marine environment. The bulk chemistry data show low but variable concentrations of most chemical constituents at both sites (Tables 2 and 3). At both "inside" and "outside" stations, four to six metals were at concentrations above NOAA's effects-based 10^{th} percentile screening value (ER-L), below which adverse effect are predicted to rarely occur (NOAA, 2008). Of these metals, only chromium, copper, and mercury were slightly higher at "inside" stations compared to "outside" stations, and only at the South Oahu site. At Hilo, the metals concentrations were virtually indistinguishable between "inside" and "outside" stations.

Only nickel exceeded its 50^{th} percentile screening value (ER-M), above which adverse effects are expected to frequently occur (NOAA, 2008). It was most elevated at Hilo, but was at similar elevated concentrations at both "inside" and "outside" stations there. Nickel is often naturally elevated in certain sediments, including volcanic sediments.

Organic constituents were also low at both sites. Only two constituents exceeded NOAA ER-L screening levels, and again only at the South Oahu site. PCBs and DDTs each slightly exceeded their respective ER-Ls at one "inside" station and one "outside" station. PCBs were generally higher at the "inside" stations, even when not exceeding the ER-L. There were no exceedances of ER-Ls for organics at either "inside" or "outside" stations at the Hilo site.

Table 2. **Summary of sediment chemistry for the South Oahu Ocean Dredged Material Disposal site and vicinity.**

		Survey Station:											
South Oahu site		"Inside"					"Outside"					NOAA Screening	
Analyte	Units (dw)	SO-N1	SO-N1 dup*	SO-N2	SO-SW1	SO-W1	SO-SE4**	SO-W5	SO-S6	SO-E6	SO-E4	ER-L	ER-M
Gravel	%	21	3	69	3	12	1	1	0	1	11	--	--
Sand	%	43	53	29	47	50	78	79	82	83	64	--	--
Silt	%	21	24	11	25	24	16	12	12	10	20	--	--
Clay	%	14	17	4	15	11	5	4	5	5	7	--	--
Total Organic Carbon	%	1.25	1.78	1.25	1.02	1.48	0.58	0.53	0.43	0.41	0.81	--	--
Arsenic	mg/kg	20	13	24	33	19	40	39	27	30	27	8.2	70
Cadmium	mg/kg	0.6	0.69	0.39	ND	0.43	ND	0.42	ND	ND	ND	1.2	9.6
Chromium	mg/kg	100	160	100	110	120	68	100	47	45	73	81	370
Copper	mg/kg	65	84	47	43	56	22	36	11	13	37	34	270
Lead	mg/kg	25	31	22	15	95	19	37	10	15	23	46.7	218
Mercury	mg/kg	0.2	0.13	0.13	0.1	0.38	0.09	0.1	0.02	0.05	0.19	0.15	0.71
Nickel	mg/kg	68	140	68	71	92	37	63	24	30	53	20.9	51.6
Selenium	mg/kg	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	--	--
Silver	mg/kg	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1	3.7
Zinc	mg/kg	78	130	76	75	86	52	79	34	35	69	150	410
Dioxins - Total TEQ	ng/kg	6.33	3.88	4.49	1.27	4.12	1.06	0.91	0.07	0.95	4.01	--	--
Total DDTs	ug/kg	ND	2.1	ND	ND	ND	ND	ND	ND	ND	2.6	1.58	46.1
Total Organotins	ug/kg	1.73	4.67	4	1.46	2.21	0.71	5.83	ND	4.1	2.09	--	--
Total PAHs	ug/kg	741	264	274	182	160	344	153.8	ND	263	1501	4022	44792
Total PCB Congeners	ug/kg	21.43	17.49	35.98	8.87	14.11	6.07	7.16	0.09	2.7	23.15	22.7	180

"Inside" stations are both within the disposal site boundary AND on the dredged material deposit as determined by the SPI-PVP survey.
"Outside" stations are both outside the site boundary AND off the dredged material deposit.

* Field duplicate sample from a separate grab taken at a different time at the same station

** This station was chosen for full OTM testing on upcoming dredging project(s) as a possible new reference site for future Hawaii projects.

Table 3. **Summary of sediment chemistry for the Hilo Ocean Dredged Material Disposal site and vicinity.**

		Survey Station:									
Hilo site		"Inside"				"Outside"				NOAA Screening	
Analyte	**Units (dw)**	**H-W1**	**H-W1 dup***	**H-N1**	**H-SW1**	**H-SE4**	**H-NE5**	**H-SW6**	**H-W6**	**ER-L**	**ER-M**
Gravel	%	2	3	2	0	0	0	0	0	--	--
Sand	%	62	61	47	69	72	85	26	14	--	--
Silt	%	25	24	21	26	21	16	61	70	--	--
Clay	%	5	8	7	5	7	5	11	17	--	--
Total Organic Carbon	%	0.83	0.98	0.81	0.81	0.69	0.57	2.43	3.27	--	--
Arsenic	mg/kg	36	36	32	36	26	28	48	55	8.2	70
Cadmium	mg/kg	0.4	ND	0.5	0.6	0.72	0.5	0.71	0.62	1.2	9.6
Chromium	mg/kg	110	120	140	130	140	140	150	160	81	370
Copper	mg/kg	30	35	31	31	30	31	51	56	34	270
Lead	mg/kg	11	11	11	12	9.6	11	19	21	46.7	218
Mercury	mg/kg	0.05	0.06	0.05	0.06	0.04	0.04	0.14	0.17	0.15	0.71
Nickel	mg/kg	160	200	290	230	320	290	88	82	20.9	51.6
Selenium	mg/kg	ND	ND	ND	ND	ND	ND	ND	ND	--	--
Silver	mg/kg	ND	ND	ND	ND	0.75	ND	1.1	1.2	1	3.7
Zinc	mg/kg	70	81	83	78	87	83	91	95	150	410
Dioxins - Total TEQ	ng/kg	3.02	1.99	2.19	1.96	1.58	0.831	4.84	7.65	--	--
Total DDTs	ug/kg	ND	ND	ND	ND	ND	ND	ND	ND	1.58	46.1
Total Organotins	ug/kg	ND	ND	0.86	ND	ND	ND	ND	ND	--	--
Total PAHs	ug/kg	2.2	2.3	10.2	1.8	ND	ND	3	17.4	4022	44792
Total PCB Congeners	ug/kg	0.3	0.5	ND	ND	ND	ND	0.25	0.28	22.7	180

"Inside" stations are both within the disposal site boundary and ON the dredged material deposit as determined by the SPI-PVP survey.
"Outside" stations are both outside the site boundary and OFF the dredged material deposit.

* Field duplicate sample from a separate grab taken at a different time at the same station

The screening level exceedances were relatively minor in magnitude and, in many cases, were seen at both “inside” and “outside” stations. The few constituents that were at higher concentrations within the disposal sites reflect the contaminant levels in the dredged material approved for discharge. All sediments discharged at ocean disposal sites are fully characterized before approval for ocean disposal is granted. Sediments that contain toxic pollutants in toxic amounts, or that contain elevated levels of compounds that will readily bioaccumulate into tissues of organisms exposed to them on the seafloor, are prohibited from being discharged. Thus the chemical concentrations identified are not considered to represent a risk of environmental impacts in and of themselves; also, these low concentrations indicate that the pre-dredge sediment testing regime is adequately protecting the environment of the disposal sites by identifying and excluding more highly contaminated sediments from being disposed.

3.3 Benthic Community Analysis Results

Less than half of the original targeted stations were sampled for sediment grab sampling due to ship and equipment problems. Nevertheless, by selecting stations based on the results of the SPI-PVP surveys, sufficient samples were collected within and outside of site boundaries and the dredged material deposit footprint to provide general characterization of benthic communities occupying native (ambient) seafloor and seafloor physically impacted by dredged material disposal.

3.3.1 Abundance of Infauna

As noted earlier, some physical changes (e.g., grain size and organic carbon content) were apparent at stations with dredged material, especially at the South Oahu site. However, overall abundances of different organism classes, while low, were not statistically different between “inside” and “outside” stations at either disposal site (Tables 4 and 5) (EcoAnalysts, Inc., 2014).

At South Oahu, where both disposal volume and physical changes were greatest, crustaceans were similarly abundant at “inside” and “outside” stations; annelids appeared to be somewhat less abundant at “inside” stations; while mollusks and other miscellaneous taxa appeared to be somewhat more abundant at “inside” stations. But considering all infauna classes, overall abundance was very similar on-site and off-site.

At Hilo, crustacea appeared to be somewhat more abundant at “inside” stations, but annelids, mollusks and other miscellaneous taxa appeared to be somewhat more abundant at “outside” stations. Overall abundance of infaunal organisms appeared to be slightly greater off-site than on-site but these results were not statistically significant, perhaps due in part to the small sample size. As predicted from the SPI-PVP survey results, overall infaunal abundance appeared to be slightly greater at Hilo than at South Oahu.

Dredged material had been fairly recently deposited at both sites, and these infaunal abundance results are consistent with relatively rapid recolonization following disposal.

***Table 4*. Infaunal species abundances at the South Oahu site.**

	"Inside"				"Outside"				
Category	**SO-N1**	**SO-N2**	**SO-W1**	**SO-SW1**	**SO-W5**	**SO-S6**	**SO-SE4**	**SO-E4**	**SO-E6**
Annelida	390	540	700	400	1190	120	50	660	670
Annelida Average	507.5				538				
Crustacea	0	10	10	10	20	0	0	10	10
Crustacea Average	7.5				8				
Mollusca	10	40	20	20	0	30	0	10	0
Mollusca Average	22.5				8				
Miscellaneous Taxa	30	50	130	40	20	10	0	110	60
Miscellaneous Taxa Average	62.5				40				
Totals	430	640	860	470	1230	160	50	790	740
Overall Averages	600				594				

***Table 5*. Infaunal species abundances at the Hilo site.**

	"Inside"		"Outside"		
Category	**H-N1**	**H-SW1**	**H-NE5**	**H-SW6**	**H-SE4**
Annelida	900	320	490	930	650
Annelida Average	610		690		
Crustacea	20	20	10	0	10
Crustacea Average	20		6.7		
Mollusca	50	10	10	260	10
Mollusca Average	30		93.3		
Miscellaneous Taxa	50	50	50	80	100
Miscellaneous Taxa Average	50		76.7		
Totals	1020	400	560	1270	770
Overall Averages	710		866.7		

3.3.2 Diversity of Infauna

Based on species lists and statistics presented in EcoAnalysts, Inc. (2014), the overall benthic community at the South Oahu site was shown to be different from the assemblage at the Hilo site. This finding is not surprising given that the Hilo site is located in a relatively heterogeneous area containing a mixture of hard bottom features (submerged reef and terraces) coupled with areas of accumulated finer grained sediments (USGS, 2000), while the South Oahu site is located on a more homogeneous sandy seafloor with some scattered hard bottom features. However, as is expected of deep-sea benthic habitats overall, both sites have well developed benthic communities with high diversity and relatively low abundances, and presence of several undescribed taxa.

For both sites combined, there were 126 taxa found. A total of 85 infaunal taxa were identified from the South Oahu ODMDS sampled locations and a total of 79 taxa were identified from the Hilo ODMDS sampled stations. Within the polychaetes identified from both locations, 24 of 89 species were determined to likely be undescribed (EcoAnalysts, Inc., 2014).

At the South Oahu site, diversity was high and abundances tended to be low at all stations. Stations located inside the disposal site were not statistically different in terms of diversity, abundances, or species richness when compared to stations located outside the disposal site. Thus there is no evidence that dredge material is negatively impacting the benthic communities at the South Oahu ODMDS sites sampled.

Similarly at the Hilo site, there were no significant differences in diversity between inside and outside stations. As at South Oahu, diversity was high while abundances were relatively low, which was expected of deep-sea benthic habitats. Based on these results there is no evidence that dredge material is negatively impacting the benthic communities at the Hilo ODMDS stations sampled, other than the expected reduction of abundances due to physical impacts from rubble disposed at the center of the site.

3.4 Sub-Bottom Profile Survey (South Oahu site only)

The survey area, approximately 8 square nautical miles, covered the current designated site and surrounding abyssal plain seafloor areas, including existing hard bottom features (such as relic reefs and other outcrops) (Figure 25). The contrast between high reflectance native bottom bed forms and lower reflectance non-native deposited sediments allowed for identification of dredged material deposits throughout the study area.

While dredged material was identified within the current disposal site boundary, deposits of dredged material were still identifiable outside the site boundaries as well (Figure 26), probably due to past (pre-1981) disposal at historic disposal sites as well as mis-dumping before the 2000's (when satellite tracking systems began being required to help ensure proper disposal within site boundaries). Transects lines for the survey are shown on Figure 27. Figure 28 superimposes an area-wide surface geological map from the sub-bottom profiling survey with the SPI-based mapping of the dredged material footprint, showing excellent concordance between the two methods. Sub-surface results for a typical transect are shown on Figure 29, which presents a cross-section through the center of the disposal site looking down through both the dredged material deposit and the native sediment underlying it.

The analysis of the full sub-bottom data set (Sea Engineering, Inc., 2014) suggests that the dredged material deposits in and around the South Oahu site generally vary between 3 and 12 feet (1- 4 m) in thickness. An order of magnitude approximation of the total amount of dredged material within the study area was calculated using an average thickness of 6 feet (2 meters). The total volume of dredged material mapped throughout the entire study area, including historic disposal outside the current site boundaries, was thus calculated to be 27,885,600 cubic yards (21,320,000 cubic meters). However, the total volume of dredged material mapped within the current South Oahu site boundary was calculated to be 1,736,000 cubic yards (1,327,350 cubic meters). This compares quite favorably with the recorded volume of 1,855,230 cubic yards of material known to have been disposed from 2000 through 2013 (Table 1, and Figure 30).

Figure 25. USGS shaded-relief image showing the boundary of the sub-bottom survey area around the South Oahu disposal site, as well as major bedforms in the vicinity (shaded relief imagery from USGS, 2000). (Sea Engineering, 2014)

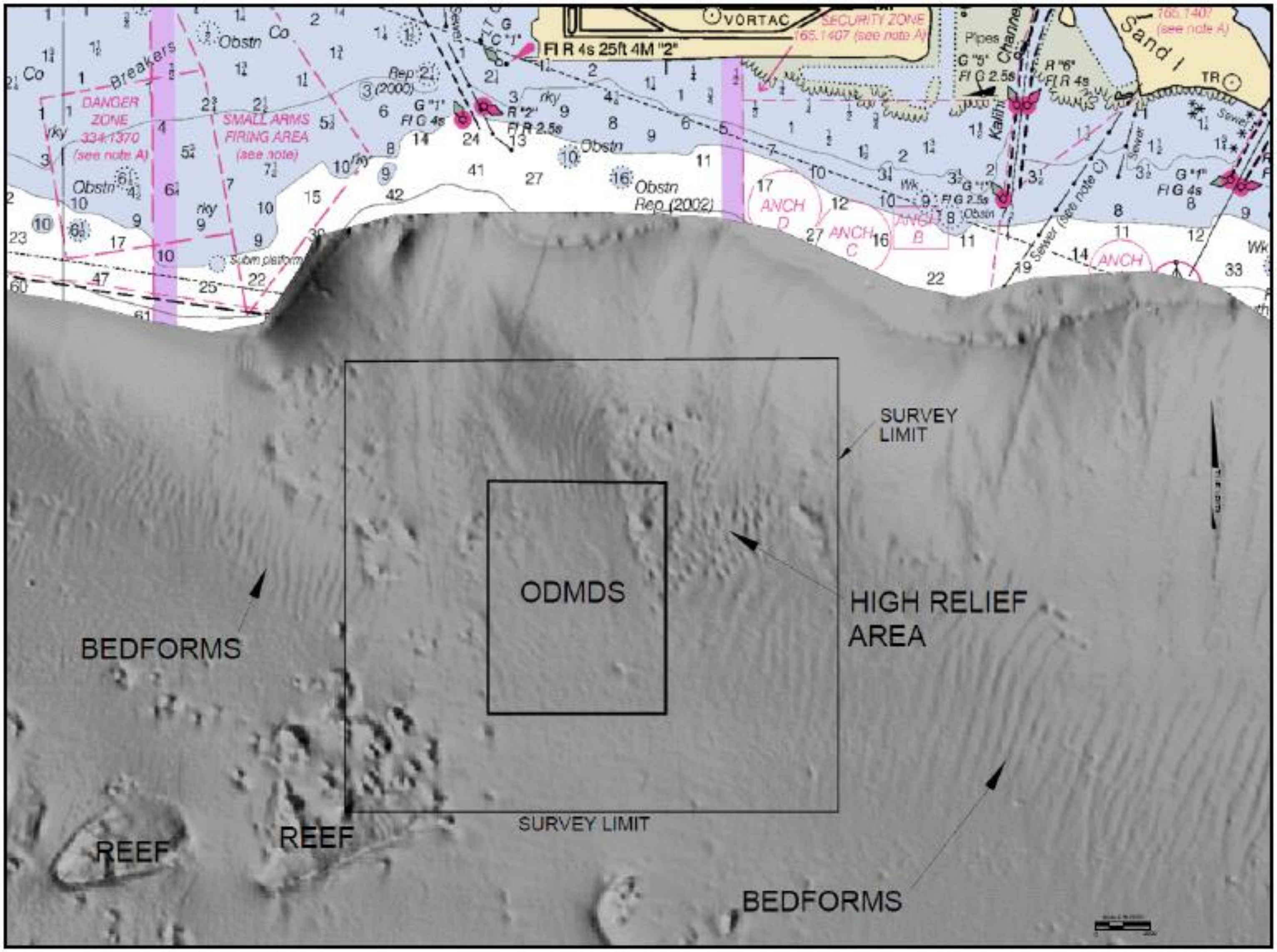


Figure 26. USGS sidescan sonar (backscatter) image showing historic dredged material deposits around the sub-bottom survey area and the South Oahu disposal site (sidescan imagery from USGS, 2000). (Sea Engineering, 2014)

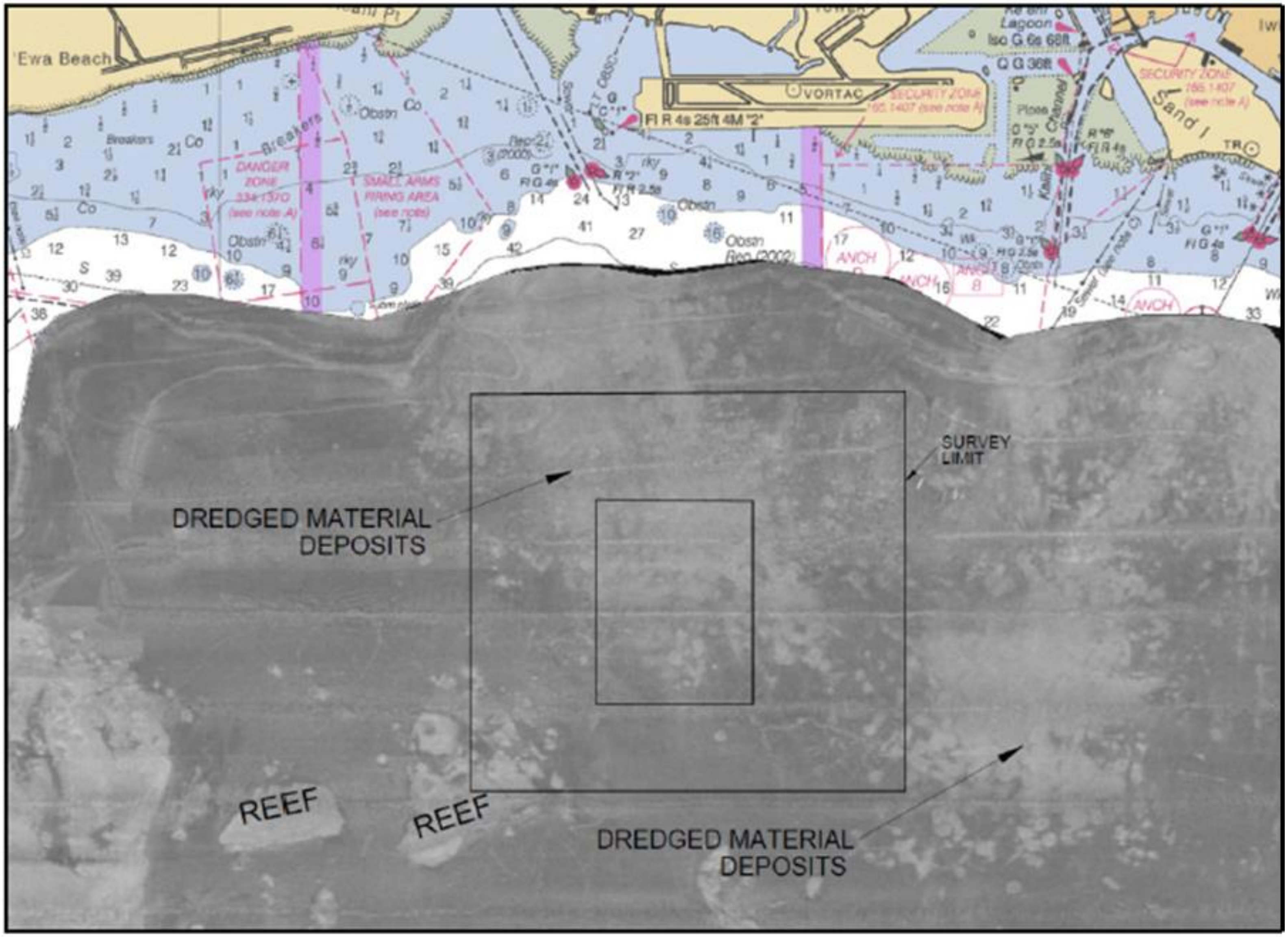


Figure 27. Transect lines for the sub-bottom profiling survey of the South Oahu site. Results for Diagonal line 1 through the center of the disposal site (arrows) are given in Figure 29. (Sea Engineering, 2014)

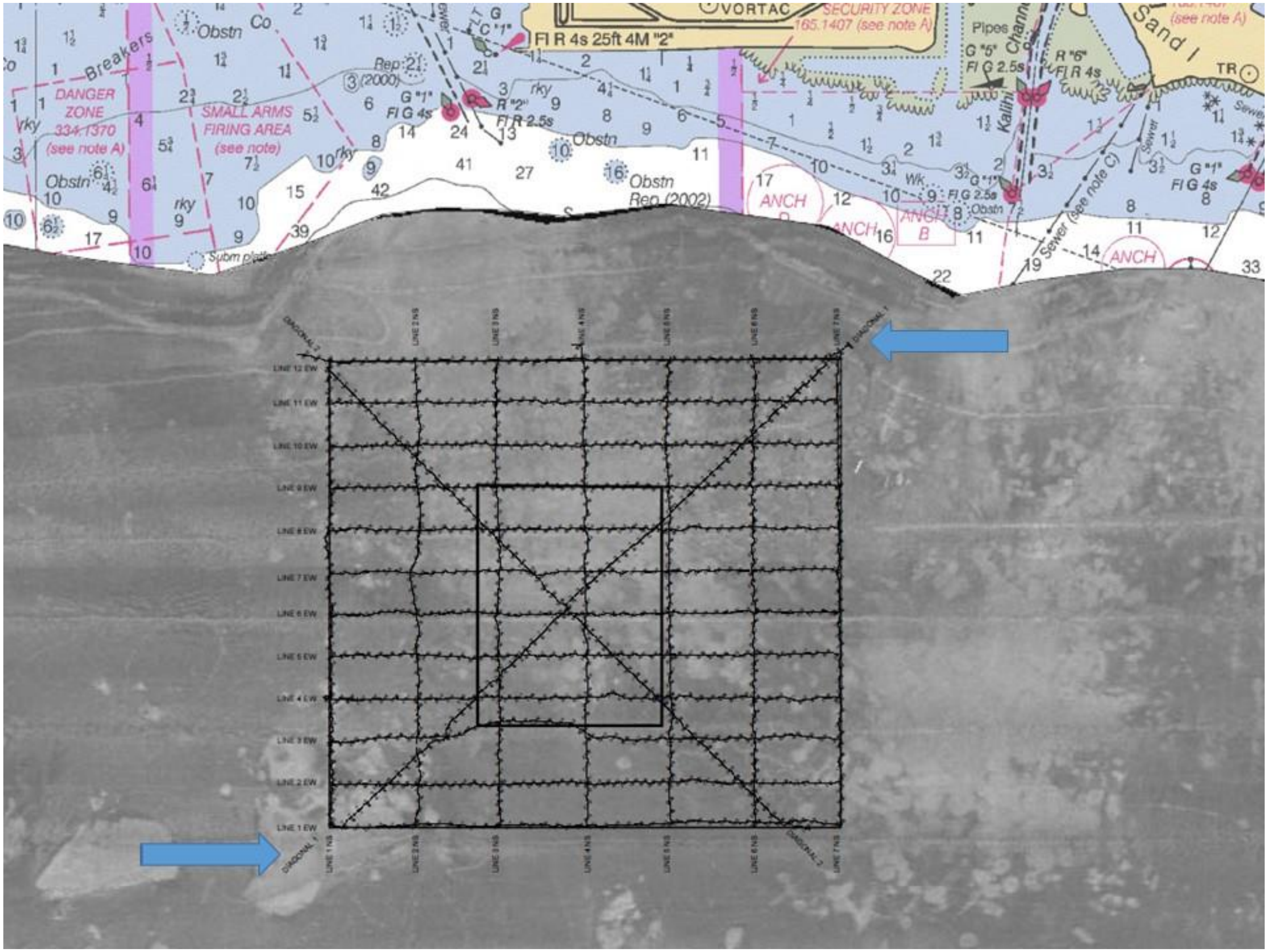


Figure 28. Geological (surface) interpretation from the sub-bottom profiling survey superimposed with the SPI-based dredged material footprint map shown in Figure 17. (DM = dredged material; HSL = hard sand layer; HR/DM = high-relief terrain with dredged material.) (Sea Engineering, 2014)

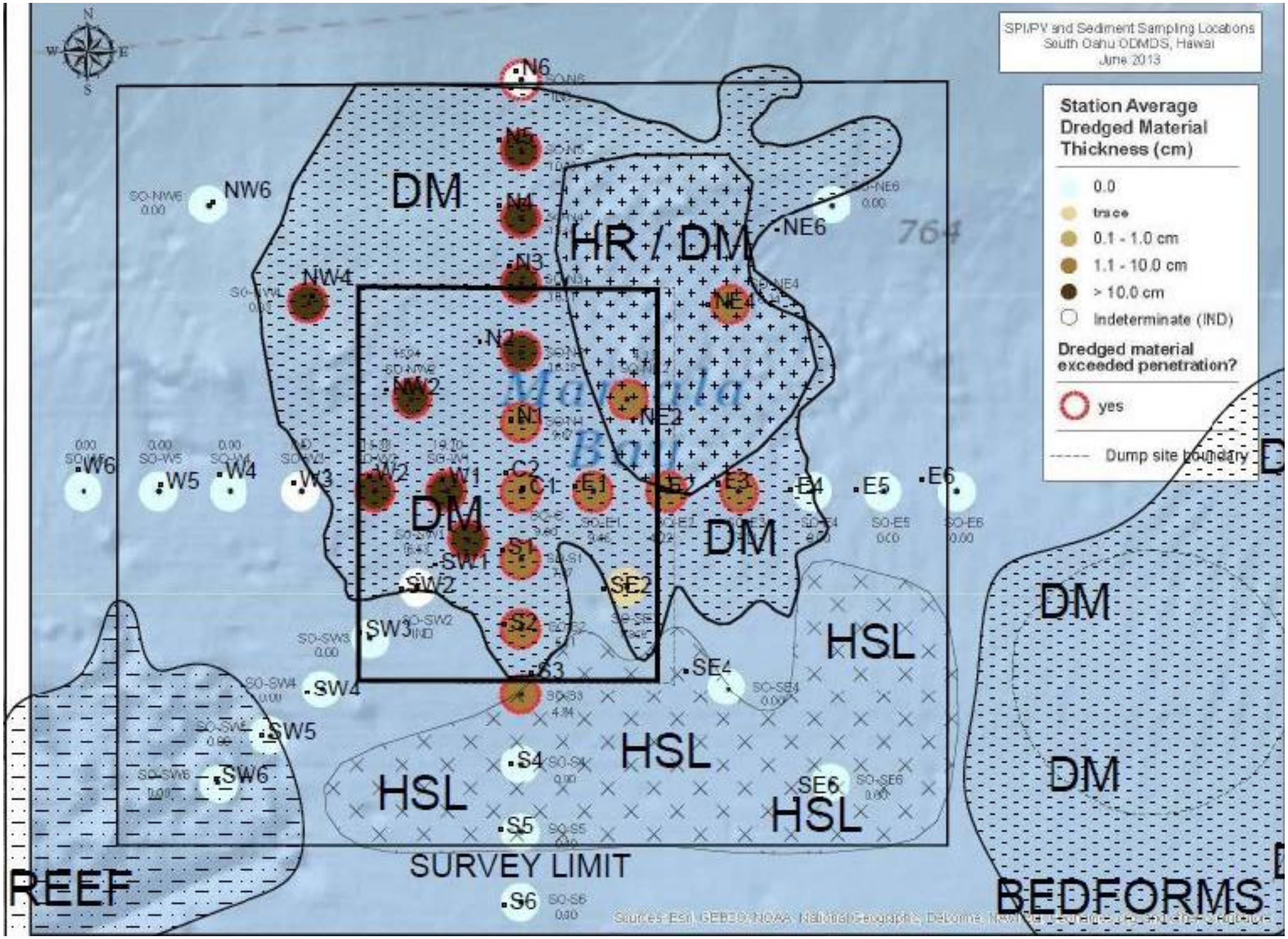


Figure 29A. Sub-bottom profile – NE portion of Diagonal Line 1. (Sea Engineering, 2014)

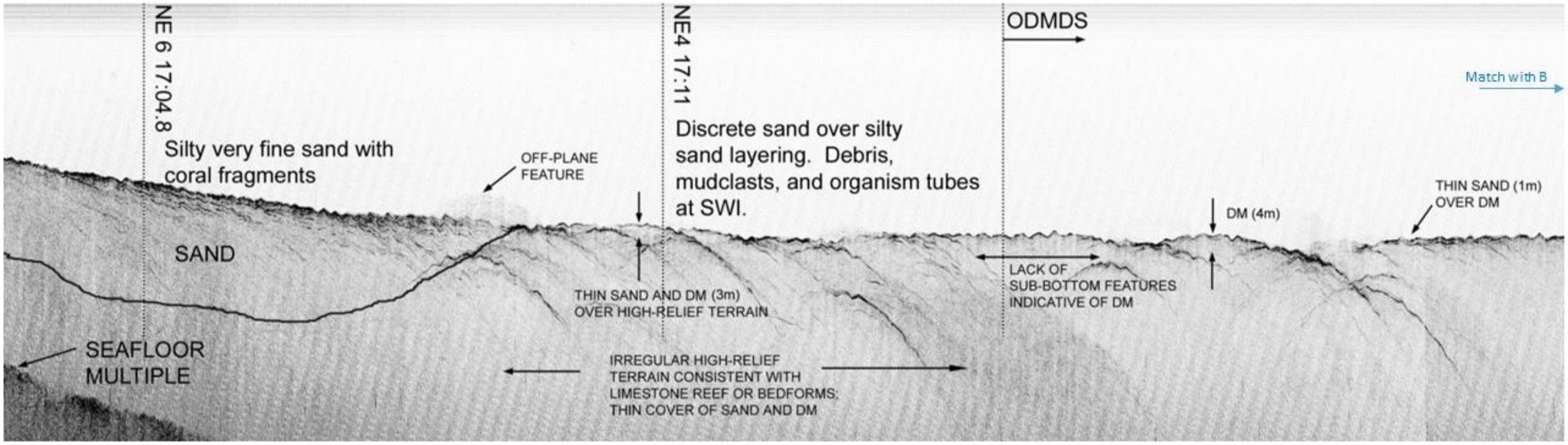


Figure 29B. Sub-bottom profile – SW portion of Diagonal Line 1. (Sea Engineering, 2014)

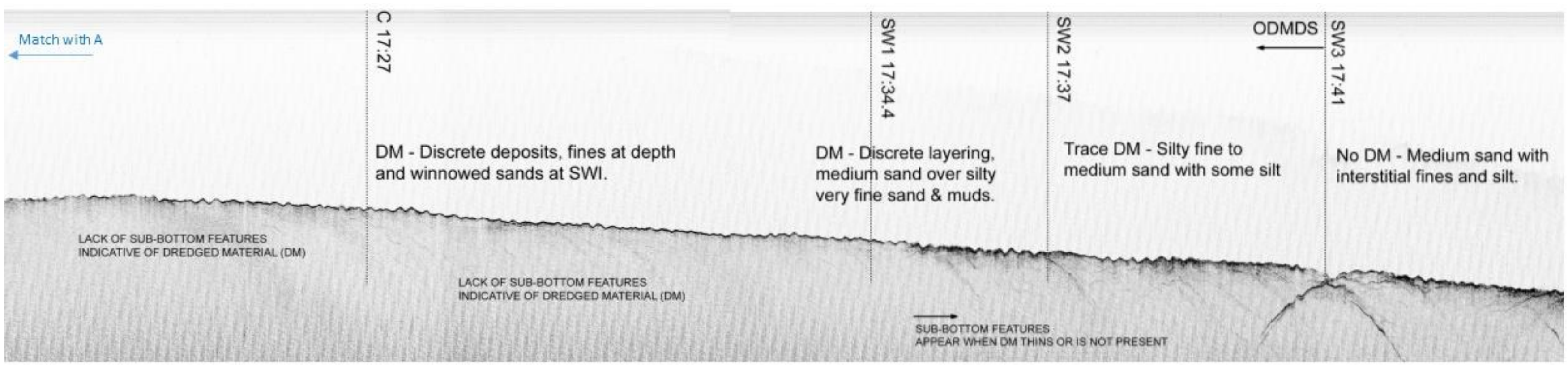
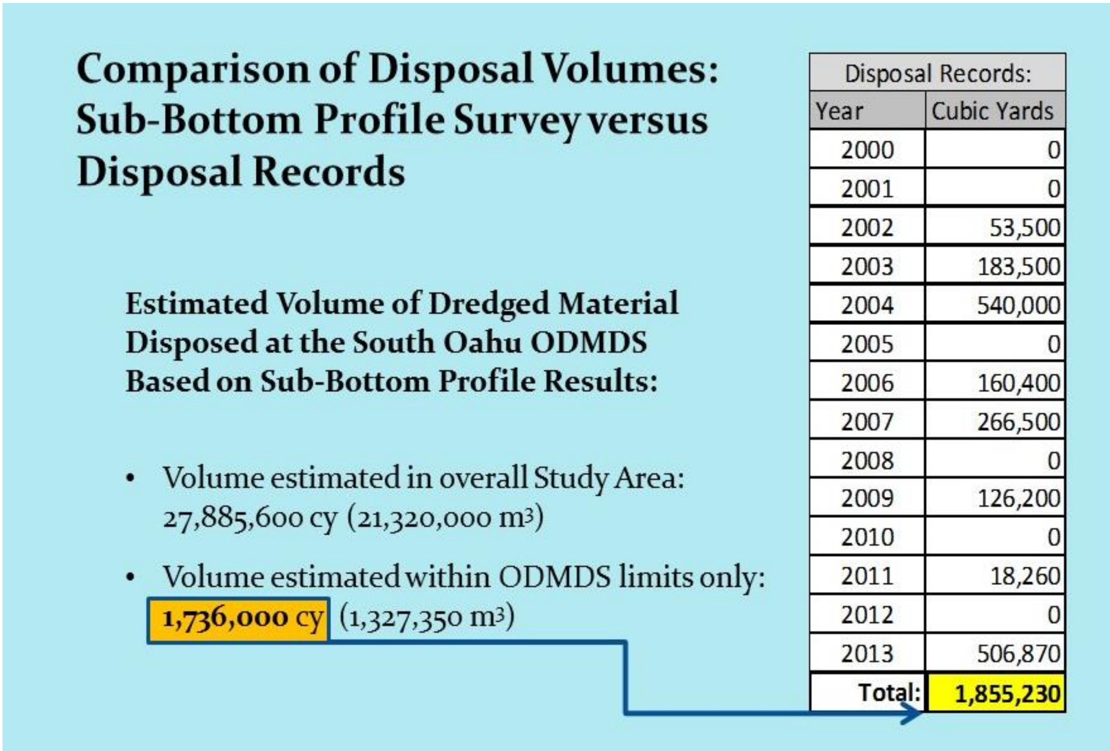


Figure 30. Comparison of South Oahu site dredged material volume estimates: from sub-bottom mapping versus recorded disposal volumes for 2000-2013 (see Table 1).



Disposal Records:	
Year	Cubic Yards
2000	0
2001	0
2002	53,500
2003	183,500
2004	540,000
2005	0
2006	160,400
2007	266,500
2008	0
2009	126,200
2010	0
2011	18,260
2012	0
2013	506,870
Total:	1,855,230

Although the volume of dredged material estimated by the sub-bottom profiling survey to be within the South Oahu disposal site boundary (1.74 million cy) compares well with the actual disposal records since 2000 (1.85 million cy), Table 1 shows that a total of 6.3 million cy has actually been disposed since the site was designated in 1981. It is likely that some substantial portion of the total 6.3 million cy disposed at the South Oahu site since 1981 is actually represented within the approximately 26 million cy of historic material estimated to be *outside* the site boundaries. Prior to the early 2000s, automatic satellite-based tracking and recording of disposal scow position was not required [2], and "short-dumping" (resulting in material depositing outside site boundaries) probably occurred fairly frequently. Still, it is highly likely that much of the material disposed between 1981 and 2000 was nevertheless deposited on-site, so more than 1.8 million cy should be present. It is to be expected that physical consolidation of any dredged material deposit would occur over time, reducing its apparent volume compared to disposal records. For all these reasons, the sub-bottom profiling survey's rough estimate is certainly low. However, it is also certainly within an order of magnitude, and is an interesting cross-check on other disposal site monitoring results.

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[2] The 1997 SMMP (USEPA and USACE, 1997) required a navigation system capable of 30 m accuracy, but did not specify that the system show the position of the disposal scow itself (as opposed to the tug or towing vessel). Similarly, the 1997 SMMP did not require "black box" recording of the actual disposal location, so independent confirmation that disposal only occurred at the center of the disposal site (as required) was difficult. But beginning in the 2000s, as both commercial GPS accuracy and vessel sensor technology advanced, and EPA and USACE began requiring sophisticated automatic tracking systems as conditions for all individual project's ocean disposal permits.

3.5 Comparison to 1980 Baseline Information

3.5.1 South Oahu Disposal Site

Comparison of the data contained in the 1980 EIS to the data collected from the 2013 survey shows that the grain size proportions in the disposal site have shifted to a higher percentage of silt and clay, as well as higher percentage of sediments coarser than sand (Table 6). This is not surprising because maintenance dredged material tends to be finer grained in comparison to the native bottom sediments which contain a higher percentage of sand, as described in the 1980 EIS. New work (deepening) dredging projects in areas such as Pearl Harbor have likely removed deeper layers of reef formation material, thus contributing to the gravel-sized fraction. This much coarser material is expected to sink rapidly to the bottom, without dispersing and drifting outside of the site boundary, in contrast to fine grained dredged material.

Table 6. **Average Percent Grain Size – South Oahu Site**

Grain Size Category	1980 EIS (Pre-Disposal)	2013 - Disposal Site only	2013 - Outside of Disposal Site	2013 – Entire Survey Area
Gravel	12.0	21.6	2.8	12.2
Sand	75.0	44.4	77.2	60.8
Silt & Clay	13.0	33.2	19.2	26.2

Comparison to baseline sediment chemistry is limited to the trace metal concentrations shown in the 1980 EIS. When comparing the 1980 trace metal data to the data collected from the 2013 survey, it is apparent that dredged material disposal operations generally have not appreciably increased contaminant loading on-site, or relative to the surrounding environs, except for copper (Table 7). The slightly elevated on-site copper concentration is higher than the NOAA ER-L screening level, but is much lower than the ER-M screening level where toxicity effects are more likely to occur. As discussed in Section 3.2, all sediments discharged at ocean disposal sites are fully characterized before approval for ocean disposal is granted. Sediments that contain toxic pollutants in toxic amounts are prohibited from being discharged. Thus the slightly elevated concentration of copper compared to the 1980 baseline is not considered to represent a risk of environmental impact.

Table 7. **Trace Metal Concentrations – South Oahu Site**

Analyte	1980 EIS (Pre-Disposal)		2013 - Disposal Site only		2013 - Outside of Disposal Site		2013 – Entire Survey Area		ER-L	ER-M
	Range (ppm)	Ave. (ppm)	Range (ppm)	Ave. (ppm)	Range (ppm)	Ave. (ppm)	Range (ppm)	Ave. (ppm)		
Cadmium	4.0-6.3	5.2	0.0-0.69	0.4	0.0-0.42	0.08	0.0-0.69	0.25	1.2	9.6
Mercury	0.5-0.9	0.7	0.10-0.38	0.18	0.02-0.19	0.09	0.02-0.38	0.14	0.15	0.71
Copper	17.6-45.5	31.0	43.0-84.0	59.0	11.0-37.0	23.8	11.0-84.0	41.4	34	270
Lead	38.1-59.0	48.6	15.0-95.0	37.6	10.0-37.0	20.8	10.0-95.0	29.2	46.7	218

The 1980 EIS characterized the benthic community as typical for abyssal depths, with low infaunal abundance relative to shallow depth communities. Infaunal abundances were similar in the 2013 surveys, although on-site percent abundances of crustaceans and other miscellaneous taxa appeared to be slightly lower than in 1980 (Table 8). Nevertheless, even these minor differences are most likely attributable to natural variability across the study area rather than to disposal activities. This conclusion is supported by abundances of crustaceans and other miscellaneous taxa in 2013 being *greater* inside the disposal site compared to outside it.

***Table 8.* Percent Abundance – South Oahu Site**

Taxonomic Group	1980 EIS (Pre-Disposal)	2013 – Disposal Site only	2013 – Outside of Disposal Site	2013 – Entire Survey Area
Annelida (includes polychaetes)	82.9	84.6	90.6	87.9
Crustacea	2.9	1.3	1.3	1.3
Mollusca	0.8	3.8	1.3	2.4
Miscellaneous taxa	13.3	10.4	6.7	8.4

3.5.2 Hilo Disposal Site

Comparison of the data contained in the 1980 EIS to the data collected from the 2013 survey shows that the grain size character has shifted to a somewhat higher percentage of silt and clay (Table 9). This is not surprising because maintenance dredged material tends to be finer grained in comparison to the native bottom sediments which contain a higher percentage of sand, as described in the 1980 EIS. But these physical changes are less obvious and widespread than at the South Oahu site, where much more dredged material has been disposed. Also in contrast to the South Oahu site, new work (deepening) dredging projects have not placed such a high volume of much coarser reef formation material, and as a result, the gravel-sized fraction has not increased significantly.

***Table 9.* Average Percent Grain Size – Hilo Site**

Grain Size Category	1980 EIS (Pre-Disposal)	2013 - Disposal Site only	2013 - Outside of Disposal Site	2013 – Entire Study Area
Gravel	1.0	1.75	0.0	0.9
Sand	77.0	59.8	49.3	54.5
Silt & Clay	22.0	30.3	52.0	41.1

Comparison to baseline sediment chemistry is limited to the trace metal concentrations shown in the 1980 EIS. When comparing the 1980 trace metal data to the data collected from the 2013 survey, it is apparent that dredged material disposal operations at the Hilo site have not caused any significant increase in contaminant loading, except for copper (Table 10.). The slightly elevated copper concentration is higher than the NOAA ER-L screening level, but is much lower than the ER-M screening level, where toxicity effects are more likely to occur; therefore the slightly elevated copper is not considered to represent a risk of environmental impact. In addition, the copper elevation is shoreward and *outside* the disposal site. Possible explanations include contaminants from other shore-side source, or historic short-dumping from disposal scows (prior to the early 2000's, after which "black box" compliance monitoring was required).

Table 10. **Trace Metal Concentrations – Hilo Site**

Analyte	1980 EIS (Pre-Disposal)		2013 - Disposal Site only		2013 - Outside of Disposal Site		2013 – Entire Survey Area		ER-L	ER-M
	Range (ppm)	Ave. (ppm)	Range (ppm)	Ave. (ppm)	Range (ppm)	Ave. (ppm)	Range (ppm)	Ave. (ppm)		
Cadmium	---	3.4	0.0-0.6	0.4	0.50-0.72	0.64	0.0-0.72	0.51	1.2	9.6
Mercury	0.10-0.59	0.35	0.05-0.06	0.06	0.04-0.17	0.10	0.04-0.17	0.08	0.15	0.71
Copper	33.9-38.1	36.0	30.0-35.0	31.8	30.0-56.0	42.0	30.0-56.0	36.9	34	270
Lead	19.5-29.0	24.3	11.0-12.0	11.2	9.6-21.0	15.2	9.6-21.0	13.2	46.7	218

The 1980 EIS characterized the benthic community at the Hilo site as typical for abyssal depths, with low infaunal abundances relative to shallow depth communities. Compared to data presented in the site designation EIS, some minor differences in percent abundance appear to have occurred (Table 10). Mollusks and miscellaneous taxa appear to be very slightly lower on-site compared to off-site in 2013 (though not statistically significantly so), and miscellaneous taxa appear to be less abundant in 2013 than they were in 1980. However, in 2013 miscellaneous taxa were lower both inside and outside the disposal site, while mollusks were *more* abundant region-wide than in 1980. As noted earlier, the native benthic environment around the Hilo site is more heterogeneous than around the South Oahu site to begin with. These minor differences may in infaunal abundances therefore are at least substantially attributable to natural variability across the study area rather than to disposal activities.

Table 11. **Percent Abundance – Hilo Site**

Taxonomic Group	1980 EIS (Pre-Disposal)	2013 – Disposal Site only	2013 – Outside of Disposal Site	2013 – Entire Survey Area
Annelida (includes polychaetes)	80.0	85.9	79.6	81.8
Crustacea	2.2	2.8	1.0	1.5
Mollusca	1.1	4.2	10.8	8.5
Miscellaneous taxa	16.7	7.0	8.8	8.2

IV. CONCLUSIONS AND RECOMMENDATIONS

Multiple survey activities were conducted in 2013 to assess the condition and performance of the EPA-designated South Oahu and Hilo ocean dredged material disposal sites. Over the past two decades, South Oahu and Hilo have been the most heavily used of the five disposal sites that serve the ports and harbors of the Hawaiian Islands. The survey results are intended to identify whether any adverse impacts of dredged material disposal are occurring compared to baseline conditions, to confirm the protectiveness of the pre-disposal sediment testing required by EPA and USACE, and to serve as a basis for updating the Site Management and Monitoring Plan (SMMP) as appropriate.

The dredged material deposit (footprint) was mapped at each site. Significant deposits of dredged material are apparent outside the South Oahu site boundaries, but this likely resulted from short-dumping prior to the early 2000s when EPA and USACE began requiring "black box" tracking systems. Since that time, virtually all material disposed at South Oahu is documented as having been discharged properly within the Surface Disposal Zone at the center of the site. At the Hilo site, almost all of the dredged material footprint is contained within the site boundary.

Sediment sampling confirms that there have been no significant adverse impacts as a result of dredged material disposal operations at either of the disposal sites monitored. Only minor physical effects (grain size and organic carbon content changes) have occurred at either site, despite the order-of-magnitude greater volume that has been disposed at the South Oahu site over the last 15 years. Chemical analysis of both on-site and off-site stations indicated only low concentrations of chemicals of concern, both on-site and off-site. Benthic community analyses showed that recolonization occurs after dredged material is deposited, and similar infaunal and epifaunal communities occupy both on-site and off-site areas. Taken together, these results also provide support that the pre-disposal sediment testing program is effective in not allowing highly contaminated sediments to be discharged at either site.

The 2013 monitoring results also indicate a lack of significant adverse impacts compared to 1980 baseline conditions. Only minor and localized physical changes are apparent as a result of disposal operations at either site.

Overall, these findings suggest that ongoing use of the South Oahu and Hilo ocean dredged material disposal sites, under testing and management conditions at least as stringent as have been applied over the past 15 years, should similarly result no significant adverse effects. Permit conditions should be updated in the revised SMMP, and a more specific site monitoring schedule should be established for the future. But based on all the monitoring results, no significant changes to sediment testing or to the overall site management framework appear to be warranted for these sites.

Continued use of the other three Hawaii ocean dredged material disposal sites that were not monitored in 2013 is also supported by inference. These sites have received far less frequent dredged material disposal than South Oahu or even Hilo, and impacts can be expected to be negligible there as well. Nevertheless, the other Hawaii sites should be considered for confirmatory monitoring after the next round of disposal operations, currently expected to occur in 2016.

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APPENDIX

SUMMARY OF PLANNED VS ACTUAL SURVEY ACTIVITIES AT HAWAII OCEAN DREDGED MATERIAL DISPOSAL SITES, 2013

APPENDIX
SUMMARY OF PLANNED VS ACTUAL SURVEY ACTIVITIES AT HAWAII OCEAN DREDGED MATERIAL DISPOSAL SITES, 2013

General Survey Information:

Site Name (Region): South Oahu and Hilo Ocean Dredged Material Disposal Sites (Region 9)
Survey Chief Scientist/Organization: Allan Ota (EPA Region 9)
Telephone: 415-972-3476
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Other Key Personnel/Organization: Brian Ross (EPA Region 9)
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Science Crew/Organization:
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Leslie Robinson (US Navy, HI)
Sean Hanser (US Navy, HI)
Thomas Smith (USACE, HI)
Robert O'Connor (NOAA, HI)
Joseph Germano (Germano & Assoc., WA)
David Browning (Germano & Assoc., WA)
Christine Smith (ANAMAR, FL)

Schedule of Operations:
Number of survey days: 8 planned, 5 actual (plus 2 for mobilization/demobilization)
Mobilization date (Location): 24-25 June 2013 (Ford Island, Pearl Harbor, Oahu)
Demobilization date (Location): 03 July 2013 (Ford Island, Pearl Harbor, Oahu)

Original Problem Definitions/Task Descriptions (from Quality Assurance Project Plan)

1. Using the Hi'ialakai, collect MBES images to confirm overall bathymetry and identify any features of interest to adjust sediment sampling locations as appropriate:
    a. Is the overall bathymetry different from the standard NOAA charts?
    b. Are there unusual or unique features that suggest that adjustment of planned sampling station locations is necessary to improve interpretation of site monitoring data?
2. Using the Hi'ialakai, collect SPI and PVP images at up to 49 stations covering each EPA ODMDS and adjacent areas outside of site boundaries to address the following management questions:
    a. Is the footprint of recently deposited dredged material contained within site boundaries? Are dredged materials in a single mound feature or contained in multiple mounds?

   b. Are the sediments within the dredged material deposit footprint visually similar or dissimilar from ambient bottom sediments?
   c. Are there indications of disposal of materials other than dredged materials?
   d. Are there indications of an undisturbed or disturbed environment (adverse impacts)?
3. Using the Hi'ialakai, collect up to 20 sediment grab samples at each EPA ODMDS and adjacent areas outside of site boundaries to address the following management questions:
   a. Are sediment contamination levels at the sites within the range predicted by pre-disposal sediment testing of dredged material approved for disposal?
   b. Are levels of contaminants at historic disposal sites (>10 years since used) adjacent to the active South Oahu site similar to or below ambient levels (undisturbed native sediments – outside of deposit footprint or site boundaries)?
   c. How do the biological communities compare, between within the site and outside of site boundaries?
   d. How do the biological communities compare to what existed when these permanent sites were designated?
4. Using a contracted (Sea Engineering) vessel, collect high resolution sub-bottom seismic profiles within selected basin locations to address the following management questions:
   a. Based on the acoustic signal contrast between native bottom sediments and dredged material layer, what is the horizontal extent of the dredged material deposit footprint relative to the site boundaries? – i.e., does the dredged material deposit appear to reside mostly or completely within site boundaries, suggesting site is performing as expected?
   b. Based on the acoustic signal contrast between native bottom sediments and dredged material layer, what is the apparent thickness of the dredged material deposit footprint? – i.e., does the bulk of the dredged material volume appear to reside mostly or completely within site boundaries, suggesting site is performing as expected?
   c. How does the calculated volume of the dredged material identified by this survey compare with dredging records for projects using the site? – i.e., comparison of volumes from compiled disposal records to the calculated volume using information from (a) and (b) above.

Actual Sequence of Tasks/Events

The surveys were originally scheduled to occur over 8 days (plus mobilization and demobilization), but problems associated with readiness of the NOAA ship and its equipment caused some delays. The surveys were ultimately conducted over a 5-day period (not including transit between the South Oahu site and the Hilo site, and the return transit to Pearl Harbor from the Hilo site). Field operations were conducted continuously over a 24-hour period (two scientific crews working12-hour shifts).

The survey sampling objectives were not fully accomplished due to the following problems:

1. Departure was delayed by one day, due to:
   a. Hole/rupture in the NOAA ship's bilge tank which had to be repaired.

   b. The original contracted marine winch, which was installed during the previous week, was not working properly and its hydraulic unit had to be replaced.
2. The replacement winch operated at a slower rate (about 20 meters per minute, instead of 40-60 meters per minute) than what was expected when the survey plan was conceived, resulting in less than half of the planned sediment grab sampling stations being occupied in the time remaining for survey work.
3. Hard bottom features were encountered and multiple attempts were needed at several stations to obtain acceptable samples, as judged by QAPP metrics (i.e., adequate penetration and undisturbed appearance).

4. The multi-beam echo sounder (MBES) survey initially planned for both sites was not executed due to the equipment on the NOAA vessel not functioning properly at the beginning of the first survey leg. As a result, no MBES data was collected at either site. In the absence of the MBES survey data, the combination of SPI and PVP photography and analysis of the SPI visual parameters provided information on the horizontal and vertical extent of the dredged material footprint, and context for the other (sediment) sampling results.

Survey Activities/Operations Conducted to Address Problem Definitions:

The following are the survey activities executed at both sites:

1. <u>Sediment Profile Imaging (SPI) and Plan View Photography (PVP)</u>
   SPI-PVP surveys were conducted for each ODMDS to delineate the horizontal extent of the dredged material deposit footprint within the site, and outside of site boundaries if any deposits exist (Figure 2). A total of 86 stations were occupied with the SPI/PV camera system (40 at South Oahu and 46 at Hilo), compared to the planned 98 (49 at each site). With optimal resolution on the order of millimeters, the SPI system is particularly useful for identifying a number of features, including the edges of the footprint as they overlay native sediments of the seabed, identifying dredged material layers relative to native sediments, and the level of disturbance as indicated by presence of certain classes of benthic organisms (Figures 3 and 4). PVP is useful for identifying surface features where the SPI photos are taken, thereby providing surface context for the vertical profiles at each station. For each station, a minimum of four SPI photos were taken, coupled with a single PVP photo.
2. <u>Sediment Sampling for Chemistry and Benthic Communities:</u>
   Sediment samples were collected for sediment grain size, chemistry, and benthic community analysis with a stainless steel double Van Veen sediment grab (Figure 5) capable of penetrating a maximum of 20 centimeters of depth below the sediment surface. Sediment grab samples were judged acceptable based on approved QAPP metrics. After each acceptable grab sample was measured for depth of penetration and photographed, sufficient volume of chemistry subsample were extracted from one of the two grabs with a stainless steel spoon for further processing (Figure 6). The chemistry subsample was then homogenized and divided into the different chemistry analysis jars (i.e., grain size, metals and organics). After the chemistry subsample was extracted, the entire volume of the other grab was processed (Figure 7) to create a benthic community sample for that station. A 500 micron sieve was used to separate organisms from the sediment, and the separated organisms were then initially preserved

with formalin. A total of 18 sediment grab sample stations were occupied in the two survey areas combined, relative to the original targeted 40 locations. 18 chemistry samples were processed (10 at South Oahu, and 8 at Hilo), 3 of which were field or laboratory duplicates. A total of 14 benthic community samples were collected; the lower number than the chemistry samples was due to some grabs being used for field and laboratory chemistry duplicates, and one station where QAPP metrics were not met for an acceptable benthic sample (lack of time to re-deploy).

The following survey activity was executed only at the South Oahu site:

3. Collection of high-resolution sub-bottom seismic-reflection profiles:
   The primary purpose of this survey was to collect cross-sectional images of the native sediment layers and identify layers indicative of the dredged material deposit footprint in the environs of the South Oahu ODMDS. (The Hilo site was not surveyed in this manner during this round of surveys, primarily due to the much smaller volumes of dredged material which may not be detectable in terms of thickness and contrast.) The survey was contracted to Sea Engineering, who conducted the work aboard a separate vessel specially rigged for this type of survey with an acoustic sub-bottom profiler system (Figure 8), which was more cost effective than attempting to install the equipment on the NOAA vessel. The results of this survey allowed EPA to calculate an estimate of cumulative volume of dredged material in the South Oahu site.

The study areas are depicted in Figures 9 and 10 (South Oahu) and 11, and 12 (Hilo) The target sampling station coordinates are listed in Tables 2 (South Oahu) and 3 (Hilo).

Figure 9. General location of the South Oahu ODMDS

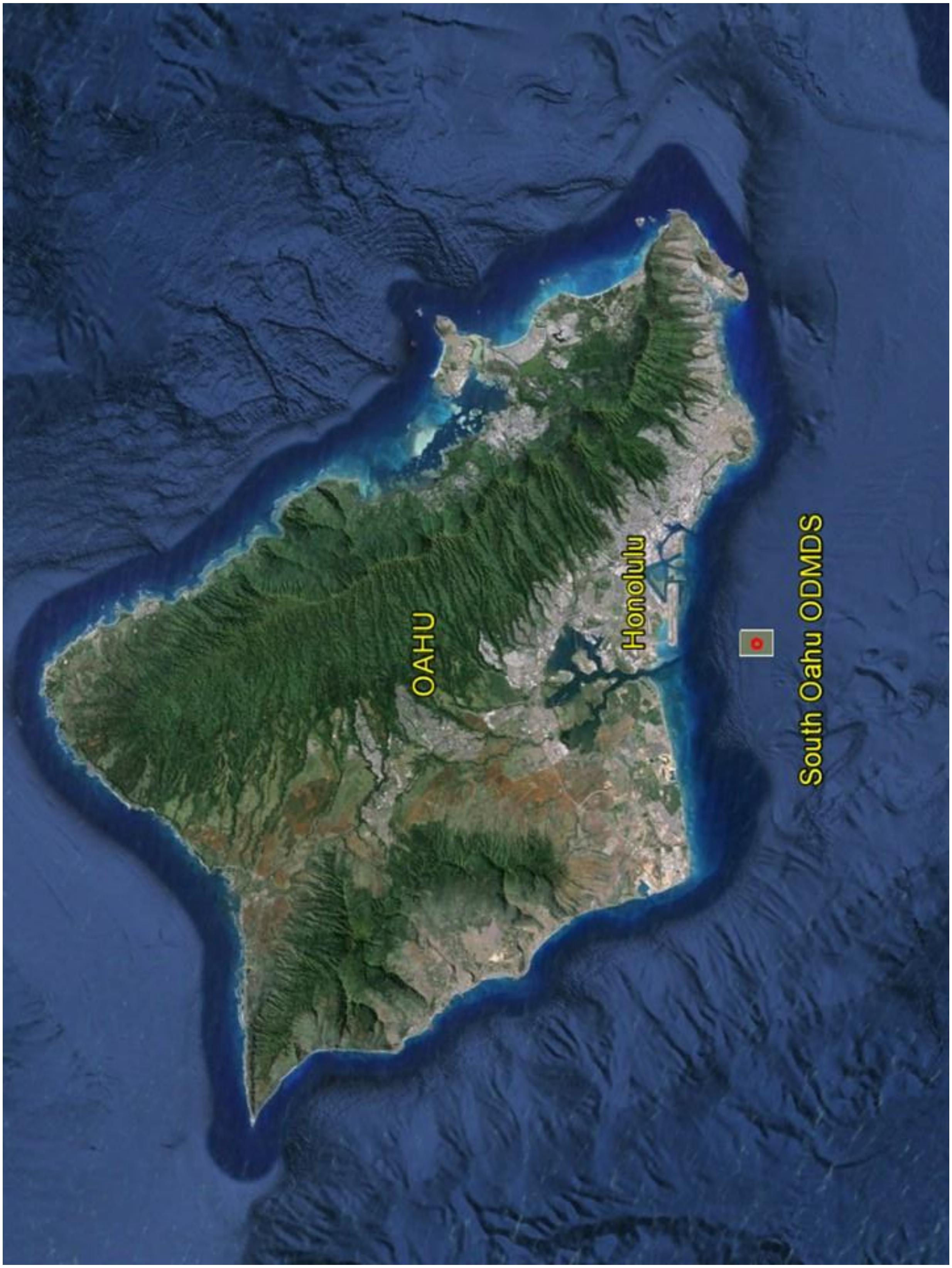

Figure 10. Planned and actual sample station locations at the South Oahu ODMDS:

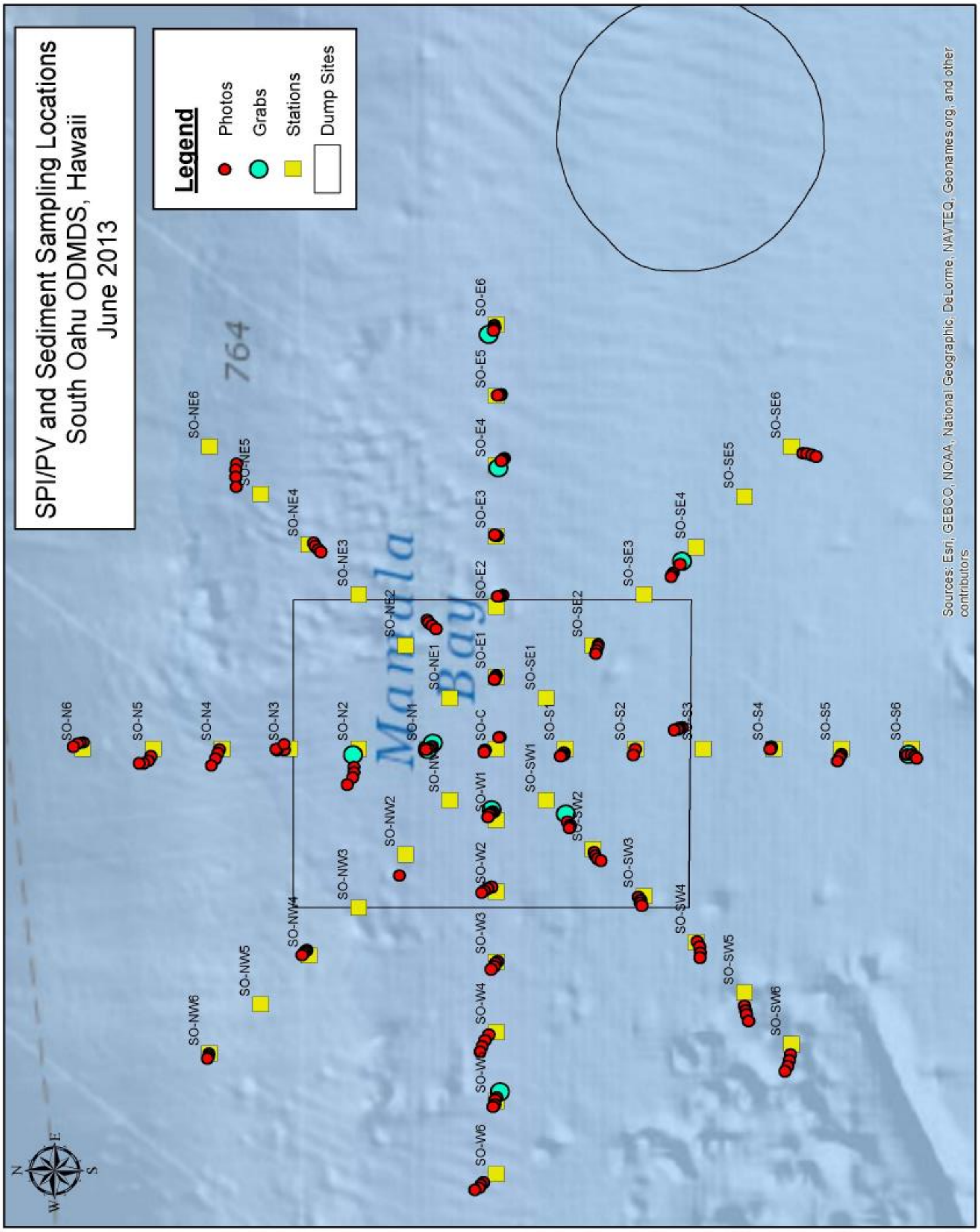

Table 2. **South Oahu ODMDS Sampling Station Coordinates (NAD83). SPI and PVP photographic samples at all stations; sediment grab samples at highlighted stations.**

Station ID	Latitude	Longitude	Sampling Notes
C	21 14.970 N	157 56.670 W	SPI-PV only
N1	21 15.220 N	157 56.670 W	SPI-PV and sediment grab
N1-A	21 15.199 N	157 56.647 W	SPI-PV and sediment grab (field dupe)
N2	21 15.470 N	157 56.670 W	SPI-PV and sediment grab
N3	21 15.720 N	157 56.670 W	SPI-PV only
N4	21 15.965 N	157 56.670 W	SPI-PV only
N5	21 16.215 N	157 56.670 W	SPI-PV only
N6	21 16.470 N	157 56.670 W	SPI-PV only
S1	21 14.720 N	157 56.670 W	SPI-PV only
S2	21 14.465 N	157 56.670 W	SPI-PV only
S3	21 14.220 N	157 56.670 W	SPI-PV only
S4	21 13.965 N	157 56.670 W	SPI-PV only
S5	21 13.720 N	157 56.670 W	SPI-PV only
S6	21 13.465 N	157 56.670 W	SPI-PV and sediment grab
W1	21 14.970 N	157 56.940 W	SPI-PV and sediment grab
W2	21 14.970 N	157 57.210 W	SPI-PV only
W3	21 14.970 N	157 57.475 W	SPI-PV only
W4	21 14.970 N	157 57.740 W	SPI-PV only
W5	21 14.970 N	157 58.000 W	SPI-PV and sediment grab
W6	21 14.970 N	157 58.275 W	SPI-PV only
E1	21 14.970 N	157 56.400 W	SPI-PV only
E2	21 14.970 N	157 56.135 W	SPI-PV only
E3	21 14.970 N	157 55.870 W	SPI-PV only
E4	21 14.970 N	157 55.600 W	SPI-PV and sediment grab
E5	21 14.970 N	157 55.340 W	SPI-PV only
E6	21 14.970 N	157 55.070 W	SPI-PV and sediment grab
NW1	21 15.140 N	157 56.865 W	Station not occupied
NW2	21 15.300 N	157 57.070 W	SPI-PV only
NW3	21 15.470 N	157 57.270 W	Station not occupied
NW4	21 15.650 N	157 57.450 W	SPI-PV only
NW5	21 15.825 N	157 57.635 W	Station not occupied
NW6	21 16.010 N	157 57.820 W	SPI-PV only

Table 2, continued. **South Oahu ODMDS Sampling Station Coordinates (NAD83). SPI and PVP photographic samples at all stations; sediment grab samples at highlighted stations.**

NE1	21 15.140 N	157 56.480 W	Station not occupied
NE2	21 15.300 N	157 56.280 W	SPI-PV only
NE3	21 15.470 N	157 56.090 W	Station not occupied
NE4	21 15.650 N	157 55.900 W	SPI-PV only
NE5	21 15.825 N	157 55.710 W	Station not occupied
NE6	21 16.010 N	157 55.530 W	SPI-PV only
SW1	21 14.790 N	157 56.865 W	SPI-PV only
SW2	21 14.620 N	157 57.050 W	SPI-PV and sediment grab
SW3	21 14.435 N	157 57.225 W	SPI-PV only
SW4	21 14.245 N	157 57.400 W	SPI-PV only
SW5	21 14.070 N	157 57.590 W	SPI-PV only
SW6	21 13.900 N	157 57.785 W	SPI-PV only
SE1	21 14.790 N	157 56.480 W	Station not occupied
SE2	21 14.620 N	157 56.280 W	SPI-PV only
SE3	21 14.435 N	157 56.090 W	Station not occupied
SE4	21 14.245 N	157 55.910 W	SPI-PV and sediment grab
SE5	21 14.070 N	157 55.720 W	Station not occupied
SE6	21 13.900 N	157 55.530 W	SPI-PV only

Figure 11. General location of the Hilo ODMDS:

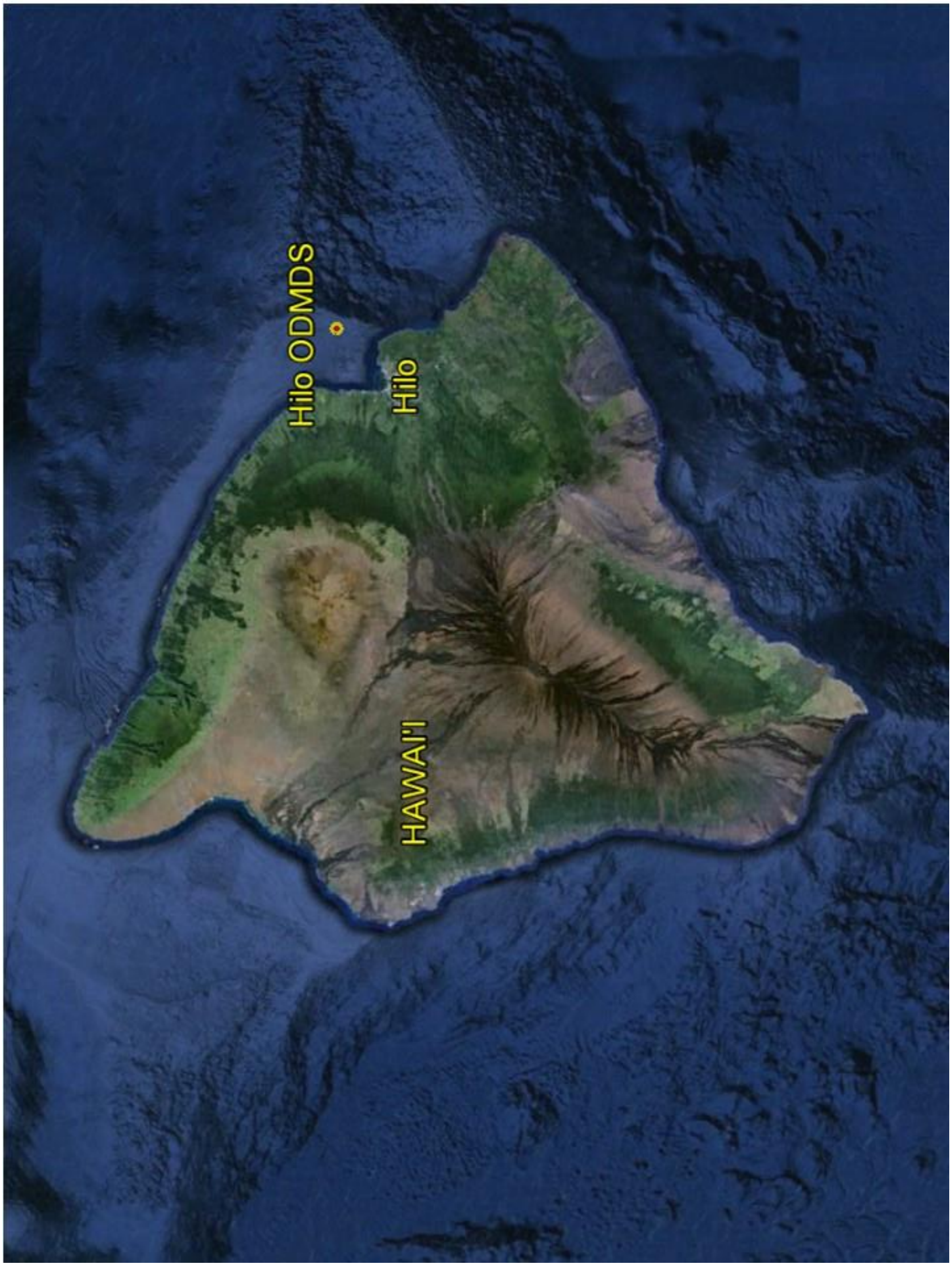

Figure 12. Planned and actual sample station locations at the Hilo ODMDS:

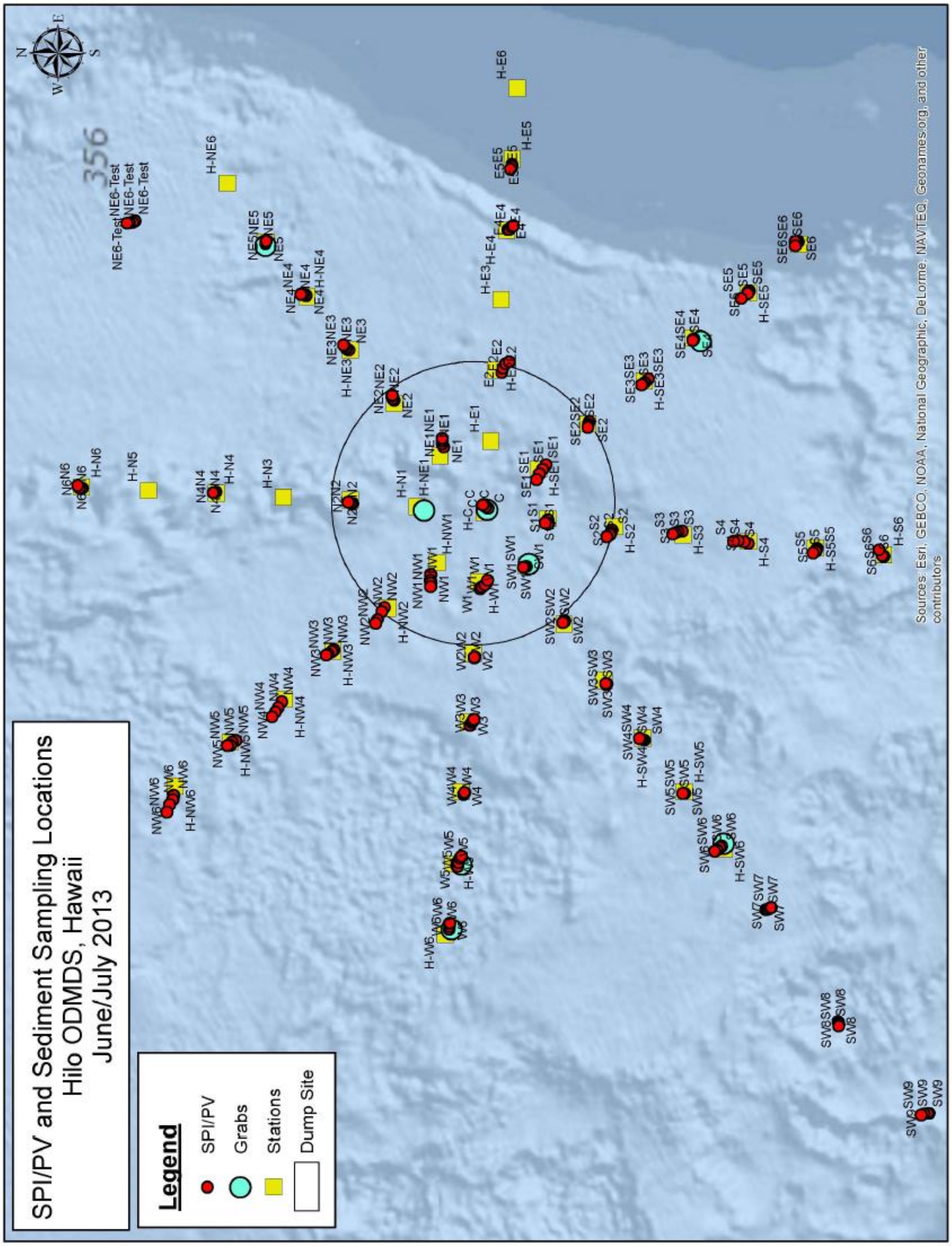

Table 3. **Hilo ODMDS Sampling Station Coordinates (NAD83). SPI and PVP photographic samples at all stations; sediment grab samples at highlighted stations.**

Station ID	Latitude	Longitude	Notes
C	19 48.315 N	154 58.340 W	SPI-PV only (grab failed)
N1	19 48.565 N	154 58.320 W	SPI-PV and sediment grab
N2	19 48.815 N	154 58.295 W	SPI-PV only
N3	19 49.065 N	154 58.285 W	Station not occupied
N4	19 49.315 N	154 58.270 W	SPI-PV only
N5	19 49.570 N	154 58.260 W	Station not occupied
N6	19 49.820 N	154 58.245 W	SPI-PV only
S1	19 48.075 N	154 58.365 W	SPI-PV only
S2	19 47.825 N	154 58.395 W	SPI-PV only
S3	19 47.570 N	154 58.425 W	SPI-PV only
S4	19 47.325 N	154 58.450 W	SPI-PV only
S5	19 47.075 N	154 58.475 W	SPI-PV only
S6	19 46.820 N	154 58.500 W	SPI-PV only
W1	19 48.335 N	154 58.600 W	SPI-PV only
W2	19 48.355 N	154 58.870 W	SPI-PV only
W3	19 48.375 N	154 59.125 W	SPI-PV only
W4	19 48.400 N	154 59.385 W	SPI-PV only
W5	19 48.430 N	154 59.655 W	SPI-PV only (grab failed)
W6	19 48.460 N	154 59.920 W	SPI-PV and sediment grab
E1	19 48.290 N	154 58.075 W	Station not occupied
E2	19 48.270 N	154 57.810 W	SPI-PV only
E3	19 48.250 N	154 57.545 W	Station not occupied
E4	19 48.230 N	154 57.285 W	SPI-PV only
E5	19 48.210 N	154 57.020 W	SPI-PV only
E6	19 48.190 N	154 56.755 W	Station not occupied
NW1	19 48.490 N	154 58.530 W	SPI-PV only
NW2	19 48.675 N	154 58.700 W	SPI-PV only
NW3	19 48.880 N	154 58.860 W	SPI-PV only
NW4	19 49.060 N	154 59.040 W	SPI-PV only
NW5	19 49.265 N	154 59.200 W	SPI-PV only
NW6	19 49.470 N	154 59.365 W	SPI-PV only
NE1	19 48.480 N	154 58.130 W	SPI-PV only
NE2	19 48.650 N	154 57.935 W	SPI-PV only

Table 3, continued. **Hilo ODMDS Sampling Station Coordinates (NAD83). SPI and PVP photographic samples at all stations; sediment grab samples at highlighted stations**.

NE3	19 48.815 N	154 57.735 W	SPI-PV only
NE4	19 48.975 N	154 57.535 W	SPI-PV only
NE5	19 49.130 N	154 57.330 W	SPI-PV and sediment grab
NE6	19 49.275 N	154 57.110 W	Station not occupied
SW1	19 48.155 N	154 58.540 W	SPI-PV and sediment grab
SW2	19 48.015 N	154 58.760 W	SPI-PV only
SW3	19 47.865 N	154 58.970 W	SPI-PV only
SW4	19 47.720 N	154 59.185 W	SPI-PV only
SW5	19 47.565 N	154 59.385 W	SPI-PV only
SW6	19 47.415 N	154 59.600 W	SPI-PV and sediment grab
SW7	19 47.257 N	154 59.827 W	SPI-PV only (station added in field)
SW8	19 46.989 N	155 00.245 W	SPI-PV only (station added in field)
SW9	19 46.648 N	155 00.587 W	SPI-PV only (station added in field)
SE1	19 48.110 N	154 58.180 W	SPI-PV only
SE2	19 47.925 N	154 58.010 W	SPI-PV only
SE3	19 47.715 N	154 57.850 W	SPI-PV only
SE4	19 47.530 N	154 57.690 W	SPI-PV and sediment grab
SE5	19 47.325 N	154 57.520 W	SPI-PV only
SE6	19 47.135 N	154 57.340 W	SPI-PV only

Appendix 3 to EPA Consultation with NMFS

for Continued Use of Five Existing Ocean Dredged Material Disposal Sites (ODMDS)

in Waters Offshore of Hawaii

Preliminary Chemistry Results from the 2017 Monitoring Survey of the Nawiliwili, Kahului, and Port Allen Ocean Disposal Sites

2017 EPA Monitoring Survey of the Kahului, Nawiliwili, and Port Allen Ocean Disposal Sites in Hawai‘i: Preliminary Chemistry Results

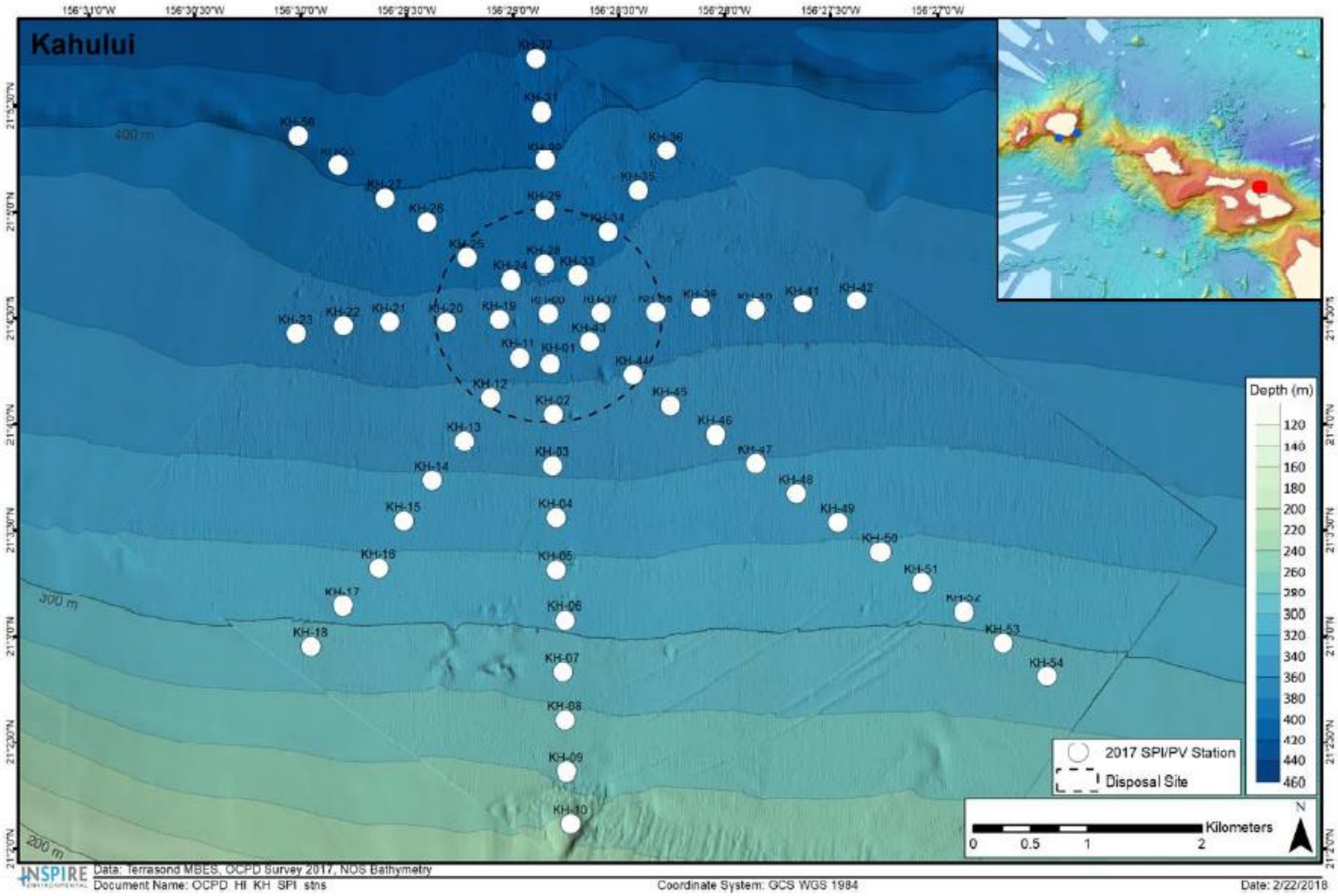

Figure 1. Map of the stations in the Kahului ocean disposal site survey area. A subset of these stations was selected for sediment grabs.

Table 1. Sediment chemistry results from the Kahului ocean disposal site (first of two tables).

Kahului site		"Inside"														Reference Site	NOAA Screening	
Analyte	**Units (dw)**	KH00	KH01	KH12	KH20	KH28	KH28	KH34	KH37	KH44	KH03	KH21	KH27	KH30	KH39		**ER-L**	**ER-M**
TOC	%	3430.00	4020.00	4170.00	5270.00	3970.00	3460.00	3510.00	4160.00	3520.00	4210.00	7220.00	4000.00	3400.00	4240.00	0.58	--	--
Arsenic	mg/kg	16.00	16.00	22.00	17.00	17.00	18.00	22.00	16.00	17.00	22.00	18.00	20.00	23.00	18.00	40	8.2	70
Cadmium	mg/kg	0.36	0.36	0.40	0.38	0.37	0.37	0.38	0.34	0.37	0.40	0.39	0.41	0.41	0.38	ND	1.2	9.6
Chromium	mg/kg	55.00	54.00	80.00	64.00	59.00	61.00	69.00	46.00	59.00	79.00	68.00	80.00	67.00	65.00	68	81	370
Copper	mg/kg	23.00	23.00	31.00	26.00	26.00	25.00	26.00	20.00	23.00	29.00	27.00	31.00	24.00	25.00	22	34	270
Lead	mg/kg	4.70	5.30	13.00	7.20	5.40	6.60	6.90	3.40	7.70	11.00	8.30	12.00	6.50	7.90	19	46.7	218
Mercury	mg/kg	0.02	0.03	0.05	0.03	0.03	0.03	0.05	0.02	0.06	0.04	0.03	0.05	0.03	0.03	0.09	0.15	0.71
Nickel	mg/kg	52.00	56.00	54.00	52.00	50.00	55.00	53.00	57.00	47.00	54.00	50.00	51.00	42.00	51.00	37	20.9	51.6
Selenium	mg/kg	1.50	1.40	1.60	1.50	1.50	1.50	1.50	1.40	1.50	1.60	1.60	1.70	1.60	1.50	ND	--	--
Silver	mg/kg	0.73	0.71	0.79	0.76	0.74	0.74	0.76	0.69	0.75	0.80	0.79	0.83	0.81	0.77	ND	1	3.7
Zinc	mg/kg	41.00	43.00	47.00	65.00	44.00	43.00	46.00	40.00	40.00	45.00	45.00	48.00	44.00	44.00	52	150	410
Dioxins & Furans	TEQ	0.93	4.24	0.88	0.53	0.78	0.56	0.89	0.79	1.01	1.17	1.01	1.02	0.94	0.70	1.06		
Total DDTs	ug/kg	14.40	13.80	15.60	15.00	14.40	15.00	15.00	13.80	15.00	52.00	15.60	16.20	16.20	15.00	ND	1.58	46.1
Total Organotins	ug/kg	806.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.00	0.00	0.00	0.00	0.00	0.71	--	--
Total PAHs	ug/kg	53.40	67.10	92.00	54.20	48.80	68.30	84.20	51.60	91.80	71.00	55.00	73.70	73.00	60.20	344	4022	44792
Total PCBs	ug/kg	0.00	0.00	0.30	0.00	0.00	0.00	0.00	0.31	0.00	0.00	0.00	2.73	0.00	8.32	6.07	22.7	180

* Note: Inside denotes stations inside the dredged material footprint, as determined by the SPI taken. Outside denotes stations outside of the dredged material footprint, as determined by the SPI taken.

Table 2. Sediment chemistry results from the Kahului ocean disposal site (second of two tables).

Kahului site		"Outside"														**Reference Site**	**NOAA Screening**	
Analyte	**Units (dw)**	KH05	KH09	KH14	KH16	KH23	KH32	KH36	KH41	KH41	KH46	KH48	KH50	KH53	KH56		**ER-L**	**ER-M**
TOC	%	5380.00	3680.00	4440.00	5630.00	4900.00	3700.00	3950.00	4230.00	4250.00	3610.00	3200.00	2700.00	2610.00	4500.00	0.58	--	--
Arsenic	mg/kg	33.00	32.00	21.00	24.00	20.00	23.00	21.00	20.00	24.00	19.00	30.00	29.00	33.00	23.00	40	8.2	70
Cadmium	mg/kg	0.39	0.37	0.41	0.42	0.41	0.41	0.38	0.40	0.41	0.39	0.40	0.38	0.36	0.41	ND	1.2	9.6
Chromium	mg/kg	82.00	74.00	75.00	89.00	78.00	68.00	69.00	74.00	86.00	68.00	78.00	78.00	67.00	72.00	68	81	370
Copper	mg/kg	24.00	20.00	27.00	31.00	29.00	25.00	25.00	28.00	30.00	24.00	24.00	24.00	19.00	26.00	22	34	270
Lead	mg/kg	6.90	4.70	11.00	13.00	11.00	4.80	8.30	9.20	16.00	9.10	8.60	5.80	4.10	8.30	19	46.7	218
Mercury	mg/kg	0.03	0.02	0.05	0.05	0.04	0.02	0.05	0.05	0.05	0.05	0.06	0.05	0.02	0.05	0.09	0.15	0.71
Nickel	mg/kg	52.00	50.00	47.00	55.00	51.00	41.00	46.00	49.00	55.00	46.00	52.00	53.00	57.00	47.00	37	20.9	51.6
Selenium	mg/kg	1.60	1.50	1.60	1.70	1.70	1.60	1.50	1.60	1.60	1.60	1.60	1.50	1.40	1.60	ND	--	--
Silver	mg/kg	0.79	0.74	0.82	0.84	0.83	0.82	0.77	0.79	0.82	0.79	0.80	0.76	0.72	0.82	ND	1	3.7
Zinc	mg/kg	43.00	38.00	41.00	43.00	47.00	45.00	41.00	44.00	43.00	40.00	45.00	44.00	41.00	46.00	52	150	410
Dioxins & Furans	TEQ	1.13	0.61	1.40	0.97	0.88	0.48	0.55	0.88	1.00	1.03	0.92	0.58	0.70	0.76	1.06	--	--
Total DDTs	ug/kg	15.60	14.40	16.20	16.80	16.20	16.20	15.00	15.60	50.50	15.60	15.60	15.00	14.40	16.20	ND	1.58	46.1
Total Organotins	ug/kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.71	--	--
Total PAHs	ug/kg	59.00	58.40	71.00	61.80	52.80	60.00	59.20	79.00	81.80	70.80	68.00	64.20	33.40	65.80	344	4022	44792
Total PCB	ug/kg	0.00	0.00	0.00	35.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.46	0.31	4.27	6.07	22.7	180

* Note: Inside denotes stations inside the dredged material footprint, as determined by the SPI taken. Outside denotes stations outside of the dredged material footprint, as determined by the SPI taken.

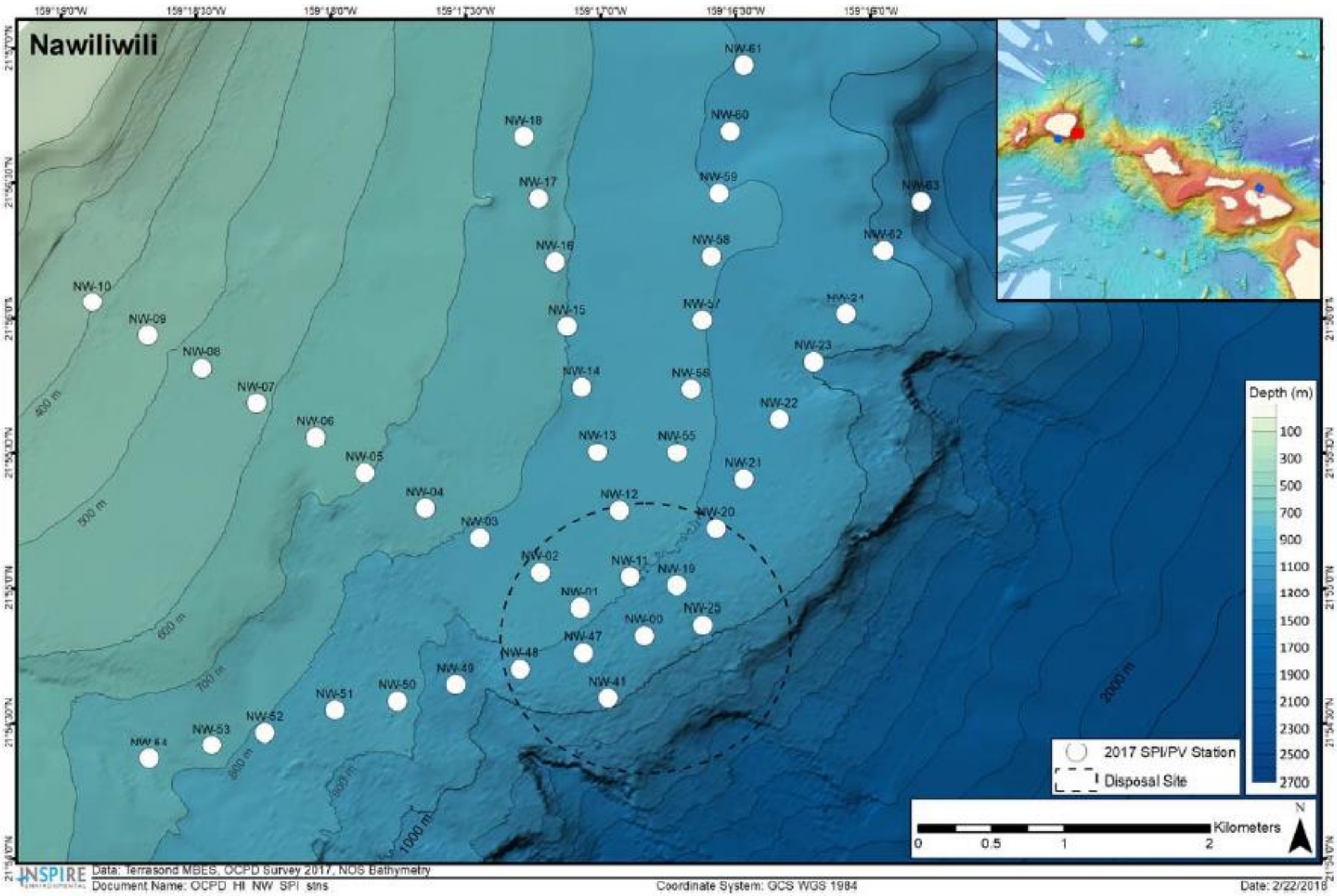

Figure 2. Map of the stations in the Nawiliwili ocean disposal site survey area. A subset of these stations was selected for sediment grabs.

Table 3. Sediment chemistry results from the Nawiliwili ocean disposal site.

Nawiliwili Site		**"Inside"**							**"Outside"**					**Reference Site**	**NOAA Screening**	
Analyte	**Units (dw)**	NW01	NW19	NW55	NW07	NW18	NW23	NW59	NW10	NW15	NW52	NW57	NW57D		**ER-L**	**ER-M**
TOC	%	2300	2540	1970	1320	3400	1170	2730	2200	780	3690	1260	1140	0.58	--	--
Arsenic	mg/kg	18	19	15	12	19	16	21	14	9	22	12	No data	40	8.2	70
Cadmium	mg/kg	0.37	0.35	0.38	0.37	0.39	0.41	0.40	0.36	0.42	0.41	0.40		ND	1.2	9.6
Chromium	mg/kg	84	75	80	62	110	64	120	46	31	130	52		68	81	370
Copper	mg/kg	17.00	21.00	19.00	14.00	24.00	16.00	27.00	7.20	7.30	27.00	13.00		22	34	270
Lead	mg/kg	2.20	7.90	2.30	2.40	2.40	2.40	2.40	2.10	2.50	2.40	2.40		19	46.7	218
Mercury	mg/kg	0.02	0.03	0.02	0.02	0.02	0.02	0.03	0.02	0.02	0.03	0.02		0.09	0.15	0.71
Nickel	mg/kg	88	87	100	52	100	95	110	27	32	110	54		37	20.9	51.6
Selenium	mg/kg	1.50	1.40	1.50	1.50	1.60	1.60	1.60	1.40	1.70	1.60	1.60		ND	--	--
Silver	mg/kg	0.74	0.69	0.77	0.74	0.79	0.81	0.79	0.71	0.84	0.82	0.79		ND	1	3.7
Zinc	mg/kg	43	35	43	25	48	37	53	15	17	55	29		52	150	410
Dioxins & Furans	TEQ	0.92	No data	1.26	0.66	1.03	0.61	0.69	1.03	0.56	1.09	0.62	0.65	1.06	--	--
Total DDTs	ug/kg	14.40	13.80	15.00	14.40	15.60	16.20	15.60	13.80	16.80	16.20	15.60		ND	1.58	46.1
Total Organotins	ug/kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.71	--	--
Total PAHs	ug/kg	48.40	45.60	48.20	49.40	50.00	49.00	49.00	50.40	52.80	50.00	36.40		344	4022	44792
Total PCBs	ug/kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.80	0.00	0.00	0.00	6.07	22.7	180

* Note: Inside denotes stations inside the dredged material footprint, as determined by the SPI taken. Outside denotes stations outside of the dredged material footprint, as determined by the SPI taken.

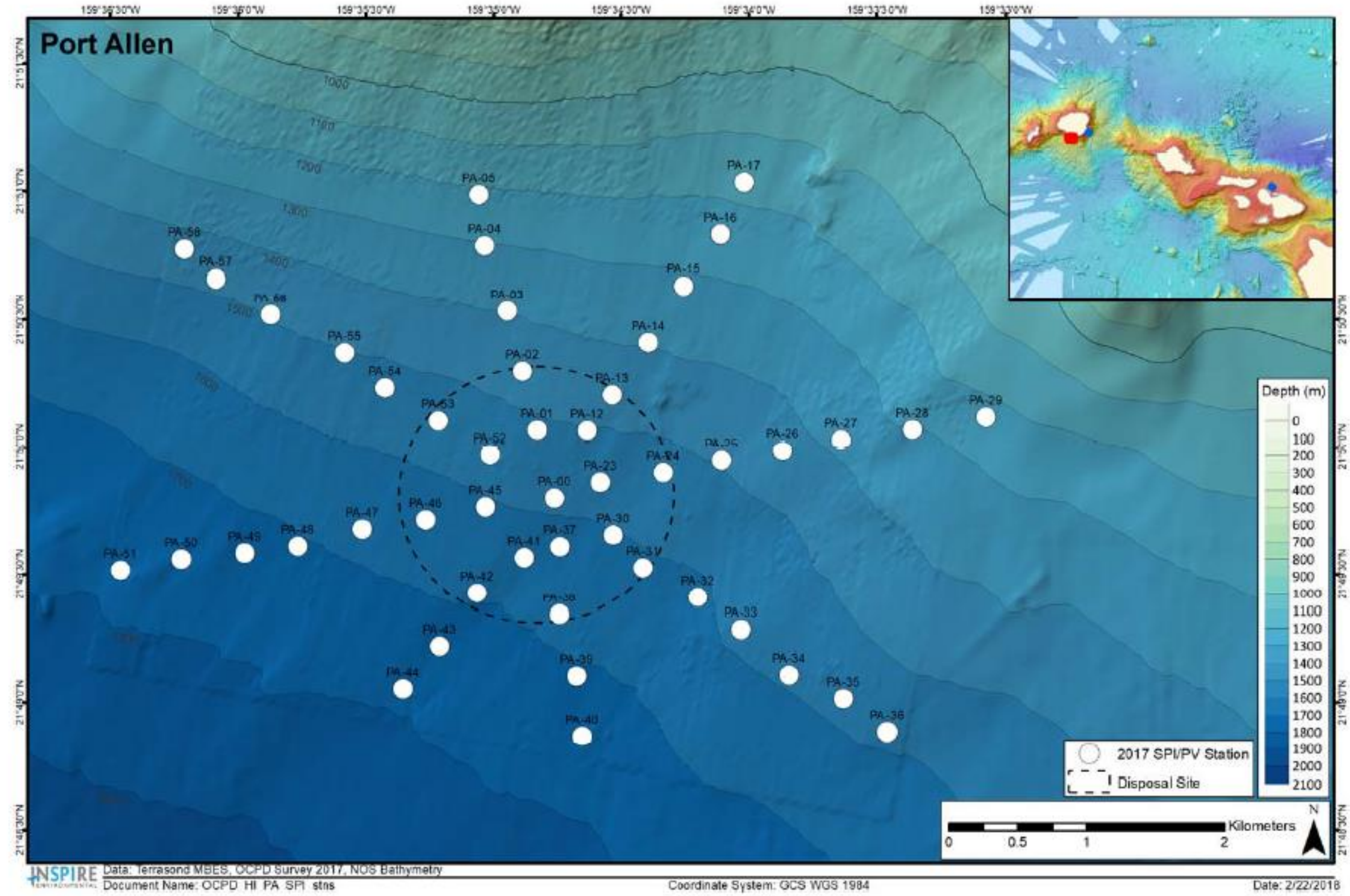

Figure 3. Map of the stations in the Port Allen ocean disposal site survey area. A subset of these stations was selected for sediment grabs.

Table 4. Sediment chemistry results from the Port Allen ocean disposal site.

Port Allen Site		**"Inside"**					**"Outside"**						**Reference Site**	**NOAA Screening**	
Analyte	**Units (dw)**	PA00	PA13	PA31	PA53	PA15	PA27	PA29	PA34	PA49	PA51	PA55		**ER-L**	**ER-M**
TOC	%	4400	6500	3770	6000	2340	6200	5000	3700	4160	5200	6070	0.58	--	--
Arsenic	mg/kg	19	19	18	23	14	21	21	17	22	23	23	40	8.2	70
Cadmium	mg/kg	0.46	0.43	0.42	0.50	0.38	0.44	0.42	0.42	0.47	0.48	0.55	ND	1.2	9.6
Chromium	mg/kg	150	160	130	180	72	170	140	140	150	190	180	68	81	370
Copper	mg/kg	42	46	41	54	15	46	37	45	52	63	53	22	34	270
Lead	mg/kg	4.00	4.20	3.00	6.00	2.30	5.90	4.20	4.00	6.90	6.80	7.70	19	46.7	218
Mercury	mg/kg	0.10	0.09	0.08	0.11	0.02	0.09	0.05	0.06	0.11	0.10	0.10	0.09	0.15	0.71
Nickel	mg/kg	190	140	130	190	65	150	120	120	130	180	170	37	20.9	51.6
Selenium	mg/kg	1.60	1.70	1.70	1.70	1.50	1.80	1.70	1.70	1.70	1.80	1.80	ND	--	--
Silver	mg/kg	0.82	0.86	0.84	0.85	0.75	0.88	0.85	0.85	0.87	0.88	0.88	ND	1	3.7
Zinc	mg/kg	62.00	65.00	56.00	76.00	28.00	66.00	55.00	58.00	62.00	83.00	70.00	52	150	410
Dioxins & Furans	TEQ	3.03	3.66	1.61	5.72	1.32	2.53	1.84	3.82	2.67	4.07	7.24	1.06	--	--
Total DDTs	ug/kg	16.20	16.80	16.80	16.80	15.00	17.40	16.80	16.80	17.40	17.40	17.40	ND	1.58	46.1
Total Organotins	ug/kg	0.00	5.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.71	--	--
Total PAHs	ug/kg	76.30	73.00	83.60	88.50	70.10	82.20	74.50	59.80	89.60	116.80	80.40	344	4022	44792
Total PCBs	ug/kg	28.61	29.00	29.00	30.00	25.00	32.00	27.21	25.00	25.29	26.00	26.59	6.07	22.7	180

* Note: Inside denotes stations inside the dredged material footprint, as determined by the SPI taken. Outside denotes stations outside of the dredged material footprint, as determined by the SPI taken.

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Pacific Islands Regional Office
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Honolulu, Hawaii 96818
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November 27, 2020

Mr. Hudson Slay
U.S. Environmental Protection Agency
Region IX
75 Hawthorne Street
San Francisco, CA 94105

RE: Request for Informal ESA Consultation on the reinitiation of the updates and extensions proposed for the five existing Hawaii. EPA-designated ocean dredged material disposal sites at Oʻahu, Hawaiʻi, Maui, and Kauaʻi (PIRO-2020-02769)

Dear Mr. Slay:

On June 22, 2020, NOAA's National Marine Fisheries Service (NMFS) received your written request for reinitiation and concurrence that the U.S. Environmental Protection Agency's (EPA) proposed action to continue utilizing the five EPA-designated ocean dredged material disposal sites (ODMDS) at Oʻahu, Hawaiʻi, Maui, and Kauaʻi is not likely to adversely affect (NLAA) the 15 endangered or threatened species listed in Table 2, or designated critical habitat under NMFS' jurisdiction, which includes the designated critical habitat for Main Hawaiian Islands (MHI) insular false killer whales and Hawaiian monk seals. This response to your request was prepared by NMFS pursuant to Section 7 of the Endangered Species Act of 1973 (ESA), as amended (16 U.S.C. §1531 *et seq*.), implementing regulations at 50 CFR 402, and agency guidance for the preparation of letters of concurrence.

The Hawaii ocean disposal sites were designated in 1981 based on a 1980 Final Environmental Impact Statement (EIS) completed by EPA Headquarters. NMFS was consulted during the planning stages for the designation of the ocean disposal sites for the purposes of dredged material disposal. The previous consultation included narrowing 14 proposed sites down to the five sites currently in use, and covered the humpback whale, Hawaiian monk seal and green sea turtle. In that consultation NMFS concluded that the species listed above may be affected, but not likely adversely affected due to the site depths and infrequent use of the sites. No tracking number was provided, as EPA does not have a record of NOAA applying tracking numbers during this time period.

On July 22, 2020, NMFS sent the EPA a request for additional information via email to clarify and add information to their draft consultation package. The EPA responded on August 16, 2020, with an updated draft. On September 30, 2020, NMFS sent a second request for additional information via email to clarify the EPA's effects determinations for the MHI insular false killer whale and their designated critical habitat, the agreement to add the endangered olive ridley population, and to address the effects of chemical compounds. The EPA responded on October 2, 2020, and NMFS initiated consultation that day.

This response to your request was prepared by NMFS pursuant to Section 7 of the Endangered Species Act of 1973 (ESA), as amended (16 U.S.C. §1531 et seq.), implementing updated regulations at 50 CFR 402 (84 FR 44976; 10/28/2019), and agency guidance for the preparation of letters of concurrence. We have reviewed the information and analyses relied upon to complete this letter of concurrence in light of the updated regulations and conclude the letter is fully consistent with the updated regulations.

This letter also underwent pre-dissemination review using standards for utility, integrity, and objectivity in compliance with applicable guidelines issued under the Data Quality Act (section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001, Public Law 106-554. A complete record of this consultation is on file at the Pacific Island Regional Office, Honolulu, Hawaii .

Proposed Action

The EPA proposes to reinitiate and update their programmatic rule for the continued use of five EPA-designated ODMDS's at O'ahu, Hawaii, Maui, and Kaua'i and to include the newly listed species and designated critical habitats not originally covered in the 1981 rule-making. The purpose of this consultation is to allow for the continuation of sediment dumping at these sites which is critical to national defense, the maritime-related economy of the State of Hawaii, and for the continued dredging needed in the federally authorized navigation channels in Hawaii's harbors. It is important to note that this consultation does not cover impacts from the individual dredging operations, as these actions are separately evaluated, and project-specific consultations are conducted when needed, by the US Army Corps of Engineers (USACE) during their permitting process.

The sites will continue to be used only for the disposal of suitable, non-toxic sediment dredged by USACE from federally authorized navigation channels in Hawaii's harbors, as well as for disposal of suitable, non-toxic dredged sediment from other permitted navigation dredging projects in Hawaii, including by the US Navy. All disposal activities at the sites will continue to meet the criteria and factors stated in the Ocean Dumping regulations published at 40 CFR Parts 228.5 and 228.6. Ocean disposal will also continue to occur under the terms of a Site Management and Monitoring Plan (SMMP) that sets forth Best Management Practices (BMPs) in the form of enforceable permit conditions, as well as site monitoring requirements and contingency actions should any adverse impacts occur.

The Hawaii sites are used differently amongst each other and reflect the differing dredging needs of each island. Dredged material disposal volumes in Hawaii have had a long-term annual average of approximately 220,000 cubic yards (cy) being disposed at the five sites combined (USACE 2020). Discharge volumes from individual disposals range from approximately 1,000 cy to as much as 5,000 cy each time (common for USACE hopper dredging loads). Based on the average annual disposal volumes (142,428 cy) since 2000, this equates to an average of 28 to 142 individual disposal trips going to all five Hawaii ocean disposal sites combined in any one year.

The South O'ahu site, which serves US Navy facilities at Pearl Harbor as well as Hawaii's main commercial port complex in Honolulu Harbor, is the most frequently used, with at least some dredging and disposal occurring in 22 of the 40 years. On average, disposal at the South O'ahu site accounts for over 80% of all Hawaii disposal. In recent years (since 2000), Hilo and Nawiliwili have been the next most frequently used sites (receiving approximately 9 and 8% of the total material, respectively), followed by Kahului (approximately 2%). There has been no dredged material disposal at the Port Allen since 1999, however some disposal may occur in 2021.

There are no seasonal disposal restrictions on use or no annual disposal volume limits at any of the sites. However, the EPA and/or USACE may place volume limits and seasonal or other restrictions in individual project's permits or authorizations if deemed necessary. Alternatives to ocean disposal (including beneficial uses) are considered on a project-by-project basis to ensure that the minimum necessary volume of dredged material is disposed at any ODMDS. Each site is restricted to the authorized disposal of suitable dredged material only. The suitability of dredged material for ocean disposal is determined based on criteria in the MPRSA and in EPA's Ocean Dumping Regulations (40 CFR Part 227). EPA and USACE have a joint national sediment testing manual titled *Evaluation of Dredged Material Proposed for Ocean Disposal* (EPA and USACE, 1991), or the Ocean Testing Manual or OTM. The OTM details the testing and sampling methods needed to comply with the MPRSA and EPA's regulations. The Marine Protection, Research and Sanctuaries Act (MPRSA) and EPA regulations call for careful alternatives analysis and BMPs to reduce or eliminate potential adverse effects to marine resources. Importantly, the regulations only allow for suitable, non-toxic sediments to be discharged at EPA-designated ocean disposal sites; even when sediment is suitable for ocean disposal, it is only approved when there is no practicable alternative.

EPA's regulations also establish strict criteria for evaluating whether dredged material is suitable for ocean disposal (40 CFR Part 227.5-9). The regulations specify that certain prohibited constituents (for example, industrial wastes or high-level radioactive wastes) may not be disposed in the ocean, while other constituents such as organohalogen compounds or mercury, may only be discharged if they are present in no more than "trace" amounts that will not cause an unacceptable adverse impact after dumping. "Trace" is determined by passing a series of bioassays that address the potential for short- and long-term toxicity and bioaccumulation.

Among sediment testing prior to disposal, careful site selection, and disposal alternative evaluations, the EPA actively takes additional management measures at the sites to further minimize adverse effects to the marine environment once a dredging project has been approved for ocean disposal. These measures, outlined in the SMMP and in the Mandatory Disposal Site Use Conditions (2015) for the Hawaii sites (see Appendix B), include:

- a variety of disposal BMPs as enforceable permit conditions for each project;
- satellite tracking all disposal vessels to ensure that disposal activities occur only where and as required;
- ensors on all disposal vessels to ensure that there is no significant leakage or spilling of dredged material during transit to the disposal site, especially during transit through the nearshore zone where corals, seagrasses, and sensitive animals are most likely to be present; and
- tracking and sensor information reported online for each disposal trip.

Recent Monitoring Results

The EPA recently completed monitoring surveys within the past decade at each of the five Hawaii ocean disposal sites. Multiple stations "inside" and "outside" the disposal site were tested. The South Oʻahu and Hilo sites (the most heavily used of the Hawaiʻi sites) were first monitored in 2013 and results were summarized in a 2015 Hawaii. Ocean Disposal Site Monitoring Synthesis Report. The EPA updated the SMMP for all the Hawaii sites in 2015 based on these monitoring results. Similar monitoring surveys were also completed for the Nawiliwili, Port Allen, and Kahului sites in 2017, and the SMMP for these sites will be updated again based on those monitoring results and on the outcome of this ESA and EFH consultation with NMFS.

2013 chemical results, as summarized in the 2015 Hawaii. Ocean Disposal Site Monitoring Synthesis Report

Substrate: The EPA observed that the South Oʻahu site had substantially more gravel, more fines (silt and clay), and higher organic carbon, but was determined by the EPA that these findings would not result in significant or adverse impacts. At the Hilo site, the dredged material has not substantially altered the physical nature of the disposal site.

Chemical: Most of the chemistry data showed low but also variable concentrations of most chemical constituents at both sites. At both inside and outside the disposal sites, four to six metals were at concentrations above NOAA's effects-based 10^{th} percentile screening value (ER-L), below which adverse effect are predicted to rarely occur (NOAA, 2008). Only chromium, copper, and mercury were shown to be slightly higher inside the disposal boundaries compared to the outside stations at the South Oʻahu site. At Hilo, they're levels were almost indistinguishable between inside and outside stations.

Nickel exceeded its 50^{th} percentile screening value (ER-M), above which adverse effects are expected to occur (NOAA, 2008). It was greatest at the Hilo site, but was at similar elevated concentrations at both inside and outside the site. Organic constituents were also low at both sites, and there were no exceedances of ER-Ls for organics at either "inside" or "outside" stations at the Hilo site. Only two constituents exceeded NOAA ER-L screening levels, and only at the South Oʻahu site. Polychlorinated biphenyls (PCBs) and dichlorodiphenyltrichloroethanes (DDTs) slightly exceeded their respective ER-Ls at one inside station and one outside station. PCBs were generally higher at the inside stations, even when not exceeding the ER-L.

Benthic Community: As noted above, some physical changes (e.g., grain size and organic carbon content) were apparent at stations with dredged material. However, overall abundances of different organism classes, while low, were not statistically different between inside and outside stations at either disposal site (EcoAnalysts, Inc., 2014).

Diversity was high at the South Oʻahu site but abundances tended to be low at all stations monitored. Diversity, abundance, or species richness were not significantly different between stations both outside and inside the disposal site. The EPA determined that this presented no evidence that the dredged material disposed here has negatively impacted the benthic communities at the South Oʻahu ODMDSs sampled.

At the Hilo site, the EPA also concluded that there were no significant differences in diversity between inside and outside stations. As similarly identified at the South Oʻahu site, diversity was high while abundances were low. Based on these results, the EPA determined that there has been no evidence that dredge material is negatively impacting the benthic communities at the Hilo ODMDS, with the exception of the expected low abundances due to physical impacts from rubble disposed at the center of the site.

Compared to the baseline conditions in 1980, the 2013 monitoring results indicate a lack of significant adverse impacts. Based on these findings, the EPA has determined that disposal activities that have occurred at these two sites since 1981 have resulted in only minor and localized physical changes. Overall, these findings suggest that the continuing disposals at both sites should similarly result in no significant adverse impacts. EPA has stated that permit conditions should be updated in the revised SMMP, and a more specific site monitoring schedule should be established for the future. However, based on all the monitoring results, no significant changes to sediment testing or to the overall site management framework appear to be needed for these sites.

Preliminary chemistry results from the 2017 Monitoring Survey of the Nawiliwili, Kahului, and Port Allen Ocean Disposal Sites

Dredged sediment testing was conducted in 2017 at the Nawiliwili, Kahului, and Port Allen sites and the preliminary results were included in the EPAs consultation request package. In summary, all three disposal sites presented elevated levels of arsenic and total DDTs that exceeded NOAA's ER-L but did not exceed the ER-M screening. The Nawiliwili site also showed traces of chromium that exceeded the ER-L, and the Port Allen site showed traces of copper and total PCBs that exceeded the ER-L. In addition, testing results at all three sites also identified elevated levels of nickel that exceeded the ER-M.

<u>Action Area</u>

The action area for the proposed disposal activities encompasses five EPA-designated ODMDSs located off the islands of Oʻahu, Hawaii, Maui, and Kauaʻi, and the area transited to and from those sites (Figure 1). The EPA developed criteria for avoiding impacts to the marine environment and to human uses of the ocean to the maximum extent possible as part of their disposal site designation process, within an economically feasible transport distance from the area where navigation dredging must occur. All of the Hawaii ODMDSs are in relatively deep water. Each site ranges from 4 to 6.5 nautical miles (nmi) offshore in water depths that range from 1,100 to 5,300 feet (ft) (330 to 1,610 meters [m]). Each site includes a small Surface Disposal Zone (SDZ) within which all disposal actions must take place, and a larger site boundary on the seafloor where most of the sediment is intended to deposit after falling through the water column (Table 1). To date, the total disposal volumes for all five sites between the years of 1981 and 2020 have equaled to 8,837,230 cy.

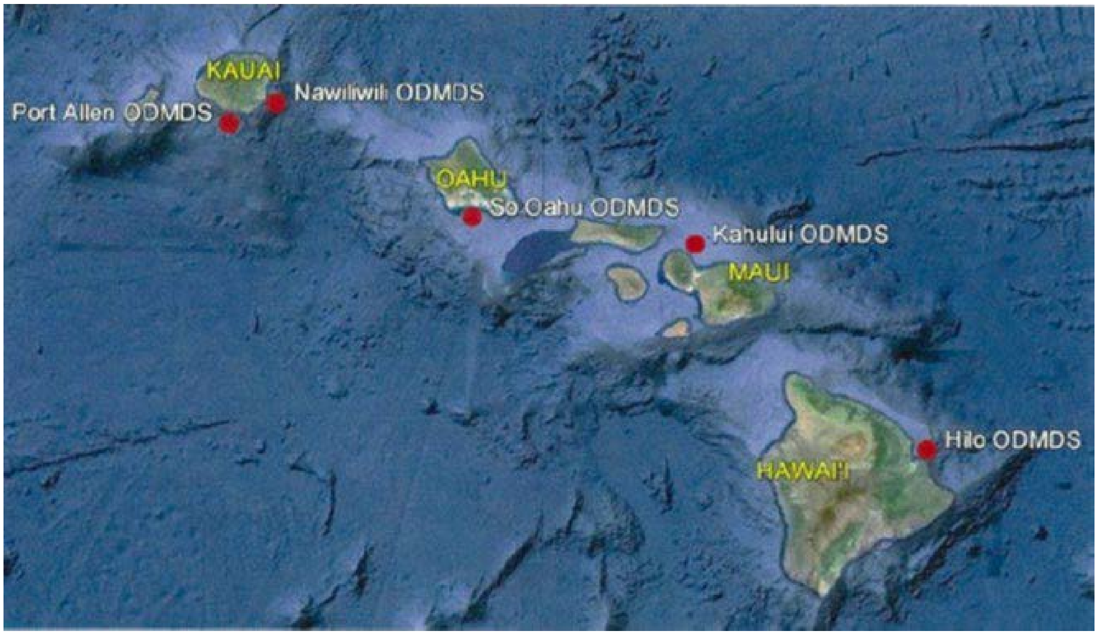

Figure 1. Map showing the five existing disposal sites (provided by EPA).

Table 1. Dimensions and center coordinates for Hawaii ocean disposal sites and their SDZs (provided by EPA).

Disposal Site	Depth Range	Shape and Dimensions (Seafloor Footprint)	Surface Disposal Zone (SDZ) Dimensions	Center Coordinates (NAD 83)
South O'ahu	375-475 m	Rectangular, 2.0 (W-E) by 2.6 km (N-S) (1.08 by 1.4 nautical miles [nmi])	Circular, 305 m radius	21° 15' 10" N, 157° 56' 50" W
Hilo	330-340 m	Circular, 920 m radius	Circular, 305 m radius	19° 48' 30" N 154° 58' 30" W
Nawiliwili	840-1,120 m	Circular, 920 m radius	Circular, offset 200 m (600 ft) radius: [21° 55' 15" N; 159° 17' 13.8" W]	21° 55' 00" N 159° 17' 00" W
Port Allen	1,460-1,610 m	Circular, 920 m radius	Circular, 305 m radius	21° 50' 00" N 159° 35' 00" W
Kahului	345-365 m	Circular, 920 m radius	Circular, 305 m radius	21° 04' 42" N 156° 29' 00" W

Listed Species

The ESA-listed threatened and endangered species under NMFS' jurisdiction listed in Table 2 are known to occur, or could reasonably be expected to occur, in the action area, and may be affected by the proposed activities. Detailed information about the biology, habitat, and conservation status of the animals listed in Table

2 can be found in their status reviews, recovery plans, federal register notices, and other sources at https://www.fisheries.noaa.gov/topic/endangered-species-conservation.

Table 2. Common name, scientific name, ESA status, effective listing date, and Federal Register reference for ESA-listed species considered in this consultation.

Species	Scientific Name	ESA Status	Effective Listing Date	Federal Register. Reference
Green Sea Turtle Central North Pacific	*Chelonia mydas*	Threatened	05/06/2016	81 FR 20057
Hawksbill Sea Turtle	*Eretmochelys imbricata*	Endangered	06/03/1970	35 FR 8491
Loggerhead Sea Turtle North Pacific	*Caretta caretta*	Endangered	10/24/2011	76 FR 58868
Olive Ridley Sea Turtle	*Lepidochelys olivacea*	Threatened	08/27/1978	43 FR 32800
Olive Ridley Sea Turtle, Mexican Nesting Population	*Lepidochelys olivacea*	Endangered	08/27/1978	43 FR 32800
Leatherback Sea Turtle	*Dermochelys coriacea*	Endangered	06/03/1970	35 FR 8491
Hawaiian Monk Seal	*Neomonachus schauinslandi*	Endangered	11/23/1976	41 FR 51612
Blue Whale	*Balaenoptera musculus*	Endangered	12/02/1970	35 FR 18319
Fin Whale	*Balaenoptera physalus*	Endangered	12/02/1970	35 FR 18319
Sei Whale	*Balaenoptera borealis*	Endangered	12/02/1970	35 FR 18319
Sperm Whale	*Physeter macrocephalus*	Endangered	12/02/1970	35 FR 18319
North Pacific Right Whale	*Eubalaena japonica*	Endangered	04/07/2008	73 FR 12024
False Killer Whale Main Hawaiian Island Insular	*Pseudorca crassidens*	Endangered	12/28/2012	77 FR 70915
Oceanic Whitetip Shark	*Carcharhinus longimanus*	Threatened	03/01/2018	83 FR 4153
Giant Manta Ray	*Manta birostris*	Threatened	02/21/2018	83 FR 2916
Critical Habitat				
Hawaiian monk seals			9/21/2015	80 FR 50925
Main Hawaiian Island Insular false killer whales			8/23/2018	83 FR35062

Critical Habitat.

In designated areas of the Main Hawaiian Islands (MHI), critical habitat for monk seals includes the marine environment with a seaward boundary that extends from the 200-m depth contour line (relative to mean lower low water), including the seafloor and all subsurface waters and marine habitat within 10-m of the seafloor, through the water's edge 5-m into the terrestrial environment. Detailed information on Hawaiian monk seal critical habitat can be found at https://www.fisheries.noaa.gov/species/Hawaiian-monk-seal#conservation-management.

The essential features for the conservation of the Hawaiian monk seal are the following:

1. Terrestrial areas and adjacent shallow, sheltered aquatic areas with characteristics preferred by monk seals for pupping and nursing;
2. Marine areas from 0 to 200 m in depth that support adequate prey quality and quantity for juvenile and adult monk seal foraging; and
3. Significant areas used by monk seals for hauling out, resting or molting.

Critical habitat for Main Hawaiian Island insular false killer whales includes the geographic area of the 45-m depth contour to the 3200-m depth contour in waters that surround the Main Hawaiian Islands from Niihau east to the Island of Hawaii . Critical habitat for the main Hawaiian Islands insular false killer whale consists of one essential feature comprised of four characteristics:

1. Space for movement and use within shelf and slope habitat
2. Prey species of sufficient quantity, quality, and availability to support individual growth, reproduction, and development, as well as overall population growth;
3. Waters free of pollutants of a type and amount harmful to MHI IFKWs; and
4. Sound levels that would not significantly impair false killer whales' use or occupancy.

Detailed information on Main Hawaiian Islands insular false killer whale critical habitat can be found at: https://www.fisheries.noaa.gov/species/false-killer-whale#conservation-management.

Analysis of Effects.

In order to determine that a proposed action is not likely to adversely affect ESA-listed species, NMFS must find that the effects of the proposed action are expected to be insignificant, discountable[1], or completely beneficial. As defined in the joint USFWS-NMFS Endangered Species Consultation Handbook, beneficial effects are contemporaneous positive effects without any adverse effects to the species. Insignificant effects relate to the size of the impact and should never reach the scale where take occurs[2]. Discountable effects are those extremely unlikely to occur. Based on best judgment, a person would not: 1) be able to meaningfully measure, detect, or evaluate insignificant effects; or 2) expect discountable effects to occur (USFWS & NMFS 1998). This standard, as well as consideration of the probable duration, frequency, and potential for interactions, was applied during the analysis of effects of the proposed action on ESA-listed marine species, as is described in the consultation request.

The EPA has identified the following stressors that have the potential to affect listed marine species in the action area:

- Elevated turbidity levels;
- Contaminants/bioaccumulation

NMFS has identified the additional following potential stressors:

- Exposure to wastes and discharges

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[1] When the terms "discountable" or "discountable effects" appear in this document, they refer to potential effects that are found to support a "not likely to adversely affect" conclusion because they are extremely unlikely to occur. The use of these terms should not be interpreted as having any meaning inconsistent with our regulatory definition of "effects of the action."

[2] Take" is defined by the ESA as harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect any threatened or endangered species. NMFS defines "harass" as to "create the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering." NMFS defines "harm" as "an act which actually kills or injures fish or wildlife." Such an act may include significant habitat modification or degradation where it actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns, including breeding, spawning, rearing, migrating, feeding or sheltering. Take of species listed as endangered is prohibited at the time of listing, while take of threatened species may not be specifically prohibited unless NMFS has issued regulations prohibiting take under section 4(d) of the ESA.

- Disturbance and physical impact from equipment (vessel and disposal operation); and
- Vessel collision

Elevated turbidity levels

Turbidity is a term which describes the optical properties that cause light to be observed or scattered within the water column and is related to the concentration of suspended sediments whether inorganic, organic, or artificial (Birtwell 1999). Kjellad et al. (2015) determined after extensive literature review that the long term affects to aquatic species are not well understood but are important to determine exposure limits and thresholds which could potentially alter relevant population dynamics. By understanding these principles, mitigation strategies and measures can be employed to reduce the affects to these populations (Kjellad et al. 2015). It should be noted that much of the literature on the effects of suspended sediments and turbidity to aquatic animals focuses on fresh water systems and biota, particularly salmonids. However, some resounding themes provide clarity on the important aspects which affect aquatic organisms. As Birtwell (1999) describes, the European Inland Fisheries Advisory Committee (EIFAC) determined five mechanisms which can deleteriously affect aquatic organisms which in turn established defined threshold levels based on concentrations of suspended sediments and can be applicable to marine species as well. These mechanisms are (EIFAC 1964):

- The reduction in the resistance to disease, growth rate, or mortality of the individual animal subjected to the concentration;
- the prevention of the normal developmental processes of eggs and/or larvae;
- modification of an animal's migration or movement patterns;
- decrease in the abundance or quality of forage; and
- affecting the ability of an animal to successfully capture prey.

These mechanisms are further substantiated by literature produced by the U. S. EPA (Berry et al. 2003; U.S. EPA 2012). Furthermore, turbidity can also reduce the concentration of dissolved oxygen in the water, and increase water temperatures as suspended particles absorb heat. Reductions in dissolved oxygen can cause behavioral responses such as increased air breathing or surface respiration, alterations in an animal's activity, or changes in the vertical or horizontal use of the habitat (Kramer 1985).

For species under consideration in this consultation, sub-lethal effects must be considered as well. These effects can be a result or reflection of stress and could pertain directly to the individual, the species, or to a mechanism of their survival by alteration in their respective trophic pathway(s). Sub-lethal effects would be more applicable to the species under consideration as they are higher on the food chain and may not be subjected to direct impacts of increased sedimentation in the water column. Sub-lethal effects have been described in detail and include variables such as gill trauma to fish (Servizi and Martens 1987; Hess et al. 2015), increased chance of predation (Mesa et al. 1994; Birtwell et al. 1999; Chivers et al. 2013), decreased feeding efficiency and growth rates of invertebrates (i.e. food sources) (Hynes 1970; Tjensvoll et al. 2015; Pineda et al. 2017), alterations in social behaviors, disrupted feeding patterns, displacement, and increased susceptibility to disease (Scriverner et al. 1994), delayed coral reef fish larval development (Wenger et al. 2014), transgenerational effects (Kjellad et al 2015), alterations of habitat complexity by the reduced ability for coral recruitment (i.e. effects to coral larvae, shading, etc.) to occur (Rogers 1990; Jones et al. 2015), coral reef community responses (Pastorok and Bilyard 1985; Erftemeijer et al. 2012), and finally, the compromise of an individual's normal physiological performance (Farrell et al. 1998; Jain et al. 1998). Many sub-lethal effects can be considered trait mediated indirect interactions and are described in an ecological context by Peacor and Werner (2001) and Werner and Peacor (2003). While not an exhaustive review of all literature on this topic, this consultation attempts to define mechanisms and pathways which can potentially affect those species listed in Table 2 using the best scientific data available.

Species considered in this consultation would potentially be exposed to increased sediment loads and thus higher levels of turbidity within the water column by the proposed action, which could cause a range of effects such as these, if mitigation measures were not implemented. It is important to also clarify that natural events such as rain, floods, tidal events and cycles, storms, etc., occur regularly which increase sediment loads to the nearshore environment and/or ocean. Effects to these species could be variable depending on the length of exposure, the concentration of the sediment within the water column - referring to the severity of the exposure, and the frequency of exposure, or as Wilber and Clarke (2001) declare as the "scope, timing, duration, and intensity."

Regarding the direct effects of increased turbidity, given that listed sea turtles and marine mammals breathe air, increased turbidity will not affect their respiration. Although turtles are sometimes observed in turbid areas, it is possible that they will temporarily avoid any localized turbidity plumes in favor of clearer water, reducing exposure risk. Marine mammals are also capable of quickly leaving unsuitable areas if they so choose. Determining whether an animal moves from an area based on an increased turbidity concentration or a conscious decision for various other reasons is speculative at best.

We would not expect turbidity or increased sediment loads to affect the development process of eggs, larvae, or the reproductive capacities of the species under consideration. The exposure interval for this proposed activity is expected to be of minimal duration in context of the species life histories and may or may not coincide with reproduction activities either temporally or spatially when considering species like the oceanic whitetip shark, or the giant manta ray. Elasmobranches, like the giant manta ray have been known to congregate for reproduction or pupping purposes (Duncan and Holland 2006; Miller and Klimovich 2016). However, we do not expect the turbidity created by the proposed action to interfere or affect those species in those areas during the time interval they congregate for these purposes, as these species are highly mobile and will likely avoid the disturbance caused by sediment dumping if in the action area. Additionally, neither the giant manta ray nor the oceanic whitetip shark have documented congregations for reproduction purposes in the proposed action area.

Sea turtles lay eggs onshore, marine mammals either pup onshore or give live-birth in an open ocean environment, and the ESA-listed elasmobranches are viviparous. We would not expect these species to produce offspring or mate within the action area during the proposed event. Furthermore, we would not expect the concentration of sediments to elicit mortality in the species under consideration as they are regularly exposed to natural events of greater severity and are not affected.

Due to the proposed action's footprint, short duration of activities that would cause turbidity, and the species' ranges and distributions, we do not expect the action to produce an effect that would alter or prevent any ESA-listed animal from altering their migration or movement patterns. While species may avoid perturbations, such as those resulting from the proposed disposal activities, we would not expect the action to create a situation that would stop an animal from foraging or traveling. The species under consideration are highly mobile and typically have ample opportunities and large ranges to forage. Exposure in the water column is temporary, and all the Hawaii disposal sites are offshore, in relatively deep water, where initial dilution is even more rapid and disposal plumes dissipate to background levels quickly. Cumulative water column effects are not expected because discharges from disposal vessels typically occur over only a few minutes, and individual disposal events are at least several hours apart, even in the most active circumstances. Finally, the disposal volumes are relatively low and infrequent across the five Hawaii sites. Considering these factors, we would not expect migration activities or corridors to be affected by the proposed action. Thus, we would not expect turbidity created from this proposed project to alter migration or movement patterns of these species.

Additionally, we would not expect any elevated turbidity resulting from this proposed action to affect any ESA-listed animal's ability to capture prey. Elevated turbidity levels such as those expected from the proposed action are not expected to create long-term affects to these species by altering the normal trophic structure within the immediate area (i.e. alterations in algae composition or species, reduced ability to identify prey, etc.) (Weiffen et al. 2006; Chivers et al. 2013). Ambush predator species, such as the oceanic whitetip shark, may even be attracted to the turbidity plumes from disturbance, thus benefiting from the turbidity. Furthermore, we would not expect this proposed activity to create a significant effect based on use of all established BMPs and adherence to Federal mandates required for this project to be implemented.

In summary, the amount of material (i.e. sediment) mobilized is expected to be localized, short-lived (only lasting two to four minutes at the surface), and given limited exposure, potential effects would be unlikely to result in take or a quantifiable effect, as such effects would be within the range of normal behaviors that would not alter their ability to grow and reproduce for those species under consideration. Such effects to ESA-listed species from turbidity from the proposed action are therefore insignificant.

Lastly, the boundary for the MHI insular false killer whale critical habitats overlaps with the five disposal sites and the turbidity caused from disposals may affect the four essential features of MHI insular false killer whale critical habitat. However, all the Hawaii disposal sites are limited in size (for example, the Surface Disposal Zones where all disposal must occur are generally only about 0.11 square mile in area). The disposal sites are in deep, open water where disposal plumes will dissipate quickly, and disposals typically occur over only just a few minutes in duration and are several hours apart from each other. For these reasons, the potential for adverse effects to components of MHI insular false killer whale critical habitat (space for movement, prey availability, waters free of pollutants, and sound levels) is considered discountable. Turbidity will have no effect on Hawaiian monk seal critical habitat, as the critical habitat boundaries do not overlap with any of the five disposal sites.

Contaminants/bioaccumulation
Disposal activities may expose listed species to toxic metals contained within the dredged sediment. Data from the surveys conducted in 2013 confirm the presence of multiple chemicals in the dredged material used for disposal, some of which exceed NOAA's 50th percentile screening value (such as nickel). Contaminants contained within the sediment plumes could pass through the gills of listed species such as oceanic whitetip sharks. Contaminants may also bioaccumulate directly into an animal's tissue, or in prey items such as plankton and other bony fish and move its way up the food chain.

For example, a previous study by Mongillo et al. (2016) assessed the effects of toxic chemical exposure on the endangered Southern Resident killer whales. Tissue samples were analyzed to assess how contaminants were affecting the health of the species. The high levels of contaminants such as PCBs, polybrominated diphenyl ethers (PBDEs), and DDTs in Southern Resident killer whales have multiple health consequences that are correlated with stressors such as abundance of prey (Chinook salmon), interactive effects of contaminant mixtures, and the vulnerability of life stages. Chinook salmon are an important summer food source for this species of killer whale, and based on the fish's geographic range and evidence of contaminant levels, they are likely also a main source of contaminants to the Southern Residents. It's suggested that the high levels of contaminants in these salmon populations may be great enough to negatively impact the overall health of the fish and to indirectly affect the killer whales' food source (Mongillo et al. 2016). Although the health implications to transient killer whales are not discussed (which generally have higher persistent organic pollutant [POP] levels than resident killer whales), the stressors affecting Chinook salmon are expected to be similar in the Southern Residents. Thus, the high levels of PCBs, PBDEs, and DDTs are thought to be a growing concern despite data gaps and insufficient data to indicate that Southern Residents are experiencing adverse health effects from POP exposure. Research conducted within the past decade has confirmed that the high levels of contaminants and limited prey have become a prioritizing threat, but cannot be addressed without a more long-term commitment.

Although this is a main issue for Southern Residents, and may be a similar growing concern we see for MHI insular false killer whales, the issue with Southern Residents is different. These individuals are eating prey who spend a portion of their time in estuaries that were superfund sites for many decades. Further, the EPA disposal sites are far offshore and in deep water where the false killer whales' primary prey feed and are not in superfund sites. There would need to be significant exposure and extreme circumstances, along with enough data to suggest that bioaccumulation is occurring at a level that is adversely affecting individuals, and thus would be discountable.

Despite these concerns, the EPA confirms that all five Hawaii ODMDSs are restricted to the authorized disposal of suitable dredged material, only. The suitability of dredged material for ocean disposal is determined based on criteria in the MPRSA and in the EPA Ocean Dumping Regulations (40 CFR Part 227). The EPA and USACE have published a joint national sediment testing manual entitled *Evaluation of Dredged Material Proposed for Ocean Disposal* (EPA and USACE, 1991), also known as the Ocean Testing Manual (OTM). As a critical component of site management, EPA also periodically conducts surveys of disposal sites to confirm that only physical effects occur within site boundaries, and that no adverse, physical, chemical, or biological effects occur outside the disposal site.

Only suitable, non-toxic, dredged material is permitted to be disposed. Strict pre-dredging testing occurs to determine the suitability of material for disposal. Sediments that contain pollutants in toxic amounts, or that contain elevated levels of compounds that will readily bioaccumulate into tissues of organisms exposed to them on the seafloor, are prohibited from being discharged. Water column assessments must confirm that temporary exposure to the suspended sediment immediately following disposal will not exceed applicable marine water-quality criteria or cause toxicity to representative sensitive marine organisms after allowance for initial mixing and dilution.

The potential for contaminants to move from the sediment into the food web must be evaluated in advance for each dredging project. Bioaccumulation testing examines persistence, toxicity, and bioaccumulation to ensure that material disposed will not cause any adverse impact to listed species post-dumping and ensures that trophic cascades are unlikely. Bioaccumulative contaminants are selected/evaluated by the EPA for each project based on their presence in the test sediment. They expose the benthic organisms to the sediment, usually for 28 days, and tissues are measured for the contaminants concentrations. The tissue concentration results are then compared against concentrations in tissues of the same species exposed to the reference sediment.

In addition to these measures, each disposal events only last two to four minutes at the surface, is occurring in deep/open water, and any plume that forms within the upper water column usually dissipates quickly. Sediments whose plumes would result in any toxicity to sensitive water column organisms after initial mixing are not authorized for ocean disposal. Given the short duration of each disposal event, low toxicity in the water column, we would not anticipate adverse effects to filter feeders and other species that may be exposed to the toxic chemicals.

Furthermore, the 2017 preliminary screening data indicated that the majority of chemical concentrations fell below the ER-L, similar to the South Oʻahu and Hilo sites, and the few concentrations above screening levels (ER-M) were relatively minor in magnitude and, in most cases, were seen at stations both inside and outside the sites. Therefore, the concentrations of contaminants found within the sediment plumes are not expected to cause adverse effects to listed species. As confirmed by EPA monitoring and modeling, no short or long-term contaminant exposure concerns are associated with the discharged sediment.

Additionally, the animals and their prey would only potentially be exposed for a brief amount of time and only on those occasions when dumping occurs. The sediments are expected to remain at the bottom of the dump sites for the foreseeable future and any contaminants that are present would not be expected to affect any of the ESA-listed species listed in table 2, or any feature of any designated critical habitat. Thus, any indirect and direct effects to the ESA-listed species in Table 2 or to its water column prey species are determined insignificant.

The boundaries for the MHI insular false killer whale critical habitats overlap with the disposal sites and contaminants may negatively affect the essential features. However, the action will not degrade the essential features of critical habitat because the level of contaminants are not high enough to reduce the quality of the water column, nor high enough to reduce the quality of the prey base or poison them which would indirectly harm individuals that use that habitat. Therefore, the potential for contaminant exposure to result in adverse effects to prey availability and waters free of pollutants is considered discountable. This stressor will have no effect on the sound levels or space for movement essential features. The presence of toxic chemicals will also have no effect on Hawaiian monk seal critical habitat, as the critical habitat boundaries do not overlap with any of the five disposal sites.

Exposure to wastes and discharges

Equipment spills, discharges, and run-off from vessels transiting to the disposal site and in the project area could contain chemicals such as fuel oils, gasoline, lubricants, hydraulic fluids and other toxicants, which could expose ESA-listed species. Depending on the chemicals and their concentration, the effects of exposure may range between animals temporarily avoiding an area to death of the exposed animals. Vessel staff are expected to adhere to applicable BMPs pertaining to the elimination of discharges and waste, and would have contingency response protocols for accidental leaks, spills, and discharges aboard their vessels.

The EPA has strong enforcement authority under the Marine Protection, Research and Sanctuaries Act (MPRS) for disposal violations. Such violations may include: dumping unauthorized materials, unauthorized excess dumping, dumping outside of designated sites, and spills or leaks from hopper dredges or scows during transit. If any violations occur, the permit may be revoked or suspended. Even if the permit is not revoked, the MPRSA authorizes EPA to require ocean dumping activities to cease immediately when violations are imminent or continuing. EPA may even suspend the use of the ocean disposal site altogether, if necessary. In addition to ensuring that ongoing violations are stopped, EPA may impose monetary penalties when ocean dumping violations occur.

According to the SMMP, the permittee will also ensure that dredged material is not spilled or leaked from disposal vessels during transit to the five ODMDSs. EPA will ensure the use of a Grizzly (steel mesh to catch large debris) to prevent large uncharacterized material such as trash, vessels, and other dredged debris from being discharged at the disposal sites. Transportation will only be authorized when weather at sea conditions are safe and will not result in risk of leak, spillage, or the loss of any other dredged material. The permittee will also report any actual, potential, or anticipated variances from compliance with the Standard Conditions, and any additional project-specific Special Conditions, to EPA Region IX and the Honolulu District USACE within 24 hours of discovering such a situation.

Each disposal vessel is also closely tracked during transit through the nearshore zone. This tracking includes sensors to detect any substantial leaking or spilling of material that could increase turbidity and suspended sediment near sensitive habitats, such as corals and seagrasses. Disposal vessels that leak or spill must be removed from service and repaired before being approved for continued use.

Moreover, it is anticipated that leaks or spills would be infrequent, small, and quickly cleaned. Any resulting discharges would be at extremely low concentrations, exposure to which is expected to cause no effect on an exposed individual's health, and result in no behavioral response. Potential exposure to wastes and discharges resulting from the proposed project would therefore have insignificant effects on ESA-listed marine species under NMFS' jurisdiction identified in Table 2.

MHI false killer whale critical habitat may be negatively impacted by the effects of discharges and waste at the disposal sites, and Hawaiian monk seal critical habitat may be negatively impacted by the effects of discharges and waste during vessel transit. However, with the adherence to SMMP and measures discussed above, the effects from this stressor will be discountable.

Disturbance and physical impact from equipment (vessel and disposal)

The majority of the sounds generated from this project will be from vessel movement and disposal events. ESA-listed species will be exposed to short periods of noises from moving parts of the equipment, noise and physical contact of the sediment being dumped in the water, and vessel motors. However, we expect minimal risk from behavioral changes by these species' exposure to sounds generated during disposal events and vessel transit. ESA-listed species may respond to these noises by avoiding, halting their activities, experience reduced hearing by masking, or attraction to source noises; although the true cause of those anticipated behavior responses are unclear since animals can use other cues such as vision to trigger behavior response. Avoidance is most likely, and a common natural reaction by ESA-listed species and considered low risk. ESA-listed species are large, highly mobile, and capable of swimming away safely from any disturbance that would harm them. Response by a listed vertebrate species to any potential disturbance by vessel noise generation or vessel movements expected to be implemented would be limited to temporary avoidance with no injury to the individual.

ESA-listed species are also at risk of injury from physical impact from dumped sediment if present at the surface in the action area during disposal events. However, these species are highly mobile and will likely avoid the area from an approaching vessel before any sediment is disposed. In the rare case that an animal is physically struck with sediment, it is unlikely that this action will be adverse to result in the level of take. Therefore, it is highly unlikely that any such disturbances would cause any measurable behavioral effects to any ESA-listed species under NMFS' jurisdiction identified in Table 2, and would thus be insignificant.

Lastly, disturbance from vessel transits from port may affect the essential features of Hawaiian monk seal critical habitat and disrupt monk seal pupping, nursing, and foraging, as well as adjacent and significant shallow areas used by monk seals for hauling out, resting or molting. However, due to the infrequent use of the disposal sites and adherence to slow vessel speeds, effects to these essential feature are discountable. This stressor will also have no effect on any of the MHI insular false killer whale critical habitat essential features.

Vessel collision

The proposed action would expose all ESA-listed marine species under NMFS' jurisdiction found in Table 2 to the risk of collision with vessels during transit to disposal sites. Depending on the severity of contact, the collision could cause injuries including bruising, broken bones or carapaces, lacerations, or even death in severe cases.

While specific studies have not been conducted for oceanic white tips or giant manta rays for vessel avoidance, they are elasmobranchs and are highly mobile species. Giant manta rays in particular are known to rest near the surface. However, while the function of the lateral line in manta rays is poorly understood, they also have a suite of other biological functions which are considered highly sophisticated sensory systems (Bleckmann and Hoffmann 1999; Deakos 2010). This suggests that they possess capabilities of detection and could avoid slow moving vessels as well.

Given the high vessel traffic volume around Hawaii , collisions between turtles and vessels are relatively rare events. NMFS conservatively estimated 37.5 sea turtle and 0.45 Hawaiian monk seal vessel strikes and mortalities per year from an estimated 577,872 vessel trips per year in Hawaii . This includes fishing and non-fishing vessels (NMFS 2008). This calculates to a 0.006% probability of a vessel strike with sea turtles for all vessels and trips, many of who are not reducing speeds or employing lookouts for ESA-listed species.

In addition, Vanderlaan and Taggart (2007) report that the severity of injury to larger whale species is directly related to vessel speed. They found that the probability of lethal injury increased from 21% for vessels traveling at 8.6 knots, to over 79% for vessels moving at 15 knots or more. We assume collisions at higher speeds would result in more severe injuries for all animals.

There are data suggesting that the probability of vessel collisions between whales and vessels associated with this action would be more uncommon than that of sea turtle vessel strikes. Lammers et al. (2013) estimated at most, the risk was 7 humpback whale strikes per year, which is less than 1/5 of the number reported for sea turtles (or 2/5 if you consider that humpback whales are in Hawaii. for half the year). Lammers et al. (2013) also noted that most strikes occurred in February and March, which is the peak of the humpback whale season in Hawaii . This increases the odds of a vessel strike. Furthermore, most recorded vessel strikes occurred with calves. These trends are relevant because they represent a biased rate of collision.

False killer whales commonly travel in pods and are known to approach vessels and ride the bows of vessels. The density of MHI insular false killer whales is expected to be very low along the transit routes closer to ports but higher around the disposal sites since these whales are generally found in deeper areas just offshore, (median preferred depth is 1679 m) rather than nearshore areas (Baird et al. 2010; Baird et al. 2012). However, we have little to no data on vessel strikes on false killer whales, but false killer whales are much more agile than baleen whales and few have been reported. False killer whales are also highly mobile and have adequate space to avoid possible collision. Thus, we expect the probability of vessel strikes of false killer whales to be low.

In addition, EPA-required satellite tracking confirms that disposal vessels typically travel at maximum speeds of 6 to 8 knots when transiting the approximate 4 to 6.5 nmi from harbor dredging locations to the Hawaii ocean disposal sites. These speeds are consistent with vessel speed limitations recommended by NMFS to minimize vessel strikes to whales. Vessels also slow to nearly a stop during disposal activities. The disposal sites are several miles offshore in deep water, where there is more space for species to avoid the vessels, and generally fewer foraging areas for certain listed species such as sea turtles. Due the slow speeds to be used during most operations, depths at the sites, temporary nature of the disposal events, and the expectation that ESA-listed marine species would be widely scattered throughout the proposed areas of operation and avoid the disturbance, the potential for an incidental boat strike is extremely unlikely to occur. Thus, the effects of this stressor to any ESA-listed marine species under NMFS' jurisdiction identified in Table 2 are discountable.

Vessel movement may affect the space for movement and use within the shelf and slope habitat essential features of MHI insular false killer whale critical habitat; however, the low number of vessels transiting from the ports to the disposal sites each year are extremely unlikely to affect these features, and are therefore discountable.

Conclusion

Considering the information and assessments presented in the consultation request and available reports and information, and in the best scientific information available about the biology and expected behaviors of the ESA-listed marine species considered in this consultation; NMFS concurs with your determination that the proposed action is not likely to adversely affect the following ESA-listed species, and designated critical habitat: endangered sperm, fin, blue, sei, and North Pacific right whales; endangered Main Hawaiian Island insular false killer whales; endangered Hawaiian monk seals; threatened Central North Pacific green turtles; endangered hawksbill turtles; threatened North Pacific Ocean loggerhead turtles; threatened olive ridley and endangered olive ridley sea turtles; endangered leatherback turtles; threatened oceanic whitetip sharks; threatened giant manta rays; and designated critical habitat for Hawaiian monk seals and Main Hawaiian Islands insular false killer whales.

This concludes your consultation responsibilities under the ESA for species under NMFS's jurisdiction. If necessary, consultation pursuant to Essential Fish Habitat would be completed by NMFS' Habitat Conservation Division in a separate communication.

Conservation Recommendations

Section 7(a)(1) of the ESA directs Federal agencies to use their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of the threatened and endangered species. Specifically, conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on ESA-listed species or designated critical habitat (50 CFR 402.02).

NMFS recommends that the EPA assess lower-level trophic species (fish and plankton) for chemicals/compounds in the area where sediment dumping is occurring.

Reinitiation Notice

ESA Consultation must be reinitiated if: 1) take occurs to an endangered species, or to a threatened species for which NMFS has issued regulations prohibiting take under section 4(d) of the ESA; 2) new information reveals effects of the action that may affect ESA-listed species or designated critical habitat in a manner or to an extent not previously considered; 3) the identified action is subsequently modified in a manner causing effects to ESA-listed species or designated critical habitat not previously considered; or 4) a new species is listed or critical habitat designated that may be affected by the action.

If you have further questions, please contact Shelby Creager (808) 725-5144 or shelby.creager@noaa.gov. Thank you for working with NMFS to protect our nation's living marine resources.

Sincerely,

Ann M. Garrett

Ann M. Garrett
Assistant Regional Administrator
Protected Resources Division

NMFS File No.: PIRO-2020-02769
PIRO Reference No.:. I-PI-20-1846-AG

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Appendix A

DATA QUALITY ACT DOCUMENTATION AND PRE-DISSEMINATION REVIEW

The Data Quality Act (DQA) specifies three components contributing to the quality of a document. They are utility, integrity, and objectivity. This section of the letter addresses these DQA components, documents compliance with the DQA, and certifies that this letter has undergone pre-dissemination review.

Utility

Utility principally refers to ensuring that the information contained in this consultation is helpful, serviceable, and beneficial to the intended users. The intended users of this letter are FHWA. Other interested users could include permittees listed in Table 1 and others interested in the conservation of listed species and their ecosystems. Individual copies of this were provided to the FHWA. The document will be available within two weeks at the NOAA Library Institutional Repository [https://repository.library.noaa.gov/welcome]. The format and naming adheres to conventional standards for style.

Integrity

This consultation was completed on a computer system managed by NMFS in accordance with relevant information technology security policies and standards set out in Appendix III: *Security of Automated Information Resources,* Office of Management and Budget Circular A-130; the Computer Security Act; and the Government Information Security Reform Act.

Objectivity

Information Product Category: Natural Resource Plan

Standards: This consultation and supporting documents are clear, concise, complete, and unbiased; and were developed using commonly accepted scientific research methods. They adhere to published standards including the NMFS ESA Consultation Handbook, and the ESA regulations, 50 CFR 402.01 et seq.

Best Available Information: This consultation and supporting documents use the best available information, as referenced in the References section. The analyses in this letter contain more background on information sources and quality.

Referencing: All supporting materials, information, data and analyses are properly referenced, consistent with standard scientific referencing style.

Review Process: This consultation was drafted by NMFS staff with training in ESA and reviewed in accordance with Pacific Island Region ESA quality control and assurance processes.

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January 21, 2021

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RE: NMFS, Pacific Islands Regional Office, essential fish habitat (EFH) conservation recommendations for the Environmental Protection Agency's (EPA) continued use of five ocean dredged material disposal sites in Hawaiʻi

Dear Ms. Blake,

The National Marine Fisheries Service, Pacific Islands Regional Office (NMFS), received the U.S. Environmental Protection Agency's (hereafter, EPA) request to initiate an essential fish habitat (EFH) consultation for the five existing Hawaiʻi ocean dredged material disposal sites. NMFS provided an early coordination technical assistance letter for this project on August 30, 2018, conducted a conference call on June 26, 2020 to provide EFH consultation guidance to the EPA, and completed a review of the draft EFH Assessment on September 22, 2020. We have reviewed your EFH consultation request and the accompanying EFH Assessment pursuant to the EFH provision of the Magnuson-Stevens Fishery Conservation and Management Act (MSA; Section 305(b)(2) as described by 50 CFR 600.920). We have determined that the proposed activities may adversely affect EFH. We have provided EFH conservation recommendations that, when implemented and adhered to, will ensure that potential adverse effects will be avoided, minimized, offset for, or otherwise mitigated.

Project Description

The EPA has requested consultation for the five EPA-designated offshore dredged material disposal sites for Hawaiʻi for which the EPA oversees permitting for dredged sediment disposal. The sites are used only for the disposal of suitable, non-toxic sediment dredged by the U.S. Army Corps of Engineers (USACE) from the federally authorized navigation channels in Hawaiʻi's harbors, and from other permitted navigation dredging projects in Hawaiʻi, including those by the Navy. The Hawaiʻi ocean disposal sites were designated together via rulemaking in 1981 based on a 1980 Final Environmental Impact Statement completed by EPA Headquarters. While an Endangered Species Act consultation was completed, an EFH consultation under the MSA was not required.

The disposal sites are offshore of the islands of Oʻahu, Hawaiʻi, Maui, and Kauaʻi ranging from 4 to 6.5 nautical miles offshore in waters from 330 to 1,610-meters (m) deep (Table 1). Each site includes a small Surface Disposal Zone within which all disposal actions must occur, and a larger site boundary on the seafloor where most of the sediment deposition is intended to occur. From 2000-2020, the average sediment disposal volumes for the South Oʻahu, Hilo, Kahalui, Nawiliwili, and Port Allen sites were: 121,371, 12,198, 2,724, 11,914, and 0 cubic yards, respectively.

Table 1. Description of the five EPA-designated Hawaiʻi offshore dredged material

Disposal Site	Depth Range	Shape and Dimensions (Seafloor Footprint)	Surface Disposal Zone (SDZ) Dimensions	Center Coordinates (NAD 83)
South Oʻahu	375-475 m (1,230-1,560 ft)	Rectangular 2.0 (W-E) by 2.6 km (N-S) (1.08 by 1.4 nmi)	Circular 305 m (1000 ft) radius	21° 15' 10" N, 157° 56' 50" W
Hilo	330-340 m (1,080-1,115 ft)	Circular 920 m (3000 ft) radius	Circular 305 m (1000 ft) radius	19° 48' 30" N 154° 58' 30" W
Nawiliwili	840-1,120 m (2,750-3,675 ft)	Circular 920 m (3000 ft) radius	Circular, offset 200 m (600 ft) radius: [21° 55' 15" N 159° 17' 13.8" W]	21° 55' 00" N 159° 17' 00" W
Port Allen	1,460-1,610 m (4,800-5,280 ft)	Circular 920 m (3000 ft) radius	Circular 305 m (1000 ft) radius	21° 50' 00" N 159° 35' 00" W
Kahului	345-365 m (1,130-1,200 ft)	Circular 920 m (3000 ft) radius	Circular 305 m (1000 ft) radius	21° 04' 42" N 156° 29' 00" W

Disposal Site Designation Process

The EPA notes that the site designation process for ocean disposal includes criteria to avoid impacts to the aquatic environment and to human ocean use to the maximum extent possible. The site designation process and regulations (promulgated under the Marine Protection, Research, and Sanctuaries Act (MPRSA) and the National Environmental Policy Act (NEPA)) independently require evaluation of a variety of factors intended to minimize the potential effects of disposal on marine species and their habitat. The MPRSA regulations at 40 CFR Part 228.5–228.6 include the following disposal site selection habitat and species avoidance and minimization criteria:

- Disposal activities must avoid existing fisheries and shellfisheries (228.5(a)).
- Temporary water quality perturbations from disposal within the site must be reduced to ambient levels before reaching any marine sanctuary or known geographically limited fishery or shellfishery (228.5(b)).
- The size of disposal sites must be minimized in order to be able to monitor for and control any adverse effects (228.5(d)).
- Where possible, disposal sites should be beyond the edge of the continental shelf (228.5(e)).
- The location of disposal sites must be considered in relation to breeding, spawning, nursery, feeding or passage areas of living resources in adult or juvenile phases (228.6(a)(2)).
- Dispersal and transport from the disposal site be must considered (228.6(a)(6)).
- Cumulative effects of other discharges in the area must be considered (228.6(a)(7)).
- Interference with recreation, fishing, fish and shellfish culture, areas of special scientific importance and other uses of the ocean must be considered (228.6(a)(8)).

- The potential for development or recruitment of nuisance species must be considered (228.6(a)(10)).
- Based on these site selection criteria, the five Hawai‘i sites were identified as the environmentally preferred alternative locations serving each of the five main Hawai‘i port areas.

Dredged Material Testing

The EPA's regulations establish strict criteria for evaluating whether dredged material is suitable for ocean disposal (see 40 CFR Part 227.5-9). These regulations specify that certain prohibited constituents, such as industrial wastes or high-level radioactive wastes, may not be disposed in the ocean at all, while other constituents, such as organohalogen compounds or mercury, may only be discharged if present in no more than "trace" amounts that will not cause an unacceptable adverse impact after dumping. "Trace" is determined by passing a series of bioassays addressing the potential for short- and long-term toxicity and bioaccumulation. The EPA and the U.S. Army Corps of Engineers (USACE) have jointly published national sediment testing guidance for conducting these evaluations in advance of dredging (i.e., the Ocean Testing Manual (OTM)).

Sampling Analysis Plans

The EPA and the USACE review and approve sampling and analysis plans (SAPs) in advance of each dredging project; this is intended to ensure that the samples to be tested are representative of the material proposed for dredging. The number and location of required sediment samples is informed by expected dredge volumes and past testing history; however, specific attention is focused on sampling near known or potential sources of contamination such as outfalls, storm drains, repair yards, and industrial sites. Individual samples may be composited for analysis only within contiguous areas expected to be subject to the same pollutant sources and hydrodynamic factors (e.g., a single berth in a harbor). Representative sediment collected pursuant to an approved SAP is then subjected to chemistry evaluations, toxicity bioassays (for short-term water column and longer-term benthic impacts), and bioaccumulation tests. The results are compared to the same tests conducted with reference site sediment.

Sediment Chemistry

An extensive list of potential contaminants is measured in each sediment sample or composite, and in the reference sediment. These include conventional properties such as grain size and organic carbon content, as well as heavy metals, organotins, hydrocarbons, pesticides, poly-chlorinated biphenyls, and dioxins/furans. The EPA and the USACE can add compounds to this standard list whenever deemed necessary. Sediment chemistry results can be compared against various sediment guidelines (such as NOAA's effects range low (ERL) and effects range median (ERM) values) to help inform the biological testing.

Water-Column Testing

In contrast to the seafloor, where potential exposure to disposed sediment is long-term, the EPA has determined that exposure to disposal plumes in the water column is temporary. Nevertheless, to be "suitable" for ocean disposal, the EPA requires that water column assessments must confirm that temporary exposure to the suspended sediment immediately following disposal will not exceed applicable marine water-quality criteria or cause toxicity to representative sensitive marine organisms after allowance for initial mixing and dilution. For each tested sediment sample, organisms are exposed to a series of concentrations of elutriate (water plus suspended particulates) to determine the toxic concentration (LC50). A 100-fold safety factor is applied such that after initial mixing the water column plume may not exceed 1% of the LC50 for the most sensitive organism tested. Three separate water-column bioassays are conducted, with one species being a phytoplankton or zooplankton, one a larval crustacean or mollusk, and one a fish. Species must be chosen from among a list of sensitive standard test species listed in the OTM or specified in regional guidance.

All of the Hawaiʻi disposal sites are offshore, in relatively deep water; the EPA expects that initial dilution is rapid and disposal plumes would dissipate to background levels quickly. Although potential water column effects are assessed for every proposed project as described, water column testing alone has rarely, if ever, "failed" a project for ocean disposal at any of the Hawaiʻi sites. Therefore, the EPA considers the potential for direct effects to water column species, including planktonic species, filter feeders reliant on planktonic species, or pelagic prey species, discountable. Similarly, the EPA expects that cumulative water column effects would not occur because discharges from disposal vessels typically occur over only a few minutes, and individual disposal events are at least several hours apart, even in the most active circumstances.

Benthic Testing

For the benthic toxicity assessment, the EPA requires that at least two "solid phase" bioassays be completed. For these tests, sediment-associated species are utilized that, together, represent key exposure routes including filter feeding, deposit feeding, and burrowing life histories. The test species must be chosen from among a list of sensitive standard test species listed in the OTM or regional guidance. If organismal mortality is statistically greater than in the reference sediment and exceeds reference sediment mortality by 10% (20% for amphipods), the sediment is considered potentially toxic and may not be approved for ocean disposal. Solid phase benthic toxicity is usually the cause when sediments "fail" for ocean disposal.

Bioaccumulation Testing

The EPA requires that bioavailability—the potential for contaminants to move from the sediment into the food web—must also be evaluated in advance for each dredging project. Bioaccumulative contaminants are selected and evaluated by EPA for each project based on their presence in the test sediment. Benthic organisms are then exposed to the sediment (usually for 28 days), and concentrations of the contaminants of concern taken into the tissues are measured. The tissue concentrations are compared against concentrations in tissues of the same species exposed to a reference sediment.

Depending on results, tissue concentrations may also be used in trophic transfer models, and/or compared against available benchmarks including relevant total maximum daily loads (TMDLs), state or local fish consumption advisories, and Food and Drug Administration (FDA) "Action Levels for Poisonous or Deleterious Substances in Fish and Shellfish for Human Food."

Alternatives Analysis

The EPA's regulations restrict ocean disposal of dredged material by outlining factors for evaluating the need for ocean disposal and requiring consideration of alternatives to ocean disposal (40 CFR Part 227.14-16). Alternatives to ocean disposal, including beneficial uses of dredged material, are considered on a project-by-project basis to ensure that the minimum necessary volume of dredged material is disposed at any of the ocean disposal sites. Generally, alternatives to ocean disposal in the islands are more limited than on the mainland. However, even sediments that have adequately been characterized and found by the EPA and the USACE to be suitable for ocean disposal will not be permitted for ocean disposal if there is a practicable alternative available. For example, clean sand that is otherwise suitable for ocean disposal generally is not permitted for disposal if it can be feasibly used to nourish local beaches.

Disposal Site Management

The EPA expects that ongoing use of the five existing Hawai‘i ocean disposal sites will not increase the need for dredging in Hawai‘i, nor the amount of ocean disposal of dredged material that occurs. The EPA therefore expects that there would similarly be a lack of significant impacts in the future, provided that the ocean disposal sites continue to be managed under the same or similar requirements. The EPA proposes to continue managing the five existing Hawai‘i disposal sites under site use conditions and best management practices (BMPs) that are substantively the same as those currently in place. The only substantial change in site management is the recent relocation of the SDZ within the existing Nawiliwili site, and as incorporated in permit conditions for the site. This change was made based on the results of the 2017 monitoring survey, which identified hard-bottom habitat (including a volcanic escarpment, marking the ancient shoreline) in the southeastern portion of the Nawiliwili site. The relocated SDZ will avoid future deposition of sediment on the hard-bottom habitat and facilitate future monitoring of dredged material discharges on the natural sediment habitat in the northwestern portion of the site. This relocation of the SDZ is an example of EPA's adaptive approach to site management.

Enforcement

In addition to active, adaptive management of the five Hawai‘i ocean disposal sites, EPA has strong enforcement authority under the MPRSA for any violations related to disposal operations. Violations may include dumping of unauthorized materials, dumping of materials in excess of authorized amounts, dumping outside of designated sites, and spills or leaks from hopper dredges or scows during transit to the ocean disposal sites. EPA authorities apply to violations of the MPRSA itself (for unpermitted dumping) or of an MPRSA permit, (including violations relating both to dumping and transportation for the purpose of dumping). If the provisions of a permit are violated, the permit may be revoked or suspended; even if the permit is not revoked, the MPRSA authorizes EPA to require ocean dumping activities to immediately cease when violations are imminent or continuing. EPA may even suspend the use of the ocean disposal site altogether, if necessary. In addition to ensuring that ongoing violations are stopped, EPA may impose monetary penalties when ocean dumping violations occur. Administrative penalties imposed by EPA under the MPRSA can be quite heavy and serve as an effective deterrent to ongoing ocean dumping violations. Consequently, it is rare that EPA is forced to refer an ocean dumping case for judicial or criminal penalties.

Although the MPRSA does not expressly authorize penalty assessments for natural resource damages, EPA considers the gravity of the violation (including effects to sensitive species or habitats), prior violations, and the demonstrated good faith of the person charged when determining a civil penalty amount. Finally, the MPRSA also authorizes citizen suit enforcement. However, the MPRSA does not provide retain and use authority; under the Miscellaneous Receipts Act, fines and penalties are transmitted to the general treasury rather than for purposes of mitigating any damage in and around the ocean disposal site.

Additionally, the BMPs included in EPA's Site Management and Monitoring Plans (SMMPs) become enforceable conditions when attached to the USACE' ocean disposal permits. Those conditions can include requirements that minimize the risk of impacts should a violation occur, such as seasonal limitations or specified transit routes to and from the disposal site. These kinds of specifications have not been applied to the Hawaiʻi ocean disposal sites in the past, but where necessary and feasible they could be included in the SMMP.

Essential Fish Habitat

The marine water column from the surface to a depth of 1,000 meters (m) from the shoreline to the outer boundary of the Exclusive Economic Zone (200 nautical miles), and the seafloor from the shoreline out to a depth of 700 m around Hawaiʻi have been designated as EFH. As such, EFH is designated for the water column of the Pacific Ocean at the Port Allen site, and the water column and seafloor of the Pacific Ocean at the South Oʻahu, Hilo, Nawiliwili, and Kahului sites. These waters and substrates support various life stages for the management unit species (MUS) identified under the Western Pacific Fishery Management Council's, Pelagic and Hawaiʻi Fishery Ecosystem Plans. The MUS life stages found in these waters include eggs, larvae, juveniles, and adults of Bottomfish, Pelagics, and Crustacean MUS. Specific types of habitat considered as EFH include coral reef, patch reefs, hard substrate, artificial substrate, seagrass beds, soft substrate, mangrove, lagoon, estuarine, surge zone, deep-slope terraces and pelagic/open ocean. Habitat Areas of Particular Concern (HAPC) are subsets of EFH that exhibit one or more of the following traits: rare, stressed by development, provide important ecological functions for federally managed species, or are especially vulnerable to anthropogenic (or human impact) degradation. HAPC's can cover a specific location (a bank or ledge, spawning location) or cover habitat found at many locations (e.g., coral, nearshore nursery areas, or pupping grounds). A HAPC for bottomfish MUS offshore of the island of Hawaiʻi overlaps with the Hilo dumping site.

Baseline Condition

Research conducted by the EPA and the USACE since the inception of the MPRSA suggests that the benthos is most susceptible to potential adverse effects dumping. This is because deposited dredged material mixes more rapidly in the water column than in the benthos where bottom-dwelling animals reside and recycle dredged material for extended time periods. Therefore, the EPA's monitoring of ocean disposal sites has focused on the benthos, including sediment chemistry, physical characteristics, and organismal community structure and function.

The EPA conducted extensive site monitoring surveys of the Hawaiʻi ocean disposal sites in 2013 and 2017. During these surveys, the EPA used a variety of methods to achieve the monitoring objectives, including high-resolution multibeam echosounder surveys (MBES), sediment profile imaging (SPI) and plan view photography (PVP), and sediment grabs for sediment chemistry and benthic infauna.

Sediment samples from both inside and outside each of the five Hawai‘i disposal sites were collected successfully and analyzed for the same compounds evaluated during predisposal testing. The bulk chemistry data from the 2013 monitoring surveys showed generally low, but variable, concentrations of most chemical constituents at the South O‘ahu and Hilo sites (the most frequently used sites). The few concentrations above screening levels were relatively minor in magnitude and, in many cases, seen at stations both inside and outside the sites. The few constituents that were at higher concentrations within the disposal sites reflect the contaminant levels in the dredged material approved for discharge. Because sediments that contain pollutants in toxic amounts, or elevated levels of compounds that may bioaccumulate in benthic organisms, are prohibited from ocean disposal, the EPA does not consider the chemical concentrations identified to represent a risk. Instead, the EPA has interpreted that these low concentrations indicate that the pre-dredge sediment testing regime is adequately protecting the disposal site environments by identifying and excluding more highly contaminated sediments from being disposed. Sediment chemistry was also collected at the Nawiliwili, Kahului, and Port Allen sites, and is currently being analyzed for results (preliminary results are available in Appendix 3; once the report is finalized, it will be made available to NMFS). Preliminary screening indicates that, similar to the South O‘ahu and Hilo sites, the majority of chemical concentrations fell below the ERL, and the few concentrations above screening levels were relatively minor in magnitude and, in most cases, were seen at stations both inside and outside the sites.

Monitoring confirmed that minor physical (substrate) changes have occurred at the disposal sites compared to pre-disposal baseline data from 1980. Results of the 2013 survey indicate that a detectable dredged material footprint extended outside of the South O‘ahu site, however there have been no documented “short-dumps” (i.e., discharge or loss of dredged material during transit to an ocean disposal site, prior to arrival at the site) since EPA required satellite-based tracking of all disposal scows in the early 2000s (with the exception of a single partial mis-dump in 2006). Thus, the footprint outside the South O‘ahu disposal site boundary would appear to be relic material deposited more than 10 years ago. At the Hilo site, the substantially smaller cumulative volume of dredged material disposed appeared to be more fully confined within the designated disposal site boundary.

The results of the 2017 survey indicated that recently disposed dredged material, including coral and pebble rubble, was present on the seafloor surface within and near the Nawiliwili ocean disposal site. However, the commonplace presence of coral rubble and other coarse materials and sands at the seafloor surface across the survey area confounded definitive delineation of the dredged material footprint. Surveys at Port Allen and Kahului also indicated that the dredged material footprint was primarily contained within the site boundary, yet some material was detectable beyond the designated boundary to some extent at both sites. It is the EPA’s position that because the EPA has required satellite-based tracking of all disposal scows since the early 2000s, and mis-dumping has not occurred at least since then, the dredged material observed outside the sites is also assumed to be relic material. Additionally, due to benthic activity, dredged material was witnessed to have been reworked into the sediment. For example, all material at the Port Allen ocean disposal site was reworked into the sediment column by biota to some extent and no thick deposits were observed.

The benthic community was assessed through both SPI imagery and sediment grab samples. Overall, the EPA has determined that the changes in substrate may partially account for minor differences in infaunal assemblages found during the 2013 monitoring at the South Oʻahu and Hilo sites (the most heavily used of the Hawaiʻi disposal sites). However, minor benthic community changes also occurred outside those disposal sites and so appear to be partially attributable to region-wide variability as well. In addition, the EPA found no apparent adverse effects to the infaunal community associated with the presence of dredged material at the Kahului and Port Allen ocean disposal sites. The vast majority of stations across both survey areas supported stable benthic structure or advanced stages of infaunal recolonization. The EPA has determined that the presence of advanced recolonization at stations containing dredged material indicates that the benthic community has recovered post-disposal activity at these locations. Because the Nawiliwili site was so heterogeneous, benthic community grab samples were not successfully collected inside the site for comparison to the benthic community outside of the site. However, the one SPI replicate that achieved sufficient penetration near the center of the Nawiliwili site indicated the presence of stage 3 (advanced) fauna. Additionally, as previously mentioned, disposal volumes at Nawiliwili are relatively low, and preliminary screening of chemistry results indicated that dredged material disposed did not appear to result in contaminant loading, as most of the contaminants were below the ERL, and the few concentrations above screening levels were found both inside and outside of the site. Therefore, the EPA has determined that all available results from Nawiliwili indicate that dredged material disposed did not adversely affect the benthic environment. In summary, the EPA has determined that monitoring at all five sites confirmed that recolonization begins soon after dredged material is deposited, and that similar infaunal and epifaunal communities occupy areas both inside and outside the disposal sites. Thus, the EPA has determined that long-term impacts to benthic habitat quality are discountable and largely contained within the site boundaries.

<u>Overlap with a HAPC</u>

The bottomfish HAPC near the Hilo site extends for 11 miles along the coast of the island of Hawaiʻi, out from Hilo Bay, and overlaps with the Hilo ocean disposal site. The EFH within the Hilo HAPC consists of 336 square kilometers covering the water column and bottom habitat extending from the baseline to 400 m. The Hilo HAPC for bottomfish was designated in 2016, because it is an ecologically important juvenile P. filamentosus nursery area and also has rare physical pillow lava habitat. While nursery areas for P. filamentosus are usually flat, open soft substrates, the camera deployments recorded juveniles over very hard, rugose volcanic substrate. The uniqueness of this nursery habitat contributed to the designation of the area as a HAPC for bottomfish. Nevertheless, due to the depth and substrate composition of the Hilo ocean disposal site, the EPA does not believe that ocean disposal will adversely impact juvenile P.filamentosus EFH and the pillow lava habitat (i.e., the two reasons for the designation of the HAPC), as discussed below (see Adverse Effects section).

Adverse Effects

The proposed dumping of dredged sediment may result in adverse effects to water column and benthic EFH from sedimentation and turbidity, nutrient enrichment, introduction of invasive species, and pollution and chemical contamination. Habitat conversion may occur as disposed dredged material migrates outside of disposal site boundaries, which may adversely affect EFH for various MUS.

Bottomfish HAPC

Because it is an intermediate bottomfish stock, P. filamentosus EFH encompasses the water column and bottom habitat in depths from the surface to 280 m. Juvenile P. filamentosus are specifically known to occupy areas much shallower than their adult counterparts, ranging in depth from approximately 40 m to 100 m. The Hilo ocean disposal site ranges from 330-340 m deep, therefore any potential effects on P. filamentosus would likely be restricted to water column effects to life history stages rather than substrate changes. While there may be adverse effects to P. filamentosus from disposal in the water column, elutriate testing suggests that the plume should not cause toxicity to sensitive marine organisms.

HAPC Pillow Lava Substrate

EPA monitoring at the Hilo site indicates that, apart from an accumulation of small rock and coral rubble at the center of the site from previous dredged material deposits, the native sediments within the site consist of predominantly sandy substrate (77% sand, 22% silt and clay, and only 1% gravel). Monitoring outside of the Hilo ocean disposal site boundaries did identify pillow lava, however these stations were far outside of the site boundaries; no pillow lava was identified within the site boundaries.

Proposed Best Management Practices

The EPA ensures that the following BMPs are implemented for permitted disposal activities:

- A variety of disposal BMPs as enforceable permit conditions for each project, including:
    - Prohibition on leaking and spilling of material during transit.
    - Prohibition of trash and debris disposal, with required use of a 12- by 12-inch grizzly screen. All material captured by the grizzly must be separately removed and disposed.
    - Completion of a scow certification checklist.
    - No portion of the vessel from which the materials are to be released (e.g., hopper dredge, or barge) shall be further than 305 m from the center of the ODMDS, unless specified by a project-specific special permit condition.
    - Backup navigation and disposal tracking systems in the case that sensors fail.
    - Posting disposal information tracking on the internet within 24 hours of disposal.
    - Email alerts for dumping material outside of prescribed/designated dumping zones.
    - Daily record keeping and monthly reporting.
    - 24-hour requirement for notification of leaks or mis-dumps.
    - Completing a Project Completion Report within 60 days.
- Alternatives to ocean disposal will be prioritized, including upland disposal and beneficial use.
- Contaminated dredge material will not be permitted for ocean disposal. Any dredged material that contains levels of chemical contaminants in other than "trace" amounts, that exhibits toxicity in either suspended or solid phase tests, or that includes pollutants that are likely to bioaccumulate in the food web to levels of concern, is not considered suitable for ocean disposal.
- Satellite tracking all disposal vessels to ensure that disposal activities occur only where and as required.
- Sensors on all disposal vessels to ensure that there is no significant leakage or spilling of dredged material during transit to the disposal site, especially during transit through the nearshore zone where corals, seagrasses, and sensitive animals are most likely to be present.

- Tracking and sensor information reported online for each disposal trip.
- Potential inclusion of project-specific conditions to protect marine resources, such as adjusting timing of activities to avoid coral spawning.

In addition, the MPRSA regulations for site selection described at 40 CFR Part 228.5–228.6 (see above) include disposal site selection criteria which help directly avoid or minimize impacts to water column and benthic EFH.

Pre-Disposal Testing

Although the five Hawaiʻi ocean disposal sites intersect with water column EFH for the crustacean, bottomfish, and pelagic MUS, the conservative sediment elutriate testing and modeling conducted prior to dredging must confirm that exposure to the disposal plume, including the dissolved oxygen and turbidity levels, will not cause toxicity to sensitive marine organisms in the water column. Chemistry testing is conducted, and modeling to screen for water quality standards compliance assumes that 100% of all contaminants are released to the water column. Elutriate bioassays are performed, and a 100-fold safety factor is applied such that, after initial mixing, the water column plume may not exceed 1% of the toxic concentration (LC50) for the most sensitive organism tested. Further, due to the depths and offshore locations of the Hawaiʻi sites, dilution of the disposal plumes is rapid. In addition, although the South Oʻahu, Hilo, and Kahului sites intersect with the benthic EFH for bottomfish MUS, the detailed sediment testing process also includes two solid phase bioassays and bioaccumulation testing. This ensures that the material disposed will not be toxic to benthic organisms and does not include pollutants likely to bioaccumulate in the food web.

Site Management

The EPA additionally uses an active, adaptive approach to managing ocean disposal sites. More specifically, once a dredging project is approved for ocean disposal at one of the Hawaiʻi sites, a variety of disposal BMPs are included as enforceable permit conditions for the project. For example, satellite tracking is conducted for all disposal vessels, and sensors are placed on all disposal vessels to ensure there is no significant leakage or spilling of dredged material during transit to the site. These additional BMPs ensure that direct and indirect effects to water column and benthic EFH are avoided or minimized. Moreover, the EPA periodically monitors the sites to ensure that adverse effects are minimized within and nearby.

Monitoring

The South Oʻahu, Hilo, Kahului sites intersect with the benthic EFH for the bottomfish MUS deep stocks. The EPA expects that physical effects are generally anticipated at any disposal site, simply because dredged sediment's physical characteristics (e.g., grain size and organic carbon content) often differ from that of the native seafloor in the deep ocean. Nevertheless, the EPA expects that these effects to be primarily confined to the disposal site, and benthic communities are anticipated to recover rapidly following disposal. Furthermore, the volumes disposed at the five Hawaiʻi sites are very low, particularly in comparison to other dredged material disposal sites in EPA Region 9. The EPA expects that the low volume of disposed dredged material further reduces impacts to benthic EFH, and helps ensure that the dredged material can be more rapidly assimilated into the benthos following disposal. The EPA's monitoring results from 2013 and 2017 suggests that there are minimal long-term impacts to the marine community from dredged material disposal.

NMFS Concerns

NMFS has various concerns with repetitive dumping of dredged material at offshore locations near the main Hawaiian Islands. Dumping dredged sediment fines into the water column will temporarily increase turbidity while resuspending low concentrations of contaminants. Elevated turbidity levels may temporarily reduce primary and secondary production rates and therefore alter the flow of energy and nutrients up the pelagic food chain within the euphotic zone and beyond; there is no demonstrated research on how these activities affect plankton productivity rates and community structure and function. Elevated turbidity, particulate and dissolved organic carbon and nitrogen loads, and the presence of low concentrations of chemical contaminants may adversely affect eggs and larvae for various MUS.

NMFS is also concerned about the potential for dredged material to settle on EFH outside of disposal site boundaries, which has occurred at some of the sites. Migration of dredged spoils outside of the disposal areas may convert soft and hard bottom habitats to a different type of habitat that may or may not be as conducive as current substrate is for supporting MUS. It is unclear from the EFH Assessment how the EPA plans determine whether disposed sediment outside of disposal site boundaries is relic or new; this is a critical gap that needs resolution so as to abide with the EPA-proposed BMP for minimizing impacts to federally managed fisheries.

Lastly, NMFS is interested to learn more about the process that permittees complete for collecting and reporting sediment chemistry data for material destined for offshore disposal. Permittee reporting of sample sizes and chemical characteristics for individual samples is extremely helpful for our consultation process. We have had consultations that have reported small sediment sample sizes (n=6) as one bulk sample value across a small area of benthic substrate; however, neither a standard error nor a standard deviation was provided. Further, the permittee determined that this mean value was representative for an area of bottom substrate where there actually was a gradient in sediment chemistry character and sediment size fraction. In essence, NMFS is unable to delineate different sediment types from one another due to this reporting style and approach, which is not statistically powerful and has the potential to be scientifically misleading. It would be helpful for our consultations involving offshore dredged material disposal if we could learn more about the sediment sampling process and contribute to the conversation about sediment sampling design, replication, and reporting prior to when activities occur.

Conservation Recommendations

NMFS provides the following EFH conservation recommendations pursuant to 50 CFR 600.920 that when implemented and adhered to would ensure that potential adverse effects to EFH from the proposed action are sufficiently avoided and/or minimized:

Conservation Recommendation 1 (CR#1): The EPA should continue to monitor dredged sediment disposal levels and chemical character in both the water column and along the benthos inside and outside of disposal site boundaries.

Conservation Recommendation 2 (CR#2): The EPA should develop a method to track/measure and determine whether dredged material disposed outside of disposal site boundaries is relic or new. This will help inform whether disposal activities need to be stopped and site boundaries reassessed.

Conservation Recommendation 3 (CR#3): If dredged material is substantially accumulating outside of site boundaries, the EPA should assess if benthic habitat conversion is occurring.

Conservation Recommendation 4 (CR#4): If benthic habitat conversion is occurring outside of site boundaries, the EPA should assess whether this conversion is adversely affecting managed fisheries, including Bottomfish, Crustaceans, and Pelagic MUS.

Conservation Recommendation 5 (CR#5): If assessments from CR#4 reveal that stocks of MUS are adversely affected by habitat conversion outside of dredge boundaries, then the EPA should restore converted habitat or develop equitable compensation to offset for the loss of this habitat. NMFS is ready and willing to coordinate on any potential discussions.

Conservation Recommendation 6 (CR#6): The EPA should ensure that SAP sediment sampling methods, designs, and data reporting requirements for permittees are statistically robust while ensuring that gradients in sediment types and size fractions and clearly depicted. If possible, consider including NMFS in early permit coordination discussions so that we can provide guidance on what permittees will need to include in their EFH assessments.

Conservation Recommendation 7 (CR#7): The EPA should consider supporting new research to understand how dredged material disposal may alter primary and secondary production rates in the water column, while evaluating shifts in phytoplankton and microbial community structure and function. This will help to inform how plumes may temporarily change ambient conditions and the flow of carbon and energy through the food web.

Conclusion

NMFS appreciates the opportunity to provide EFH conservation recommendations to the EPA for the proposed programmatic activities at these Hawaiʻi offshore dredged material dumping sites. We also greatly appreciate the early coordination and cooperative approach that the EPA implemented with us. We have determined that EPA-permitted activities to dump dredged sediment at these sites may impart adverse effects to EFH. We have provided EFH conservation recommendations that when implemented will help the EPA comply with the MSA by ensuring that potential adverse effects to EFH are sufficiently avoided, minimized, offset for, or otherwise mitigated.

Please be advised that regulations (Section 305(b)(4)(B)) to implement the EFH provision of the Magnuson-Stevens Act require that federal activities agencies provide a written response to this letter within 30 days of its receipt and, a preliminary response is acceptable if more time is needed. The final response must include a description of measures to be required to avoid, mitigate, or offset the adverse effects of the proposed activities. If the response is inconsistent with our EFH conservation recommendations, an explanation of the reason for not implementing the recommendations must be provided at least 10 days prior to final approval of the activities.

We are committed to providing continued cooperation and subject matter technical expertise as identified in the conservation recommendations, and as requested, to the EPA in order to achieve the project goals and sufficiently comply with the EFH provision of the MSA. Please do not hesitate to contact Stuart Goldberg (stuart.goldberg@noaa.gov) with any comments, questions or to request further technical assistance.

Sincerely,

Gerry Davis
Assistant Regional Administrator
Habitat Conservation Division

cc by e-mail:
Malia Chow, NMFS
Juliette Chausson, EPA
Brian Ross, EPA
Hudson Slay, EPA

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
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Gerry Davis
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National Marine Fisheries Service
Pacific Islands Regional Office
1845 Wasp Boulevard Building 176
Honolulu, Hawai‘i 96818

Re: EPA Response to NMFS EFH Conservation Recommendations for Continued Use of Five Existing Hawai‘i Ocean Disposal Sites

Dear Assistant Regional Administrator Davis:

On October 13, 2020 EPA transmitted an informal programmatic "EPA Analysis for ESA and EFH Consultation: Five Existing Hawai‘i Ocean Dredged Material Disposal Sites" to your office.[1] As described in that document, since the five Hawai‘i ocean disposal sites were designated in 1981, the Region 9 Ocean Dumping Management Program has been successful in managing these five Hawai‘i ocean disposal sites to avoid and minimize the effects of dredged material disposal on surrounding fisheries and aquatic habitat. As EFH consultation was not required at the time of designation, this analysis marked the informal initiation of consultation for the five Hawai‘i ocean disposal sites. We greatly appreciate the early and active coordination with your staff in helping us prepare, and now in reviewing, our analysis. This letter transmits EPA's responses to the Essential Fish Habitat (EFH) Conservation Recommendations included in your January 21, 2021 letter.

In general, EPA agrees with NMFS' proposed Conservation Recommendations (CR). As described in the attached document and based on conversations with your staff, we discuss how we will implement practicable solutions to address the intent of the original CRs. The CRs will be included, as appropriate, into an updated Site Management and Monitoring Plan (SMMP) for the five Hawai‘i ocean disposal sites, which will be published jointly with the U.S. Army Corps of Engineers (USACE). We agree that the CRs, as described in the attached document, are appropriate and feasible to implement, subject to available funding for future monitoring surveys.

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[1] The ESA portion of this informal programmatic consultation concluded with the November 27, 2020 letter from Ann Garrett, concurring with our determination that the proposed action is not likely to adversely affect a number of ESA-listed species and critical habitat managed by NMFS.

We look forward to completing this programmatic consultation covering the transport and disposal of dredged material to the five Hawai‘i ocean disposal sites and to hearing from NMFS as to whether the described measures adequately address the EFH recommendations. If there are any questions regarding this letter, please feel free to contact me or Juliette Chausson of my staff by e-mail (chausson.juliette@epa.gov) or by phone (415-972-3440).

Sincerely,

Ellen M. Blake
Assistant Director, Water Division

Enclosure: Conservation Recommendations for Five Hawai‘i Ocean Disposal Sites

cc: Malia Chow, NOAA NMFS
Stuart Goldberg, NOAA NMFS

U.S. EPA Responses to NMFS EFH Conservation Recommendations for Continued Use of Five Hawai‘i Ocean Disposal Sites February 22, 2021

In its letter dated January 21, 2021, NFMS included seven Conservation Recommendations (CRs) to protect Essential Fish Habitat (EFH) that could be affected by permitted ocean disposal of dredged material at five existing EPA-designated Hawai‘i ocean disposal sites: South O‘ahu, Hilo, Kahului, Nawiliwili, and Port Allen. Each of NMFS’s original CRs is reproduced below, followed by a description of the measures that EPA will undertake to address them. Please note that these CRs programmatically apply to the transport and disposal of dredged material at the five Hawai‘i ocean disposal sites, and to EPA’s management of those sites. Dredging site impacts may also occur and may require separate project-specific consultation. Any such consultation is conducted by USACE as part of their permitting process.

NMFS Conservation Recommendations and EPA Responses

Conservation Recommendation 1 (CR#1): ***EPA should continue to monitor dredged sediment disposal levels and chemical character in both the water column and along the benthos inside and outside of disposal site boundaries.***

EPA Response: *EPA agrees with this CR regarding benthic monitoring. However, we disagree that routine water column (disposal plume) monitoring is necessary or would be beneficial, for the reasons described below.*

Sediment Physical and Chemical Monitoring:
Research conducted by EPA and USACE since the inception of the MPRSA has shown that the greatest potential for environmental impact from dredged material is in the benthic environment. This is because deposited dredged material is not mixed and dispersed as rapidly or as greatly as the small portion of the material that remains temporarily in the water column. Additionally, bottom-dwelling animals live in, and feed on, deposited material for extended periods. Therefore, EPA monitoring of ocean disposal sites to-date has focused primarily on the benthic environment, including the sediment chemistry, physical characteristics of the benthos, and the benthic community. EPA will continue to periodically monitor the physical and chemical characteristics of dredged material disposed at the five Hawai‘i ocean disposal sites, both inside and outside of site boundaries.

Water Column Monitoring:
EPA does not routinely conduct water column monitoring in association with disposal events at deep ocean disposal sites, for several reasons. First, periodic site monitoring surveys can often occur several months, or even years, following a disposal event. Water column data collected even a few hours removed from a disposal event would not provide useful information about the location, duration, or chemistry of a disposal plume at a deep-water site, due to the plume’s rapid dispersion following a disposal event. This is particularly true for offshore, deep ocean disposal sites, such as the Hawai‘i sites, where initial dilution is rapid and disposal plumes dissipate to background levels quickly. Second, in contrast to the seafloor where potential

exposure to disposed sediment is long-term, exposure to disposal plumes in the water column is quite temporary. Third, standard pre-disposal sediment testing includes three separate suspended sediment toxicity bioassays. These tests ensure that no material is discharged that would be toxic to sensitive water column organisms after initial dilution. Finally, as summarized below, extensive water column monitoring studies at the San Francisco Deep Ocean Disposal Site (SF-DODS) in the past confirmed the lack of any lasting or large-scale water column impacts.

Past Water Column Monitoring at SF-DODS:
EPA conducted monitoring during disposal events at the San Francisco Deep Ocean Disposal Site (SF-DODS), which demonstrated that there are no distinguishable impacts to the water column from the disposal (McGowan et al, 2001; McGowan et al, 2003). For the first several years of disposal operations at SF-DODS (from 1996 – 2001[1]), regional monitoring of water column parameters and pelagic organisms (principally plankton and juvenile fish) was conducted seasonally each year. The monitoring surveys were focused on water quality parameters, including nutrients, and pelagic organisms, including species important to commercial and recreational fisheries, over a study area of about 25 square nautical miles centered on the SF-DODS. These studies characterized the distribution and abundance of species, and later assessed physiological condition of species, within and outside of the boundaries of the SF-DODS. The biological data were complemented by oceanographic measurements (i.e., physical and chemical seawater properties) in order to differentiate whether any patterns seen were caused by disposal of dredged materials or by naturally occurring variations in physical and chemical properties of seawater in the region. Analysis of the data showed no direct or indirect effects of disposal operations on population abundance, species distribution, or physiological condition of selected zooplankton, fish larvae, or juvenile fishes. Instead, regional oceanographic conditions and seasonal and interannual variability, including El Niño and La Niña events, appeared to be the major influences on the distribution and abundance of upper water column organisms.

Additionally, mid-water sediment traps and caged mussels were deployed to confirm plume movement and to evaluate the potential for bioaccumulation as a result of long-term exposure to repeated suspended sediment plumes (SAIC, 2001). The sediment trap and caged mussel studies confirmed that long-term bioaccumulation was not occurring via water-column exposure to suspended sediment plumes from repeated disposal events. Therefore, because these studies have demonstrated that disposal of suitable material does not have observable effects on organisms in the water column, EPA has since dedicated its limited monitoring resources primarily to benthic monitoring, and place emphasis instead on ensuring that water column testing is conducted for every project prior to determination of suitability.

For the reasons described above, EPA believes that including additional water column monitoring at the five Hawai‘i open water ocean disposal sites is not necessary and would not be beneficial. However, EPA will continue to ensure that water column tests are conducted as a component of standard pre-disposal testing for ocean disposal.

[1] For context, the SF-DODS received approximately 9.7 million cubic yards of dredged material in the six year period of this study (1996-2001), whereas all five Hawai‘i sites combined received a total of approximately 8.8 million cubic yards of material in the 30 year period since their designation (1981 – 2020) (USEPA, 2010).

Conservation Recommendation 2 (CR#2): ***EPA should develop a method to track/measure and determine whether dredged material disposed outside of disposal site boundaries is relic or new. This will help inform whether disposal activities need to be stopped and site boundaries reassessed.***

EPA Response: *EPA agrees with this CR and will continue to track depositions of dredged material both through periodic disposal site monitoring surveys and through satellite tracking of individual disposal events.*

EPA's site monitoring surveys include stations both inside and outside the five Hawai'i disposal sites to delineate the presence of dredged material. This monitoring generally involves using a sediment profile imaging camera (SPI), which provides a cross-sectional photographic record of selected locations on the seafloor. During image analysis, the thickness of the deposited sedimentary layers can be determined by measuring the distance between the pre- and post-deposition sediment–water interface. Recently deposited material is usually evident because of its different optical reflectance and/or color relative to the underlying material in the predisposal surface. Also, in most cases, the point of contact between the two layers is usually clearly visible as a textural change in sediment composition, facilitating measurement of the thickness of the newly deposited layer. Therefore, through analysis of the images collected with the SPI camera, EPA is able to determine the presence and physical characteristics of dredged material and evaluate whether the material has been recently deposited.

Surveys at the Hawai'i disposal sites indicated that the dredged material footprint was primarily contained within the site boundary, yet some material was detectable beyond the designated boundary to some extent at all sites. However, the quantities of dredged material present outside the sites are generally extremely low and primarily consist of "trace" layers (i.e., < 0.1cm). For example, at the Hilo disposal site, which is located within a bottomfish HAPC, only one station outside the site had an indication of dredged material greater than 0.1cm (see Figure 19 in USEPA 2015 (i.e., Enclosure 2 in the original consultation package)). The remaining few stations outside the site with indications of dredged material only had indications of "trace" dredged material. These results indicate that management measures, including the requirement of disposal being conducted within a smaller surface disposal zone, are effective at containing the dredged material within the ocean disposal sites.

In contrast, more dredged material is evident outside the South Oahu site boundaries than at the other Hawai'i sites. For example, a side-scan sonar survey of the Mamala Bay seafloor conducted by USGS showed the widespread presence of non-native sedimentary material, mainly centered on historic (pre-1981) ocean disposal site locations (the USGS imagery is shown in Figure 26 of USEPA 2015). In our EFH assessment, we state, "Results of the 2013 survey indicated that a detectable dredged material footprint extended outside of the South O'ahu site, however there have been no documented "short-dumps" (i.e., discharge or loss of dredged material during transit to an ocean disposal site, prior to arrival at the site) since EPA required satellite-based tracking of all disposal scows in the early 2000s, with the exception of a single partial mis-dump that occurred in 2006. Thus, the footprint outside the South O'ahu disposal site boundary would appear to be relic material deposited more than 10 years ago." In fact, the majority of this relic material was likely deposited more than 40 years ago.

Conservation Recommendation 3 (CR#3): ***If dredged material is substantially accumulating outside of site boundaries, EPA should assess if benthic habitat conversion is occurring.***

EPA Response: *EPA agrees with this CR. We will continue to monitor for any accumulation of dredged material outside of site boundaries, and in particular to evaluate whether any such accumulation is causing a shift in benthic habitat type.*

As mentioned above (CR#2), EPA monitors stations both inside and outside the five Hawaiʻi disposal sites to determine the presence of dredged material. This monitoring is conducted using a sediment profile imaging camera (SPI), which provides a cross-sectional photographic record of selected locations on the seafloor, as well as a plan-view camera that documents the habitat type immediately surrounding the SPI images. Through these images, EPA is able to determine the presence of dredged material and evaluate the extent to which the dredged material has been reworked into the native sediment through bioturbation.

Surveys at the Hawaiʻi disposal sites indicated that the dredged material footprint was primarily contained within the site boundary, yet some material was detectable beyond the designated boundary at all sites. However, the quantities of dredged material present outside the sites are generally extremely low and mostly consist of "trace" layers (i.e., < 0.1cm). The monitoring surveys also provided evidence that dredged material is reworked into the vertical sediment profile through bioturbation: benthic community analyses have confirmed that there are only minor differences in community structure between stations inside and outside the Hawaiʻi disposal sites. Further, many stations both inside and outside the sites had evidence of stage 3 benthic infauna, which are larger, later-stage recolonizers that are able to rework the sediment to depths of 20 cm or more. These results indicate that management measures, including the requirement of disposal being conducted within a smaller surface disposal zone, are effective at containing the dredged material within the ocean disposal sites and preventing changes to benthic communities outside of the disposal sites.

It is also important to highlight that EPA designates sites in areas that avoid impacts to the aquatic environment and to human uses of the ocean to the maximum extent practicable, including avoiding impacts to fisheries and shellfisheries. Generally, monitoring in and outside the five Hawaiʻi disposal sites has not revealed any presence of unique habitat or species that would require any additional protection measures. In fact, in the rare cases nationally when such habitat has been found, such as for the Charleston Ocean Dredged Material Disposal Site, EPA has immediately altered the boundaries of the site to ensure that disposal activities would not impact such areas. With respect to the Hawaiʻi ocean disposal sites, EPA did identify hardbottom habitat at south eastern stations that were far removed from the Hilo ODMDS. However, the stations with hard-bottom (H-SE6 and H-E5) did not have evidence of dredged material (see Figure 19 in USEPA, 2015), and stations along the same transect yet closer to the site had no indication of dredged material either, indicating that the dredged material footprint is largely contained within the site and not reaching the hard bottom habitat.

Conservation Recommendation 4 (CR#4): ***If benthic habitat conversion is occurring outside of site boundaries, EPA should assess whether this conversion is adversely affecting managed fisheries, including Bottomfish, Crustaceans, and Pelagic MUS.***

EPA Response: *EPA agrees with this CR and will work with NMFS to assess any impacts to benthic communities if monitoring surveys indicate habitat conversion is occurring outside disposal site boundaries as a result of permitted activities.*

EPA uses a tiered approach to monitoring to ensure that necessary information is collected in a cost-effective manner. In this tiered approach, results of either project-specific compliance monitoring (e.g., disposal vessel tracking) or periodic site monitoring surveys can trigger further monitoring, and/or consideration of whether management actions (discussed further under CR#5, below) are necessary to ensure environmentally acceptable conditions. Such a review could be triggered, for example, if substantial dredged material is being deposited outside the site boundary, if sediment chemistry values substantially greater than expected are found inside or outside the site boundary, or if there are indications that the offsite benthic community is being adversely affected by contaminants from the disposal site.

If EPA determines that there is substantial habitat conversion outside the boundaries as a result of permitted activities, then EPA will assess the extent of this conversion and how it may have impacted the benthic communities. If impacts to benthic communities are determined, then EPA will inform NMFS of the findings and will work with NMFS to determine whether further assessment or other management actions may be needed to protect managed fisheries in the area.

Conservation Recommendation 5 (CR#5): ***If assessments from CR#4 reveal that stocks of MUS are adversely affected by habitat conversion outside of dredge boundaries, then EPA should restore converted habitat or develop equitable compensation to offset for the loss of this habitat. NMFS is ready and willing to coordinate on any potential discussions.***

Note: Through coordination with NMFS staff, EPA understands that “dredge boundaries,” in this CR is intended to mean “disposal site boundaries.”

EPA Response: *EPA agrees with the intent of this CR, especially regarding any impacts that occur because of violations of ocean disposal site use conditions contained in permits issued by USACE, or violations of the MPRSA from any unpermitted discharges. However, EPA generally does not pursue benthic habitat restoration at deep ocean disposal sites because, for the most part, such restoration is not practicable. Similarly, EPA itself does not provide compensation for such impacts, although settlement agreements for violations may sometimes include supplemental environmental projects (SEPs) that can provide indirect compensation for impacts. Instead, EPA will consider a range of possible site management actions as discussed below. These management actions will also be considered for any significant adverse impacts that may occur due to permitted disposal activity.*

Once a dredging project is approved for ocean disposal at one of the Hawaiʻi sites, several measures are required to minimize the potential for any habitat conversion to occur outside of the disposal site boundaries. These measures are outlined in the SMMP and include: satellite tracking all disposal vessels to ensure that disposal activities occur only where and as required; sensors on all disposal vessels to ensure that there is no significant leakage or spilling of dredged material during transit to the disposal site, especially during transit through the nearshore zone where corals, seagrasses, and sensitive animals are most likely to be present; and online reporting of tracking and sensor information for each disposal trip.

Nevertheless, conversion of habitat outside of the ocean disposal site boundaries may occur as a result of violation of permit conditions. If the provisions of a permit are violated, the permit itself may be revoked or suspended. In addition, EPA may impose monetary penalties. Administrative penalties imposed by EPA under the MPRSA can be quite substantial and serve as an effective deterrent to ongoing ocean dumping violations. However, the MPRSA does not provide retain and use authority; under the Miscellaneous Receipts Act, fines and penalties are transmitted to the general treasury rather than for purposes of mitigating any damage in and around the ocean disposal site. Nevertheless, settlement agreements for violations may sometimes include supplemental environmental projects (SEPs) that can provide indirect compensation for impacts.

Conversely, if habitat conversion occurs due to permitted disposals having adverse effects outside of site boundaries, EPA may modify, suspend, or terminate site use overall (or for individual projects as appropriate). In general, EPA will modify site use rather than suspend or terminate site use, when modification will be sufficient to eliminate the adverse environmental impacts identified. More specifically, potential management actions outlined in the SMMP include:

- Additional investigations to confirm and delineate the source or extent of the problem, including additional site monitoring, as appropriate;
- Modification of the Surface Disposal Zone location or the seafloor boundaries of the site;
- Change to, or additional restrictions on, permissible times, rates and total volume of dredged material that may be disposed at a site;
- Change to, or additional restrictions on the method of disposal or transportation for disposal at a site;
- Change to, or additional limitations on the allowable type or quality of dredged materials based on their physical, chemical, toxicity, or bioaccumulation characteristics; or
- Permanent site closure if this is the only means for eliminating adverse environmental impacts.

EPA will inform NMFS of monitoring findings, and any additional management measures that EPA proposes to put in place to prevent future conversion.

Conservation Recommendation 6 (CR#6): ***EPA should ensure that SAP sediment sampling methods, designs, and data reporting requirements for permittees are statistically robust while ensuring that gradients in sediment types and size fractions and clearly depicted. If possible, consider including NMFS in early permit coordination discussions so that we can provide guidance on what permittees will need to include in their EFH assessments.***

EPA Response: *EPA agrees with the intent of this CR and will work with USACE to ensure that NMFS has the opportunity to review and comment on dredging project SAPs.*

Both EPA and USACE review and approve SAPs in advance of each dredging project to ensure that the samples to be tested are representative of the material to be dredged and disposed. The number and location of required sediment samples is determined in accordance with guidance in the joint EPA-USACE national ocean disposal testing manual and is based on bathymetry, the volume to be dredged, proximity to known or potential sources of contamination (such as outfalls, storm drains, repair yards, and industrial sites) and any past testing history. Individual samples may be composited for physical, chemical, and biological analyses within areas expected to be subject to the same pollutant sources and hydrodynamic factors (e.g., a single berth, or area within a harbor). These areas are usually contiguous and with similar grain sizes. Since the material in each composite area will get mixed when being placed into the disposal vessel, EPA generally makes a separate suitability determination for each composite area rather than for its individual cores. However, since individual cores are archived, higher-resolution analysis of physical or chemical parameters (such as grain size) can also occur where needed.

EPA supports the opportunity for NMFS to participate in early coordination discussions, including review of proposed SAPs. However, under the MPRSA, USACE is the permitting agency for ocean dumping of dredged material, subject to EPA concurrence. Therefore, EPA will work with USACE to encourage early coordination with NMFS.

Conservation Recommendation 7 (CR#7): ***EPA should consider supporting new research to understand how dredged material disposal may alter primary and secondary production rates in the water column, while evaluating shifts in phytoplankton and microbial community structure and function. This will help to inform how plumes may temporarily change ambient conditions and the flow of carbon and energy through the food web.***

EPA Response: *EPA does not believe that additional research into potential effects of temporary plumes from disposal of suitable dredged material at deep-water open ocean disposal sites is necessary or would be helpful. However, EPA will continue to ensure that water column tests with appropriate sensitive marine organisms are conducted as a component of suitability determinations for ocean disposal.*

As discussed for CR#1 above, EPA conducted extensive upper water column monitoring during disposal events at SF-DODS which demonstrated that there were no distinguishable impacts to water quality or water column organisms from ongoing disposal activity. Therefore, monitoring resources at deep water sites have since been dedicated primarily to benthic monitoring. Nevertheless, the potential for water column impacts is still addressed for every disposal project via required suspended phase testing conducted prior to determination of suitability. EPA will continue to ensure that water column tests with appropriate sensitive marine organisms are conducted as a component of suitability determinations for ocean disposal.

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U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Pacific Islands Regional Office
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March 5, 2021

Ellen Blake
Assistant Director, Water Division
U.S. EPA Region 9
75 Hawthorne Street
San Francisco, CA 94105

RE: National Marine Fisheries Service (NMFS) response to the Environmental Protection Agency's (EPA) February 24, 2021 essential fish habitat (EFH) conservation recommendations response letter for the Hawai'i five ocean-dredged material disposal sites EFH consultation.

Dear Ms. Blake,

On February 24, 2021, NMFS received the EPA's letter responding to our January 21, 2021 EFH conservation recommendations letter for the five existing Hawai'i ocean dredged material disposal sites consultation. We appreciate the strong coordination between our agencies and the detailed responses that you provided to the EFH conservation recommendations. Below, we respond to each of your responses to our EFH conservation recommendations. We have provided clarification text with regard to avoidance, minimization, and offset as described in the Magnuson-Stevens Fishery Conservation and Management Act (MSA), and have further detailed our position on researching water column sediment plumes. This consultation process has satisfied the requirements of Section 305(b)(D)(2) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA), and is considered complete. We hope to continue to engage in our coordination with you for this project in the future.

NMFS Responses

Conservation Recommendation 1 (CR#1): The EPA should continue to monitor dredged sediment disposal levels and chemical character in both the water column and along the benthos inside and outside of disposal site boundaries.

<u>EPA Response to CR#1:</u> EPA agrees with this CR regarding benthic monitoring. However, we disagree that routine water column (disposal plume) monitoring is necessary or would be beneficial, for the reasons described below.

NMFS Response: NMFS appreciates that the EPA will continue to monitor dredged sediment disposal levels and chemical character in the benthos. However, our CR was referring to how plumes may alter primary and secondary productivity in the upper 1000 m and how this may alter the flow of nutrients and energy available to support MUS at these sites.

We disagree with your position on the necessity of monitoring water column EFH. Phytoplankton and microbial communities drive the flow of energy within the water column, including the upper 1000 meters, which is designated as EFH in the Pacific Islands Region. The flow of energy is driven by primary and secondary producers and directly supports the availability of food for management unit species (MUS). The field of microbial (i.e., includes autotrophs and heterotrophs) genomics and metabolomics is advancing at incredible rates. We now understand that community structure and productivity of these microbes in the subtropical North Pacific varies as a function of energy and nutrient availability (Mende et al. 2017). Microbial activity oscillates over remarkably short timescales, with metabolic pathways turning on and off as a function of physiological and biogeochemical processes in natural populations (Wilson et al. 2017). Further, the recycling of nutrients and chemicals attached to and within particulate organic matter is a key process for transporting nutrients and energy to the mesopelagic zone (i.e., 100-1000 m). The nutrient and chemistry of these compounds can influence genetic diversity of the microbes congregating these particles, and thus the flow of energy and recycling of nutrients at depth (Pelve et al. 2017).

More research is needed to understand how disposal of dredged material may alter the magnitude and flow of energy in these open ocean sites. Dredged material consists of a variety of compounds and chemicals, and may be enriched in certain macronutrients (such as carbon, nitrogen, and phosphorus) and trace metals, depending on the source and extent to which it has undergone degradation. Plumes may stimulate primary and secondary productivity and alter the balance between heterotrophic and autotrophy along short timescales. Sediments can stick to particles, causing them to sink faster thereby changing the residence time of energy and calories available up the food chain within the mesopelagic and euphotic zones. Overall, our position remains that we, collectively, need to better understand how disposal of dredge plumes affects the flow of energy at these open ocean sites. We look forward to continuing this conversation with the EPA into the future.

Conservation Recommendation 2 (CR#2): The EPA should develop a method to track/measure and determine whether dredged material disposed outside of disposal site boundaries is relic or new. This will help inform whether disposal activities need to be stopped and site boundaries reassessed.

EPA Response: EPA agrees with this CR and will continue to track depositions of dredged material both through periodic disposal site monitoring surveys and through satellite tracking of individual disposal events.

NMFS Response: NMFS appreciates that the EPA agrees with this EFH conservation recommendation, and will continue to track the occurrence of disposal accumulation outside of disposal site boundaries.

Conservation Recommendation 3 (CR#3): If dredged material is substantially accumulating outside of site boundaries, the EPA should assess if benthic habitat conversion is occurring.

EPA Response: EPA agrees with this CR. We will continue to monitor for any accumulation of dredged material outside of site boundaries, and in particular to evaluate whether any such accumulation is causing a shift in benthic habitat type.

NMFS Response: NMFS appreciates that the EPA agrees with this EFH conservation recommendation, and will evaluate whether any such accumulation of disposed sediments monitored outside of the disposal site boundaries is causing a shift in benthic habitat type.

Conservation Recommendation 4 (CR#4): If benthic habitat conversion is occurring outside of site boundaries, the EPA should assess whether this conversion is adversely affecting managed fisheries, including Bottomfish, Crustaceans, and Pelagic MUS.

EPA Response: EPA agrees with this CR and will work with NMFS to assess any impacts to benthic communities if monitoring surveys indicate habitat conversion is occurring outside disposal site boundaries as a result of permitted activities.

NMFS Response: NMFS appreciates that the EPA agrees with this EFH conservation recommendation, and will work with NMFS to assess any impacts to benthic communities if monitoring surveys indicate habitat conversion is occurring outside disposal site boundaries as a result of permitted activities.

Conservation Recommendation 5 (CR#5): If assessments from CR#4 reveal that stocks of MUS are adversely affected by habitat conversion outside of dredge boundaries, then the EPA should restore converted habitat or develop equitable compensation to offset for the loss of this habitat. NMFS is ready and willing to coordinate on any potential discussions.

EPA Response: EPA agrees with the intent of this CR, especially regarding any impacts that occur because of violations of ocean disposal site use conditions contained in permits issued by USACE, or violations of the MPRSA from any unpermitted discharges. However, EPA generally does not pursue benthic habitat restoration at deep ocean disposal sites because, for the most part, such restoration is not practicable. Similarly, EPA itself does not provide compensation for such impacts, although settlement agreements for violations may sometimes include supplemental environmental projects (SEPs) that can provide indirect compensation for impacts. Instead, EPA will consider a range of possible site management actions as discussed below. These management actions will also be considered for any significant adverse impacts that may occur due to permitted disposal activity.

NMFS Response: NMFS appreciates the clarification and description in the response provided by the EPA. The MSA requires that Federal action agencies avoid, minimize, offset for, or otherwise mitigate potential adverse effects imparted by a project action. If such adverse effects to EFH from a project activity are substantial, then offsetting or otherwise mitigating these effects would be required for compliance with the MSA. NMFS recognizes the complexities for permitting and enforcing compliance at these sites. In the unlikely event that substantial adverse effects were to occur from a permitted action, NMFS would expect to coordinate closely with the EPA to identify and assess all potential avenues to ensure compliance with the MSA.

Conservation Recommendation 6 (CR#6): The EPA should ensure that SAP sediment sampling methods, designs, and data reporting requirements for permittees are statistically robust while ensuring that gradients in sediment types and size fractions and clearly depicted. If possible, consider including NMFS in early permit coordination discussions so that we can provide guidance on what permittees will need to include in their EFH assessments.

<u>EPA Response:</u> EPA agrees with the intent of this CR and will work with USACE to ensure that NMFS has the opportunity to review and comment on dredging project SAPs.

<u>NMFS Response:</u> NMFS greatly appreciates that the EPA will work with USACE to encourage early coordination with NMFS on dredging project Sampling and Analysis Plans (SAPs).

Conservation Recommendation 7 (CR#7): The EPA should consider supporting new research to understand how dredged material disposal may alter primary and secondary production rates in the water column, while evaluating shifts in phytoplankton and microbial community structure and function. This will help to inform how plumes may temporarily change ambient conditions and the flow of carbon and energy through the food web.

<u>EPA Response:</u> EPA does not believe that additional research into potential effects of temporary plumes from disposal of suitable dredged material at deep-water open ocean disposal sites is necessary or would be helpful. However, EPA will continue to ensure that water column tests with appropriate sensitive marine organisms are conducted as a component of suitability determinations for ocean disposal.

<u>NMFS Response:</u> NMFS appreciates that the EPA will continue to ensure that water column tests with appropriate marine organisms are conducted as a component of suitability determinations for ocean disposal. However, our CR was not referring to appropriate sensitive marine organismal research; rather, it was referring to how plumes may alter primary and secondary productivity in the upper 1000 m and how this may alter the flow of nutrients and energy available to support MUS at these sites.

Phytoplankton and microbial communities drive the flow of energy within the water column, including the upper 1000 meters, which is designated as EFH in the Pacific Islands Region. The flow of energy is driven by primary and secondary producers and directly supports the availability of food for management unit species (MUS). The field of microbial (i.e., includes autotrophs and heterotrophs) genomics and metabolomics is advancing at incredible rates. We now understand that community structure and productivity of these microbes in the subtropical North Pacific varies as a function of energy and nutrient availability (Mende et al. 2017). Microbial activity oscillates over remarkably short timescales, with metabolic pathways turning on and off as a function of physiological and biogeochemical processes in natural populations (Wilson et al. 2017). Further, the recycling of nutrients and chemicals attached to and within particulate organic matter is a key process for transporting nutrients and energy to the mesopelagic zone (i.e., 100-1000 m). The nutrient and chemistry of these compounds can influence genetic diversity of the microbes congregating these particles, and thus the flow of energy and recycling of nutrients at depth (Pelve et al. 2017).

More research is needed to understand how disposal of dredged material may alter the magnitude and flow of energy in these open ocean sites. Dredged material consists of a variety of compounds and chemicals, and may be enriched in certain macronutrients (such as carbon, nitrogen, and phosphorus) and trace metals, depending on the source and extent to which it has undergone degradation. Plumes may stimulate primary and secondary productivity and alter the balance between heterotrophic and autotrophy along short timescales. Sediments can stick to particles, causing them to sink faster thereby changing the residence time of energy and calories available up the food chain within the mesopelagic and euphotic zones. Overall, our position remains that we, collectively, need to better understand how disposal of dredge plumes affects the flow of energy at these open ocean sites. We look forward to continuing this conversation with the EPA into the future.

Conclusion

NMFS greatly appreciates the opportunity to coordinate with the EPA on this EFH consultation. We appreciate your thoughtful responses to our EFH conservation recommendations and have provided our own responses with the intent of clarifying our positions and furthering our future coordination. We are committed to providing continued cooperation and subject matter technical expertise as requested by the EPA in order to achieve the project goals and sufficiently comply with the EFH provision of the MSA. Please do not hesitate to contact Stuart Goldberg (stuart.goldberg@noaa.gov) with any comments, questions or to request further technical assistance.

Sincerely,

Gerry Davis
Assistant Regional Administrator
Habitat Conservation Division

cc by e-mail:
Malia Chow, NMFS
Juliette Chausson, EPA
Brian Ross, EPA
Hudson Slay, EPA

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
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Katherine Mullett
Field Supervisor
Pacific Islands Fish and Wildlife Office
Prince Kuhio Federal Building, Room 3-122
300 Ala Moana Blvd
Honolulu, HI 96850

Re: Programmatic ESA Consultation for Five Existing Hawaiʻi Ocean Dredged Material Disposal Sites

Dear Katherine Mullet:

The U.S. Environmental Protection Agency Region 9 (EPA) manages five ocean dredged material disposal sites (ODMDS) offshore of the Hawaiian Islands to allow for safe disposal of suitable sediment generated from necessary dredging of harbors and other navigation-related facilities. Continued availability of appropriately managed ODMDS is a priority for EPA, as it is necessary to maintain safe navigation. EPA originally designated these five sites via rulemaking in 1981, based on a 1980 Final EIS prepared through EPA Headquarters. The original Endangered Species Act (ESA) consultation focused on species managed by the NOAA Fisheries Service. Since the ODMDS were designated, conditions have changed, including new species and critical habitat listings. In order to provide for the continued protected of listed species and critical habitat, EPA reinitiated ESA consultation, working closely with both NOAA Fisheries and US Fish and Wildlife Service.

As described in the enclosed analysis, EPA has determined that the continued disposal of approved, suitable dredged material at these five ODMDS under a comprehensive Site Management and Monitoring Plan may affect but is not likely to adversely affect certain species listed as threatened or endangered under the ESA. The enclosed analysis describes the use of the sites, as well as regulations and management measures in place to avoid impacts to organisms and the environment. Also discussed is the extensive monitoring that EPA has conducted at the sites, the results of which indicate that existing management practices have been successful at avoiding and minimizing adverse impacts. Based on this analysis, we respectfully request that the US Fish and Wildlife Service concur with EPA's "may affect but is not likely to adversely affect" determination.

I greatly appreciate the assistance of your staff during our development of this consultation package, and we look forward to continuing to work closely with them. Please contact Juliette Chausson of my staff by e-mail (chausson.juliette@epa.gov) or by phone (415-972-3440) if there are any questions.

Sincerely,

Ellen M. Blake
Assistant Director, Water Division

Enclosure: EPA Analysis for ESA Consultation: Five Existing Hawai'i Ocean Dredged Material Disposal Sites

Cc: Lindsy Asman
Darren LeBlanc

EPA Analysis for ESA Consultation:

Five Existing Hawai‘i Ocean Dredged Material Disposal Sites

US Environmental Protection Agency
Region IX
75 Hawthorne Street
San Francisco, CA 94105

November 13, 2020

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List of Acronyms and Abbreviations

BMP – Best Management Practice

EIS – Environmental Impact Statement

ERL – Effects Range Low

ERM – Effects Range Median

ESA – Endangered Species Act

MBES – Multibeam Echosounder Survey

MPRSA – Marine Protection, Research, and Sanctuaries Act

NEPA – National Environmental Policy Act

ODMDS – Ocean Dredged Material Disposal Site

OTM – Ocean Testing Manual

PVP – Plan View Photography

SAP – Sampling and Analysis Plan

SDZ – Surface Disposal Zone

SMMP – Site Management and Monitoring Plan

SPI – Sediment Profile Imaging

TMDL – Total Maximum Daily Load

1.0 BACKGROUND

Currently, five EPA-designated ocean dredged material disposal sites (ODMDS) serve the state of Hawaiʻi. These sites are off the islands of Oʻahu, Hawaiʻi, Maui, and Kauaʻi (**Figure 1**). They range from 4 to 6.5 nautical miles (nmi) offshore, in waters from 1,100 to 5,300 feet (330 to 1,610 meters) in depth (**Table 1**). Each site includes a small Surface Disposal Zone (SDZ) within which all disposal actions must take place, as well as a larger site boundary on the seafloor where most of the sediment is intended to deposit after falling through the water column.

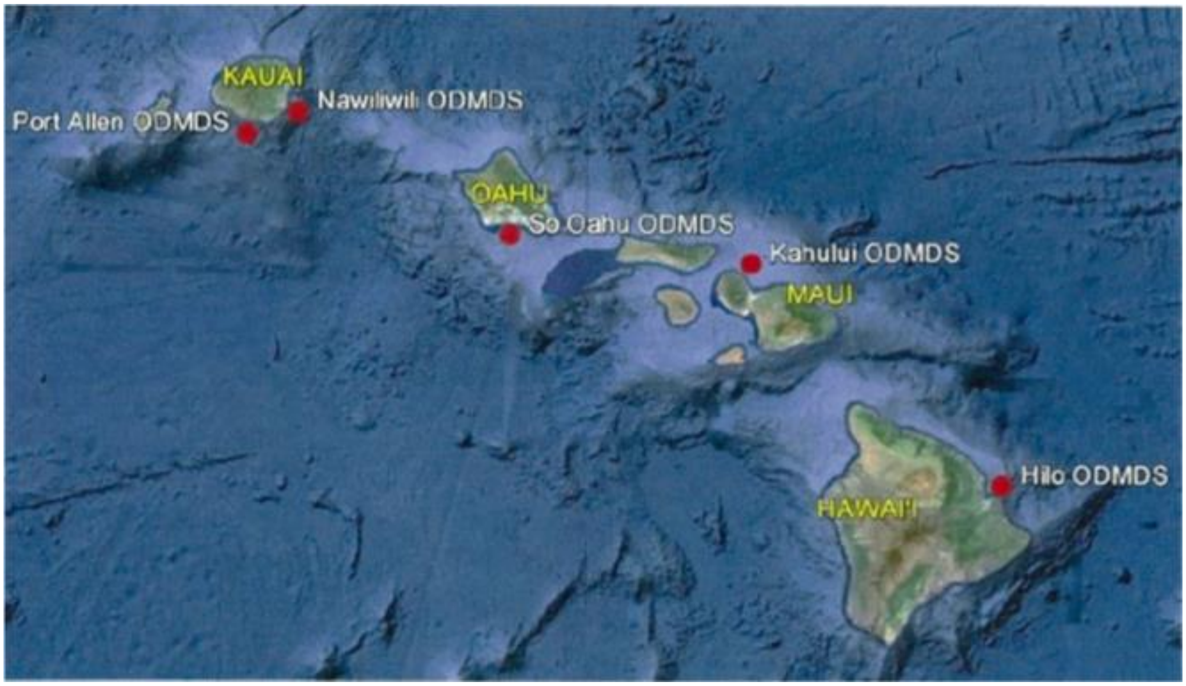

Figure 1. Vicinity map, showing the five existing Hawaiʻi EPA-designated ocean disposal sites.

Table 1. Dimensions and center coordinates for Hawaiʻi ocean disposal sites and their SDZs. The underlined text reflects an update to the 2015 Site Management and Monitoring Plan.

Disposal Site	Depth Range	Shape and Dimensions (Seafloor Footprint)	Surface Disposal Zone (SDZ) Dimensions	Center Coordinates (NAD 83)
South Oʻahu	375-475 m (1,230-1,560 ft)	Rectangular 2.0 (W-E) by 2.6 km (N-S) (1.08 by 1.4 nmi)	Circular 305 m (1000 ft) radius	21° 15' 10" N, 157° 56' 50" W
Hilo	330-340 m (1,080-1,115 ft)	Circular 920 m (3000 ft) radius	Circular 305 m (1000 ft) radius	19° 48' 30" N 154° 58' 30" W
Nawiliwili	840-1,120 m (2,750-3,675 ft)	Circular 920 m (3000 ft) radius	Circular, offset 200 m (600 ft) radius: [21° 55' 15" N 159° 17' 13.8" W]	21° 55' 00" N 159°17' 00" W
Port Allen	1,460-1,610 m (4,800-5,280 ft)	Circular 920 m (3000 ft) radius	Circular 305 m (1000 ft) radius	21° 50' 00" N 159° 35' 00" W
Kahului	345-365 m (1,130-1,200 ft)	Circular 920 m (3000 ft) radius	Circular 305 m (1000 ft) radius	21° 04' 42" N 156° 29' 00" W

The Hawaiʻi ocean disposal sites were designated together via rulemaking in 1981, based on a 1980 Final Environmental Impact Statement (EIS) completed by EPA Headquarters.[1] The original Endangered Species Act (ESA) consultation conducted as part of that action focused on the humpback whale, the Hawaiian monk seal, and the green sea turtle (species managed by NOAA Fisheries). EPA can find no records indicating that consultation occurred with the US Fish and Wildlife Service concerning three seabird species that were listed at that time and may be present near the existing Hawaiʻi ocean disposal sites: the short-tailed albatross (*Phoebastria albatrus*), the Hawaiian petrel (*Pterodroma sandwichensis*), and Newell's shearwater (*Puffinus newelli*). Since that time, one additional seabird species has been listed: the band-rumped storm-petrel (*Oceanodroma castro*). EPA is therefore now presenting an informal, programmatic ESA evaluation and determination for these four listed seabird species.

Dredged material disposal volumes in Hawaiʻi are quite modest, with a long-term annual average of just over 220,000 cubic yards (cy) being disposed at all five sites combined (and even less since 2000; **Table 2**; USACE 2020a). As a comparison, the other seven ocean disposal sites managed by EPA Region 9 receive an average total of approximately 3 million cy each year. The Hawaiʻi sites also differ among themselves in use, reflecting the differing dredging needs of each island. The South Oʻahu site, which serves US Navy facilities at Pearl Harbor as well as Hawaiʻi's main commercial port complex in Honolulu Harbor, is the most heavily used site, with at least some dredging and disposal occurring in 22 of the past 40 years. On average, disposal at the South Oʻahu site accounts for over 80% of all Hawaiʻi disposal. In recent years (since 2000), Hilo and Nawiliwili have been the next most frequently used sites (receiving ~9% and 8% of the total material, respectively), followed by Kahului (~2%). The Port Allen site has received no dredged material since 1999, however some disposal may occur in 2021.

The Marine Protection, Research and Sanctuaries Act (MPRSA) and EPA regulations call for careful alternatives analysis, design stipulations, and best management practices (BMPs) to reduce or eliminate potential adverse effects to marine resources (see **Section 3** for further details). For example, the regulations only allow suitable, non-toxic sediments to be discharged at EPA-designated ocean disposal sites; even when sediment is suitable for ocean disposal, it is only approved when there is no practicable alternative. In addition, the disposal site designation process itself is an important safeguard against any significant adverse impacts to marine resources, as EPA's site designation criteria explicitly lead EPA to identify disposal sites in locations removed from important habitat areas, fishing grounds, or other ocean uses, to the maximum extent practicable. Finally, ocean disposal sites are all managed under a Site Management and Monitoring Plan (SMMP) that enumerates any site-specific restrictions, limitations, or BMPs that may be needed to further minimize impacts of ocean disposal. While ocean disposal site designations themselves are completed via formal rulemaking and are typically permanent, SMMPs are meant to be updated as needed based on the results of required, periodic site monitoring, or on changed conditions such as updated consultations.

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[1] The 1980 FEIS and other referenced documents supporting this consultation are available via: https://www.epa.gov/ocean-dumping/managing-ocean-dumping-epa-region-9#hi

Table 2. Disposal volumes (cy) at the five Hawai‘i ocean disposal sites from 1981-2020 (Data source: EPA compliance tracking records and US Army Corps of Engineers Ocean Disposal Database (USACE, 2020a)).

Year	South O‘ahu	Hilo	Kahului	Nawiliwili	Port Allen	Total All Sites
1981						0
1982						0
1983	71,400			313,900		385,300
1984	2,554,600					2,554,600
1985	12,000					12,000
1986						0
1987	111,200					111,200
1988	57,400					57,400
1989	75,000					75,000
1990	1,198,000	80,000	58,000	343,000		1,679,000
1991	134,550					134,550
1992	233,000					233,000
1993				322,400		322,400
1994						0
1995						0
1996	27,800					27,800
1997						0
1998						0
1999	27,500		91,000	114,600	20,900	254,000
2000						0
2001						0
2002	53,500					53,500
2003	183,500					183,500
2004	540,000					540,000
2005		3,000				3,000
2006	160,400					160,400
2007	266,500					266,500
2008						0
2009	126,200					126,200
2010						0
2011	18,260	63,879				82,139
2012		70,981				70,981
2013	312,080					312,080
2014	351,920					351,920
2015						0
2016	53,900	118,300	57,200	64,700		294,100
2017						
2018						
2019	126,160			185,500		185,500
2020	235,000					235,000
Total 1981-2020	6,929,870	336,160	206,200	1,344,100	20,900	**8,837,230**
Average/year	182,365	8,404	5,155	33,603	523	**220,931**
Total 2000-2020	2,427,420	256,160	57,200	250,200	0	**2,990,980**
Average/year 2000-2020	121,371	12,198	2,724	11,914	0	**142,428**

EPA recently completed extensive monitoring surveys at each of the five Hawaiʻi ocean disposal sites. The South Oʻahu and Hilo sites (the most heavily-used of the Hawaiʻi sites) were the first to be monitored, in 2013. The 2015 EPA synthesis report summarizing the results of that monitoring is included as **Appendix 1**. Based on the monitoring results, EPA updated the SMMP for all the Hawaiʻi sites in 2015 (**Appendix 2**). Similar monitoring surveys were also completed for the Nawiliwili, Port Allen, and Kahului sites in 2017[2], and the SMMP for these sites will be updated again based on those monitoring results and on the outcome of this ESA consultation with your office.

2.0 THE FIVE HAWAIʻI OCEAN DISPOSAL SITES

This programmatic consultation update is being conducted for the five existing Hawaiʻi ocean disposal sites. Continued use of these existing disposal sites is critical to national defense and the maritime-related economy of the State of Hawaiʻi. The sites will continue to be used only for the disposal of suitable, non-toxic sediment dredged by USACE from the federally authorized navigation channels in Hawaiʻi's harbors, as well as for disposal of suitable, non-toxic dredged sediment from other permitted navigation dredging projects in Hawaiʻi, including by the US Navy (refer to **Section 3.2** for more details on sediment testing and suitability determination). Future disposal operations at the sites will continue to meet all criteria and factors set forth in the Ocean Dumping regulations published at 40 CFR Parts 228.5 and 228.6. Ocean disposal will also continue to occur under the terms of an SMMP that sets forth BMPs in the form of enforceable permit conditions, as well as site monitoring requirements and contingency actions, should any adverse impacts be identified. Continued use of the five existing Hawaiʻi sites will not in and of itself increase the need for dredging or disposal in Hawaiʻi.

3.0 NEGLIGIBLE IMPACTS TO DATE

Theoretically, ocean disposal of dredged material may have the potential to cause direct short-term adverse effects to living marine resources in the water column and long-term effects to seafloor habitats and species through increased turbidity, sedimentation, and contaminants. This in turn has the potential to indirectly adversely affect various life stages of ESA-listed species that may depend on marine organisms for subsistence. Additionally, certain ESA-listed seabird species may be attracted to, or disturbed by, disposal vessel operations. However, EPA's disposal site selection, site management, and project evaluation processes are intended to ensure that ocean disposal produces no long-term, adverse impacts to the marine environment and associated species. Specifically, EPA requires evaluation of disposal sites prior to designation, determination of the need for ocean disposal, strict testing of sediments proposed for disposal, and management and monitoring of the sites to ensure that permit conditions are met, the sites are performing as expected, and no long-term adverse effects are occurring to the marine environment. Further, the low quantity and short nature of disposal operations greatly reduce the likelihood of potential interactions with ESA-listed species. More detail is provided in in the following sections.

[2] A synthesis report is not yet available for the 2017 monitoring work, but the key results are discussed in this consultation document, and preliminary chemistry results are available in **Appendix 3**.

3.1 Disposal Site Designation

EPA's ocean disposal site designation process includes criteria for avoiding impacts to the aquatic environment and to human uses of the ocean to the maximum extent possible, within an economically feasible transport distance from the area where navigation dredging must occur. The site designation process and regulations (promulgated under the MPRSA and the National Environmental Policy Act (NEPA) independently require evaluation of a variety of factors that minimize the potential effects of disposal on marine species and their habitat. The MPRSA regulations at 40 CFR Part 228.5 – 228.6, include the following disposal site selection criteria to avoid or minimize impacts on marine species and their habitats:

- Disposal activities must avoid existing fisheries and shellfisheries (228.5(a));
- Temporary water quality perturbations from disposal within the site must be reduced to ambient levels before reaching any marine sanctuary or known geographically limited fishery or shellfishery (228.5(b));
- The size of disposal sites must be minimized in order to be able to monitor for and control any adverse effects (228.5(d));
- Where possible, disposal sites should be beyond the edge of the continental shelf (228.5(e));
- The location of disposal sites must be considered in relation to breeding, spawning, nursery, feeding or passage areas of living resources in adult or juvenile phases (228.6(a)(2));
- Dispersal and transport from the disposal site be must considered (228.6(a)(6));
- Cumulative effects of other discharges in the area must be considered (228.6(a)(7));
- Interference with recreation, fishing, fish and shellfish culture, areas of special scientific importance and other uses of the ocean must be considered (228.6(a)(8)); and
- The potential for development or recruitment of nuisance species must be considered (228.6(a)(10)).

Taken together, the site selection criteria are intended to ensure that EPA's ocean disposal site designations avoid direct and indirect impacts to marine species or supporting marine habitat to the maximum extent practicable, before any actual dredged material disposal is permitted. Based on these site selection criteria, the five Hawai‘i sites were identified as the environmentally preferred alternative locations serving each of the five main Hawai‘i port areas.

3.2 Dredged Material Testing

In addition, EPA's regulations establish strict criteria for evaluating whether dredged material is suitable for ocean disposal (40 CFR Part 227.5-9). The regulations specify that certain prohibited constituents, such as industrial wastes or high-level radioactive wastes, may not be disposed in the ocean at all, while other constituents, such as organohalogen compounds or mercury, may only be discharged if they are present in no more than "trace" amounts that will not cause an unacceptable adverse impact after dumping. "Trace" is determined by passing a series of bioassays that address the potential for short- and long-term toxicity and bioaccumulation. EPA and USACE have jointly published national sediment testing guidance for conducting these evaluations in advance of dredging, called the "Ocean Testing Manual," (OTM) (EPA, 1991).

Sampling and Analysis Plans

EPA and USACE review and approve sampling and analysis plans (SAPs) in advance of each dredging project to ensure that the samples to be tested are representative of the material to be dredged. The number and location of required sediment samples is informed by the volume to be dredged and past testing history, but specific attention is focused on sampling near known or potential sources of contamination such as outfalls, storm drains, repair yards, and industrial sites. Individual samples may be composited for analysis only within contiguous areas expected to be subject to the same pollutant sources and hydrodynamic factors (e.g., a single berth in a harbor). Representative sediment collected pursuant to an approved SAP is then subjected to chemistry evaluations, toxicity bioassays (for short-term water column and longer-term benthic impacts), and bioaccumulation tests, as described below. The results are then compared to the same tests conducted with reference site sediment (Note: The approved reference sediment for the Hawaiʻi sites is specified in the SMMP).

Sediment Chemistry Testing

An extensive list of potential contaminants of concern is measured in each sediment sample or composite, and in the reference sediment. Standard analytes and the associated recommended laboratory methods and target detection limits are listed in the SMMP. These include "conventional" properties such as grain size and organic carbon content, as well as heavy metals, organotins, hydrocarbons, pesticides, poly-chlorinated biphenyls, and dioxins/furans. EPA and USACE can add compounds to this standard list whenever deemed necessary. Sediment chemistry results can be compared against various sediment guidelines (such as NOAA's effects range low (ERL) and effects range median (ERM) values) to help inform the biological testing. However, there are no "bright-line" sediment quality standards in the way that there are for water quality standards. Therefore, sediment chemistry results alone are rarely adequate to determine whether a sediment "passes" or "fails" for ocean disposal suitability.

Water-Column Testing

In contrast to the seafloor where potential exposure to disposed sediment is long-term, exposure to disposal plumes in the water column is temporary. Nevertheless, to be "suitable" for ocean disposal, water column assessments must confirm that temporary exposure to the suspended sediment immediately following disposal will not exceed applicable marine water-quality criteria or cause toxicity to representative sensitive marine organisms after allowance for initial mixing and dilution. For each tested sediment sample, organisms are exposed to a series of concentrations of elutriate (water plus suspended particulates) to determine the toxic concentration (LC50). A 100-fold safety factor is then applied, such that after initial mixing the water column plume may not exceed 1% of the LC50 for the most sensitive organism tested. Three separate water-column bioassays are conducted, with one species being a phytoplankton or zooplankton, one a larval crustacean or mollusc, and one a fish. Species must be chosen from among a list of sensitive standard test species listed in the national manual or specified in regional guidance.

All the Hawaiʻi disposal sites are offshore, in relatively deep water, where initial dilution is rapid and disposal plumes dissipate to background levels quickly. Although potential water column effects are assessed for every proposed project as described, water column testing alone has rarely, if ever, "failed" a project for ocean disposal at any of the Hawaiʻi sites. Therefore, the potential for direct effects to water column species, including potential seabird prey species, is considered insignificant. Similarly, cumulative water column effects are not expected because discharges from disposal vessels typically occur over only a few minutes, and individual disposal events are at least several hours apart, even in the most active circumstances.

Benthic Testing

For the benthic toxicity assessment, at least two "solid phase" bioassays are conducted. For these tests, sediment-associated species must be used that together represent key exposure routes including filter-feeding, deposit-feeding, and burrowing life histories. Again, the test species must be chosen from among a list of sensitive standard test species listed in the national manual (i.e., the OTM) or regional guidance. If organism mortality is statistically greater than in the reference sediment and exceeds reference sediment mortality by 10% (20% for amphipods), the sediment is considered potentially toxic and may not be approved for ocean disposal. Solid phase benthic toxicity is usually the cause when sediments "fail" for ocean disposal.

Bioaccumulation Testing

Bioavailability – the potential for contaminants to move from the sediment into the food web – must also be evaluated in advance for each dredging project. Bioaccumulative contaminants are selected and evaluated by EPA for each project based on their presence in the test sediment. Benthic organisms are then exposed to the sediment (usually for 28 days), and concentrations of the contaminants of concern taken into the tissues are measured. The tissue concentrations are then compared against concentrations in tissues of the same species exposed to the reference sediment. Depending on results, tissue concentrations may also be used in trophic transfer models, and/or compared against available benchmarks such as any relevant total maximum daily loads (TMDLs), state or local fish consumption advisories, and Food and Drug Administration (FDA) "Action Levels for Poisonous or Deleterious Substances in Fish and Shellfish for Human Food."

"Tier IV" Testing

In the rare circumstance when the standard testing described above is unable to support a suitability determination for ocean disposal, the presumptive conclusion is that the sediment is not suitable, and ocean disposal may not be approved. However, if the dredger wishes, additional non-standard testing may be approved by EPA and USACE. Described in the OTM as "Tier IV" testing, this can include any evaluations EPA deems necessary to generate adequate information. For example, Tier IV can involve more or different kinds of bioassays such as chronic sublethal tests or steady-state bioaccumulation tests, detailed site-specific risk assessments, or forensic toxicity testing procedures (TIEs, etc.). Because Tier IV testing is "open ended," it can be quite expensive, and there is no guarantee that it will result in sediment being approved for ocean disposal. Thus, it is rarely applied in practice.

3.3 Alternatives Analysis

EPA's regulations restrict ocean disposal of dredged material by outlining factors for evaluating the need for ocean disposal and requiring consideration of alternatives to ocean disposal (40 CFR Part 227.14-16). Alternatives to ocean disposal, including beneficial uses of dredged material, are considered on a project-by-project basis to ensure that the minimum necessary volume of dredged material is disposed at any of the ocean disposal sites. Generally, alternatives to ocean disposal in the islands are more limited than on the mainland. However, even sediments that have been adequately characterized and found by EPA and USACE to be suitable for ocean disposal will not be permitted for ocean disposal if there is a practicable alternative available. For example, clean sand that is otherwise suitable for ocean disposal generally will not be permitted for disposal if it can be feasibly used to nourish local beaches.

3.4 Disposal Site Management: Best Management Practices

In addition to careful site selection, extensive sediment testing prior to dredging, and evaluation of disposal alternatives, EPA actively manages ocean disposal sites to further minimize effects. Once a dredging project is approved for ocean disposal at one of the Hawaiʻi sites, additional management measures are taken to continue to minimize the potential for adverse effects. These management measures, outlined in the SMMP for the Hawaiʻi sites (2015; **Appendix 2**), include:

- a variety of disposal BMPs as enforceable permit conditions for each project;
- satellite tracking all disposal vessels to ensure that disposal activities occur only where and as required (**Figure 2**);
- sensors on all disposal vessels to ensure that there is no significant leakage or spilling of dredged material during transit to the disposal site, especially during transit through the nearshore zone where corals, seagrasses, and sensitive animals are most likely to be present; and
- tracking and sensor information reported online for each disposal trip.

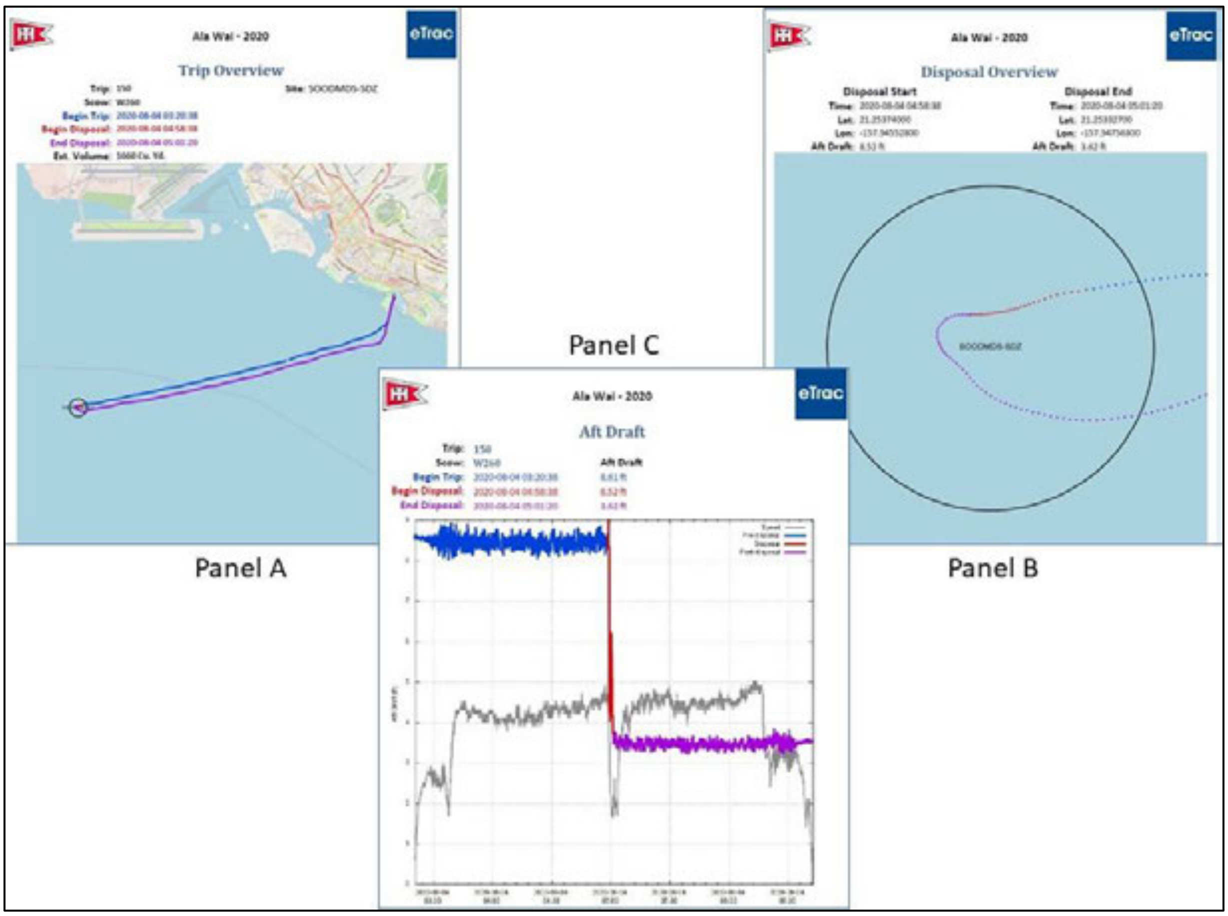

Figure 2. Example of a tracking report for an individual disposal trip. Panel A shows the vessel's route to and from the disposal site, with the blue line indicating the vessel is loaded and purple indicating it is empty following disposal. Panel B is a closeup of the disposal site's SDZ, showing the disposal (in red) occurring fully within the zone. Panel C shows the vessel's draft and speed throughout the trip, confirming no substantial loss of material from the vessel during transport.

3.5 Disposal Site Management: Site Monitoring

Monitoring Methods

As a critical component of site management, EPA periodically conducts surveys of disposal sites to confirm that no adverse, physical, chemical, or biological effects occur outside the disposal site, and that primarily physical effects occur within site boundaries. Research conducted by EPA and USACE since the inception of the MPRSA has shown that the greatest potential for environmental impact from dredged material is in the benthic environment. This is because: 1) deposited dredged material does not mix and disperse as rapidly or as greatly as the portion of the material that may remain in the water column, and 2) bottom-dwelling animals live within, and feed on, deposited material for extended periods. Therefore, EPA monitoring of ocean disposal sites has focused primarily on the benthic environment, including the sediment chemistry, physical characteristics of the benthos, and the benthic community. EPA conducted extensive site monitoring surveys of the Hawaiʻi ocean disposal sites in 2013 and 2017 (see **Appendix 1** for the final report from the 2013 monitoring surveys and **Appendix 3** for the preliminary chemistry results from the 2017 survey). During these surveys, EPA used a variety of methods to achieve the monitoring objectives, including high-resolution multibeam echosounder surveys (MBES), sediment profile imaging (SPI) and plan view photography (PVP), and sediment grabs for sediment chemistry and benthic infauna sampling.

MBES surveys were successfully conducted for the Nawiliwili, Kahului, and Port Allen sites in 2017 to assist in selecting survey stations for the SPI-PVP and sediment grab sampling (**Figure 3**). MBES surveys were also planned for the South Oʻahu and Hilo sites in 2013, but they could not be executed due to equipment issues on the vessel. In the absence of the MBES survey data, analysis of the SPI-PVP imagery (described below) was used to map the horizontal and vertical extent of the dredged material footprint and to select stations for the sediment chemistry and benthic infauna sampling for the South Oʻahu and Hilo sites.

The SPI-PVP system provides a surface and cross-sectional photographic record of selected locations on the seafloor to allow a general description of conditions both on and off dredged material deposits (**Figure 4**). SPI-PVP surveys were conducted for each ocean disposal site to delineate the horizontal extent of the dredged material footprint both within and outside the site boundaries, as well as the status of benthic recolonization. With resolution on the order of millimeters, the SPI system is more useful than traditional bathymetric or acoustic mapping approaches for identifying a number of features, including the spatial extent and thickness of the dredged material footprint over the native sediments of the seabed, the level of disturbance and recolonization as indicated by the depth of bioturbation, the apparent depth of the redox discontinuity, and the presence of certain classes of benthic organisms. PVP is useful for identifying surface features in the vicinity of the SPI photos, thereby providing important surface context for the vertical profiles at each station.

Additionally, sediment samples were collected from a subset of stations at each disposal site using a stainless steel double Van Veen sediment grab capable of penetrating a maximum of 20 cm below the sediment surface. The samples were analyzed for sediment grain size, chemistry, and benthic community parameters.

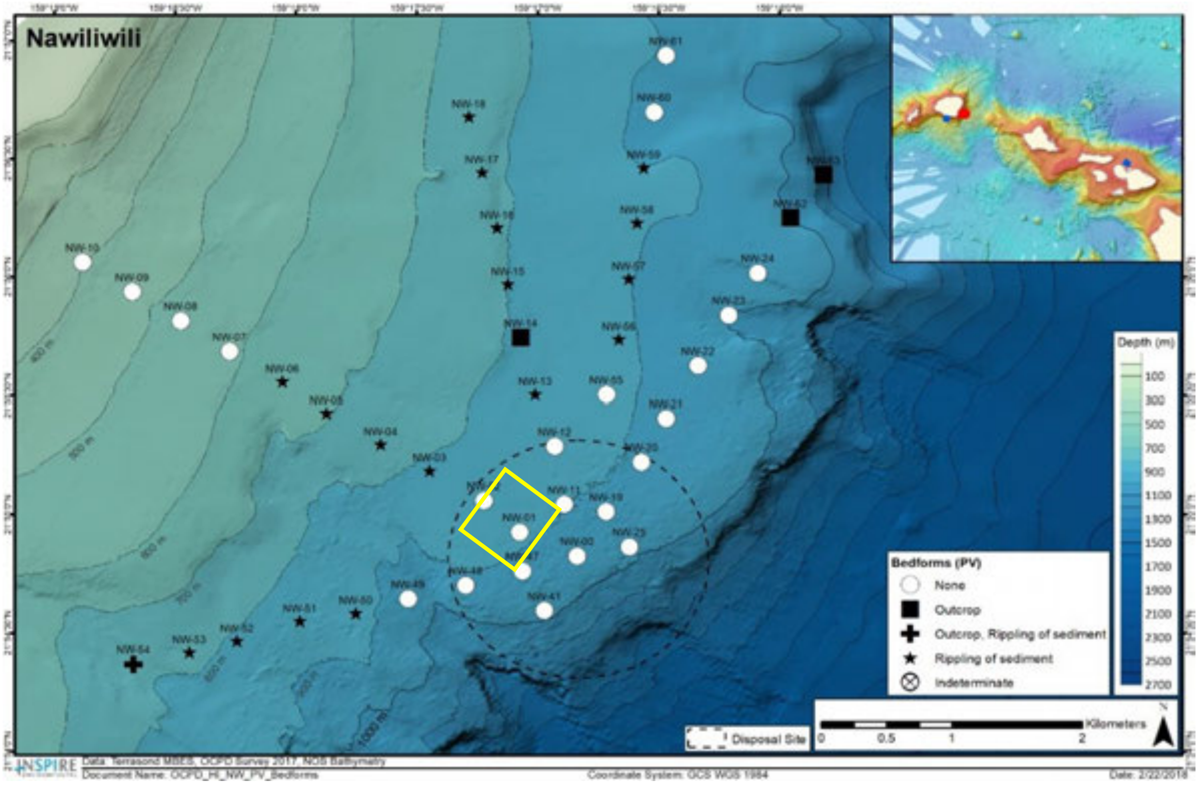

Figure 3. High-resolution bathymetry in the vicinity of the Nawiliwili disposal site. The hard-bottom habitat and a volcanic escarpment in the southeastern portion of the site precluded benthic sampling in that area. The yellow box indicates the target for the general area in which the SDZ would later be repositioned (see Figure 5 for final SDZ placement).

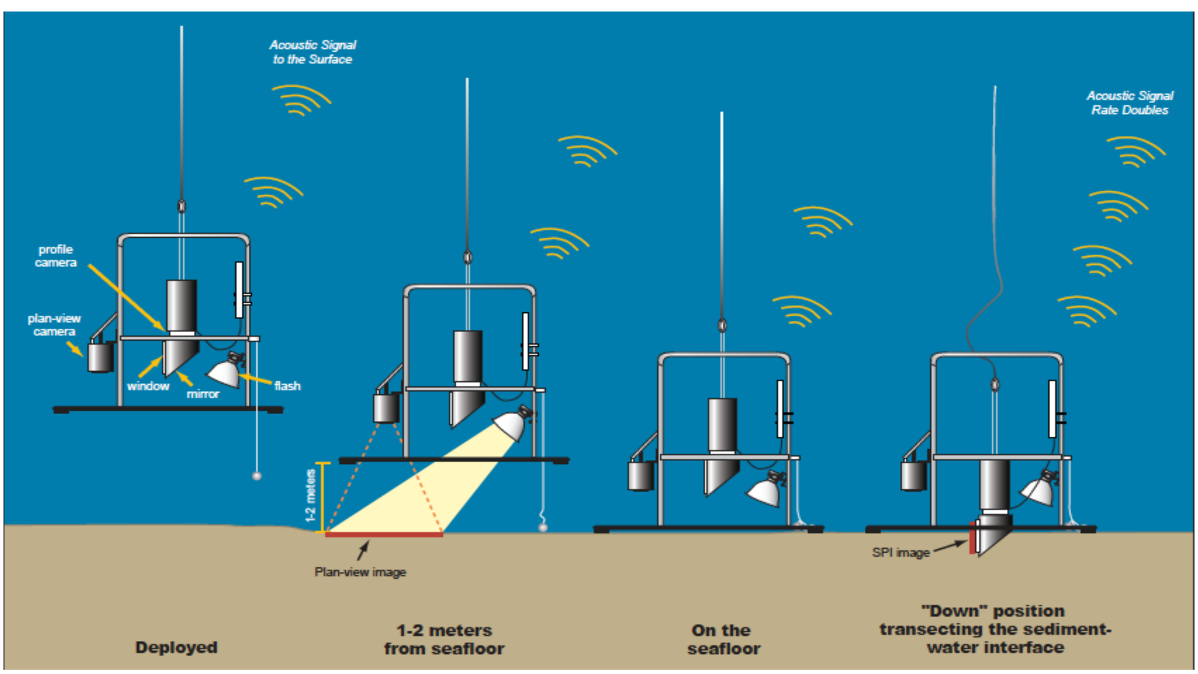

Figure 4. Schematic of deployment and collection of SPI-PVP photographs (Appendix 1).

Finally, a sub-bottom profiling survey was conducted at the South O‘ahu site. The primary purpose of this survey was to collect cross-sectional images of the native sediment layers and layers indicative of the dredged material deposit across a wide area surrounding the South O‘ahu ocean disposal site. This type of survey allowed EPA to separately estimate the cumulative volume of dredged material disposed at the South O‘ahu site, compared to volumes permitted for disposal. The South O‘ahu site was selected for the survey, because it receives the most dredged material out of the five Hawai‘i ocean disposal sites.

Monitoring Results

Sediment chemistry. Sediment samples from both inside and outside each of the five Hawai‘í disposal sites were collected successfully and analyzed for the same compounds evaluated during pre-disposal testing. The bulk chemistry data from the 2013 monitoring surveys showed generally low, but variable, concentrations of most chemical constituents at the South O‘ahu and Hilo sites (the most frequently used sites) (**Appendix 1**). The few concentrations above screening levels were relatively minor in magnitude and, in many cases, were seen at stations both inside and outside the sites. The few constituents that were at higher concentrations within the disposal sites reflect the contaminant levels in the dredged material approved for discharge. Because sediments that contain pollutants in toxic amounts, or elevated levels of compounds that may bioaccumulate in benthic organisms, are prohibited from ocean disposal, the chemical concentrations identified are not considered to represent a risk of environmental impacts in and of themselves. Instead, these low concentrations indicate that the pre-dredge sediment testing regime is adequately protecting the environment of the disposal sites by identifying and excluding more highly contaminated sediments from being disposed. Sediment chemistry was also collected at the Nawiliwili, Kahului, and Port Allen ocean disposal sites, and is currently being analyzed for results (preliminary results are available in **Appendix 3**). Preliminary screening indicates that, similar to the South O‘ahu and Hilo sites, the majority of chemical concentrations fell below the ERL, and the few concentrations above screening levels were relatively minor in magnitude and, in most cases, were seen at stations both inside and outside the sites.

Physical substrate. Physical substrate was assessed primarily through SPI-PVP imagery. Monitoring confirmed that minor physical (substrate) changes have occurred at the disposal sites compared to pre-disposal baseline data from 1980. Results of the 2013 survey indicated that a detectable dredged material footprint extended outside of the South O‘ahu site, however there have been no documented “short-dumps” (i.e., discharge or loss of dredged material during transit to an ocean disposal site, prior to arrival at the site) since EPA required satellite-based tracking of all disposal scows in the early 2000s, with the exception of a single partial mis-dump that occurred in 2006. Thus, the footprint outside the South O‘ahu disposal site boundary would appear to be relic material deposited more than 10 years ago. At the Hilo site, the substantially smaller cumulative volume of dredged material disposed (**Table 2**) appeared to be more fully confined within the designated disposal site boundary.

The results of the 2017 survey indicated that recently disposed dredged material, including coral and pebble rubble, was present on the seafloor surface within and near the Nawiliwili ocean disposal site. However, the commonplace presence of coral rubble and other coarse materials and sands at the seafloor surface across the survey area confounded definitive delineation of the dredged material footprint. Surveys at Port Allen and Kahului also indicated that the dredged material footprint was primarily contained within the site boundary, yet some material was detectable beyond the designated boundary to some extent at both sites. Again, because EPA has required satellite-based tracking of all disposal scows since the early 2000s, and mis-dumping has not occurred at least since then, the dredged material observed outside the sites is also assumed to be relic material. Additionally, due to benthic activity, dredged material was witnessed to have been reworked into the sediment. For example, all material at the Port Allen ocean disposal site was observed to have been reworked into the sediment column by biota to some extent and no thick deposits were observed.

Benthic community. The benthic community was assessed through both SPI imagery and sediment grab samples. Overall, the changes in substrate may partially account for minor differences in infaunal assemblages found during the 2013 monitoring at the South Oʻahu and Hilo sites (the most heavily used of the Hawaiʻi disposal sites). However, minor benthic community changes were also seen outside those disposal sites and so appear to be partially attributable to region-wide variability as well. In addition, there were no apparent adverse effects to the infaunal community associated with the presence of dredged material at the Kahului and Port Allen ocean disposal sites. The vast majority of stations across both survey areas supported stable benthic structure or advanced stages of infaunal recolonization. The presence of advanced recolonization at stations containing dredged material indicates that the benthic community has recovered at these locations post-disposal activity. Because the Nawiliwili site was so heterogeneous, benthic community grab samples were not successfully collected inside the site for comparison to the benthic community outside the site. However, the one SPI replicate that achieved sufficient penetration near the center of the Nawiliwili site indicated the presence of stage 3 (advanced) fauna. Additionally, as previously mentioned, disposal volumes at Nawiliwili are relatively low, and preliminary screening of chemistry results indicated that dredged material disposed did not appear to result in contaminant loading, as most of the contaminants were below the ERL, and the few concentrations above screening levels were found both inside and outside of the site. Therefore, all available results from Nawiliwili indicate that dredged material disposed did not adversely affect the benthic environment. In summary, monitoring at all five sites confirmed that recolonization begins soon after dredged material is deposited, and that similar infaunal and epifaunal communities occupy areas both inside and outside the disposal sites. Thus, long-term impact to benthic habitat quality are considered insignificant and largely contained within the site boundaries.

3.6 Disposal Site Management: An Adaptive Approach

Ongoing use of the five existing Hawaiʻi ocean disposal sites will not increase the need for dredging in Hawaiʻi, nor the amount of ocean disposal of dredged material that occurs. It is therefore expected that there would similarly be a lack of significant impacts in the future, provided that the ocean disposal sites continue to be managed under the same or similar requirements. EPA proposes to continue managing the five existing Hawaiʻi disposal sites under site use conditions and BMPs that are substantially the same as those currently in place (see **Appendix 2**). The only substantive change in site management is the recent relocation of the SDZ within the existing Nawiliwili site, as shown in **Figure 5**, and as incorporated in permit conditions for the site. [3] This change was made based on the results of the 2017 monitoring survey, which identified hard-bottom habitat (including a volcanic escarpment, marking the ancient shoreline) in the southeastern portion of the Nawiliwili site (**Figure 3**). The relocated SDZ will avoid future deposition of sediment on the hard-bottom habitat and facilitate future monitoring of dredged material discharges on the natural sediment habitat in the northwestern portion of the site. This relocation of the SDZ is an example of EPA's adaptive approach to site management.

[3] The new SDZ will also be reflected in the updated SMMP, to be published following completion of these consultations.

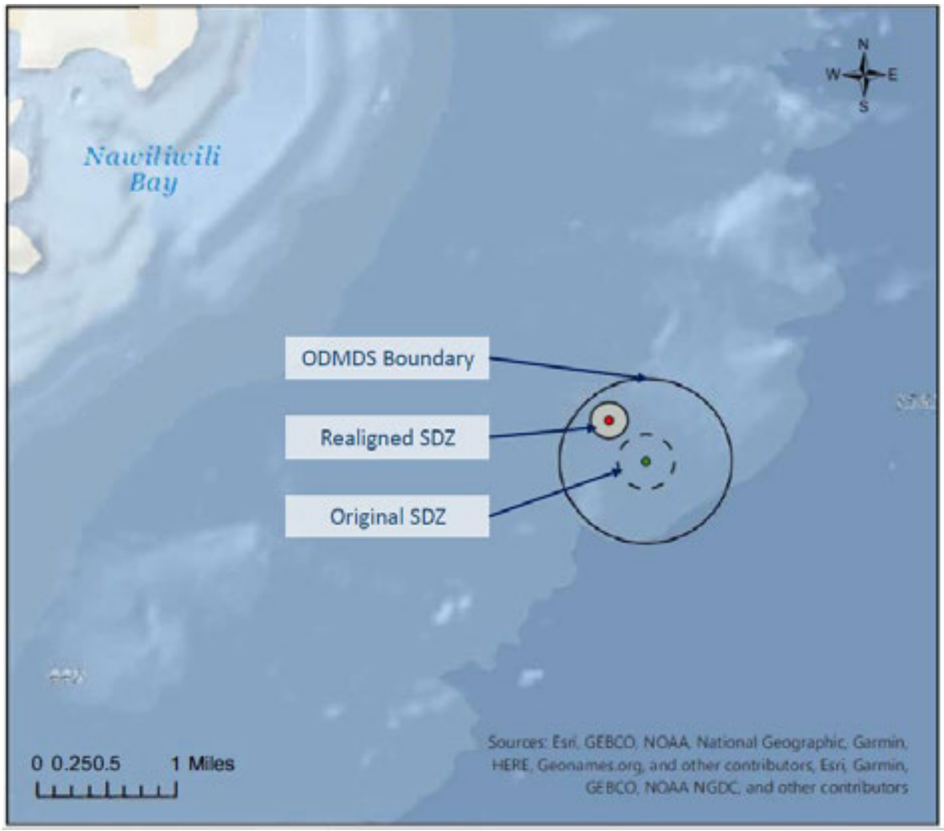

Figure 5. The Nawiliwili disposal site, showing the realigned SDZ. EPA has moved the SDZ to avoid deposition over hard-bottom habitat and facilitate monitoring of disposed sediments.

3.7 Enforcement

In addition to active, adaptive management of the five Hawaiʻi ocean disposal sites, EPA has strong enforcement authority under the MPRSA for any violations related to disposal operations. Violations may include dumping of unauthorized materials, dumping of materials in excess of authorized amounts, dumping outside of designated sites, and spills or leaks from hopper dredges or scows during transit to the ocean disposal sites. EPA authorities apply to violations of the MPRSA itself (for unpermitted dumping) or of an MPRSA permit, (including violations relating both to dumping and transportation for the purpose of dumping). If the provisions of a permit are violated, the permit may be revoked or suspended; even if the permit is not revoked, the MPRSA authorizes EPA to require ocean dumping activities to immediately cease when violations are imminent or continuing. EPA may even suspend the use of the ocean disposal site altogether, if necessary. In addition to ensuring that ongoing violations are stopped, EPA may impose monetary penalties when ocean dumping violations occur. Administrative penalties imposed by EPA under the MPRSA can be quite heavy and serve as an effective deterrent to ongoing ocean dumping violations. Consequently, it is rare that EPA is forced to refer an ocean dumping case for judicial or criminal penalties.

Although the MPRSA does not expressly authorize penalty assessments for natural resource damages, EPA considers the gravity of the violation (including effects to sensitive species or habitats), prior violations, and the demonstrated good faith of the person charged when determining a civil penalty amount. Finally, the MPRSA authorizes citizen suit enforcement as well. However, the MPRSA does not provide retain and use authority; under the Miscellaneous Receipts Act, fines and penalties are transmitted to the general treasury rather than for purposes of mitigating any damage in and around the ocean disposal site.

Additionally, the BMPs included in EPA's SMMPs become enforceable conditions when attached to the USACE's ocean disposal permits. Those conditions can include requirements that minimize the risk of impacts should a violation occur, such as seasonal limitations or specified transit routes to and from the disposal site. These kinds of specifications have not been applied to the Hawaii ocean disposal sites in the past, but where necessary and feasible they could be included in the SMMP or in individual permits.

3.8 Vessel Transit and Disposal Operations

As previously mentioned, the volumes disposed at the Hawaiʻi sites are quite modest compared to other disposal volumes in Region 9. EPA has endeavored to estimate the percent of local vessel traffic that is comprised of disposal vessels, to determine the likelihood that disposal vessels may interact with ESA-listed species.

In this assessment, EPA first attempted to estimate the number of transits conducted by disposal vessels. Individual disposal events discharge anywhere from approximately 1,000 cy (which is typical for many harbor dredging projects, where clamshell-dredged material is placed into towed scows) to as much as 5,000 cy at a time (typical for USACE hopper dredging loads). A total of 1.24 million cubic yards was disposed at the five Hawaiʻi sites combined, in the 10-year period from 2009 to 2018[4]. This equates to a range of 495 to 2,475 total transits to and from the Hawaiʻi ocean disposal sites during that time (**Table 3**).

Table 3. Volume of dredged material disposed, and minimum and maximum number of disposal trips, to and from all Hawaiʻi ocean disposal sites in from 2009-2018.

Ocean Disposal Site	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**Total**
South Oʻahu	126,200		18,260		312,080	351,920		53,900			862,360
Hilo			63,879	70,981				118,300			253,160
Kahului								57,200			57,200
Nawiliwili								64,700			64,700
Port Allen											
Total All Sites	126,200		82,139	70,981	312,080	351,920		294,100			**1,237,420**
Min. # of Trips (both ways)	50		33	28	125	141		118			**495**
Max. # of Trips (both ways)	252		164	142	624	704		588			**2,475**

[4] This specific ten-year period was selected for comparison to the most recent vessel transit data available on the USACE waterborne commerce database (USACE, 2020b).

EPA then estimated total vessel traffic by examining commercial vessel traffic from the USACE waterborne commerce database (USACE, 2020b) and the Hawaiʻi Department of Land and Natural Resources (DLNR) commercial fishing database (Hawaiʻi DLNR, 2020). The USACE database includes transits from self-propelled and non-self-propelled dry cargo ships (including passenger vessels and cruise ships), self-propelled and non-self-propelled tankers, self-propelled towboats, and non-self-propelled tanker liquid barges. Vessel transits were compiled from all ports in Hawaiʻi for which there are records in the database. Over the most recent ten-year period in the database (2009 to 2018) there were a total of 144,925 transits from the ports examined (**Table 4**; USACE, 2020b). The DLNR database contains fishing reports from licensed commercial fishermen, including the number of trips conducted per year by location. EPA compiled all trips reported from 2009 to 2018, and multiplied the number by two to account for total transits in both directions. In total, there were 125,966 transits (62,983 trips) conducted in Hawaiʻi from 2009 to 2018 (**Table 5**; Hawaiʻi DLNR, 2020).

Table 4. Ten-year commercial vessel transits by port (USACE, 2020b). These numbers of transits include receipt (incoming) and shipment (outgoing) transits, but do not include fishing vessels.

Port	2018	2017	2016	2015	2014	2013	2012	2011	2010	2009	Total
Port of Honolulu	4,207	5,147	5,689	8,435	6,653	4,870	5,716	8,013	6,881	7,029	62,640
Kahului	1,400	1,359	1,601	2,617	2,044	1,357	1,779	2,917	1,967	2,026	19,067
Port Allen	0	0	0	0	0	0	0	0	0	0	0
Hilo	1,066	1,082	1,184	1,815	1,405	1,141	1,262	2,034	1,473	1,499	13,961
Nawiliwili	984	1,057	1,172	1,762	1,340	968	1,019	4,175	1,149	1,091	14,717
Pearl Harbor	0	0	0	0	0	0	0	0	0	0	0
Barbers Point Harbor	1,482	1,661	2,415	2,327	2,074	1,938	2,049	1,614	1,784	1,860	19,204
Kaunakakai	11	142	252	230	245	246	303	227	411	430	2,497
Kawaihae Harbor	756	852	907	1,527	1,095	692	1,011	3,509	1,307	1,183	12,839
Total	9,906	11,300	13,220	18,713	14,856	11,212	13,139	22,489	14,972	15,118	**144,925**

Table 5. Ten-year commercial fishing vessel trips and transits in Hawaiʻi (DLNR commercial fishing database).

	2018	2017	2016	2015	2014	2013	2012	2011	2010	2009	Total
Total Trips	4,652	3,916	3,664	4,951	4,944	5,876	9,783	9,258	8,199	7,740	62,983
Total Transits	9,304	7,832	7,328	9,902	9,888	11,752	19,566	18,516	16,398	15,480	**125,966**

To estimate the proportion of vessel traffic attributed to disposal vessels, EPA divided the total transits from disposal vessels by the total transits from commercial vessels reported in the two databases (270,981). Therefore, the ten-year estimate of 495 to 2,475 disposal vessel transits only constitutes 0.18% to 0.91% of the total commercial vessel transits.

It is important to note that this estimate of total vessel transits over a ten-year period is highly conservative, as the combined numbers from the USACE and DLNR databases do not include local and foreign military nor recreational vessels. Therefore, disposal vessels realistically account for an even lower percentage of vessel traffic than estimated in this document.

Furthermore, when disposal vessels arrive to the ocean disposal site, individual disposal events only last two to four minutes at the surface, and upper water column plumes dissipate to background levels quickly. The low number of transits, combined with the short duration of disposal operations, greatly reduces potential for interactions with ESA-listed species.

4.0 ESA SPECIES ASSESSMENTS

The five Hawaiʻi ocean disposal sites have been in use since 1981. Seafloor monitoring has not identified any unacceptable adverse impacts resulting from previous disposal, and significant adverse effects are not expected in the future, due to sediment quality testing procedures and site management measures, including compliance requirements for vessel tracking. It is anticipated that the use of the sites can continue indefinitely from a capacity standpoint. However, the transit of disposal vessels to and from the sites has the potential to disturb seabirds that may be present. Therefore, EPA has determined that continuing use of the five Hawaiʻi ocean disposal sites may affect, but is unlikely to adversely affect, the short-tailed albatross (*Phoebastria albastrus*), Hawaiian petrel (*Pterodroma sandwichensis*), band-rumped storm-petrel (*Oceanodroma castro*), and Newell's shearwater (*Puffinus auricularis newelli*) (**Table 5**). There is no designated critical habitat within the disposal sites and transit area. A general discussion pertaining to all four ESA-listed species is outlined in **Section 4.1**, and species-specific information in provided in **Sections 4.2-4.5**. The purpose of this informal consultation is to request US Fish and Wildlife Service concurrence with our "may effect, but not likely to adversely affect" determination for these listed species.

Table 6. USFWS-managed species under ESA in the Pacific Islands Region (USFWS list from 10/7/2019).

Species	Status	EPA Recommendation
Short-tailed albatross (*Phoebastria albastrus)*	Endangered	May affect, not likely to adversely affect
Hawaiian petrel (*Pterodroma sandwichensis*)	Endangered	May affect, not likely to adversely affect
Band-rumped storm-petrel (*Oceanodroma castro*)	Endangered	May affect, not likely to adversely affect
Newell's shearwater (*Puffinus auricularis newelli)*	Threatened	May affect, not likely to adversely affect

4.1 Potential Impact Summary

Seabirds derive their food from the sea, and their distribution at sea is influenced by oceanographic and biological processes operating at various temporal and spatial scales. The most serious threats to seabirds in the Pacific Region include invasive species, fisheries interactions, oil and other pollution, habitat loss and degradation, disturbance, and climate change (USFWS, 2005). Transiting disposal vessels may potentially affect ESA-listed seabirds directly through attraction to, or disturbance from, the vessel itself. Ocean disposal of dredged material may also affect ESA-listed seabirds indirectly through food chain effects, resulting from potential short-term adverse effects to marine organisms in the water column, and long-term effects to seafloor habitats and species.

However, most marine species are generally more susceptible to potential impacts associated with dredging itself, rather than from open water transit and disposal. Dredging typically occurs in relatively enclosed waterbodies that may have restricted movement pathways, limiting animals' ability to avoid or minimize exposure to noise or turbidity. If the sediment being dredged is contaminated, there may also be increased risk of exposure of prey species to resuspended contaminants, depending on the presence and effectiveness of dredging control measures such as silt curtains or timing restrictions. Dredging may also alter natural hydrology, potentially degrading estuarine nesting and roosting habitat (USFWS, 2005). Seabirds could be attracted to the dredging operations by the presence of dead and disoriented marine organisms brought to the surface, which could constitute a new foraging resource (US DOI, 2009). Additionally, seabirds may avoid dredging operations because of the increased noise, or be attracted to the light source (US DOI, 2009). Yet, potential impacts from dredging itself are assessed by USACE on a project-specific basis, during the USACE permitting process and not as part of EPA site designation or updates to site management and monitoring plans.

In contrast, regardless of where or when the dredging occurs, placement of the sediment at any of the five Hawaiʻi offshore disposal sites has significantly less potential to affect ESA-listed seabird species, both directly from vessel operations, and indirectly from food chain effects, due to the following:

1. The sites were designated in locations originally selected to minimize impacts by avoiding any unique or limited marine habitats to the extent practicable (**Section 3.1**), thereby minimizing effects to important food chain organisms.
2. Only "suitable" (non-toxic) dredged material is permitted to be disposed. Rigorous pre-dredging testing occurs to determine suitability for disposal. The testing examines persistence, toxicity, and bioaccumulation to ensure that material disposed will not cause an unacceptable adverse impact after dumping. This testing therefore ensures that species in the marine food chain are not exposed to toxic sediments, limiting any potential biomagnification through the food chain (**Section 3.2**). As confirmed by EPA monitoring and modelling, no short- or long-term contaminant exposure concerns are associated with the discharged sediment.
3. Each disposal vessel is closely tracked during transit through the nearshore zone. This tracking includes sensors to detect any substantial leaking or spilling of material that could increase turbidity and suspended sediment outside of the disposal site. Disposal vessels that leak or spill must be removed from service and repaired before being approved for continued use (refer to **Section 3.7** on enforcement for more details on how violations may be addressed). This management measure further prevents harm to marine ecosystems that may sustain prey for ESA-listed seabird species.

4. Disposal vessel traffic generally comprises a very low percent of the total vessel traffic in the area (less 0.34 to 1.71%; **Section 3.8**), therefore greatly reducing the potential for interaction with ESA-listed seabird species.
5. Disposal vessel operations are spatially limited, as they only comprise transit to and from, and disposal in, the ocean disposal sites. In contrast, seabird species are highly mobile and generally have large foraging ranges. Therefore, any interruption of seabird movement or foraging due to disposal vessel transit operations is discountable.
6. Disposal vessel operations are temporally limited: Individual disposal events only last two to four minutes at the surface, and upper water column plumes dissipate to background levels quickly. Sediments whose plumes would result in any toxicity to sensitive water column organisms after initial mixing (including a 100-fold safety factor) may not be permitted for ocean disposal. The short duration of the disposal reduces potential for direct interactions with ESA-listed seabird species in the area (**Section 3.8**). Further, the short duration of the disposal, as well as the low toxicity in the water column (**Section 3.2)** ensures that any potential prey species is unlikely to be widely impacted by any contaminants in the water column. Therefore, both the direct or indirect effects of disposal activity on seabird foraging quality or success is insignificant.
7. Disposal vessels do not discharge large quantities of material that may attract seabirds, such as offal or fisheries discards (although some of the benthic organisms that are incidentally removed with the dredged sediment, such as worms or clams, may be temporarily available for opportunistic capture by seabirds during disposal itself).
8. During dredging, EPA requires the use of a "grizzly" to capture and remove debris that may present entanglement hazards, before the dredged material may be disposed at sea.

For these reasons, it is appropriate to programmatically assess the potential impacts of disposal of suitable material at EPA-designated ocean disposal sites and to programmatically apply necessary avoidance and minimization measures in the SMMP. USACE then includes the disposal sites' programmatic disposal restrictions (as well as any dredging-related restrictions) as enforceable conditions in individual permits for dredging projects.

4.2 Short-Tailed Albatross (*Phoebastria albastrus)*

The short-tailed albatross is the largest albatross in the north Pacific, with a wingspan averaging more than 7 feet. The average lifespan of an individual is between 12 and 45 years (USFWS, 2020a). The range of the short-tailed albatross extends from Siberia south to the China coast, into the Bering Sea and Gulf of Alaska south to Baja California, Mexico, and throughout the North Pacific, including the Northwestern Hawaiian Islands (COSEWIC, 2003; Harrison, 1984; **Figure 6**). Short-tailed albatrosses are typically found in the open ocean and tend to concentrate along the edge of the continental shelf (NatureServe, 2020a). The short-tailed albatross feeds primarily at the water surface on squid, crustaceans, and fishes. It has been known to occasionally follow fishing vessels discharging scraps and offal (USFWS, 2012). The breeding range of the species is limited almost entirely to two islands: Torishima Island, approximately 580 kilometers south of Japan, and Minami-kojima, about 270 kilometers northeast of Taiwan (NatureServe, 2020a).

The short-tailed albatross was listed as endangered in 1970 (USFWS, 2020a). Its restricted breeding range makes the species highly vulnerable to any threats at its breeding locations, such as the potential of a volcanic eruption on the main breeding site (Torishima). Other threats to the short-tailed albatross include incidental catch in commercial fisheries, ingestion of plastics, contamination by oil and other pollutants, and nesting space competition with non-native species.

Although found in Hawai‘i, the short-tailed albatross is very rare and primarily found on Midway Atoll (Hawai‘i DNLR, 2005). Given the low numbers of short-tailed albatrosses that visit the Hawaiian Islands, the small number of disposal events each year, and the lack of potential for long-term effects to upper water column prey species, EPA believes that continued operation of the five Hawai‘i ocean disposal sites may affect but is not likely to adversely affect this species.

Figure 6. Species range of the short-tailed albatross (*Phoebastria albastrus*) (USFWS, 2020a).

4.3 Hawaiian Petrel (*Pterodroma sandwichensis*)
The Hawaiian petrel breeds in several colonies throughout the Hawaiian Islands, with the main colony in Haleakala National Park, Maui (NatureServe, 2020b; **Figure 7**). Individuals measure an average of 16 inches in length, with a wingspan of around 3 feet (USWFS, 2020b). The Hawaiian petrel feeds primarily on marine organisms such as squid, fishes, and crustaceans.

The Hawaiian petrel was listed as endangered in 1967 (USFWS, 2020b). The greatest threat to this species is predation by mongooses and feral cats. In some cases, predation has caused more than 70 percent nesting failure (USFWS, 2005). Other threats include mosquito-borne diseases, collision with human-made obstacles, light attraction and subsequent groundings, and habitat destruction (Ainley and Podolsky, 1993; Simons and Hodges, 1998).

Disposal vessels may transit through areas in which Hawaiian petrels are found. However, given the relatively small number of disposal events each year, the temporary nature of disposal plumes in the water column, and the non-toxic nature of materials disposed, EPA believes that continued operation of the five Hawai‘i ocean disposal sites may affect but is not likely to adversely affect the Hawaiian Petrel.

Figure 7. Species range of Hawaiian petrel (*Pterodroma sandwichensis*) (USFWS, 2020b).

4.4 Band-Rumped Storm-Petrel (*Oceanodroma castro*)
The band-rumped storm petrel can grow to between 7 to 9 inches, with a wingspan of approximately 17 inches. Storm-petrels are the smallest of all the oceanic seabirds (Onley and Scofield, 2007). They range throughout the Hawaiian Islands (**Figure 8**) and are known to nest in remote cliff locations on Kaua‘i and Lehua Island, and on high-elevation lava fields on Hawai‘i Island (USFWS, 2020c). They are often observed in coastal waters around Kaua‘i, Niihau, and Hawai‘i Island. Band-rumped storm petrels are known to forage diurnally and primarily in deep waters, but are suspected to forage nocturnally. They are also known to be attracted to offal and discards from fishing vessels (Onley and Scofield, 2007).

The band-rumped storm petrel was listed as endangered in 2016 (USFWS, 2020c). This species is threatened by natural catastrophes such as hurricanes and landslides, predation by introduced rats, mice, cats, mongooses, and pigs, and collisions with power lines and streetlights at night (USFWS, 2005). Additional threats include commercial fishing, plastic pollution, and the loss and degradation of forested habitat.

Disposal vessels may transit through areas in which band-rumped storm petrels are found. However, the band-rumped storm petrel is one of the rarest seabirds in Hawai‘i (Hawai‘i DLNR, 2015a). Therefore, given the low numbers of individuals and the small number of disposal events each year, it is unlikely that disposal vessels may encounter and disturb band-rumped storm petrels. In addition, given the temporary nature of disposal plumes in the water column and the non-toxic nature of materials disposed, EPA believes that continued operation of the five Hawai‘i ocean disposal sites may affect but is not likely to adversely affect the band-rumped storm petrels.

Figure 8. Species range of band-rumped storm-petrel (*Oceanodroma castro*) (USFWS, 2020c).

4.5 Newell's shearwater (*Puffinus auricularis newelli*)
The Newell's shearwater is a medium-sized shearwater measuring 12 to 14 inches with a wingspan of 30-35 inches (USFWS, 2020d). It has a small breeding range in the Hawaiian Islands, almost entirely restricted to Kaua'i. The Newell's shearwater's movements are strongly nocturnal (Day and Cooper, 1995). They feed on fish, plankton, and occasionally garbage from ships (NatureServe, 2020c). They spend most of their time in the open ocean year-round (USFWS, 2005) and come ashore only to nest.

The Newell's shearwater was listed as threatened in 1975 (USFWS, 2020d). Primary threats to this species include introduced predators and disorienting artificial lighting. The two most important factors limiting population growth are low breeding probability and high rates of predation on adults and subadults (USFWS, 2011). Predator control in key habitat areas, the establishment of Bird Salvage-Aid Stations, translocation, and light attraction studies have been initiated to help save the Newell's shearwater.

Estimates of the Newell's shearwater breeding population indicate that approximately 75 to 90% of the breeding population nests on Kaua'i (Hawai'i DLNR, 2015). Therefore, this species would be most likely to potentially interact with vessels transiting to and from the Nawiliwili and Port Allen disposal sites. However, these two sites combined have only received an average of just over 11,000 cy of material each year. In terms of transits, this translates to approximately 2 to 11 round trips to the disposal site each year on average. Given the low number of disposal trips, the temporary nature of disposal plumes in the water column, and the non-toxic nature of materials disposed, EPA believes that continued operation of the five Hawai'i ocean disposal sites may affect but is not likely to adversely affect the Newell's shearwater.

Figure 9. Species range of Newell's shearwater (*Puffinus auricularis newelli*) (USFWS, 2020d).

6.0 CONCLUSIONS

Theoretically, transiting disposal vessels may potentially affect ESA-listed seabirds directly through attraction to, or disturbance from, the vessel itself. Ocean disposal may also affect ESA-listed seabirds indirectly through food chain effects, including potential short-term, adverse effects to marine organisms in the water column. In this informal consultation package, EPA has described the continued use of the Hawaiʻi ocean disposal sites, as well as the use of the sites to date and the EPA regulations and management measures in place to avoid impacts to marine organisms and the marine environment. EPA also presented the extensive monitoring that the agency has conducted at the sites, the results of which indicate that existing management practices have been successful at avoiding and minimizing adverse impacts. In summary, EPA's ocean disposal site selection, rigorous pre-disposal sediment testing, and site management measures help to ensure that adverse effects to listed species are avoided and minimized.

Based on the analysis provided in the sections above, EPA has determined that the continued use of the five Hawaiʻi ocean disposal sites may affect but is not likely to adversely affect ESA-listed seabird species. We have used the best scientific and commercial data available to complete this analysis.

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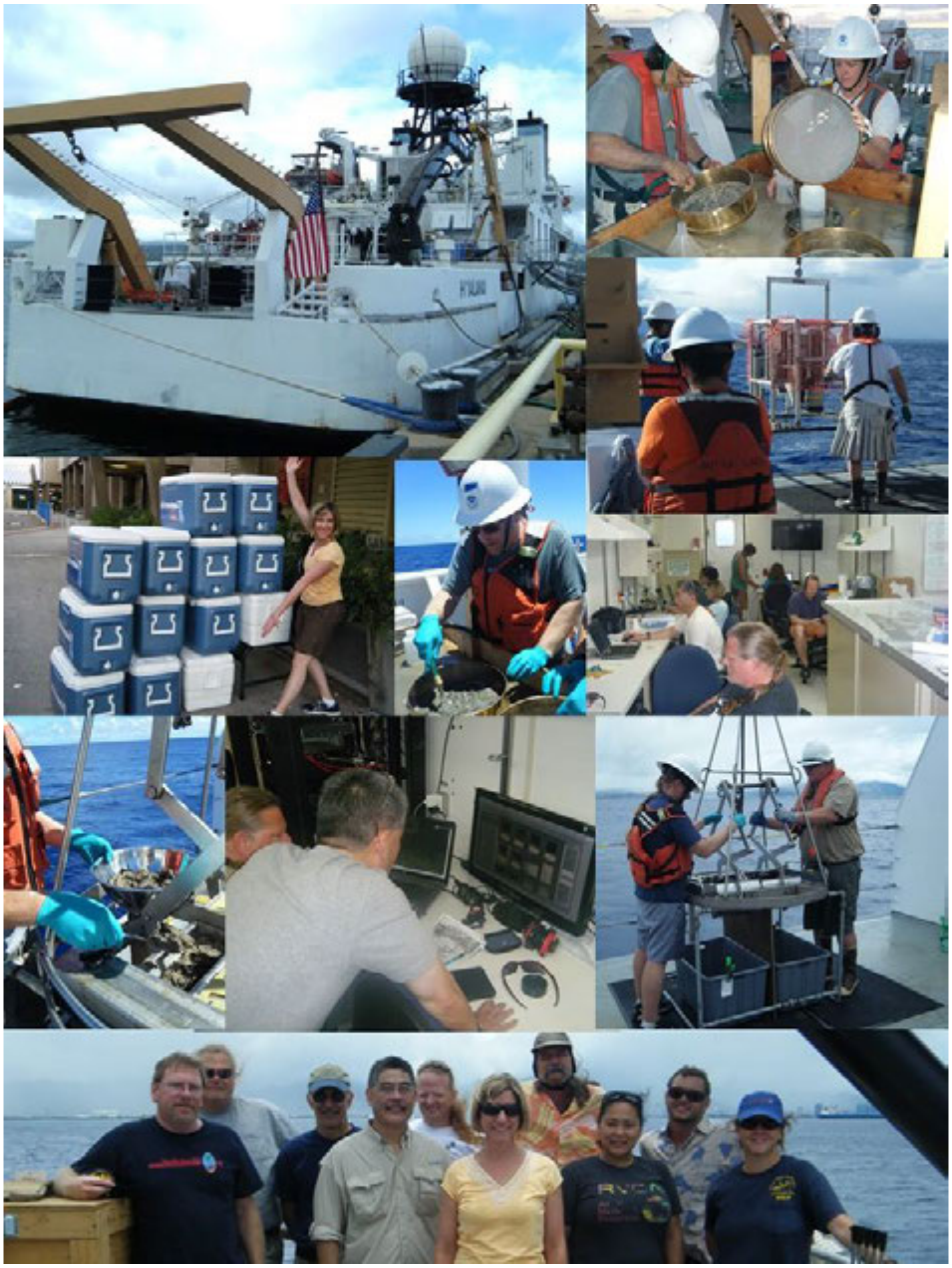
Appendix 1 to EPA Consultation with USFWS

for Continued Use of Five Existing Ocean Dredged Material Disposal Sites (ODMDS)

in Waters Offshore of Hawaii

Site Monitoring Synthesis Report
(2015)

2013 HAWAII OCEAN DISPOSAL SITE MONITORING
SYNTHESIS REPORT



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April 27, 2015

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2013 HAWAII OCEAN DISPOSAL SITE MONITORING SYNTHESIS REPORT

EXECUTIVE SUMMARY

In 1981, the US Environmental Protection Agency (EPA) designated five ocean dredged material disposal sites (ODMDS) offshore of Hawaiian Island ports and harbors. In 1997, EPA and the US Army Corps of Engineers (USACE) published a Site Monitoring and Management Plan (SMMP) covering all five of these disposal sites. But since that time, due to lack of available funding, the sites have not been comprehensively monitored and the SMMP has not been updated. Therefore, when funding became available for 2013, EPA identified the Hawaii sites as the highest priority to monitor of all the disposal sites in Region 9. Since only the South Oahu and Hilo sites had received any disposal activity since the late 1990s, EPA conducted surveys at only these two sites. Ship and equipment problems resulted in a reduction in the planned survey scope and in the overall number of samples collected. However, sufficient sampling was completed to provide an adequate basis to confirm environmental conditions at these sites and to update the SMMP. Based on analyses of sub-bottom profiling, sediment profile and plan view imaging, and sediment grain size, chemistry, and benthic community sampling, it appears that the pre-disposal sediment testing program has protected these sites and their environs from any adverse contaminant loading. The bulk of the dredged material disposed in the last decade or more appears to have been deposited properly within the site boundaries. There are minor and localized physical impacts from dredged material disposal, as expected, but no significant adverse impacts are apparent to the benthic environment outside of site boundaries. Continued use of the disposal sites, under an updated SMMP, is recommended.

I. INTRODUCTION AND BACKGROUND

Ocean dredged material disposal sites (ODMDS) around the nation are designated by the Environmental Protection Agency (EPA) under authority of the Marine Protection, Research and Sanctuaries Act (U.S.C. 1401 et seq., 1972) and the Ocean Dumping Regulations at 40 CFR 220-228. Disposal site locations are chosen to minimize cumulative environmental effects of disposal to the area or region in which the site is located, and disposal operations must be conducted in a manner that allows each site to operate without significant adverse impacts to the marine environment. Many ocean disposal sites are located near major ports, harbors, and marinas and are very important for maintaining safe navigation for commercial, military, and private vessels.

EPA and the US Army Corps of Engineers (USACE) share responsibility for managing ocean disposal of dredged sediments. First, there is a pre-disposal sediment testing program that is jointly administered by the agencies to ensure that only clean (non-toxic) sediments are permitted for ocean disposal. EPA must concur that sediments meet ocean dumping suitability requirements before USACE can issue a permit for ocean disposal. Post-disposal site monitoring then allows

EPA and USACE to confirm the environmental protectiveness of the pre-disposal testing. The agencies also jointly manage the ocean disposal sites themselves. All sites are operated under a site management and monitoring plan (SMMP), and the Agencies cooperate on updating the SMMPs if needed, based on the results of periodic site monitoring. EPA is also responsible for enforcement of potential ocean dumping violations at each site.

The site use requirements in SMMPs for each specific ODMDS can be based on any issues of concern identified in the original site designation environmental impact statement (EIS) or environment assessment (EA), and/or on the results of subsequent (post-disposal) monitoring. Each SMMP typically incorporates a compliance monitoring component to ensure that individual disposal operations are conducted properly at the site, as well as a requirement for periodic monitoring surveys to confirm that the site is performing as expected and that long term adverse impacts are not occurring.

EPA designated five ODMDS offshore of Hawaiian Island ports and harbors in 1981 (Figure 1). With the exception of the South Oahu site, these disposal sites are used infrequently (generally only every 5-10 years or so) when USACE conducts maintenance dredging of the federal channels serving each harbor. Baseline surveys were conducted in the 1970s to support the original site designation action, but only limited monitoring work has occurred since then at most of the sites. The USGS, while doing other coastal mapping work in 1994 and 1995, conducted acoustic backscatter surveys at all five sites for EPA, to map dredged material deposits on the sea floor. They also collected sediment chemistry samples at the South Oahu site. Based on the USGS survey results, EPA and USACE published an SMMP in 1997 covering all five Hawaii disposal sites. Since that time, due to lack of available funding, the sites have not been comprehensively monitored and the SMMP has not been updated. When increased funding became available for 2013, EPA therefore identified the Hawaii sites as the highest priority to monitor of all the disposal sites in Region 9. However, because only the South Oahu and Hilo sites had received any disposal at all since 1999 (Table 1), EPA planned comprehensive monitoring at only these two sites.[1]

The South Oahu site (Figure 2) is located approximately 3 nautical miles offshore of Pearl Harbor in water depths ranging from about 1,300 to 1,650 feet (400 to 500 meters). It is a rectangular ocean disposal site 2 kilometers wide (west-east) and 2.6 kilometers long (north-south), and occupies an area of about 5.2 square kilometers on the sea floor. Although the overall site is rectangular, all disposal actions must take place within a 1,000 foot (305 meter) radius Surface Disposal Zone at the center of the site. Its center coordinates are 21 degrees 15.167 minutes North Latitude, 157 degrees 56.833 minutes West Longitude (NAD 83).

The Hilo site (Figure 3) is located approximately 4 nautical miles offshore of Hilo in water depths averaging about 1,150 feet (350 meters). It is a circular ocean disposal site with a radius of 3,000 feet (920 meters) and an area of about 2.7 square kilometers on the sea floor. As at South Oahu, all disposal actions must take place within a 1,000 foot (305 meter) radius Surface Disposal Zone at the center of the site. The center coordinates of the Hilo site are 19 degrees 48.500 minutes North Latitude, 154 degrees 58.500 minutes West Longitude (NAD 83).

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[1] USACE is again planning to dredge and dispose at all five Hawaii ODMDS in 2016. Future monitoring of the other sites will be addressed in an updated SMMP for all the Hawaii ODMDS, which is currently in preparation.

Figure 1. **Five ocean dredged material disposal sites serve Hawaii ports and harbors**.

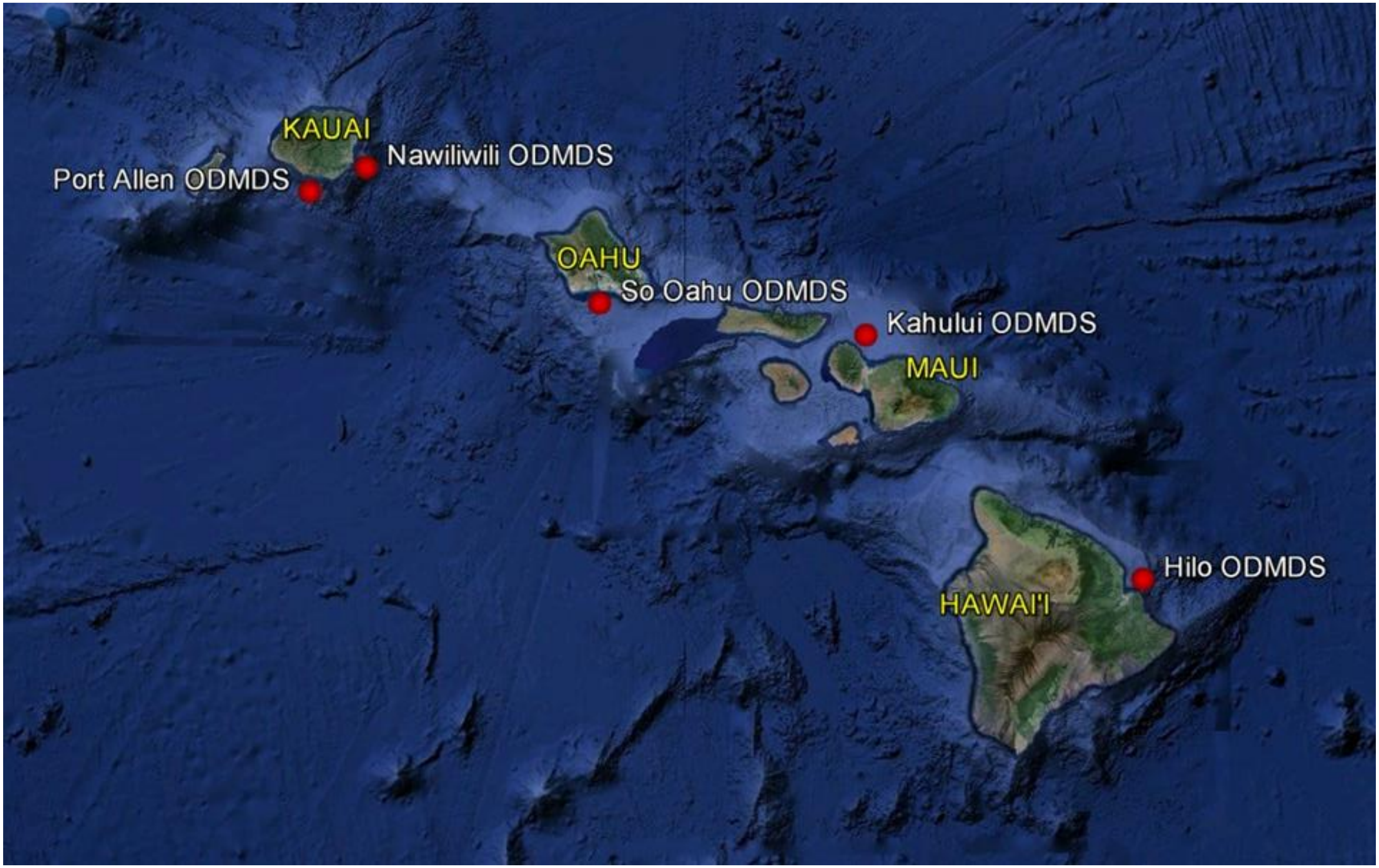


Figure 2. **General location of the South Oahu Ocean Dredged Material Disposal Site**, showing overall site (yellow box) and Surface Disposal Zone (red circle).

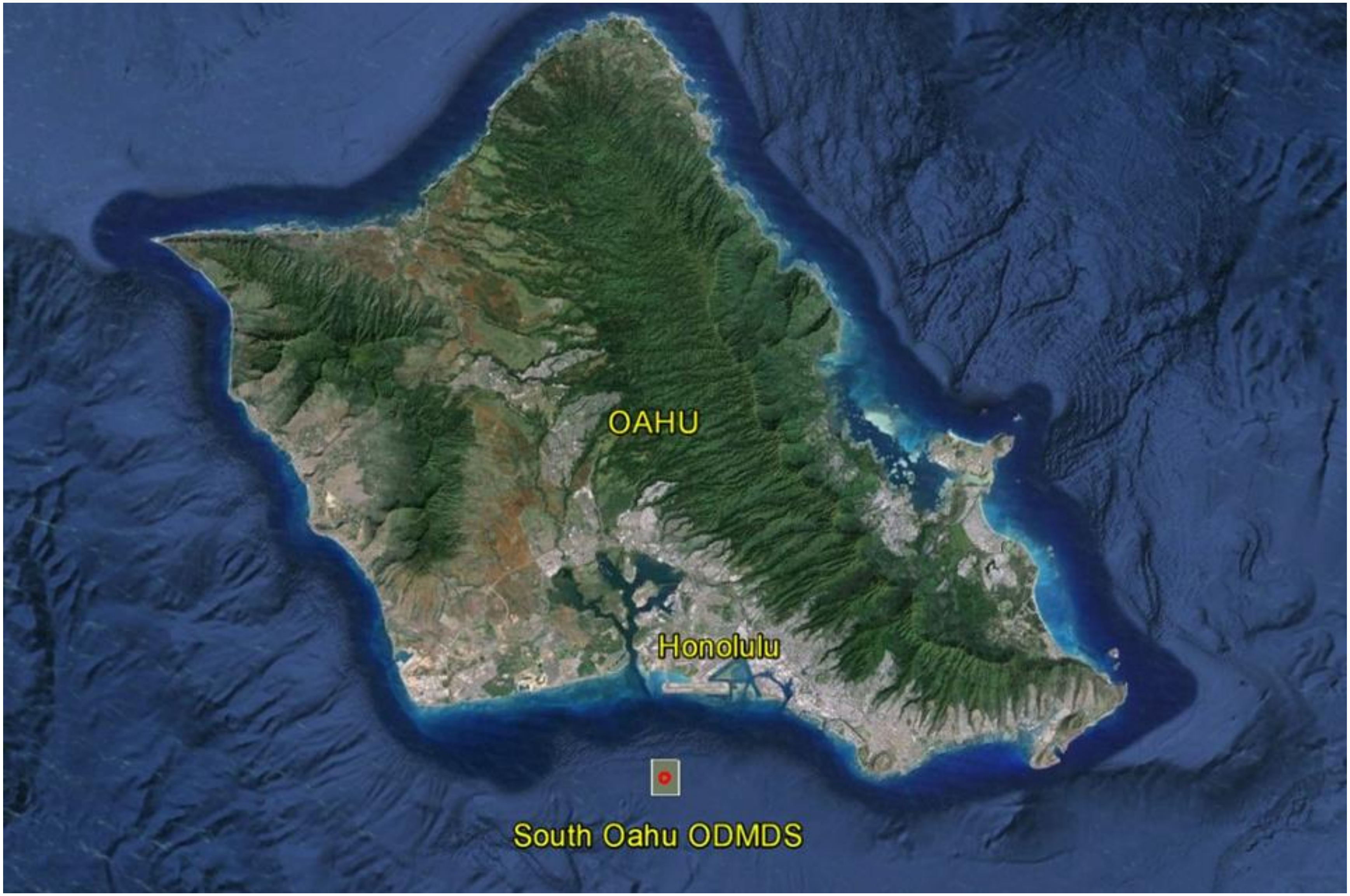
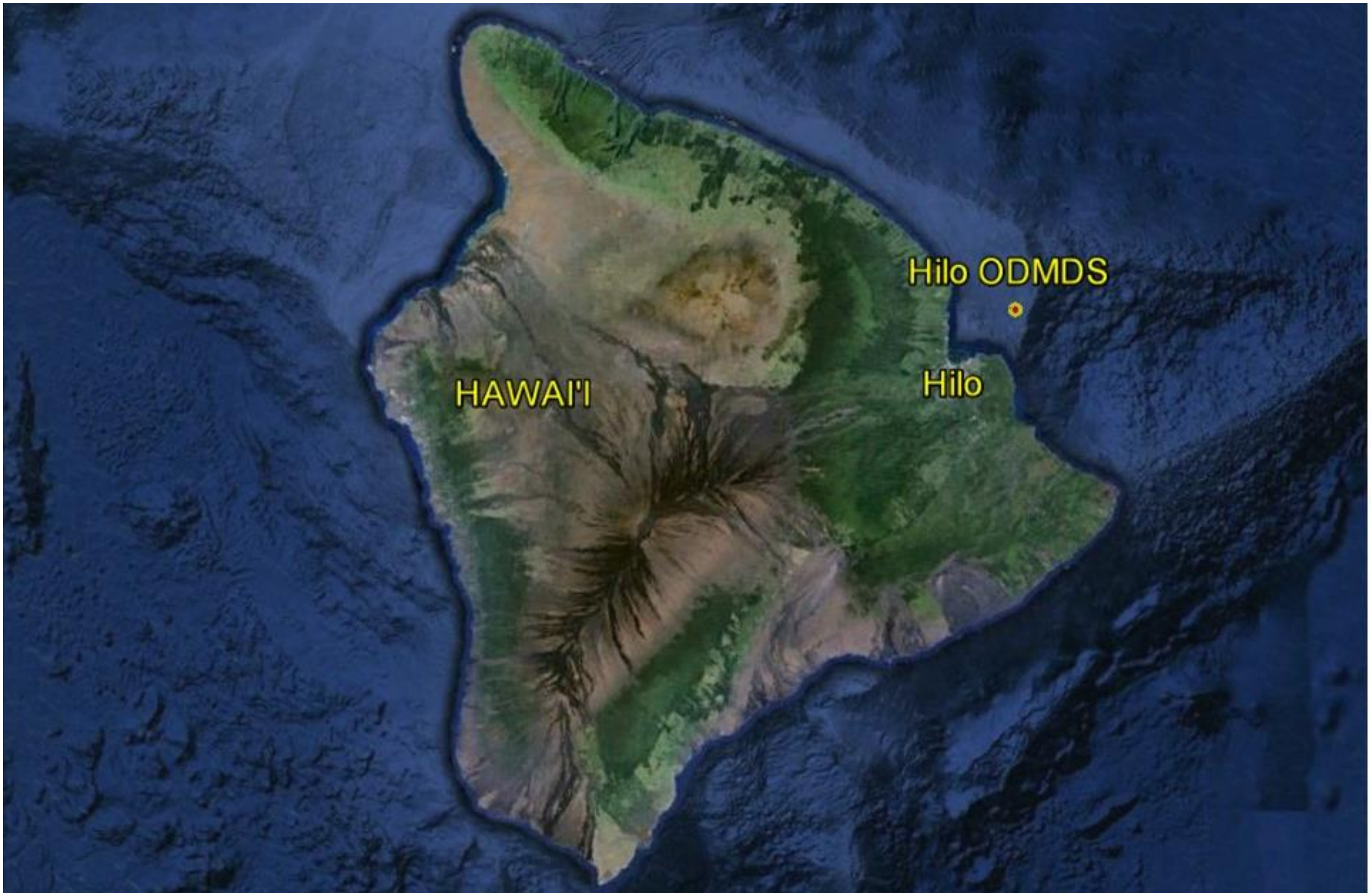


Figure 3. **General location of the Hilo Ocean Dredged Material Disposal Site**, showing overall site (yellow circle) and Surface Disposal Zone (red circle).



As shown in Table 1, the South Oahu site has received by far the greatest volume of dredged material of all 5 Hawaii sites, both historically and more recently. (Table 1 does not include volume disposed at historic Mamala Bay sites prior to 1981.) This material is generated from construction and maintenance dredging by the U.S. Navy in Pearl Harbor and maintenance dredging of the Honolulu Harbor federal channel by USACE, as well as berth maintenance dredging by Honolulu Harbor and other minor dredging by private marinas. The Hilo site has received lesser volumes of dredged material, which in recent years was generated from US Coast Guard maintenance dredging and from terminal improvement projects in Hilo Harbor.

Table 1. **Disposal volumes (cubic yards) at the 5 Hawaii ODMDS following designation in 1981.** Source: EPA compliance tracking records and USACE Ocean Disposal Database.

Year	South Oahu	Hilo	Kahului	Nawiliwili	Port Allen	Total All Sites
1981						0
1982						0
1983				313,900		313,900
1984	2,554,600					2,554,600
1985	12,000					12,000
1986						0
1987	111,200					111,200
1988	57,400					57,400
1989	75,000					75,000
1990	1,198,000	80,000	58,000	343,000		1,679,000
1991	134,550					134,550
1992	233,000					233,000
1993				322,400		322,400
1994						0
1995						0
1996	27,800					27,800
1997						0
1998						0
1999	27,500		91,000	114,600	20,900	254,000
2000						0
2001						0
2002	53,500					53,500
2003	183,500					183,500
2004	540,000					540,000
2005		3,000				3,000
2006	160,400					160,400
2007	266,500					266,500
2008						0
2009	126,200					126,200
2010						0
2011	18,260	63,879				82,139
2012		70,981				70,981
2013	506,870					506,870
Total 1981-2013	**6,286,280**	**217,860**	**149,000**	**1,093,900**	**20,900**	**7,767,940**
Average/year	**190,493**	**6,602**	**4,515**	**33,148**	**633**	**235,392**
Total 2000-2013	**1,855,230**	**137,860**	**0**	**0**	**0**	**1,993,090**
Average/year 2000-2013	**132,516**	**9,847**	**0**	**0**	**0**	**142,363**

II. SUMMARY OF SITE MONITORING ACTIVITIES

EPA Region 9 developed an overall survey plan and quality assurance project plan (QAPP) for the South Oahu and Hilo ODMDS monitoring (EPA, 2013); supplemental QAPPs were also written by sub-contractors. The surveys were conducted in late June and early July 2013. A summary of the survey design and planned vs actual sampling activities is provided in the Appendix to this report.

The main objective of site monitoring is to support any necessary updates to the SMMP by collecting data and samples adequate to determine whether the sites are performing as expected under existing site management practices. The overall site management goal is that there should be only minor physical impacts inside the disposal site and no adverse impacts outside the disposal site. Consequently, the Hawaii site monitoring surveys were designed to:

1. determine the horizontal extent of the dredged material deposit ("footprint") relative to site boundaries;
2. identify any adverse impacts of disposal of dredged material on or off site; and
3. confirm the protectiveness of pre-disposal sediment testing in avoiding disposal of contaminated sediments.

Specific survey activities specified in the QAPP included: sediment profile and plan-view imaging to map the dredged material footprint; sediment sampling and analyses for chemistry and benthic community structure to identify any chemical or biological effects beyond localized physical impacts; and a geophysical survey (sub-bottom profiling) to determine wide area distribution of native sea bed features and deposits of dredged material. EPA contracted with the National Oceanic and Atmospheric Administration (NOAA) to use its vessel Hi'ialakai, stationed in Pearl Harbor, for the sediment imaging and sampling surveys at both disposal sites, and with Sea Engineering for the separate sub-bottom profiling survey.

The surveys conducted from the Hi'ialakai were originally scheduled to occur over 8 days (plus mobilization and demobilization), but problems associated with readiness of the NOAA ship and its equipment caused some delays. The surveys were ultimately conducted over a 5-day period (not including transit between the South Oahu and Hilo sites and the return transit from Hilo to Pearl Harbor), during which field operations were conducted continuously over a 24-hour period using two scientific crews working 12-hour shifts. Even though not as many stations were sampled as originally planned due to the reduced survey time, sufficient sampling was completed to confirm the performance of each site and to provide an adequate basis to update the SMMP, as described below.

2.1 Sediment Profile Imaging (SPI) and Plan View Photography (PVP)

The SPI-PVP system provides a surface and cross-sectional photographic record of selected locations on the seafloor to allow a general description of conditions both on and off dredged material deposits. Detailed methods for the SPI-PVP survey are provided in the supplemental QAPP prepared by Germano and Associates (2013 a).

SPI-PVP surveys (Figures 4 and 5) were conducted for each ODMDS to delineate the horizontal extent of the dredged material footprint both within and outside the site boundaries, as well as the status of benthic recolonization on the deposited material. With resolution on the order of millimeters, the SPI system is more useful than traditional bathymetric or acoustic mapping approaches for identifying a number of features, including the spatial extent and thickness of the dredged material footprint over the native sediments of the seabed, and the level of disturbance and recolonization as indicated by the depth of bioturbation, the apparent depth of the redox discontinuity, and the presence of certain classes of benthic organisms (Figure 6). PVP is useful for identifying surface features in the vicinity of where the SPI photos are taken, thereby providing important surface context for the vertical profiles at each station. For each station, a minimum of four SPI photos were taken, coupled with at least a single PVP photo.

The SPI-PV camera system was deployed at a total of 86 stations (40 at South Oahu and 46 at Hilo), compared to the planned 98 (49 at each site). The planned vs actual survey stations around the South Oahu ODMDS are shown in Figure 7, while the Hilo ODMDS survey stations are shown in Figure 8. (Specific coordinates for each station are available in the Appendix.)

***Figure 4.* SPI-PVP camera system being deployed from the Hi'ialakai.**

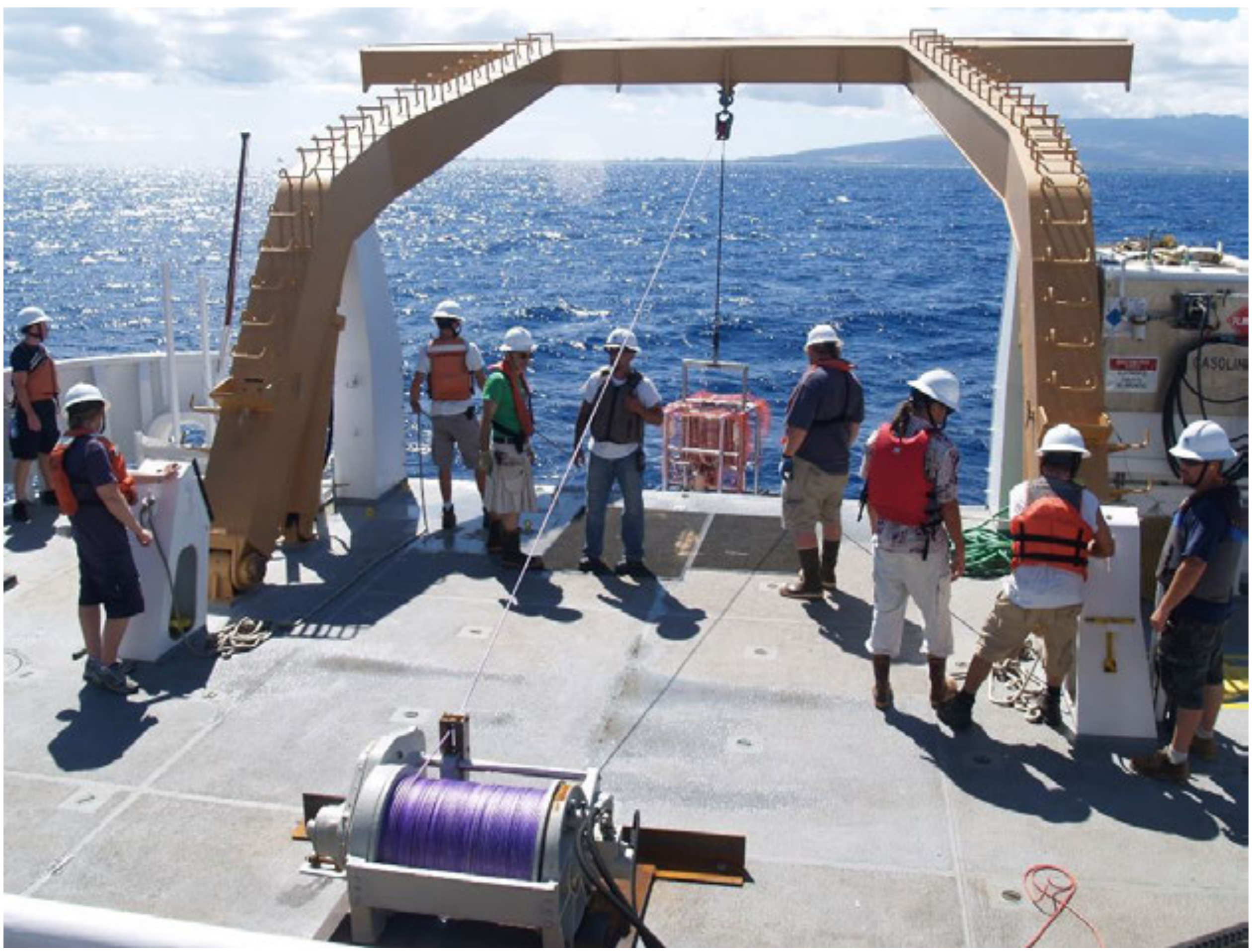


Figure 5. **Schematic of deployment and collection of plan view and sediment profile photographs.** (Germano and Assoc., 2013 b).

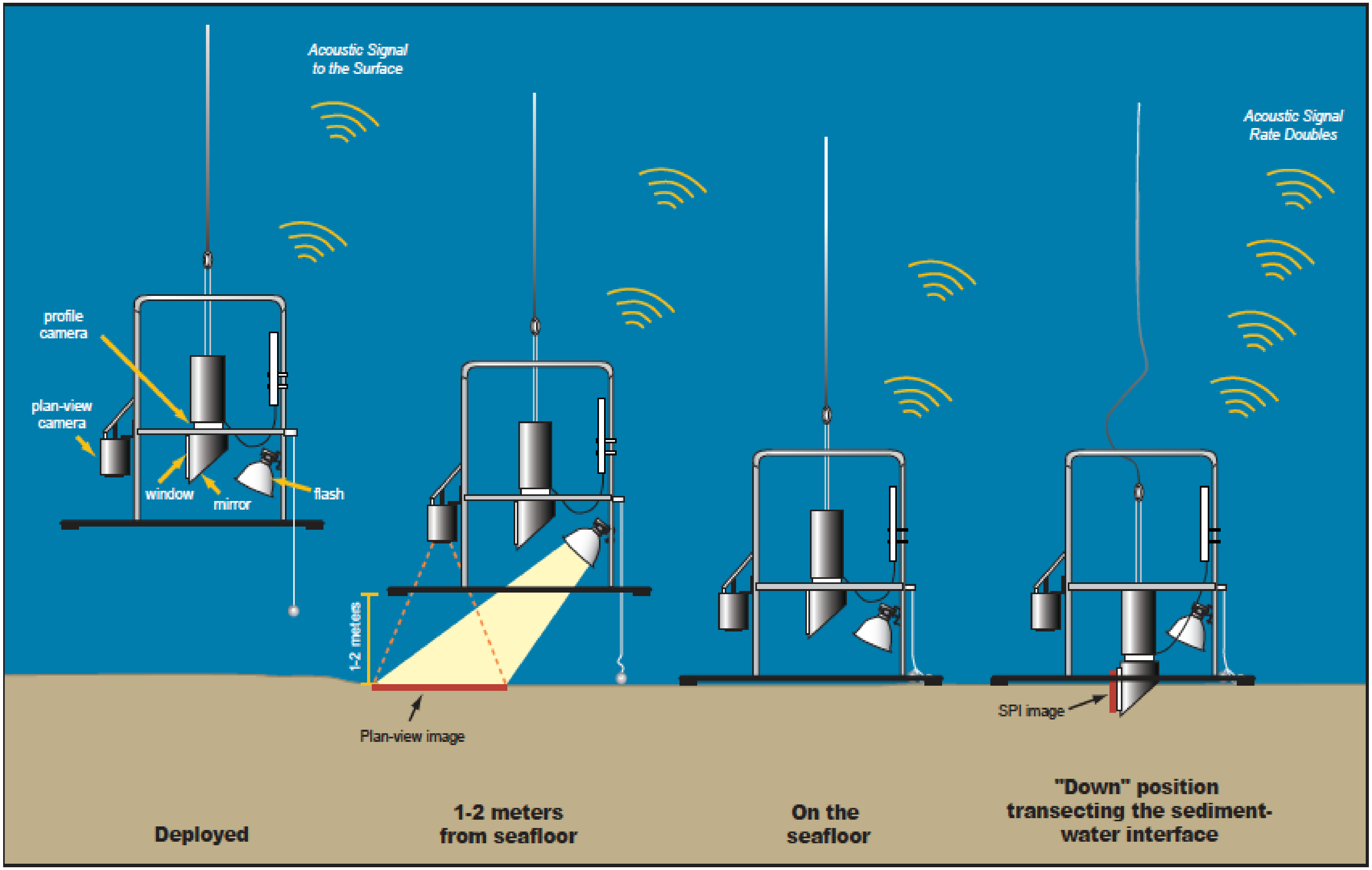


Figure 6. **Soft-bottom benthic community response to physical disturbance (top panel) or organic enrichment (bottom panel).** From Rhoads and Germano (1982).

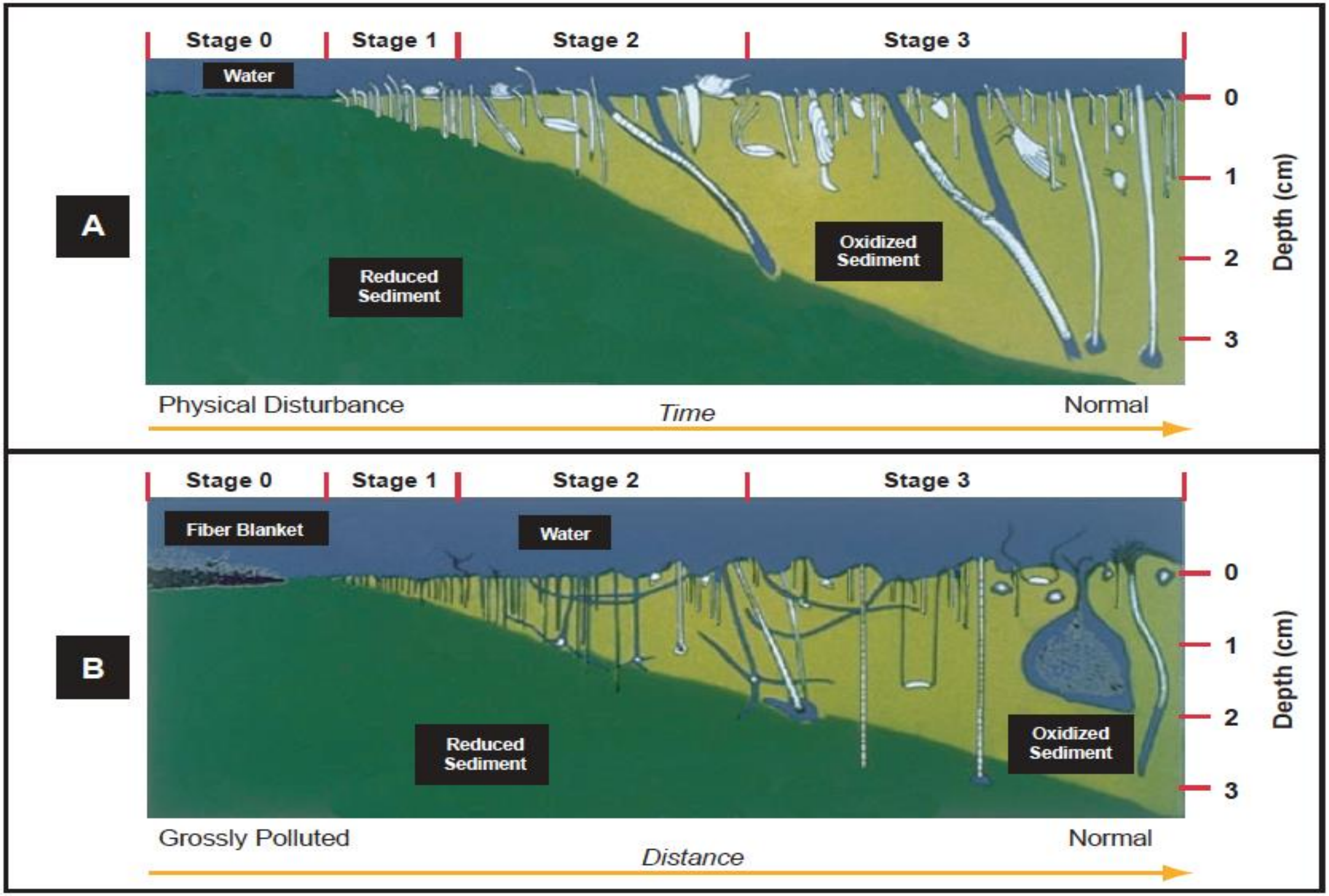


Figure 7. **Planned (yellow squares) and actual sample station locations at the South Oahu ODMDS.** (The circle at the east side of the map shows the location of a historic disposal site used before 1981.)

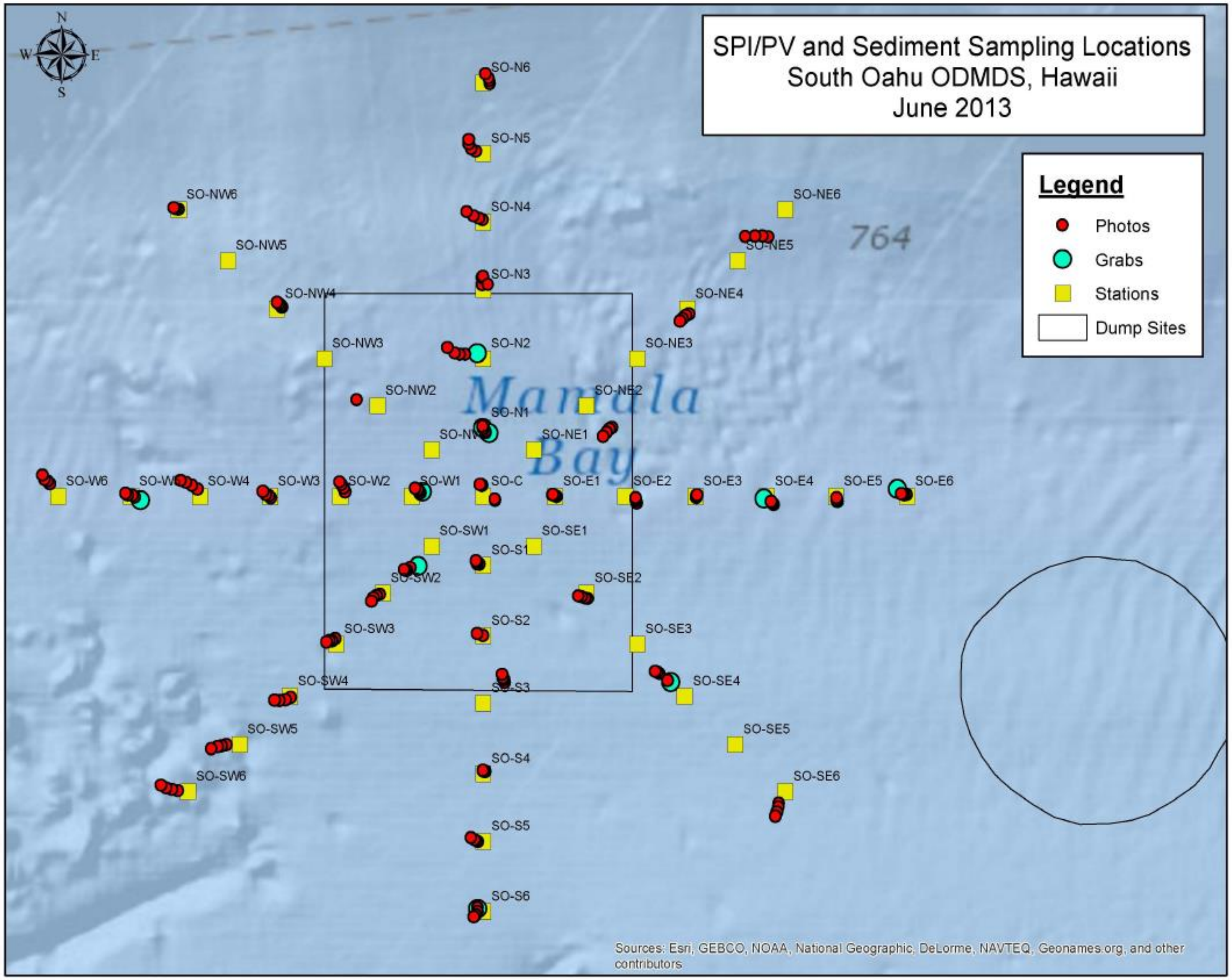
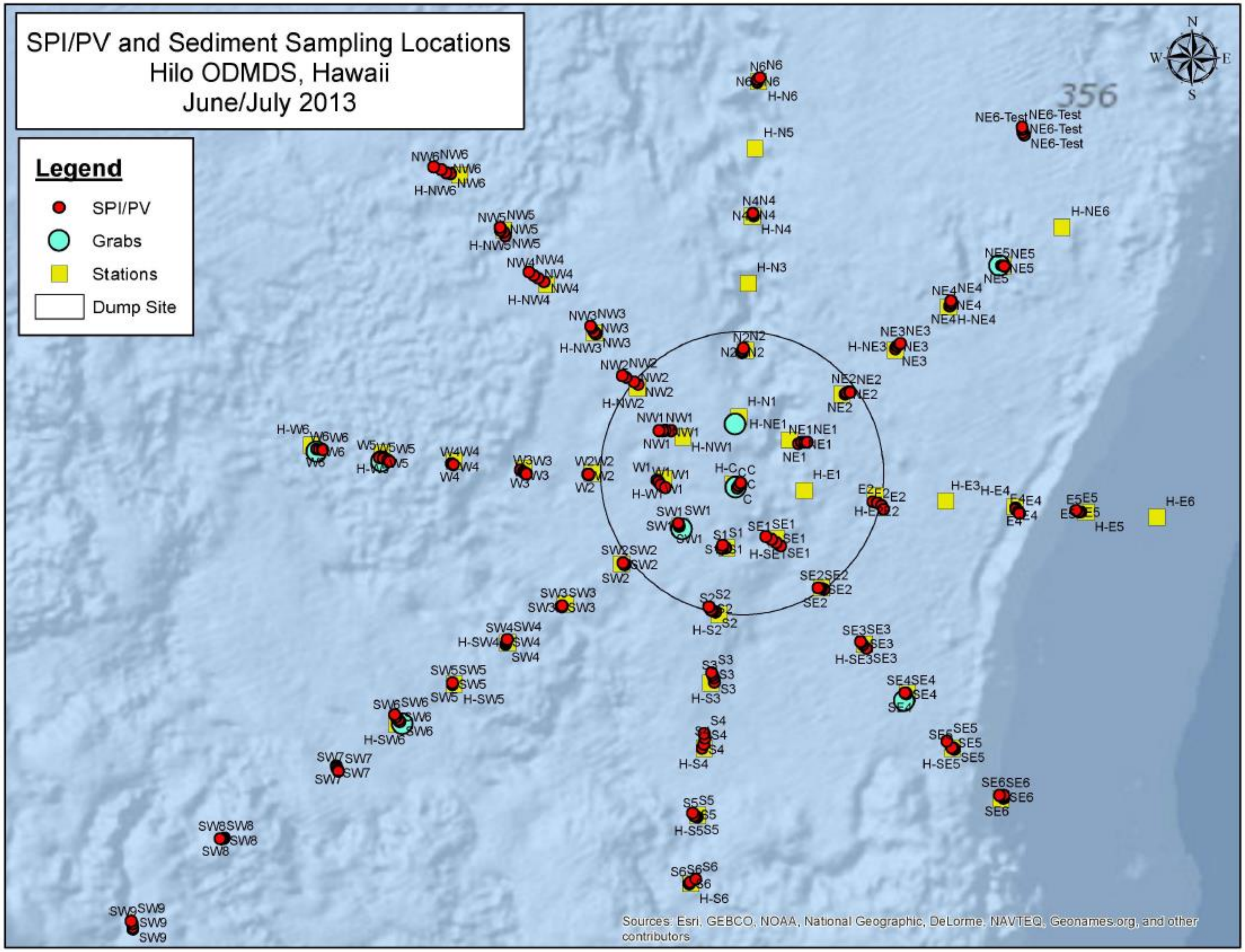


Figure 8. **Planned (yellow squares) and actual sample station locations at the Hilo ODMDS.**



2.2 Sediment Sampling for Chemistry and Benthic Communities

Sediment samples were collected from a subset of stations at each disposal site for sediment grain size, chemistry, and benthic community analysis. Samples were collected using a stainless steel double Van Veen sediment grab (Figure 9, showing side-by-side configuration) capable of penetrating a maximum of 20 centimeters below the sediment surface. Detailed methods for performing the sediment sampling for chemistry and benthic community analyses are described in the QAPP (EPA, 2013 a).

After each acceptable grab sample was measured for depth of penetration and photographed, a subsample for chemistry was extracted from one side of the grab sampler with a stainless steel spoon (Figure 10). This subsample was homogenized and divided into separate jars (Figure 11) for chemistry analyses (grain size, metals and organics). After the chemistry subsample was extracted, the entire volume of the other side of the grab was processed to create a benthic community sample for that station (Figure 12). A 500 micron sieve was used to separate organisms from the sediment, and the separated organisms were placed into bottles where they were initially preserved with formalin. A total of 18 sediment grab sample stations were sampled in the two survey areas combined: 10 at South Oahu, and 8 at Hilo (see Figures 7 and 8, respectively). Chemistry subsamples were collected from all 18 stations and benthic community samples were collected at 14 of the 18 stations (the lower number of benthic community samples was due to some grabs being used for field and laboratory chemistry duplicates, and one station where QAPP metrics were not met for an acceptable benthic sample).

Figure 9. **Double Van Veen sediment sampler deployed from the Hi'ialakai.**

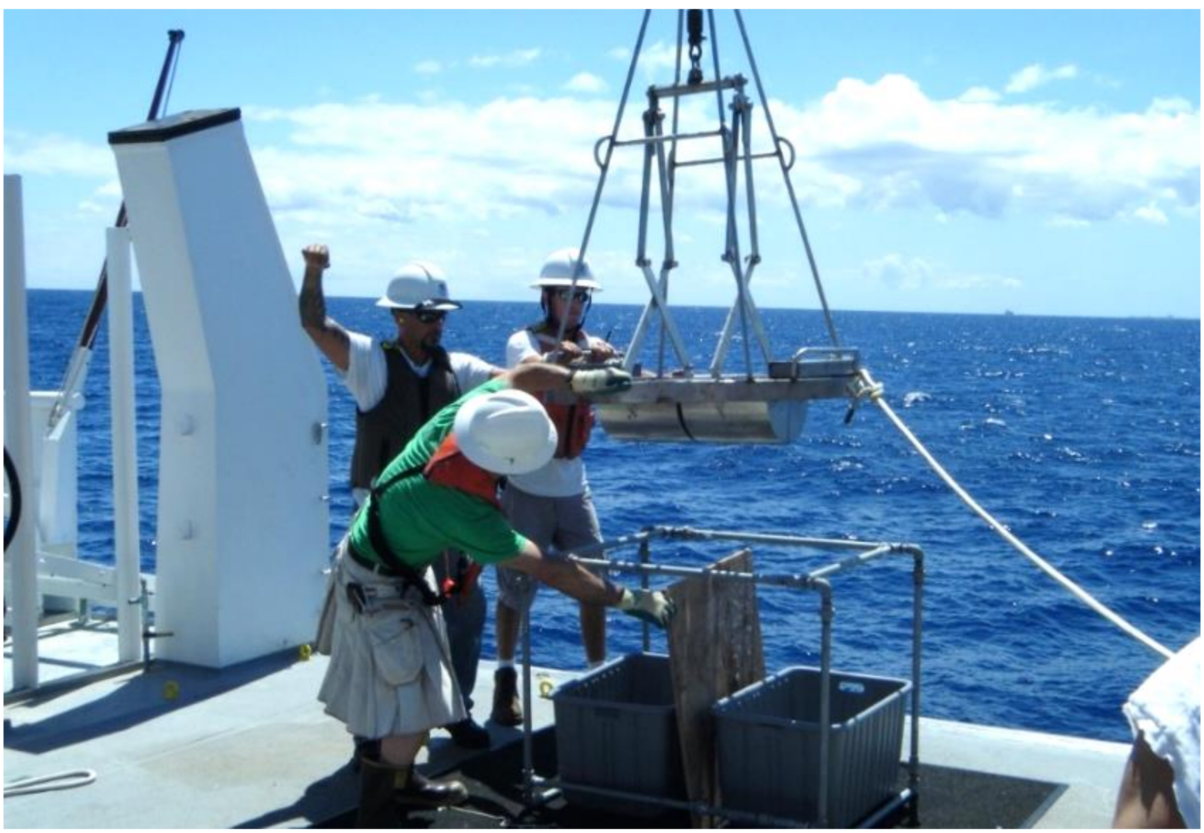


***Figure 10*. Subsampling from the Van Veen grab for sediment chemistry.**

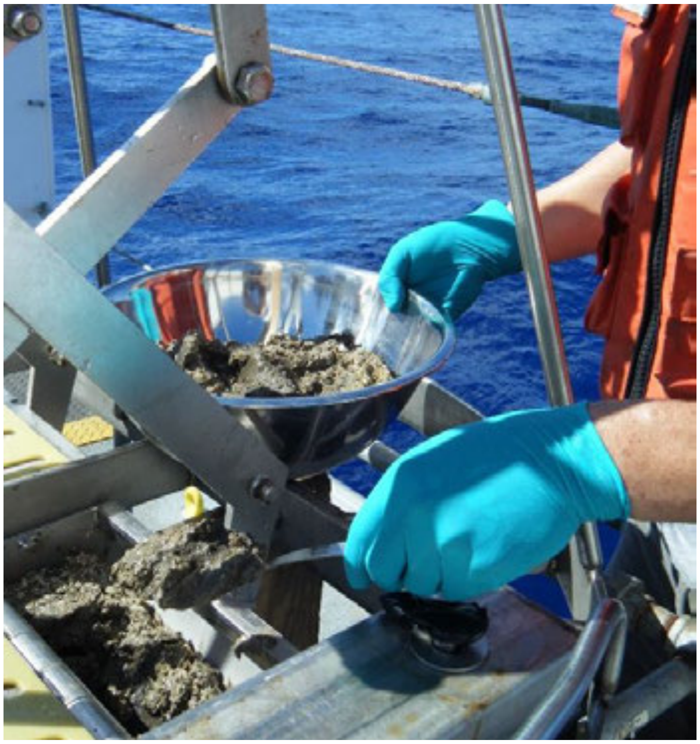


***Figure 11*. Processing a sediment sub-sample for chemical analysis.**

Figure 12. **Processing a sediment sample for benthic community analysis.**

2.3 Sub-Bottom Profiling Survey of the South Oahu ODMDS

The primary purpose of this survey was to collect cross-sectional images of the native sediment layers and layers indicative of the dredged material deposit across a wide area in the environs of the South Oahu ODMDS. (The Hilo site was not surveyed in this manner during this round of surveys because much smaller volumes of dredged material have been disposed there over time which may not be detectable in terms of thickness and contrast.)

This type of survey allows EPA to separately estimate the cumulative volume of dredged material disposed at the South Oahu site, compared to volumes permitted for disposal. The survey was sub-contracted to Sea Engineering, who conducted the work aboard a separate vessel specially rigged for this type of survey with an acoustic sub-bottom profiler system (Figure 13). Figure 14 shows the grid of transects surveyed. Detailed methods for the sub-bottom survey are provided in the supplemental QAPP prepared by Sea Engineering (2013).

Figure 13. **Sub-bottom profiler equipment – used only at the South Oahu site.**

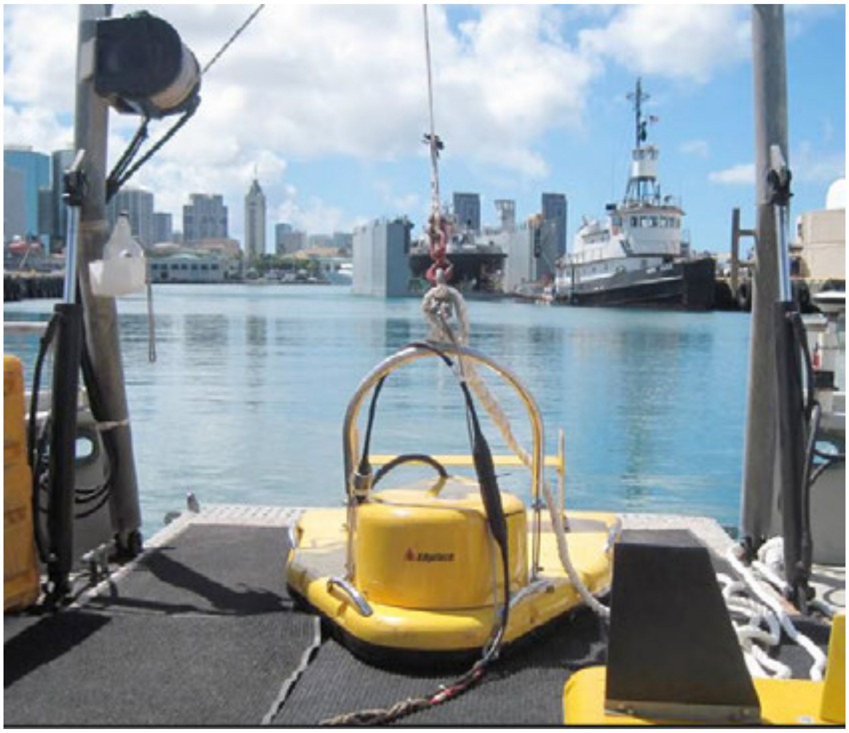
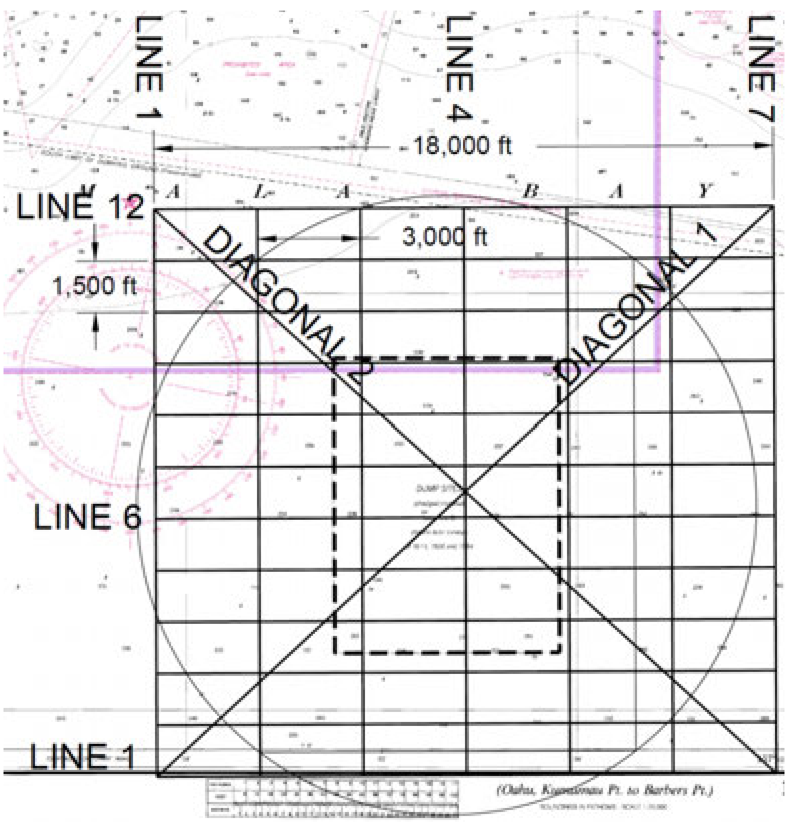


Figure 14. **Planned transect lines for the sub-bottom profiling survey around the South Oahu ODMDS** (from Sea Engineering, Inc., 2014).



III. SURVEY RESULTS

3.1 SPI – PVP Survey Results

3.1.1 Dredged Material Footprint Mapping

The presence and extent of the dredged material footprint was successfully mapped at both Hawaii disposal sites. SPI images of typical native sediments (outside of any dredged material deposit) around the South Oahu and Hilo sites are shown in Figure 15. Dredged material is usually evident because of its unique optical reflectance and/or color relative to the native pre-disposal sediments. The presence of dredged material layers can be determined from both plan view images (Figure 16) and from SPI images (Figure 17). In most cases, the point of contact between the two layers is clearly visible as a textural change in sediment composition, facilitating measurement of the thickness of the newly deposited layer.

Two off-site stations around the South Oahu site had native hard-bottom habitat (N6 and SW5, Figure 7); otherwise the native sediment was fairly uniformly muddy fine sand. The overall dredged material footprint extended well beyond the current disposal site boundary (Figure 18; also see Figure 28). Given the lack of natural fine grained sediment around the South Oahu site, dredged material would be expected to remain visible on the seafloor for a substantial amount of time (decadal scale). Similarly, given the proximity of historic disposal sites to the current designated site in Mamala Bay and the large cumulative volume of disposed sediments over the years (Table 1), it is not surprising that traces of dredged material are found outside of the current designated site boundary. However, the thickest off-site deposits were just north (shoreward) of the site boundary indicating that "short-dumping" (disposal from scows before they reached the Surface Discharge Zone at the middle of the site) probably occurred in the past. EPA has required satellite-based tracking of all disposal scows since the early 2000s, and there have been no "short-dumps" since a single partial mis-dump occurred in 2006. Thus the footprint outside the disposal site boundary would appear to be relic material deposited more than 10 years ago.

Compared to South Oahu, native sediments around the Hilo site were finer. Two off-site stations (E5 and SE6, Figure 8) were on rocky lava outcrops. Even though this area is primarily a silty, very fine to fine sandy bottom, there are periodic lava deposits or rock outcrops creating some topographic diversity. The substantially smaller cumulative volume of dredged material disposed at Hilo appeared to be more fully confined within the designated disposal site boundary (Figure 19). Except at the center of the site where rubble has accumulated (Figure 20), dredged material thickness was only 3 cm or less within the site boundary, and less than 1 cm thick outside the boundary.

3.1.2 Bioturbation Depth

The depth to which sediments are biologically mixed is an important indicator of the status of recovery of the infaunal community following disturbance (e.g., by dredged material disposal). Biogenic particle mixing depths can be estimated by measuring the depths of imaged feeding voids in the sediment column. This parameter represents the particle mixing depths of head-down feeders, mainly polychaetes. This depth is also related to the apparent redox potential discontinuity (aRPD) depth. In the absence of bioturbating organisms, the aRPD (in muds) will

Figure 15. Profile images from the ambient bottom at the Hilo ODMDS (left, Station S3) and the South Oahu site (right, Station S6). The ambient seafloor at Hilo has a higher silt-clay content, allowing greater camera penetration than at South Oahu. Scale: width of each profile image = 14.4 cm. (Germano & Assoc., 2013)

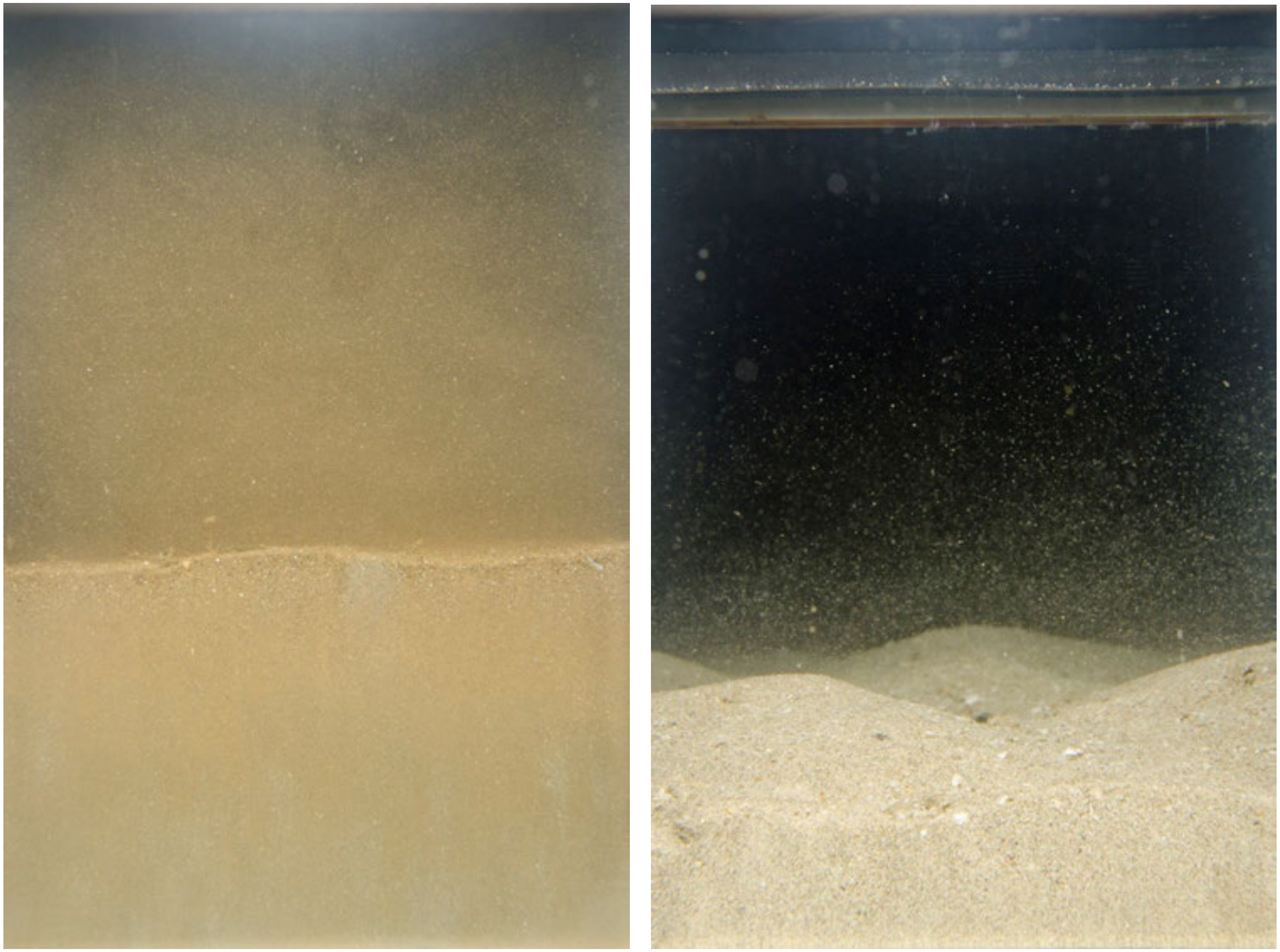


Figure 16. Plan view images of the dredged material deposit compared to the native seafloor at South Oahu. Station C1 on dredged material (top) shows the visual difference in both sediment color and surface texture/features of dredged material compared to the ambient bottom at Station NW6 (bottom). Scale: width of each PV image is approximately 4 m. (Germano & Assoc., 2013)

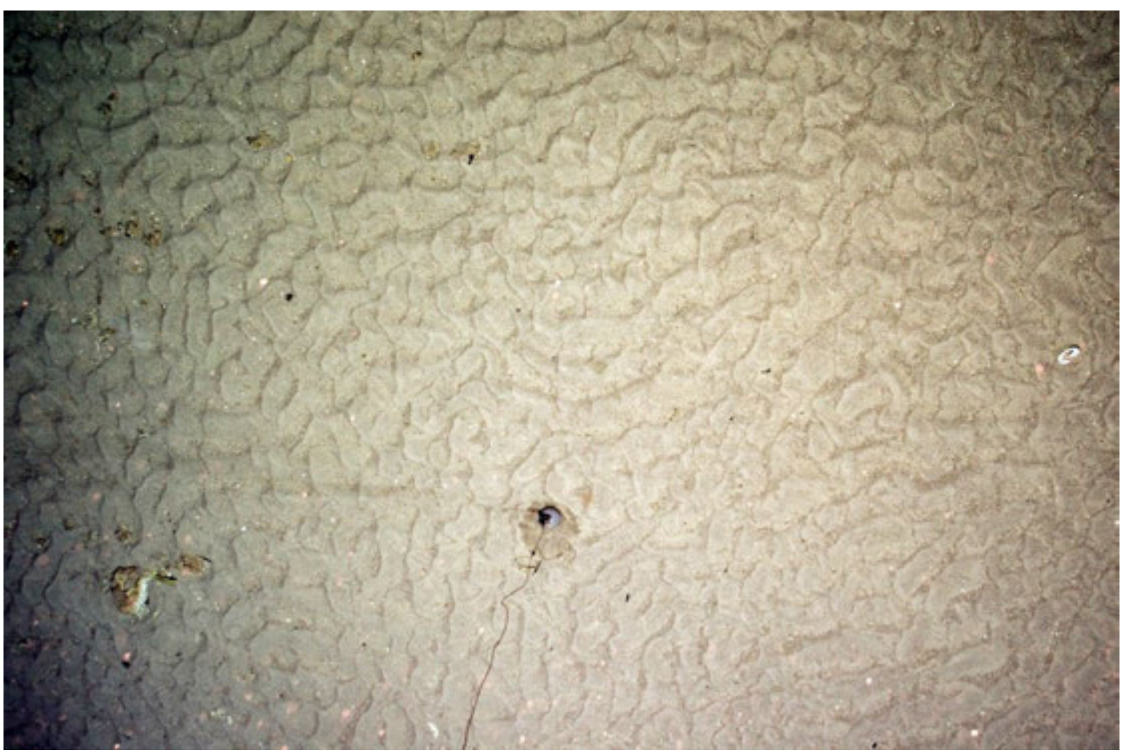


Figure 17. Profile images from two Hilo Stations showing a surface layer of disposed coarse white dredged sand that thins from NW1 (left) near the center of the disposal site to only trace amounts at NW3 (right). Scale: width of each profile image = 14.4 cm. (Germano & Assoc., 2013)

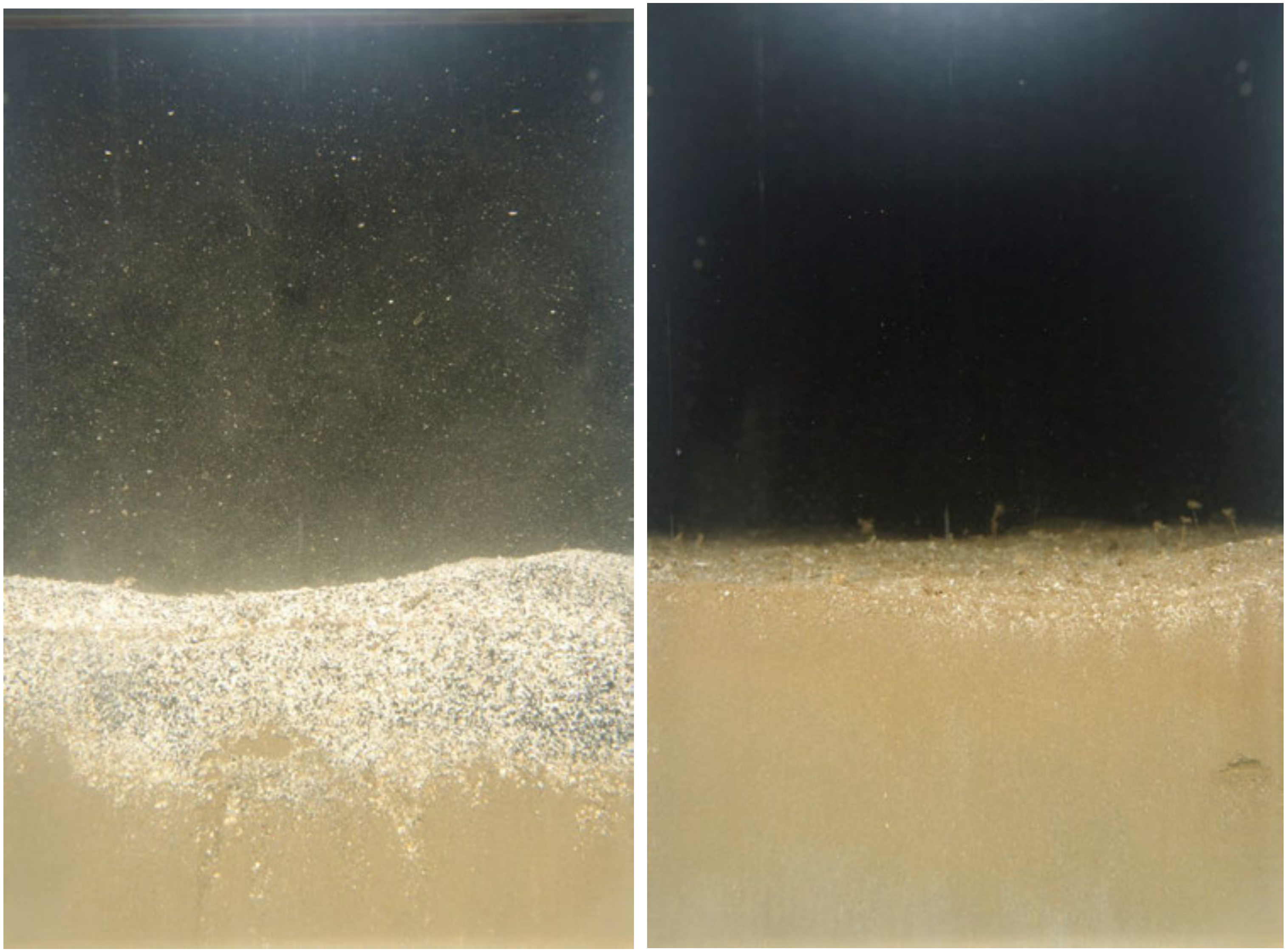


Figure 18. **Dredged material footprint identified at the South Oahu site.**

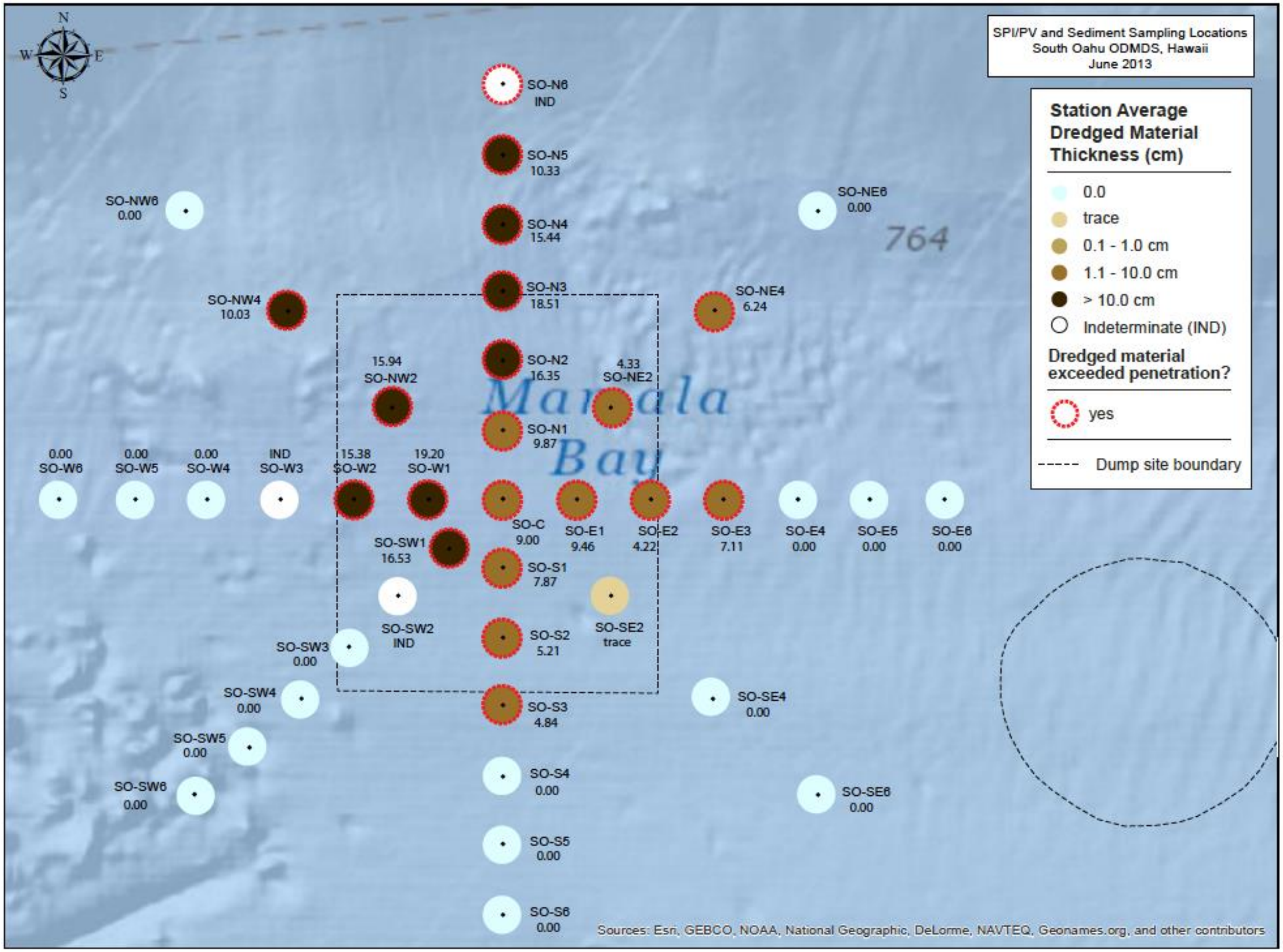


Figure 19. **Dredged material footprint identified at the Hilo site.**

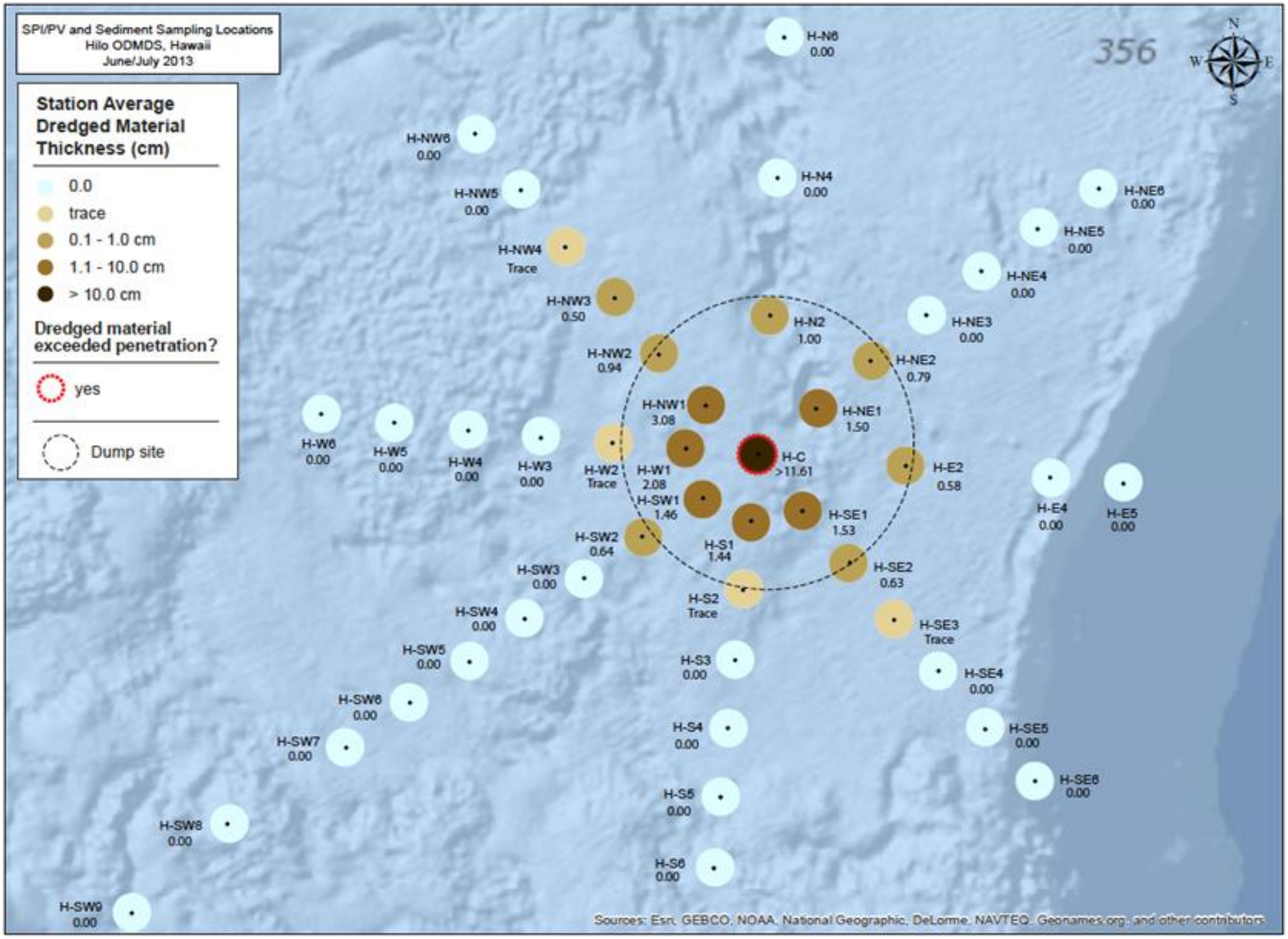
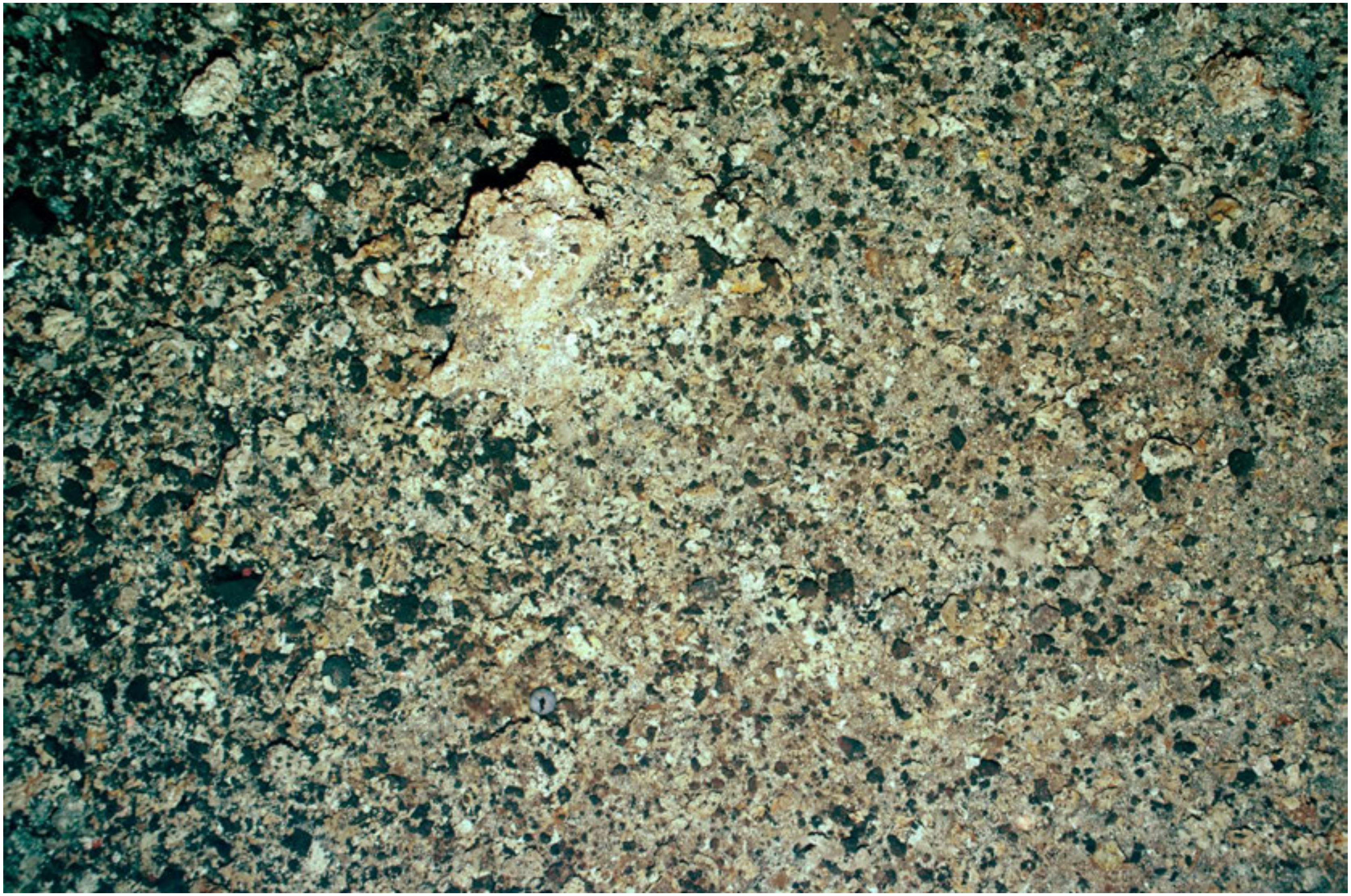


Figure 20. Plan view image from the center station of the Hilo ODMDS shows a high density of small rock and coral rubble. Rubble falls rapidly through the water column with minimal dispersal, and thus has accumulated only at the center of the site. Scale: width of PV image is approximately 4 m. (Germano & Assoc., 2013)



typically reach only 2 mm below the sediment-water interface (Rhoads 1974). However, it is quite common in profile images to see evidence of biological activity (burrows, voids, or actual animals) well below the mean aRPD (Germano and Assoc., 2013 b).

At the South Oahu site, the maximum bioturbation depths (>15 cm) were generally found at the stations that also had the thickest deposits of dredged material (including the off-site stations to the north with relic dredged material deposits) (Figure 21). A similar pattern was seen for average feeding void depth, and for the aRPD depth (see Germano and Assoc., 2013 b). This is to be expected, since dredged material is generally finer, less consolidated, and therefore more conducive to supporting a richer community of burrowing organisms compared to the native, consolidated fine sand around the disposal site. Stations with a native fine sand substrate exhibited lower camera penetration, shallower aRPD depths, and shallower average feeding void depths.

At the Hilo site, where much less dredged material has been discharged and where the native seafloor is more heterogenous, the pattern was different (Figure 22). Although dredged material was thickest at the center of the site, a high concentration of gravel and coral rubble prevented full camera penetration there, so that bioturbation depth and aRPD could not be determined fully. Other on-site stations showed fairly uniform bioturbation depths of 7-10 cm. Many off-site stations also had bioturbation depths in this range, although bioturbation depths of 10-18 cm were also common. Since the native seafloor around the Hilo site is finer-grained than around the South Oahu site, greater bioturbation depths, and less difference between on-site and off-site stations, would be expected.

3.1.3 Infaunal Successional Stage

The mapping of infaunal successional stages is readily accomplished with SPI technology. Mapping of successional stages is based on the theory that organism-sediment interactions in fine-grained sediments follow a predictable sequence after a major seafloor perturbation (Germano and Assoc., 2013). This continuum of change in animal communities after a disturbance (primary succession) has been divided subjectively into four stages: Stage 0, indicative of a sediment column that is largely devoid of macrofauna, occurs immediately following a physical disturbance or in close proximity to an organic enrichment source; Stage 1 is the initial community of tiny, densely populated polychaete assemblages; Stage 2 is the start of the transition to head-down deposit feeders; and Stage 3 is the mature, equilibrium community of deep-dwelling, head-down deposit feeders (see Figure 6).

After an area of bottom is disturbed by natural or anthropogenic events, the first invertebrate assemblage (Stage 1) appears within days after the disturbance. Stage 1 consists of assemblages of tiny tube-dwelling marine polychaetes that reach population densities of 10^4 to 10^6 individuals per m^2. These animals feed at or near the sediment-water interface and physically stabilize or bind the sediment surface by producing a mucous “glue” that they use to build their tubes.

If there are no repeated disturbances to the newly colonized area, then these initial tube dwelling suspension or surface-deposit feeding taxa are followed by burrowing, head-down deposit feeders that rework the sediment deeper and deeper over time and mix oxygen from the overlying water into the sediment. The animals in these later-appearing communities (Stage 2 or 3) are larger, have lower overall population densities (10 to 100 individuals per m^2), and can rework the sediments to depths of 3 to 20 cm or more.

Figure 21. **Bioturbation depth at the South Oahu site** – deeper values here are reflective of an active benthic community reworking deposited dredged material. (Germano & Assoc., 2013)

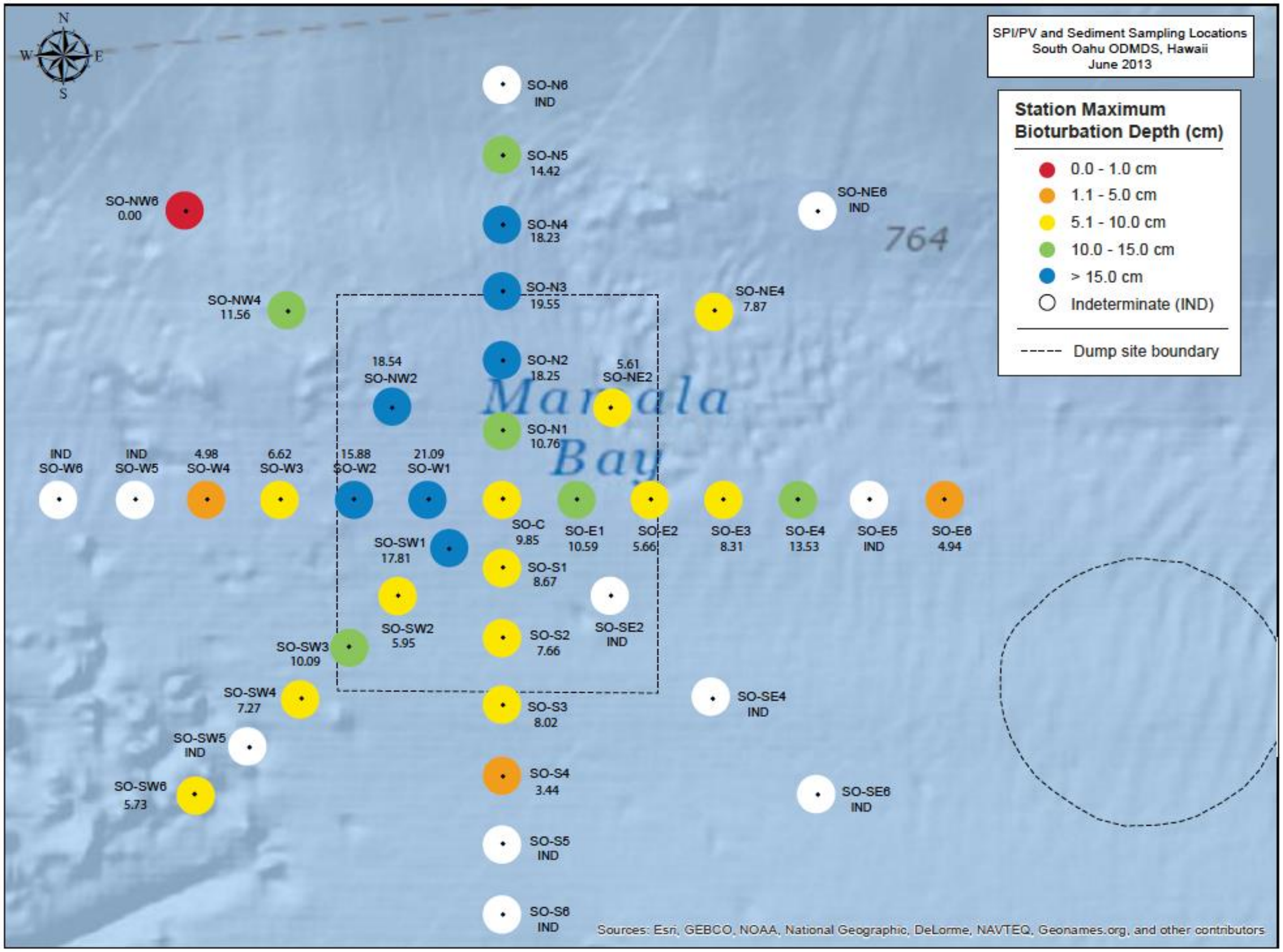
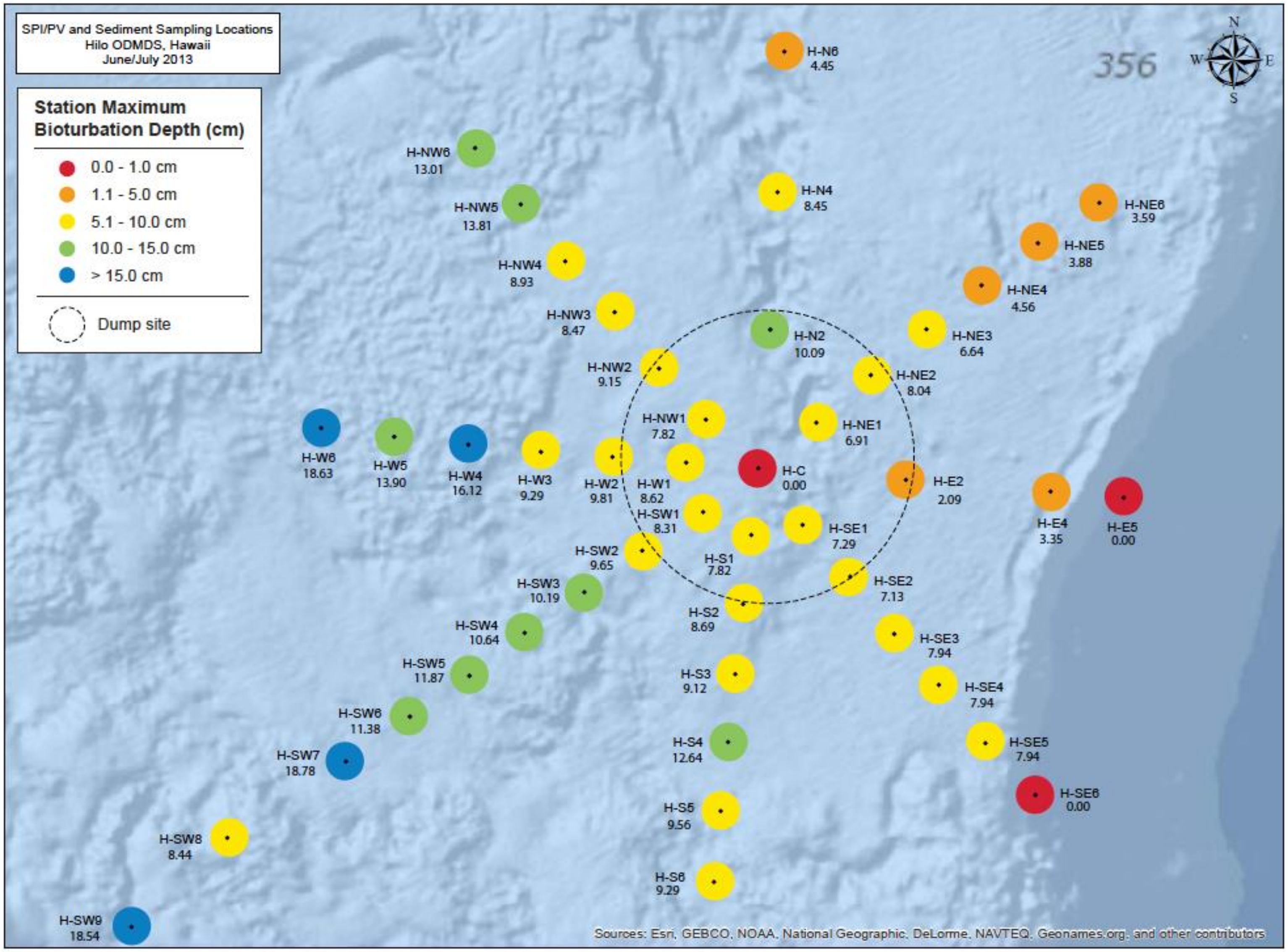


Figure 22. **Bioturbation depth at the Hilo site:** on-site and off-site stations show similar depths (much less material has been disposed here than at South Oahu). (Germano & Assoc., 2013)



Various combinations of these basic successional stages are possible. For example, secondary succession can occur (Horn, 1974) in response to additional labile carbon input to surface sediments, with surface-dwelling Stage 1 or 2 organisms co-existing at the same time and place with Stage 3, resulting in the assignment of a “Stage 1 on 3” or “Stage 2 on 3” designation

The distribution of successional stages in the context of the mapped disturbance gradients is one of the most sensitive indicators of the ecological quality of the seafloor (Rhoads and Germano 1986). The presence of Stage 3 equilibrium taxa (mapped from subsurface feeding voids as observed in profile images) can be a good indication of relatively high benthic habitat stability and quality. A Stage 3 assemblage indicates that the sediment surrounding these organisms has not been disturbed severely in the recent past and that the inventory of bioavailable contaminants is relatively small.

At the South Oahu site, infaunal community successional stage was readily apparent on the dredged material deposit, but was generally unmeasurable (indeterminate) on the native sandy sediments off-site (Figure 23). Successional stage on the dredged material mound, including the relic off-site material to the north, was fairly uniformly Stage 1 on 3. While this indicates relatively rapid recolonization and a well-established infaunal community in the finer, more carbon-rich dredged sediments, it is clearly a different community than would be supported by the native fine sand at this location in the absence of dredged material disposal.

At the Hilo site, differences between stations with and without dredged material were less apparent (Figure 24). Since far less dredged material has been discharged at this site than at the South Oahu site, less disturbance to the native sediments around the site has occurred. Both on-site and off-site stations were dominated by Stage 1 on 3 communities, but more heterogenous communities were present to the east and northeast of the site as well. These stations had either no apparent dredged material, or only trace thicknesses of dredged material; therefore the different community structure at these stations may reflect natural heterogeneity of benthic habitat types in this area rather than any particular effect from dredged material deposition.

3.1.4 Plan-View Photography

Unusual surface sediment textures or structures detected in any of the sediment profile images can be interpreted in light of the larger context of surface sediment features (for example, is a surface layer or topographic feature a regularly occurring feature and typical of the bottom in this general vicinity or just an isolated anomaly?). The scale information provided by the underwater lasers allows accurate density counts (number per square meter) of attached epifaunal colonies, sediment burrow openings, or larger macrofauna or fish which may be missed in the sediment profile cross-sections.

Except for the two stations on hard bottom, the native seafloor around the South Oahu site is a muddy carbonate sand with rippled bedforms and relatively low abundance of epifauna. Other than the occasional hermit crab or other decapods such as shrimp or Brachyurans, the presence and abundance of epifauna was directly proportional to the amount of rock/rubble/outcrop present on the flat sandy bottom. Anything that provided a hard surface or additional vertical relief for niche/topographic diversity became a suitable substratum to which organisms could attach (tunicates, cnidarians, bryozoans) or hide within (echinoderms), which subsequently attracted more fish to that particular location.

Figure 23. **Community structure at the South Oahu site:** presence of Stage 3 organisms is indicative of healthy benthic community. (Germano & Assoc., 2013)

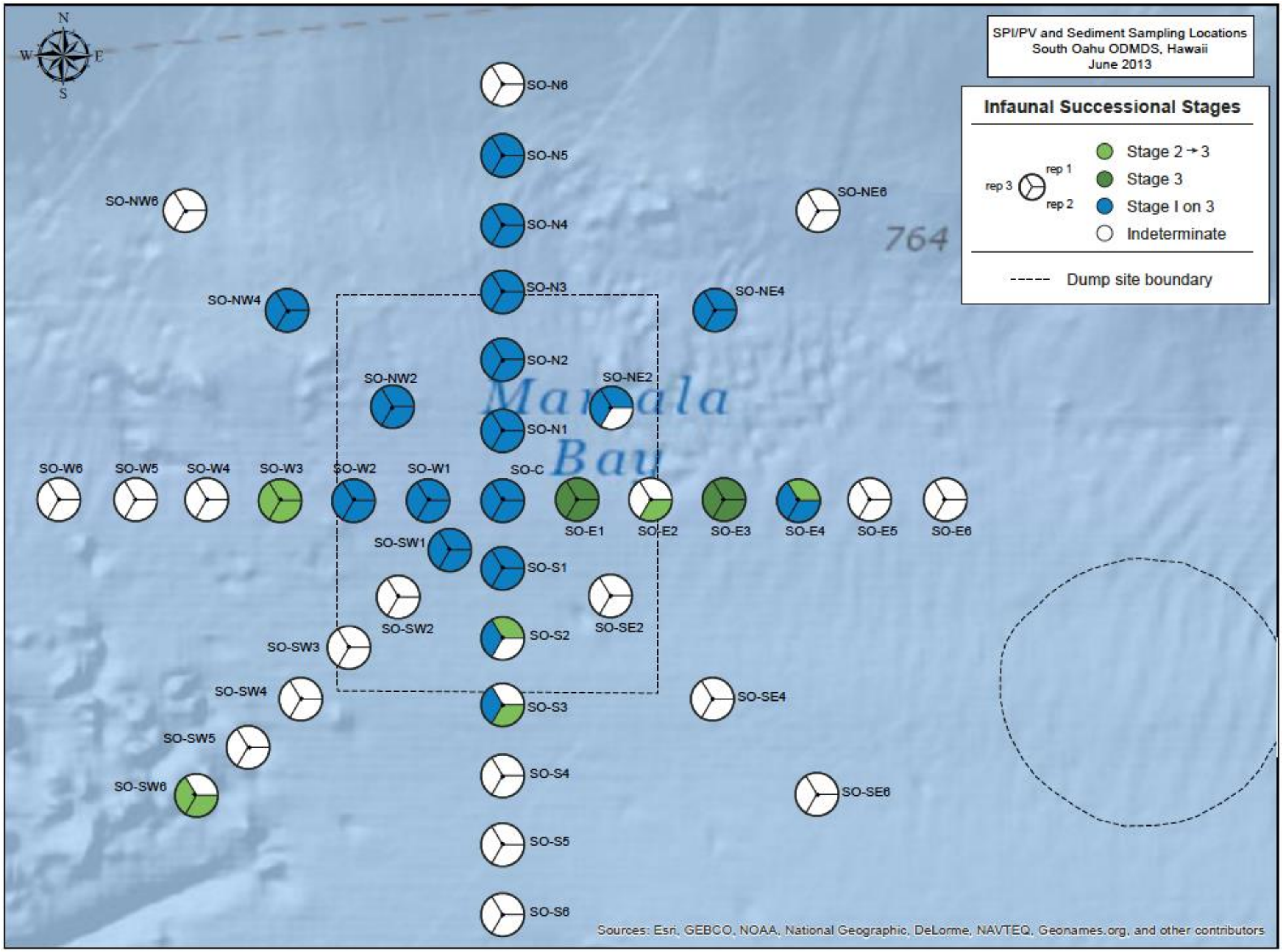
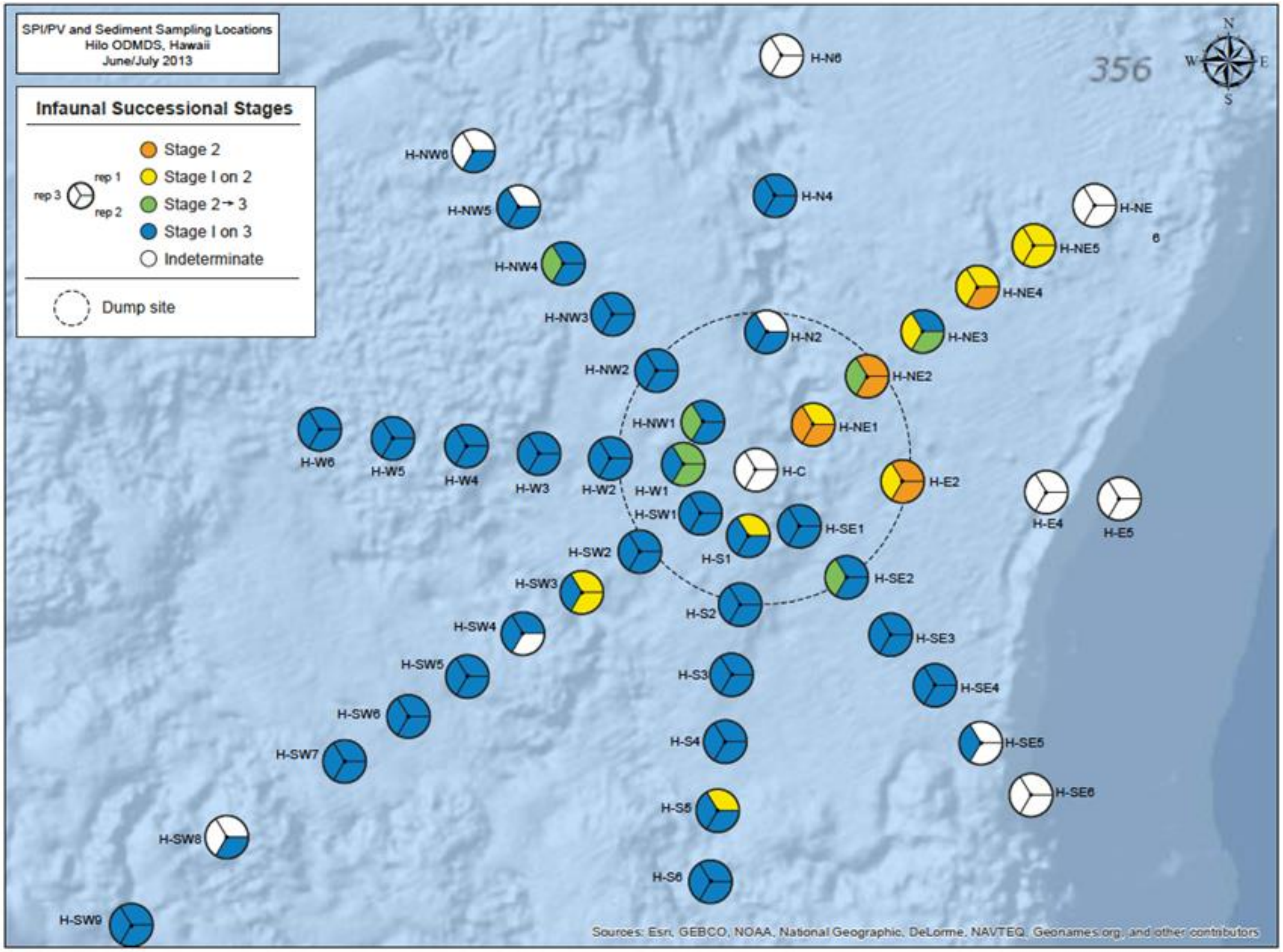


Figure 24. **Community structure at the Hilo site:** presence of Stage 3 organisms is indicative of healthy benthic community. (Germano & Assoc., 2013)



In contrast, the native Hilo sediments had a higher percentage of fine sediments (attracting higher densities of small prey, evidenced by burrow holes in plan view images) along with more frequent occurrence of rocky outcrops (creating habitat heterogeneity) both inside and outside the site boundaries. These characteristics attracted a generally more abundant and varied epifauna and fish assemblage. Unlike the South Oahu site, the areas of the highest accumulation of dredged material (near the site center where the surface was a continuous cover of rubble) appeared to have the lowest faunal attractiveness. But higher densities of fish and anthozoans as well as more frequent evidence of burrowing infauna were seen throughout the area as a whole, compared to South Oahu.

3.1.5 Discussion: SPI – PVP Surveys

Minor and localized physical impacts are expected within the site as a result of disposal operations. However, historical and more recent disposal activity appear to have had little lasting adverse impact on benthic infauna, or epibenthic organisms, at either site. With the exception of the center station at the Hilo site where an accumulation of disposed rubble has most likely altered the resident infaunal community on a localized scale, the disposal of dredged material, in general, has not impeded benthic recolonization or the re-establishment of mature successional stages. At the South Oahu site, it appears the larger cumulative volume of fine grained, higher carbon content dredged material deposited over the native coarser grain carbonate sands may have actually enhanced the secondary benthic production by promoting the settlement and persistence of subsurface deposit feeders that would not normally exist in the native carbonate sand bottom here.

The prediction in the original EIS (EPA 1980) that disposal of dredged material at both the Hilo and South Oahu ODMDS will have no lasting adverse impact on the benthic community inside or outside of site boundaries is supported by the results of the SPI-PVP survey. Stage 3 taxa have successfully recolonized all but the center station at the Hilo ODMDS, and secondary production appears to be enhanced at the South Oahu ODMDS within the dredged material footprint. Also epifauna, in general, are similar on-site and off-site (though different between South Oahu and Hilo overall.

Based on the results of the SPI-PVP surveys, the authors predicted that the traditional benthic sampling results would also show a higher species diversity and infaunal abundance in samples from the Hilo site versus those from the South Oahu site, because of the increased amount of fines and evidence of increased subsurface burrowing in the images from the Hilo site. (See discussion of Benthic Community Analysis Results, below.)

3.2 Sediment Physical and Chemical Survey Results

Full physical and chemical analytical results are provided in ALS Environmental (2013) and EPA (2013 b). Due to vessel and equipment problems, less than half the originally-targeted benthic grab stations were sampled. But by using the SPI survey results to help select the chemistry (and benthic community) stations at each site, a sufficient number of samples were collected within and outside of site boundaries and the dredged material footprints to characterize the native (ambient) seafloor compared to seafloor areas physically impacted by dredged material disposal. Nevertheless, only qualitative (vs statistical) analysis of the physical and chemical results was conducted given that only four “on site” and five “offsite” stations were ultimately sampled at South Oahu, and only three “on site” and four “offsite” stations were sampled at Hilo.

3.2.1 Physical Results

Minor and localized physical impacts are expected within the site boundary as a result of disposal operations. Tables 2 (South Oahu) and 3 (Hilo) compare areas within the disposal sites that have dredged material deposits (indicated as "Inside") and off site areas without any dredged material deposits (indicated as "Outside"). Physical on-site differences are most apparent at the South Oahu site, which has received an order of magnitude more dredged material over the years than the Hilo site. At South Oahu (Table 2), "inside" stations have substantially more gravel, more fines (silt and clay), and higher organic carbon content than the "outside" stations that represent ambient or native seafloor conditions. This reflects the character of dredged material typically disposed at this site, which often includes grave-size coral rubble, and fines from land-side runoff that settles in harbors, berths, and navigation channels. In contrast, native sediments around the South Oahu site are uniformly sandier, with lower carbon. These on-site physical changes are expected to be persistent, but are not considered to be a significant or adverse impact.

Physical characteristics of the off-site ambient or native sediments around the Hilo site are more variable (Table 3) reflecting the more heterogeneous nature of the seafloor in the area, which includes a mixture of hard bottom features (submerged reef and terraces) coupled with areas of accumulated finer grained sediments (USGS, 2000). The dredged material disposed at the Hilo site has not substantially altered the physical nature of the disposal site in part due to this natural variability, and in part because only a relatively small volume of material has been disposed at Hilo (especially compared to disposal volumes at South Oahu).

3.2.2 Chemical Results

Although physical differences are expected as a result of disposal operations, pre-disposal sediment testing is intended to minimize any degradation to the site which might be caused by introduction of contaminants which are bioavailable and/or pose a toxicity risk to the marine environment. The bulk chemistry data show low but variable concentrations of most chemical constituents at both sites (Tables 2 and 3). At both "inside" and "outside" stations, four to six metals were at concentrations above NOAA's effects-based 10^{th} percentile screening value (ER-L), below which adverse effect are predicted to rarely occur (NOAA, 2008). Of these metals, only chromium, copper, and mercury were slightly higher at "inside" stations compared to "outside" stations, and only at the South Oahu site. At Hilo, the metals concentrations were virtually indistinguishable between "inside" and "outside" stations.

Only nickel exceeded its 50^{th} percentile screening value (ER-M), above which adverse effects are expected to frequently occur (NOAA, 2008). It was most elevated at Hilo, but was at similar elevated concentrations at both "inside" and "outside" stations there. Nickel is often naturally elevated in certain sediments, including volcanic sediments.

Organic constituents were also low at both sites. Only two constituents exceeded NOAA ER-L screening levels, and again only at the South Oahu site. PCBs and DDTs each slightly exceeded their respective ER-Ls at one "inside" station and one "outside" station. PCBs were generally higher at the "inside" stations, even when not exceeding the ER-L. There were no exceedances of ER-Ls for organics at either "inside" or "outside" stations at the Hilo site.

Table 2. **Summary of sediment chemistry for the South Oahu Ocean Dredged Material Disposal site and vicinity.**

South Oahu site		Survey Station:										NOAA Screening	
		"Inside"					"Outside"						
Analyte	Units (dw)	SO-N1	SO-N1 dup*	SO-N2	SO-SW1	SO-W1	SO-SE4**	SO-W5	SO-S6	SO-E6	SO-E4	ER-L	ER-M
Gravel	%	21	3	69	3	12	1	1	0	1	11	--	--
Sand	%	43	53	29	47	50	78	79	82	83	64	--	--
Silt	%	21	24	11	25	24	16	12	12	10	20	--	--
Clay	%	14	17	4	15	11	5	4	5	5	7	--	--
Total Organic Carbon	%	1.25	1.78	1.25	1.02	1.48	0.58	0.53	0.43	0.41	0.81	--	--
Arsenic	mg/kg	20	13	24	33	19	40	39	27	30	27	8.2	70
Cadmium	mg/kg	0.6	0.69	0.39	ND	0.43	ND	0.42	ND	ND	ND	1.2	9.6
Chromium	mg/kg	100	160	100	110	120	68	100	47	45	73	81	370
Copper	mg/kg	65	84	47	43	56	22	36	11	13	37	34	270
Lead	mg/kg	25	31	22	15	95	19	37	10	15	23	46.7	218
Mercury	mg/kg	0.2	0.13	0.13	0.1	0.38	0.09	0.1	0.02	0.05	0.19	0.15	0.71
Nickel	mg/kg	68	140	68	71	92	37	63	24	30	53	20.9	51.6
Selenium	mg/kg	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	--	--
Silver	mg/kg	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1	3.7
Zinc	mg/kg	78	130	76	75	86	52	79	34	35	69	150	410
Dioxins - Total TEQ	ng/kg	6.33	3.88	4.49	1.27	4.12	1.06	0.91	0.07	0.95	4.01	--	--
Total DDTs	ug/kg	ND	2.1	ND	ND	ND	ND	ND	ND	ND	2.6	1.58	46.1
Total Organotins	ug/kg	1.73	4.67	4	1.46	2.21	0.71	5.83	ND	4.1	2.09	--	--
Total PAHs	ug/kg	741	264	274	182	160	344	153.8	ND	263	1501	4022	44792
Total PCB Congeners	ug/kg	21.43	17.49	35.98	8.87	14.11	6.07	7.16	0.09	2.7	23.15	22.7	180

"Inside" stations are both within the disposal site boundary AND on the dredged material deposit as determined by the SPI-PVP survey.
"Outside" stations are both outside the site boundary AND off the dredged material deposit.

* Field duplicate sample from a separate grab taken at a different time at the same station

** This station was chosen for full OTM testing on upcoming dredging project(s) as a possible new reference site for future Hawaii projects.

Table 3. **Summary of sediment chemistry for the Hilo Ocean Dredged Material Disposal site and vicinity.**

		Survey Station:									
Hilo site		"Inside"				"Outside"				NOAA Screening	
Analyte	**Units (dw)**	**H-W1**	**H-W1 dup***	**H-N1**	**H-SW1**	**H-SE4**	**H-NE5**	**H-SW6**	**H-W6**	**ER-L**	**ER-M**
Gravel	%	2	3	2	0	0	0	0	0	--	--
Sand	%	62	61	47	69	72	85	26	14	--	--
Silt	%	25	24	21	26	21	16	61	70	--	--
Clay	%	5	8	7	5	7	5	11	17	--	--
Total Organic Carbon	%	0.83	0.98	0.81	0.81	0.69	0.57	2.43	3.27	--	--
Arsenic	mg/kg	36	36	32	36	26	28	48	55	8.2	70
Cadmium	mg/kg	0.4	ND	0.5	0.6	0.72	0.5	0.71	0.62	1.2	9.6
Chromium	mg/kg	110	120	140	130	140	140	150	160	81	370
Copper	mg/kg	30	35	31	31	30	31	51	56	34	270
Lead	mg/kg	11	11	11	12	9.6	11	19	21	46.7	218
Mercury	mg/kg	0.05	0.06	0.05	0.06	0.04	0.04	0.14	0.17	0.15	0.71
Nickel	mg/kg	160	200	290	230	320	290	88	82	20.9	51.6
Selenium	mg/kg	ND	ND	ND	ND	ND	ND	ND	ND	--	--
Silver	mg/kg	ND	ND	ND	ND	0.75	ND	1.1	1.2	1	3.7
Zinc	mg/kg	70	81	83	78	87	83	91	95	150	410
Dioxins - Total TEQ	ng/kg	3.02	1.99	2.19	1.96	1.58	0.831	4.84	7.65	--	--
Total DDTs	ug/kg	ND	ND	ND	ND	ND	ND	ND	ND	1.58	46.1
Total Organotins	ug/kg	ND	ND	0.86	ND	ND	ND	ND	ND	--	--
Total PAHs	ug/kg	2.2	2.3	10.2	1.8	ND	ND	3	17.4	4022	44792
Total PCB Congeners	ug/kg	0.3	0.5	ND	ND	ND	ND	0.25	0.28	22.7	180

"Inside" stations are both within the disposal site boundary and ON the dredged material deposit as determined by the SPI-PVP survey.
"Outside" stations are both outside the site boundary and OFF the dredged material deposit.

* Field duplicate sample from a separate grab taken at a different time at the same station

The screening level exceedances were relatively minor in magnitude and, in many cases, were seen at both "inside" and "outside" stations. The few constituents that were at higher concentrations within the disposal sites reflect the contaminant levels in the dredged material approved for discharge. All sediments discharged at ocean disposal sites are fully characterized before approval for ocean disposal is granted. Sediments that contain toxic pollutants in toxic amounts, or that contain elevated levels of compounds that will readily bioaccumulate into tissues of organisms exposed to them on the seafloor, are prohibited from being discharged. Thus the chemical concentrations identified are not considered to represent a risk of environmental impacts in and of themselves; also, these low concentrations indicate that the pre-dredge sediment testing regime is adequately protecting the environment of the disposal sites by identifying and excluding more highly contaminated sediments from being disposed.

3.3 Benthic Community Analysis Results

Less than half of the original targeted stations were sampled for sediment grab sampling due to ship and equipment problems. Nevertheless, by selecting stations based on the results of the SPI-PVP surveys, sufficient samples were collected within and outside of site boundaries and the dredged material deposit footprint to provide general characterization of benthic communities occupying native (ambient) seafloor and seafloor physically impacted by dredged material disposal.

3.3.1 Abundance of Infauna

As noted earlier, some physical changes (e.g., grain size and organic carbon content) were apparent at stations with dredged material, especially at the South Oahu site. However, overall abundances of different organism classes, while low, were not statistically different between "inside" and "outside" stations at either disposal site (Tables 4 and 5) (EcoAnalysts, Inc., 2014).

At South Oahu, where both disposal volume and physical changes were greatest, crustaceans were similarly abundant at "inside" and "outside" stations; annelids appeared to be somewhat less abundant at "inside" stations; while mollusks and other miscellaneous taxa appeared to be somewhat more abundant at "inside" stations. But considering all infauna classes, overall abundance was very similar on-site and off-site.

At Hilo, crustacea appeared to be somewhat more abundant at "inside" stations, but annelids, mollusks and other miscellaneous taxa appeared to be somewhat more abundant at "outside" stations. Overall abundance of infaunal organisms appeared to be slightly greater off-site than on-site but these results were not statistically significant, perhaps due in part to the small sample size. As predicted from the SPI-PVP survey results, overall infaunal abundance appeared to be slightly greater at Hilo than at South Oahu.

Dredged material had been fairly recently deposited at both sites, and these infaunal abundance results are consistent with relatively rapid recolonization following disposal.

***Table 4*. Infaunal species abundances at the South Oahu site.**

	"Inside"				"Outside"				
Category	**SO-N1**	**SO-N2**	**SO-W1**	**SO-SW1**	**SO-W5**	**SO-S6**	**SO-SE4**	**SO-E4**	**SO-E6**
Annelida	390	540	700	400	1190	120	50	660	670
Annelida Average	507.5				538				
Crustacea	0	10	10	10	20	0	0	10	10
Crustacea Average	7.5				8				
Mollusca	10	40	20	20	0	30	0	10	0
Mollusca Average	22.5				8				
Miscellaneous Taxa	30	50	130	40	20	10	0	110	60
Miscellaneous Taxa Average	62.5				40				
Totals	430	640	860	470	1230	160	50	790	740
Overall Averages	600				594				

***Table 5*. Infaunal species abundances at the Hilo site.**

	"Inside"		"Outside"		
Category	**H-N1**	**H-SW1**	**H-NE5**	**H-SW6**	**H-SE4**
Annelida	900	320	490	930	650
Annelida Average	610		690		
Crustacea	20	20	10	0	10
Crustacea Average	20		6.7		
Mollusca	50	10	10	260	10
Mollusca Average	30		93.3		
Miscellaneous Taxa	50	50	50	80	100
Miscellaneous Taxa Average	50		76.7		
Totals	1020	400	560	1270	770
Overall Averages	710		866.7		

3.3.2 Diversity of Infauna

Based on species lists and statistics presented in EcoAnalysts, Inc. (2014), the overall benthic community at the South Oahu site was shown to be different from the assemblage at the Hilo site. This finding is not surprising given that the Hilo site is located in a relatively heterogeneous area containing a mixture of hard bottom features (submerged reef and terraces) coupled with areas of accumulated finer grained sediments (USGS, 2000), while the South Oahu site is located on a more homogeneous sandy seafloor with some scattered hard bottom features. However, as is expected of deep-sea benthic habitats overall, both sites have well developed benthic communities with high diversity and relatively low abundances, and presence of several undescribed taxa.

For both sites combined, there were 126 taxa found. A total of 85 infaunal taxa were identified from the South Oahu ODMDS sampled locations and a total of 79 taxa were identified from the Hilo ODMDS sampled stations. Within the polychaetes identified from both locations, 24 of 89 species were determined to likely be undescribed (EcoAnalysts, Inc., 2014).

At the South Oahu site, diversity was high and abundances tended to be low at all stations. Stations located inside the disposal site were not statistically different in terms of diversity, abundances, or species richness when compared to stations located outside the disposal site. Thus there is no evidence that dredge material is negatively impacting the benthic communities at the South Oahu ODMDS sites sampled.

Similarly at the Hilo site, there were no significant differences in diversity between inside and outside stations. As at South Oahu, diversity was high while abundances were relatively low, which was expected of deep-sea benthic habitats. Based on these results there is no evidence that dredge material is negatively impacting the benthic communities at the Hilo ODMDS stations sampled, other than the expected reduction of abundances due to physical impacts from rubble disposed at the center of the site.

3.4 Sub-Bottom Profile Survey (South Oahu site only)

The survey area, approximately 8 square nautical miles, covered the current designated site and surrounding abyssal plain seafloor areas, including existing hard bottom features (such as relic reefs and other outcrops) (Figure 25). The contrast between high reflectance native bottom bed forms and lower reflectance non-native deposited sediments allowed for identification of dredged material deposits throughout the study area.

While dredged material was identified within the current disposal site boundary, deposits of dredged material were still identifiable outside the site boundaries as well (Figure 26), probably due to past (pre-1981) disposal at historic disposal sites as well as mis-dumping before the 2000's (when satellite tracking systems began being required to help ensure proper disposal within site boundaries). Transects lines for the survey are shown on Figure 27. Figure 28 superimposes an area-wide surface geological map from the sub-bottom profiling survey with the SPI-based mapping of the dredged material footprint, showing excellent concordance between the two methods. Sub-surface results for a typical transect are shown on Figure 29, which presents a cross-section through the center of the disposal site looking down through both the dredged material deposit and the native sediment underlying it.

The analysis of the full sub-bottom data set (Sea Engineering, Inc., 2014) suggests that the dredged material deposits in and around the South Oahu site generally vary between 3 and 12 feet (1- 4 m) in thickness. An order of magnitude approximation of the total amount of dredged material within the study area was calculated using an average thickness of 6 feet (2 meters). The total volume of dredged material mapped throughout the entire study area, including historic disposal outside the current site boundaries, was thus calculated to be 27,885,600 cubic yards (21,320,000 cubic meters). However, the total volume of dredged material mapped within the current South Oahu site boundary was calculated to be 1,736,000 cubic yards (1,327,350 cubic meters). This compares quite favorably with the recorded volume of 1,855,230 cubic yards of material known to have been disposed from 2000 through 2013 (Table 1, and Figure 30).

Figure 25. USGS shaded-relief image showing the boundary of the sub-bottom survey area around the South Oahu disposal site, as well as major bedforms in the vicinity (shaded relief imagery from USGS, 2000). (Sea Engineering, 2014)

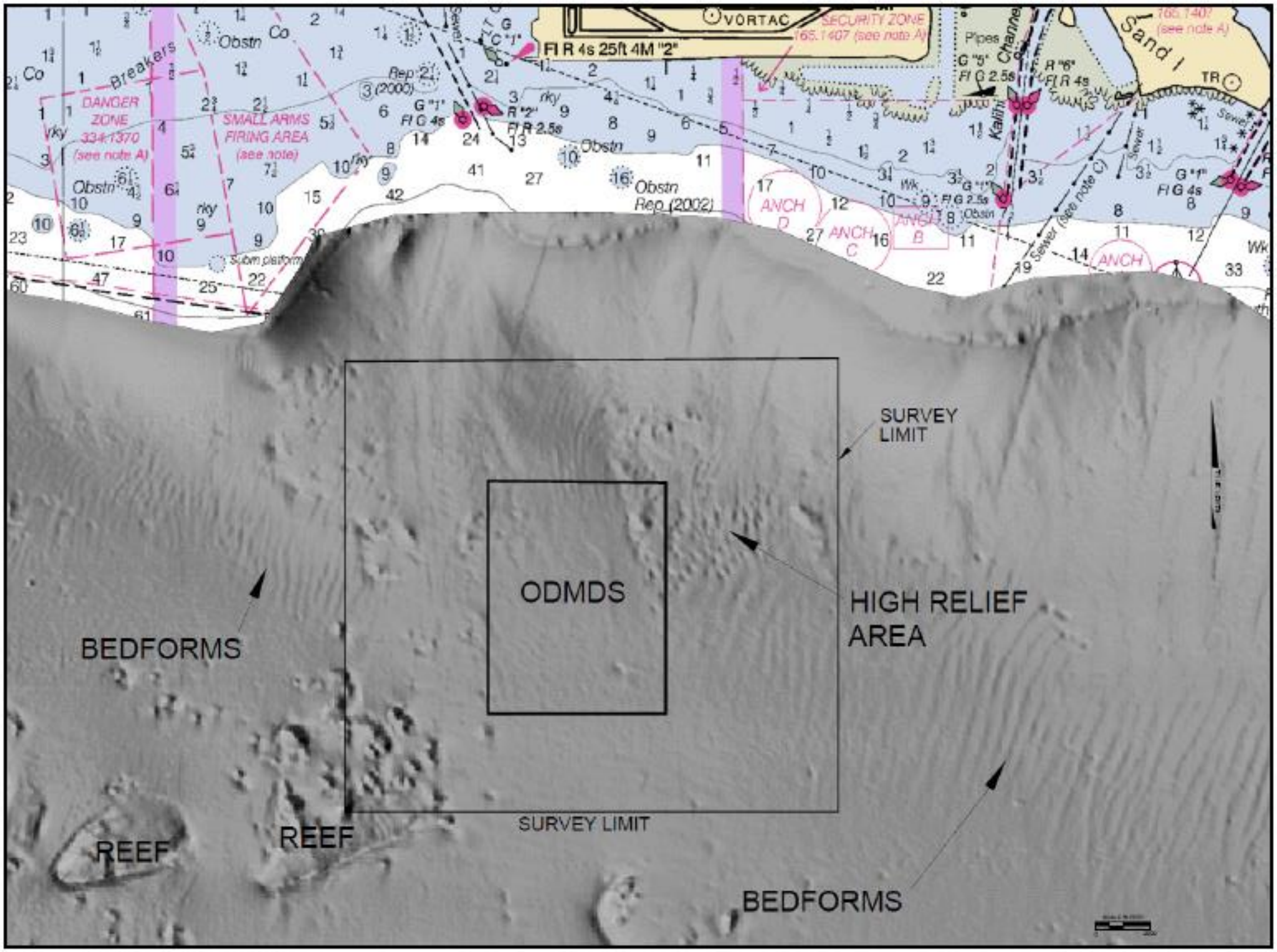


Figure 26. USGS sidescan sonar (backscatter) image showing historic dredged material deposits around the sub-bottom survey area and the South Oahu disposal site (sidescan imagery from USGS, 2000). (Sea Engineering, 2014)

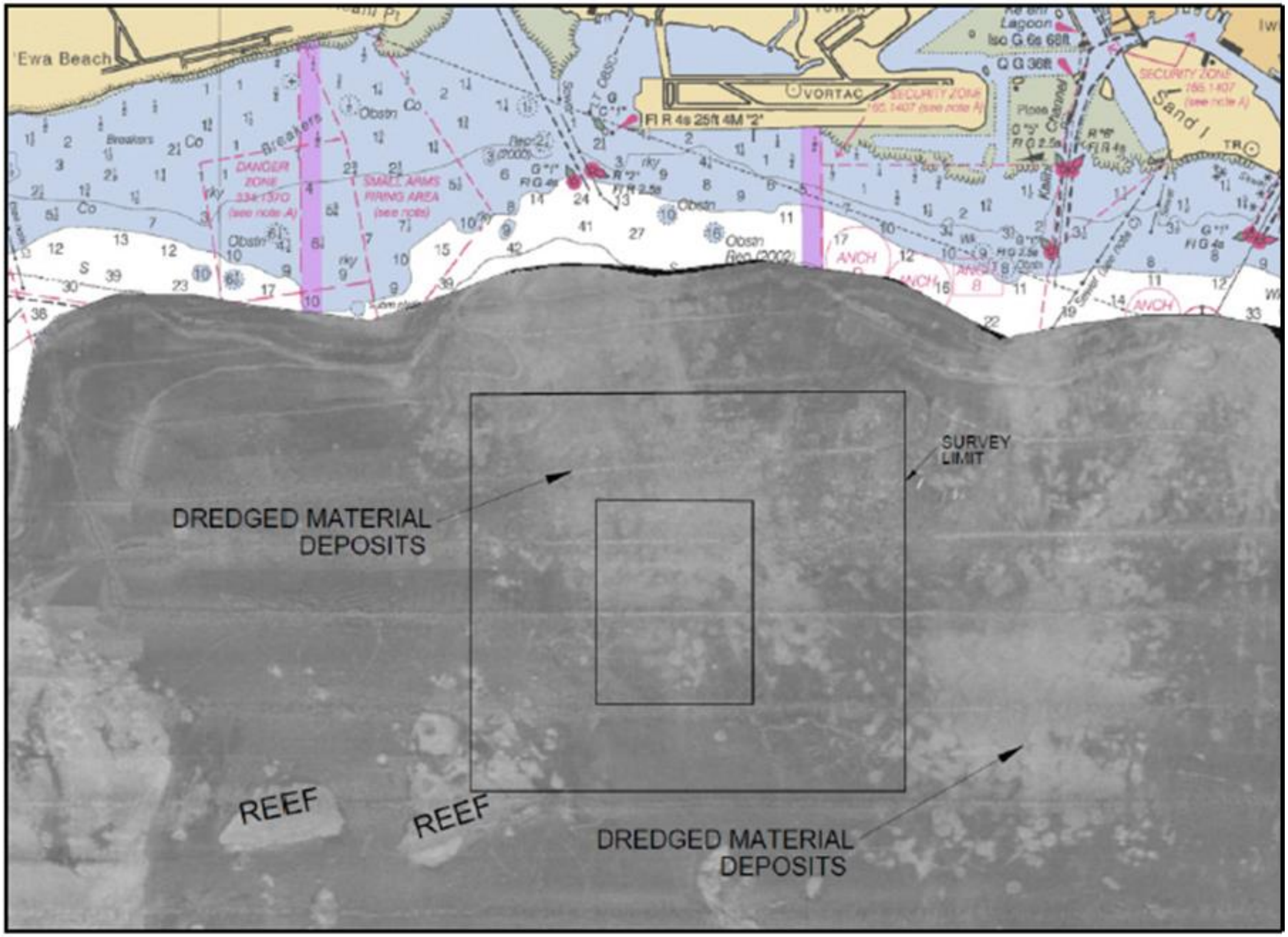


Figure 27. Transect lines for the sub-bottom profiling survey of the South Oahu site. Results for Diagonal line 1 through the center of the disposal site (arrows) are given in Figure 29. (Sea Engineering, 2014)

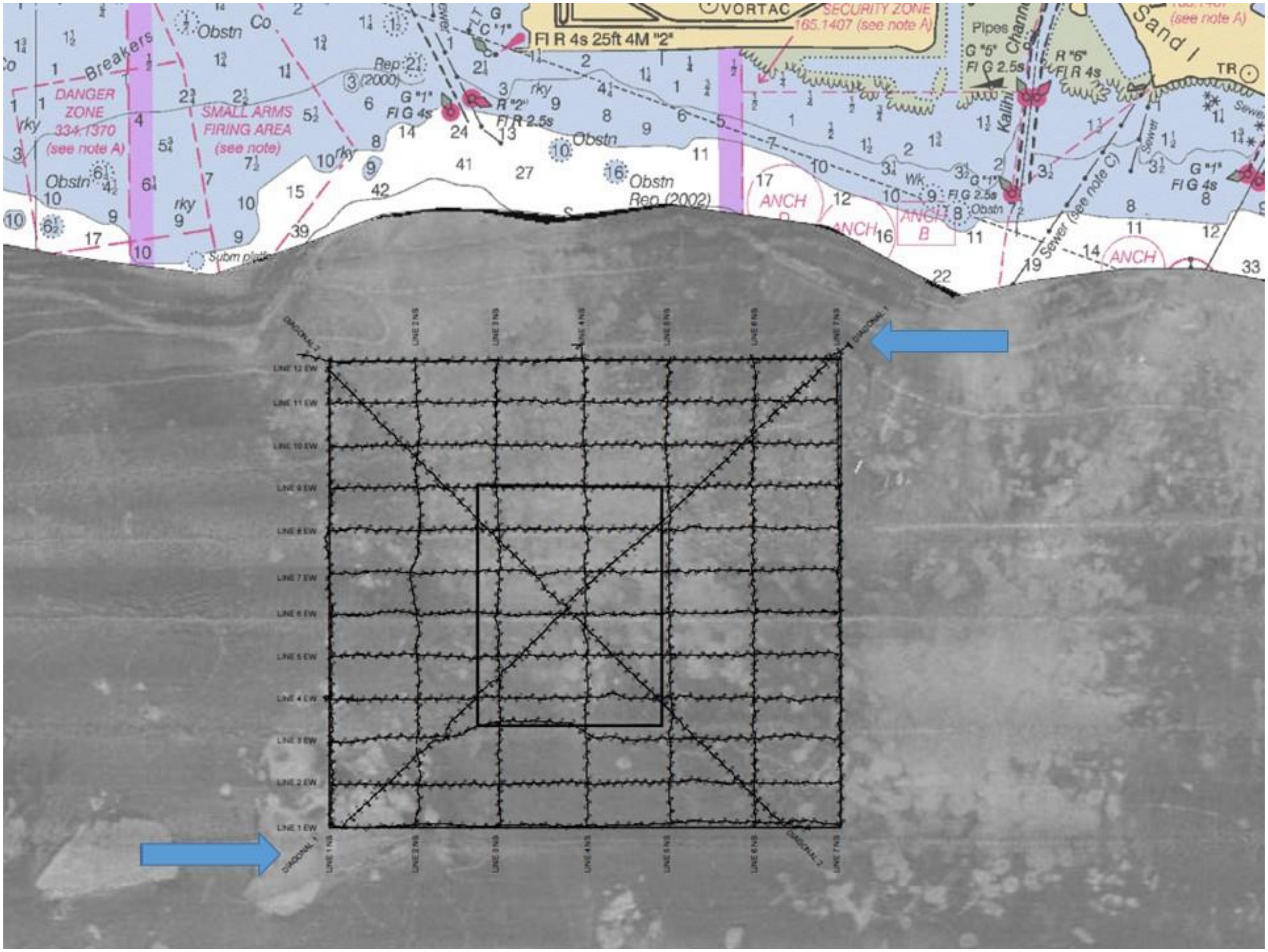


Figure 28. Geological (surface) interpretation from the sub-bottom profiling survey superimposed with the SPI-based dredged material footprint map shown in Figure 17. (DM = dredged material; HSL = hard sand layer; HR/DM = high-relief terrain with dredged material.) (Sea Engineering, 2014)

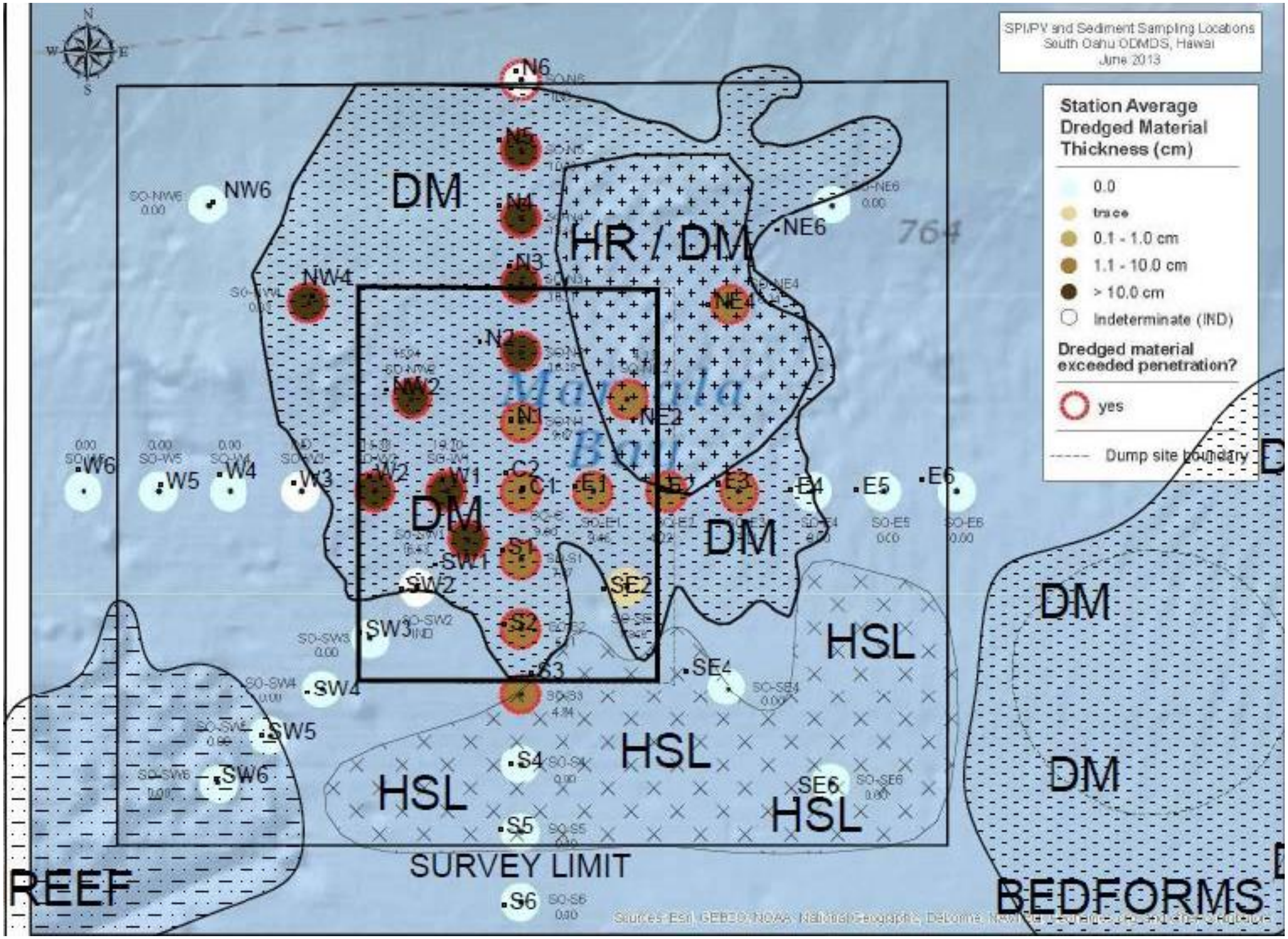


Figure 29A. Sub-bottom profile – NE portion of Diagonal Line 1. (Sea Engineering, 2014)

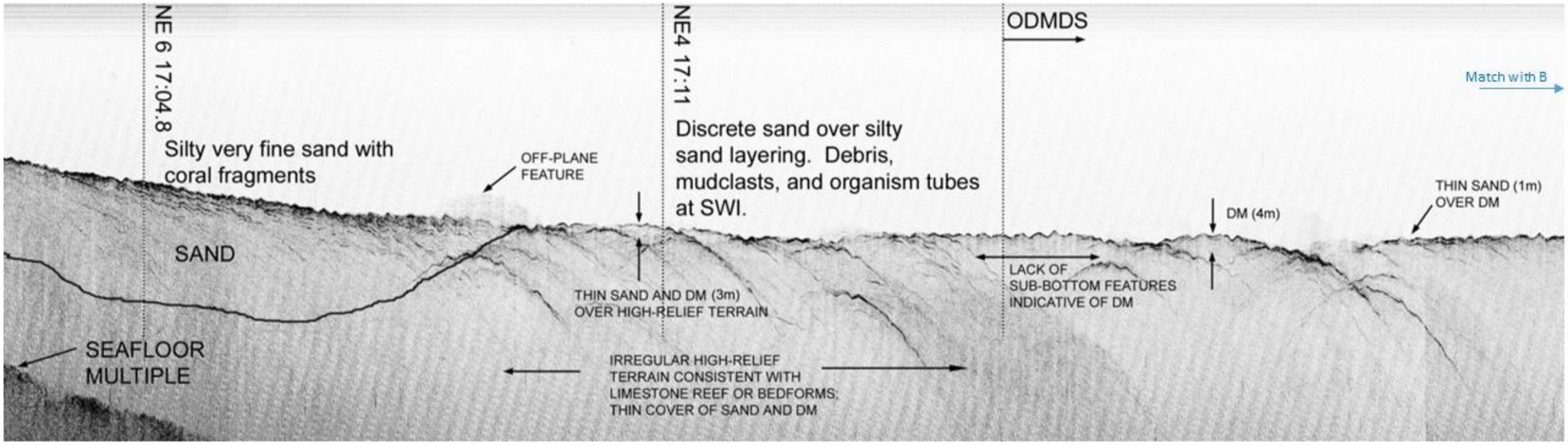


Figure 29B. Sub-bottom profile – SW portion of Diagonal Line 1. (Sea Engineering, 2014)

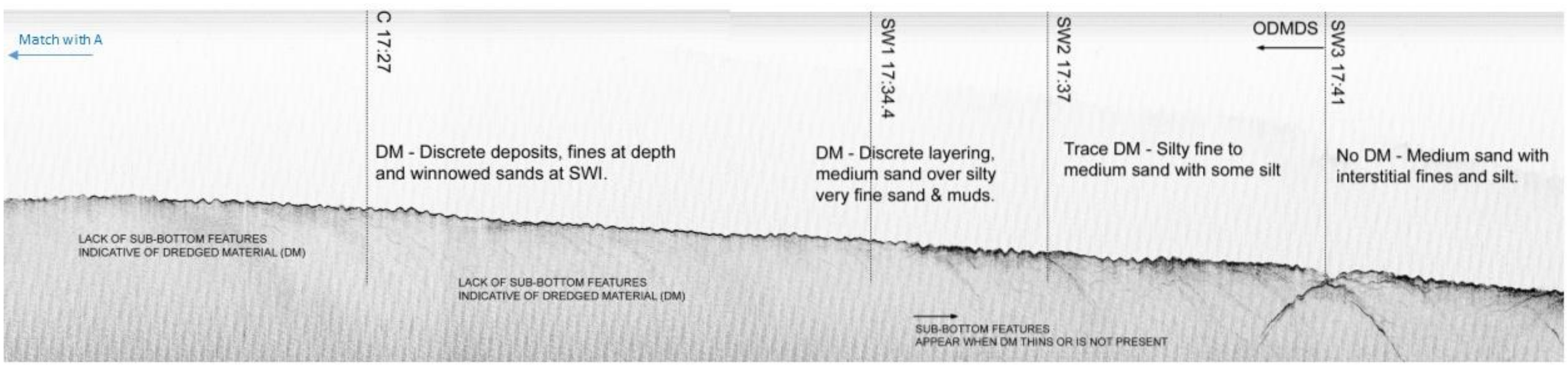
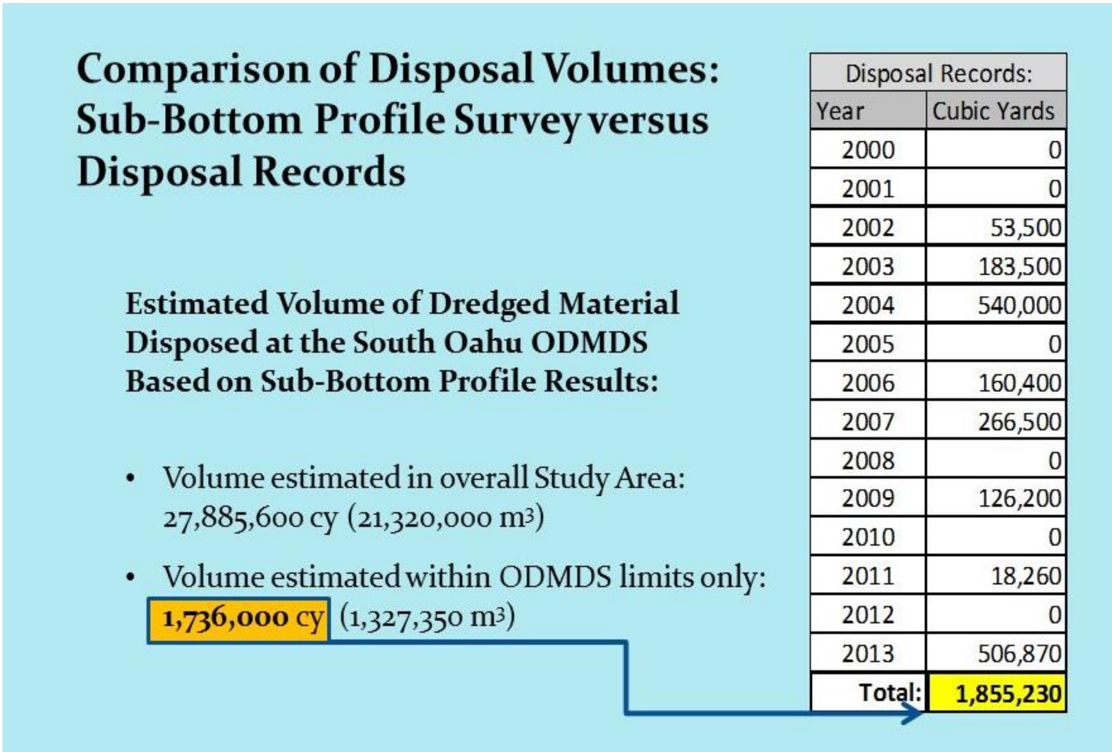


Figure 30. Comparison of South Oahu site dredged material volume estimates: from sub-bottom mapping versus recorded disposal volumes for 2000-2013 (see Table 1).



Although the volume of dredged material estimated by the sub-bottom profiling survey to be within the South Oahu disposal site boundary (1.74 million cy) compares well with the actual disposal records since 2000 (1.85 million cy), Table 1 shows that a total of 6.3 million cy has actually been disposed since the site was designated in 1981. It is likely that some substantial portion of the total 6.3 million cy disposed at the South Oahu site since 1981 is actually represented within the approximately 26 million cy of historic material estimated to be *outside* the site boundaries. Prior to the early 2000s, automatic satellite-based tracking and recording of disposal scow position was not required [2], and "short-dumping" (resulting in material depositing outside site boundaries) probably occurred fairly frequently. Still, it is highly likely that much of the material disposed between 1981 and 2000 was nevertheless deposited on-site, so more than 1.8 million cy should be present. It is to be expected that physical consolidation of any dredged material deposit would occur over time, reducing its apparent volume compared to disposal records. For all these reasons, the sub-bottom profiling survey's rough estimate is certainly low. However, it is also certainly within an order of magnitude, and is an interesting cross-check on other disposal site monitoring results.

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[2] The 1997 SMMP (USEPA and USACE, 1997) required a navigation system capable of 30 m accuracy, but did not specify that the system show the position of the disposal scow itself (as opposed to the tug or towing vessel). Similarly, the 1997 SMMP did not require "black box" recording of the actual disposal location, so independent confirmation that disposal only occurred at the center of the disposal site (as required) was difficult. But beginning in the 2000s, as both commercial GPS accuracy and vessel sensor technology advanced, and EPA and USACE began requiring sophisticated automatic tracking systems as conditions for all individual project's ocean disposal permits.

3.5 Comparison to 1980 Baseline Information

3.5.1 South Oahu Disposal Site

Comparison of the data contained in the 1980 EIS to the data collected from the 2013 survey shows that the grain size proportions in the disposal site have shifted to a higher percentage of silt and clay, as well as higher percentage of sediments coarser than sand (Table 6). This is not surprising because maintenance dredged material tends to be finer grained in comparison to the native bottom sediments which contain a higher percentage of sand, as described in the 1980 EIS. New work (deepening) dredging projects in areas such as Pearl Harbor have likely removed deeper layers of reef formation material, thus contributing to the gravel-sized fraction. This much coarser material is expected to sink rapidly to the bottom, without dispersing and drifting outside of the site boundary, in contrast to fine grained dredged material.

***Table 6.* Average Percent Grain Size – South Oahu Site**

Grain Size Category	1980 EIS (Pre-Disposal)	2013 - Disposal Site only	2013 - Outside of Disposal Site	2013 – Entire Survey Area
Gravel	12.0	21.6	2.8	12.2
Sand	75.0	44.4	77.2	60.8
Silt & Clay	13.0	33.2	19.2	26.2

Comparison to baseline sediment chemistry is limited to the trace metal concentrations shown in the 1980 EIS. When comparing the 1980 trace metal data to the data collected from the 2013 survey, it is apparent that dredged material disposal operations generally have not appreciably increased contaminant loading on-site, or relative to the surrounding environs, except for copper (Table 7). The slightly elevated on-site copper concentration is higher than the NOAA ER-L screening level, but is much lower than the ER-M screening level where toxicity effects are more likely to occur. As discussed in Section 3.2, all sediments discharged at ocean disposal sites are fully characterized before approval for ocean disposal is granted. Sediments that contain toxic pollutants in toxic amounts are prohibited from being discharged. Thus the slightly elevated concentration of copper compared to the 1980 baseline is not considered to represent a risk of environmental impact.

***Table 7.* Trace Metal Concentrations – South Oahu Site**

Analyte	1980 EIS (Pre-Disposal)		2013 - Disposal Site only		2013 - Outside of Disposal Site		2013 – Entire Survey Area		ER-L	ER-M
	Range (ppm)	Ave. (ppm)	Range (ppm)	Ave. (ppm)	Range (ppm)	Ave. (ppm)	Range (ppm)	Ave. (ppm)		
Cadmium	4.0-6.3	5.2	0.0-0.69	0.4	0.0-0.42	0.08	0.0-0.69	0.25	1.2	9.6
Mercury	0.5-0.9	0.7	0.10-0.38	0.18	0.02-0.19	0.09	0.02-0.38	0.14	0.15	0.71
Copper	17.6-45.5	31.0	43.0-84.0	59.0	11.0-37.0	23.8	11.0-84.0	41.4	34	270
Lead	38.1-59.0	48.6	15.0-95.0	37.6	10.0-37.0	20.8	10.0-95.0	29.2	46.7	218

The 1980 EIS characterized the benthic community as typical for abyssal depths, with low infaunal abundance relative to shallow depth communities. Infaunal abundances were similar in the 2013 surveys, although on-site percent abundances of crustaceans and other miscellaneous taxa appeared to be slightly lower than in 1980 (Table 8). Nevertheless, even these minor differences are most likely attributable to natural variability across the study area rather than to disposal activities. This conclusion is supported by abundances of crustaceans and other miscellaneous taxa in 2013 being *greater* inside the disposal site compared to outside it.

***Table 8.* Percent Abundance – South Oahu Site**

Taxonomic Group	1980 EIS (Pre-Disposal)	2013 – Disposal Site only	2013 – Outside of Disposal Site	2013 – Entire Survey Area
Annelida (includes polychaetes)	82.9	84.6	90.6	87.9
Crustacea	2.9	1.3	1.3	1.3
Mollusca	0.8	3.8	1.3	2.4
Miscellaneous taxa	13.3	10.4	6.7	8.4

3.5.2 Hilo Disposal Site

Comparison of the data contained in the 1980 EIS to the data collected from the 2013 survey shows that the grain size character has shifted to a somewhat higher percentage of silt and clay (Table 9). This is not surprising because maintenance dredged material tends to be finer grained in comparison to the native bottom sediments which contain a higher percentage of sand, as described in the 1980 EIS. But these physical changes are less obvious and widespread than at the South Oahu site, where much more dredged material has been disposed. Also in contrast to the South Oahu site, new work (deepening) dredging projects have not placed such a high volume of much coarser reef formation material, and as a result, the gravel-sized fraction has not increased significantly.

***Table 9.* Average Percent Grain Size – Hilo Site**

Grain Size Category	1980 EIS (Pre-Disposal)	2013 - Disposal Site only	2013 - Outside of Disposal Site	2013 – Entire Study Area
Gravel	1.0	1.75	0.0	0.9
Sand	77.0	59.8	49.3	54.5
Silt & Clay	22.0	30.3	52.0	41.1

Comparison to baseline sediment chemistry is limited to the trace metal concentrations shown in the 1980 EIS. When comparing the 1980 trace metal data to the data collected from the 2013 survey, it is apparent that dredged material disposal operations at the Hilo site have not caused any significant increase in contaminant loading, except for copper (Table 10.). The slightly elevated copper concentration is higher than the NOAA ER-L screening level, but is much lower than the ER-M screening level, where toxicity effects are more likely to occur; therefore the slightly elevated copper is not considered to represent a risk of environmental impact. In addition, the copper elevation is shoreward and *outside* the disposal site. Possible explanations include contaminants from other shore-side source, or historic short-dumping from disposal scows (prior to the early 2000’s, after which “black box” compliance monitoring was required).

***Table 10.* Trace Metal Concentrations – Hilo Site**

Analyte	1980 EIS (Pre-Disposal)		2013 - Disposal Site only		2013 - Outside of Disposal Site		2013 – Entire Survey Area		ER-L	ER-M
	Range (ppm)	Ave. (ppm)	Range (ppm)	Ave. (ppm)	Range (ppm)	Ave. (ppm)	Range (ppm)	Ave. (ppm)		
Cadmium	---	3.4	0.0-0.6	0.4	0.50-0.72	0.64	0.0-0.72	0.51	1.2	9.6
Mercury	0.10-0.59	0.35	0.05-0.06	0.06	0.04-0.17	0.10	0.04-0.17	0.08	0.15	0.71
Copper	33.9-38.1	36.0	30.0-35.0	31.8	30.0-56.0	42.0	30.0-56.0	36.9	34	270
Lead	19.5-29.0	24.3	11.0-12.0	11.2	9.6-21.0	15.2	9.6-21.0	13.2	46.7	218

The 1980 EIS characterized the benthic community at the Hilo site as typical for abyssal depths, with low infaunal abundances relative to shallow depth communities. Compared to data presented in the site designation EIS, some minor differences in percent abundance appear to have occurred (Table 10). Mollusks and miscellaneous taxa appear to be very slightly lower on-site compared to off-site in 2013 (though not statistically significantly so), and miscellaneous taxa appear to be less abundant in 2013 than they were in 1980. However, in 2013 miscellaneous taxa were lower both inside and outside the disposal site, while mollusks were *more* abundant region-wide than in 1980. As noted earlier, the native benthic environment around the Hilo site is more heterogeneous than around the South Oahu site to begin with. These minor differences may in infaunal abundances therefore are at least substantially attributable to natural variability across the study area rather than to disposal activities.

***Table 11.* Percent Abundance – Hilo Site**

Taxonomic Group	1980 EIS (Pre-Disposal)	2013 – Disposal Site only	2013 – Outside of Disposal Site	2013 – Entire Survey Area
Annelida (includes polychaetes)	80.0	85.9	79.6	81.8
Crustacea	2.2	2.8	1.0	1.5
Mollusca	1.1	4.2	10.8	8.5
Miscellaneous taxa	16.7	7.0	8.8	8.2

IV. CONCLUSIONS AND RECOMMENDATIONS

Multiple survey activities were conducted in 2013 to assess the condition and performance of the EPA-designated South Oahu and Hilo ocean dredged material disposal sites. Over the past two decades, South Oahu and Hilo have been the most heavily used of the five disposal sites that serve the ports and harbors of the Hawaiian Islands. The survey results are intended to identify whether any adverse impacts of dredged material disposal are occurring compared to baseline conditions, to confirm the protectiveness of the pre-disposal sediment testing required by EPA and USACE, and to serve as a basis for updating the Site Management and Monitoring Plan (SMMP) as appropriate.

The dredged material deposit (footprint) was mapped at each site. Significant deposits of dredged material are apparent outside the South Oahu site boundaries, but this likely resulted from short-dumping prior to the early 2000s when EPA and USACE began requiring "black box" tracking systems. Since that time, virtually all material disposed at South Oahu is documented as having been discharged properly within the Surface Disposal Zone at the center of the site. At the Hilo site, almost all of the dredged material footprint is contained within the site boundary.

Sediment sampling confirms that there have been no significant adverse impacts as a result of dredged material disposal operations at either of the disposal sites monitored. Only minor physical effects (grain size and organic carbon content changes) have occurred at either site, despite the order-of-magnitude greater volume that has been disposed at the South Oahu site over the last 15 years. Chemical analysis of both on-site and off-site stations indicated only low concentrations of chemicals of concern, both on-site and off-site. Benthic community analyses showed that recolonization occurs after dredged material is deposited, and similar infaunal and epifaunal communities occupy both on-site and off-site areas. Taken together, these results also provide support that the pre-disposal sediment testing program is effective in not allowing highly contaminated sediments to be discharged at either site.

The 2013 monitoring results also indicate a lack of significant adverse impacts compared to 1980 baseline conditions. Only minor and localized physical changes are apparent as a result of disposal operations at either site.

Overall, these findings suggest that ongoing use of the South Oahu and Hilo ocean dredged material disposal sites, under testing and management conditions at least as stringent as have been applied over the past 15 years, should similarly result no significant adverse effects. Permit conditions should be updated in the revised SMMP, and a more specific site monitoring schedule should be established for the future. But based on all the monitoring results, no significant changes to sediment testing or to the overall site management framework appear to be warranted for these sites.

Continued use of the other three Hawaii ocean dredged material disposal sites that were not monitored in 2013 is also supported by inference. These sites have received far less frequent dredged material disposal than South Oahu or even Hilo, and impacts can be expected to be negligible there as well. Nevertheless, the other Hawaii sites should be considered for confirmatory monitoring after the next round of disposal operations, currently expected to occur in 2016.

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APPENDIX

SUMMARY OF PLANNED VS ACTUAL SURVEY ACTIVITIES AT HAWAII OCEAN DREDGED MATERIAL DISPOSAL SITES, 2013

APPENDIX
SUMMARY OF PLANNED VS ACTUAL SURVEY ACTIVITIES AT HAWAII OCEAN DREDGED MATERIAL DISPOSAL SITES, 2013

General Survey Information:

Site Name (Region): South Oahu and Hilo Ocean Dredged Material Disposal Sites (Region 9)
Survey Chief Scientist/Organization: Allan Ota (EPA Region 9)
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Other Key Personnel/Organization: Brian Ross (EPA Region 9)
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Science Crew/Organization:
Amy Wagner (EPA Region 9)
Leslie Robinson (US Navy, HI)
Sean Hanser (US Navy, HI)
Thomas Smith (USACE, HI)
Robert O'Connor (NOAA, HI)
Joseph Germano (Germano & Assoc., WA)
David Browning (Germano & Assoc., WA)
Christine Smith (ANAMAR, FL)

Schedule of Operations:
Number of survey days: 8 planned, 5 actual (plus 2 for mobilization/demobilization)
Mobilization date (Location): 24-25 June 2013 (Ford Island, Pearl Harbor, Oahu)
Demobilization date (Location): 03 July 2013 (Ford Island, Pearl Harbor, Oahu)

Original Problem Definitions/Task Descriptions (from Quality Assurance Project Plan)

1. Using the Hi'ialakai, collect MBES images to confirm overall bathymetry and identify any features of interest to adjust sediment sampling locations as appropriate:
    a. Is the overall bathymetry different from the standard NOAA charts?
    b. Are there unusual or unique features that suggest that adjustment of planned sampling station locations is necessary to improve interpretation of site monitoring data?
2. Using the Hi'ialakai, collect SPI and PVP images at up to 49 stations covering each EPA ODMDS and adjacent areas outside of site boundaries to address the following management questions:
    a. Is the footprint of recently deposited dredged material contained within site boundaries? Are dredged materials in a single mound feature or contained in multiple mounds?

   b. Are the sediments within the dredged material deposit footprint visually similar or dissimilar from ambient bottom sediments?
   c. Are there indications of disposal of materials other than dredged materials?
   d. Are there indications of an undisturbed or disturbed environment (adverse impacts)?
3. Using the Hi'ialakai, collect up to 20 sediment grab samples at each EPA ODMDS and adjacent areas outside of site boundaries to address the following management questions:
   a. Are sediment contamination levels at the sites within the range predicted by pre-disposal sediment testing of dredged material approved for disposal?
   b. Are levels of contaminants at historic disposal sites (>10 years since used) adjacent to the active South Oahu site similar to or below ambient levels (undisturbed native sediments – outside of deposit footprint or site boundaries)?
   c. How do the biological communities compare, between within the site and outside of site boundaries?
   d. How do the biological communities compare to what existed when these permanent sites were designated?
4. Using a contracted (Sea Engineering) vessel, collect high resolution sub-bottom seismic profiles within selected basin locations to address the following management questions:
   a. Based on the acoustic signal contrast between native bottom sediments and dredged material layer, what is the horizontal extent of the dredged material deposit footprint relative to the site boundaries? – i.e., does the dredged material deposit appear to reside mostly or completely within site boundaries, suggesting site is performing as expected?
   b. Based on the acoustic signal contrast between native bottom sediments and dredged material layer, what is the apparent thickness of the dredged material deposit footprint? – i.e., does the bulk of the dredged material volume appear to reside mostly or completely within site boundaries, suggesting site is performing as expected?
   c. How does the calculated volume of the dredged material identified by this survey compare with dredging records for projects using the site? – i.e., comparison of volumes from compiled disposal records to the calculated volume using information from (a) and (b) above.

Actual Sequence of Tasks/Events

The surveys were originally scheduled to occur over 8 days (plus mobilization and demobilization), but problems associated with readiness of the NOAA ship and its equipment caused some delays. The surveys were ultimately conducted over a 5-day period (not including transit between the South Oahu site and the Hilo site, and the return transit to Pearl Harbor from the Hilo site). Field operations were conducted continuously over a 24-hour period (two scientific crews working12-hour shifts).

The survey sampling objectives were not fully accomplished due to the following problems:

1. Departure was delayed by one day, due to:
   a. Hole/rupture in the NOAA ship's bilge tank which had to be repaired.

   b. The original contracted marine winch, which was installed during the previous week, was not working properly and its hydraulic unit had to be replaced.
2. The replacement winch operated at a slower rate (about 20 meters per minute, instead of 40-60 meters per minute) than what was expected when the survey plan was conceived, resulting in less than half of the planned sediment grab sampling stations being occupied in the time remaining for survey work.
3. Hard bottom features were encountered and multiple attempts were needed at several stations to obtain acceptable samples, as judged by QAPP metrics (i.e., adequate penetration and undisturbed appearance).

4. The multi-beam echo sounder (MBES) survey initially planned for both sites was not executed due to the equipment on the NOAA vessel not functioning properly at the beginning of the first survey leg. As a result, no MBES data was collected at either site. In the absence of the MBES survey data, the combination of SPI and PVP photography and analysis of the SPI visual parameters provided information on the horizontal and vertical extent of the dredged material footprint, and context for the other (sediment) sampling results.

Survey Activities/Operations Conducted to Address Problem Definitions:

The following are the survey activities executed at both sites:

1. <u>Sediment Profile Imaging (SPI) and Plan View Photography (PVP)</u>
   SPI-PVP surveys were conducted for each ODMDS to delineate the horizontal extent of the dredged material deposit footprint within the site, and outside of site boundaries if any deposits exist (Figure 2). A total of 86 stations were occupied with the SPI/PV camera system (40 at South Oahu and 46 at Hilo), compared to the planned 98 (49 at each site). With optimal resolution on the order of millimeters, the SPI system is particularly useful for identifying a number of features, including the edges of the footprint as they overlay native sediments of the seabed, identifying dredged material layers relative to native sediments, and the level of disturbance as indicated by presence of certain classes of benthic organisms (Figures 3 and 4). PVP is useful for identifying surface features where the SPI photos are taken, thereby providing surface context for the vertical profiles at each station. For each station, a minimum of four SPI photos were taken, coupled with a single PVP photo.
2. <u>Sediment Sampling for Chemistry and Benthic Communities:</u>
   Sediment samples were collected for sediment grain size, chemistry, and benthic community analysis with a stainless steel double Van Veen sediment grab (Figure 5) capable of penetrating a maximum of 20 centimeters of depth below the sediment surface. Sediment grab samples were judged acceptable based on approved QAPP metrics. After each acceptable grab sample was measured for depth of penetration and photographed, sufficient volume of chemistry subsample were extracted from one of the two grabs with a stainless steel spoon for further processing (Figure 6). The chemistry subsample was then homogenized and divided into the different chemistry analysis jars (i.e., grain size, metals and organics). After the chemistry subsample was extracted, the entire volume of the other grab was processed (Figure 7) to create a benthic community sample for that station. A 500 micron sieve was used to separate organisms from the sediment, and the separated organisms were then initially preserved

with formalin. A total of 18 sediment grab sample stations were occupied in the two survey areas combined, relative to the original targeted 40 locations. 18 chemistry samples were processed (10 at South Oahu, and 8 at Hilo), 3 of which were field or laboratory duplicates. A total of 14 benthic community samples were collected; the lower number than the chemistry samples was due to some grabs being used for field and laboratory chemistry duplicates, and one station where QAPP metrics were not met for an acceptable benthic sample (lack of time to re-deploy).

The following survey activity was executed only at the South Oahu site:

3. Collection of high-resolution sub-bottom seismic-reflection profiles:
   The primary purpose of this survey was to collect cross-sectional images of the native sediment layers and identify layers indicative of the dredged material deposit footprint in the environs of the South Oahu ODMDS. (The Hilo site was not surveyed in this manner during this round of surveys, primarily due to the much smaller volumes of dredged material which may not be detectable in terms of thickness and contrast.) The survey was contracted to Sea Engineering, who conducted the work aboard a separate vessel specially rigged for this type of survey with an acoustic sub-bottom profiler system (Figure 8), which was more cost effective than attempting to install the equipment on the NOAA vessel. The results of this survey allowed EPA to calculate an estimate of cumulative volume of dredged material in the South Oahu site.

The study areas are depicted in Figures 9 and 10 (South Oahu) and 11, and 12 (Hilo) The target sampling station coordinates are listed in Tables 2 (South Oahu) and 3 (Hilo).

Figure 9. General location of the South Oahu ODMDS

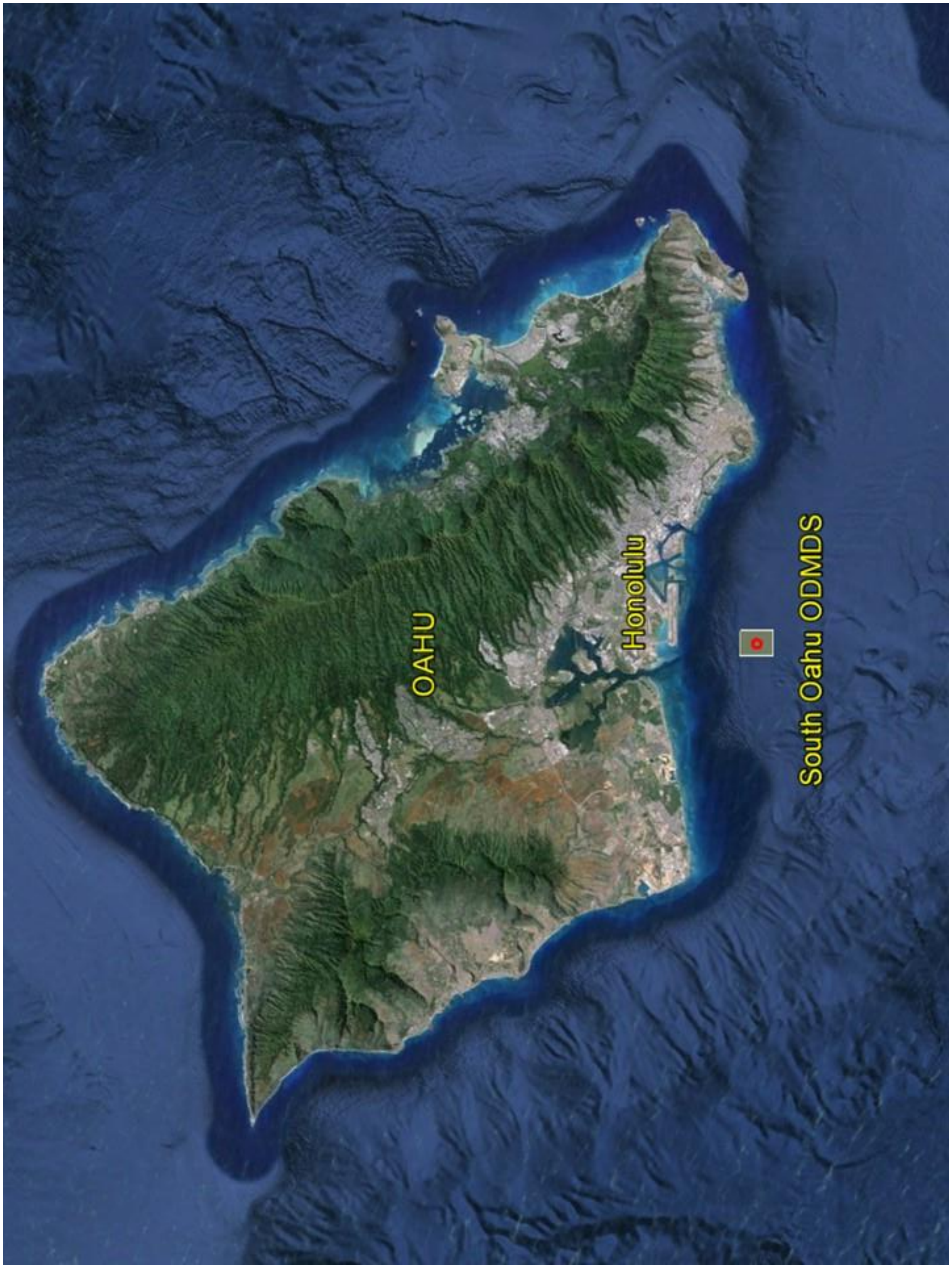

Figure 10. Planned and actual sample station locations at the South Oahu ODMDS:

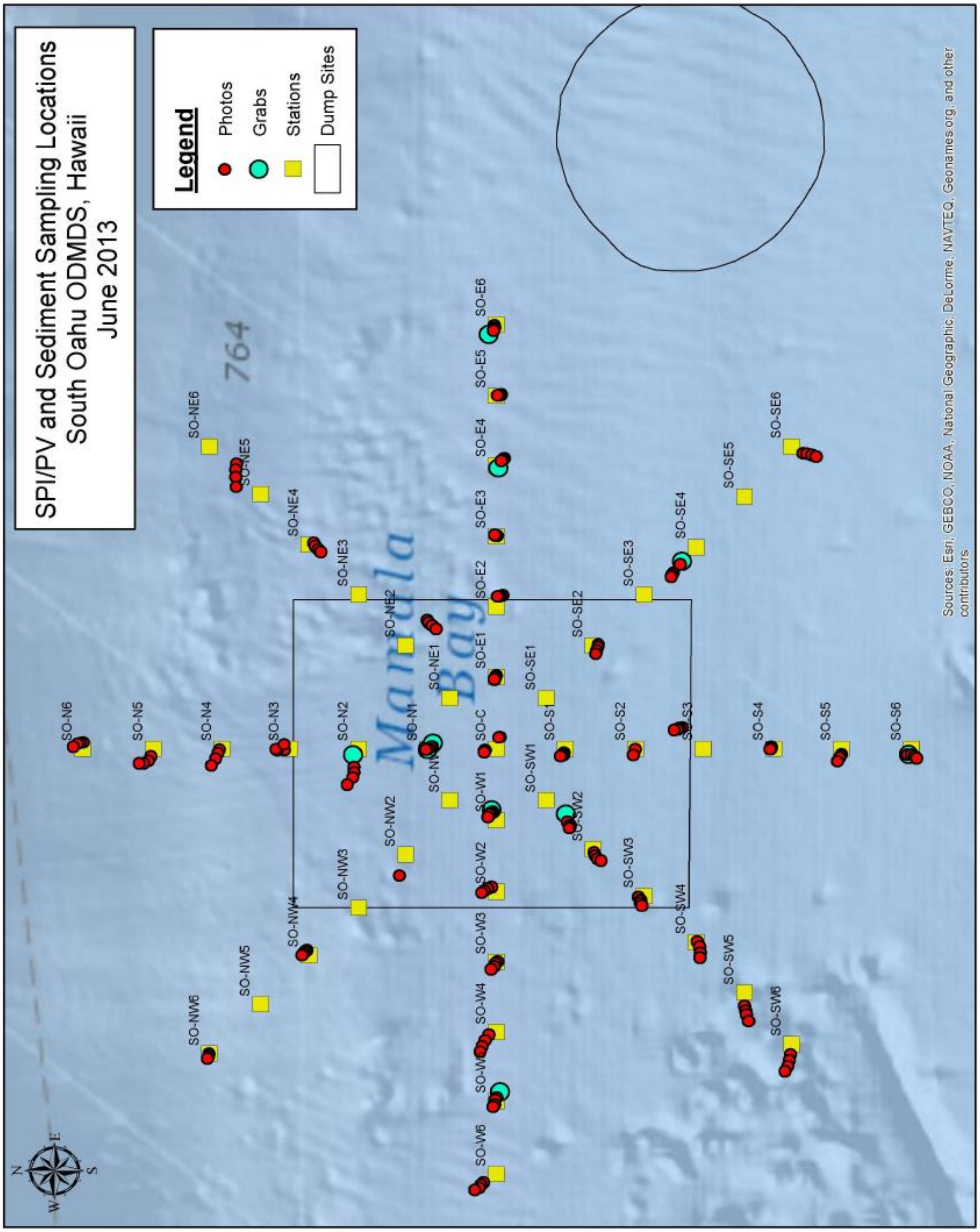

***Table 2.* South Oahu ODMDS Sampling Station Coordinates (NAD83). SPI and PVP photographic samples at all stations; sediment grab samples at highlighted stations.**

Station ID	Latitude	Longitude	Sampling Notes
C	21 14.970 N	157 56.670 W	SPI-PV only
N1	21 15.220 N	157 56.670 W	SPI-PV and sediment grab
N1-A	21 15.199 N	157 56.647 W	SPI-PV and sediment grab (field dupe)
N2	21 15.470 N	157 56.670 W	SPI-PV and sediment grab
N3	21 15.720 N	157 56.670 W	SPI-PV only
N4	21 15.965 N	157 56.670 W	SPI-PV only
N5	21 16.215 N	157 56.670 W	SPI-PV only
N6	21 16.470 N	157 56.670 W	SPI-PV only
S1	21 14.720 N	157 56.670 W	SPI-PV only
S2	21 14.465 N	157 56.670 W	SPI-PV only
S3	21 14.220 N	157 56.670 W	SPI-PV only
S4	21 13.965 N	157 56.670 W	SPI-PV only
S5	21 13.720 N	157 56.670 W	SPI-PV only
S6	21 13.465 N	157 56.670 W	SPI-PV and sediment grab
W1	21 14.970 N	157 56.940 W	SPI-PV and sediment grab
W2	21 14.970 N	157 57.210 W	SPI-PV only
W3	21 14.970 N	157 57.475 W	SPI-PV only
W4	21 14.970 N	157 57.740 W	SPI-PV only
W5	21 14.970 N	157 58.000 W	SPI-PV and sediment grab
W6	21 14.970 N	157 58.275 W	SPI-PV only
E1	21 14.970 N	157 56.400 W	SPI-PV only
E2	21 14.970 N	157 56.135 W	SPI-PV only
E3	21 14.970 N	157 55.870 W	SPI-PV only
E4	21 14.970 N	157 55.600 W	SPI-PV and sediment grab
E5	21 14.970 N	157 55.340 W	SPI-PV only
E6	21 14.970 N	157 55.070 W	SPI-PV and sediment grab
NW1	21 15.140 N	157 56.865 W	Station not occupied
NW2	21 15.300 N	157 57.070 W	SPI-PV only
NW3	21 15.470 N	157 57.270 W	Station not occupied
NW4	21 15.650 N	157 57.450 W	SPI-PV only
NW5	21 15.825 N	157 57.635 W	Station not occupied
NW6	21 16.010 N	157 57.820 W	SPI-PV only

Table 2, continued. **South Oahu ODMDS Sampling Station Coordinates (NAD83). SPI and PVP photographic samples at all stations; sediment grab samples at highlighted stations.**

NE1	21 15.140 N	157 56.480 W	Station not occupied
NE2	21 15.300 N	157 56.280 W	SPI-PV only
NE3	21 15.470 N	157 56.090 W	Station not occupied
NE4	21 15.650 N	157 55.900 W	SPI-PV only
NE5	21 15.825 N	157 55.710 W	Station not occupied
NE6	21 16.010 N	157 55.530 W	SPI-PV only
SW1	21 14.790 N	157 56.865 W	SPI-PV only
SW2	21 14.620 N	157 57.050 W	SPI-PV and sediment grab
SW3	21 14.435 N	157 57.225 W	SPI-PV only
SW4	21 14.245 N	157 57.400 W	SPI-PV only
SW5	21 14.070 N	157 57.590 W	SPI-PV only
SW6	21 13.900 N	157 57.785 W	SPI-PV only
SE1	21 14.790 N	157 56.480 W	Station not occupied
SE2	21 14.620 N	157 56.280 W	SPI-PV only
SE3	21 14.435 N	157 56.090 W	Station not occupied
SE4	21 14.245 N	157 55.910 W	SPI-PV and sediment grab
SE5	21 14.070 N	157 55.720 W	Station not occupied
SE6	21 13.900 N	157 55.530 W	SPI-PV only

Figure 11. General location of the Hilo ODMDS:

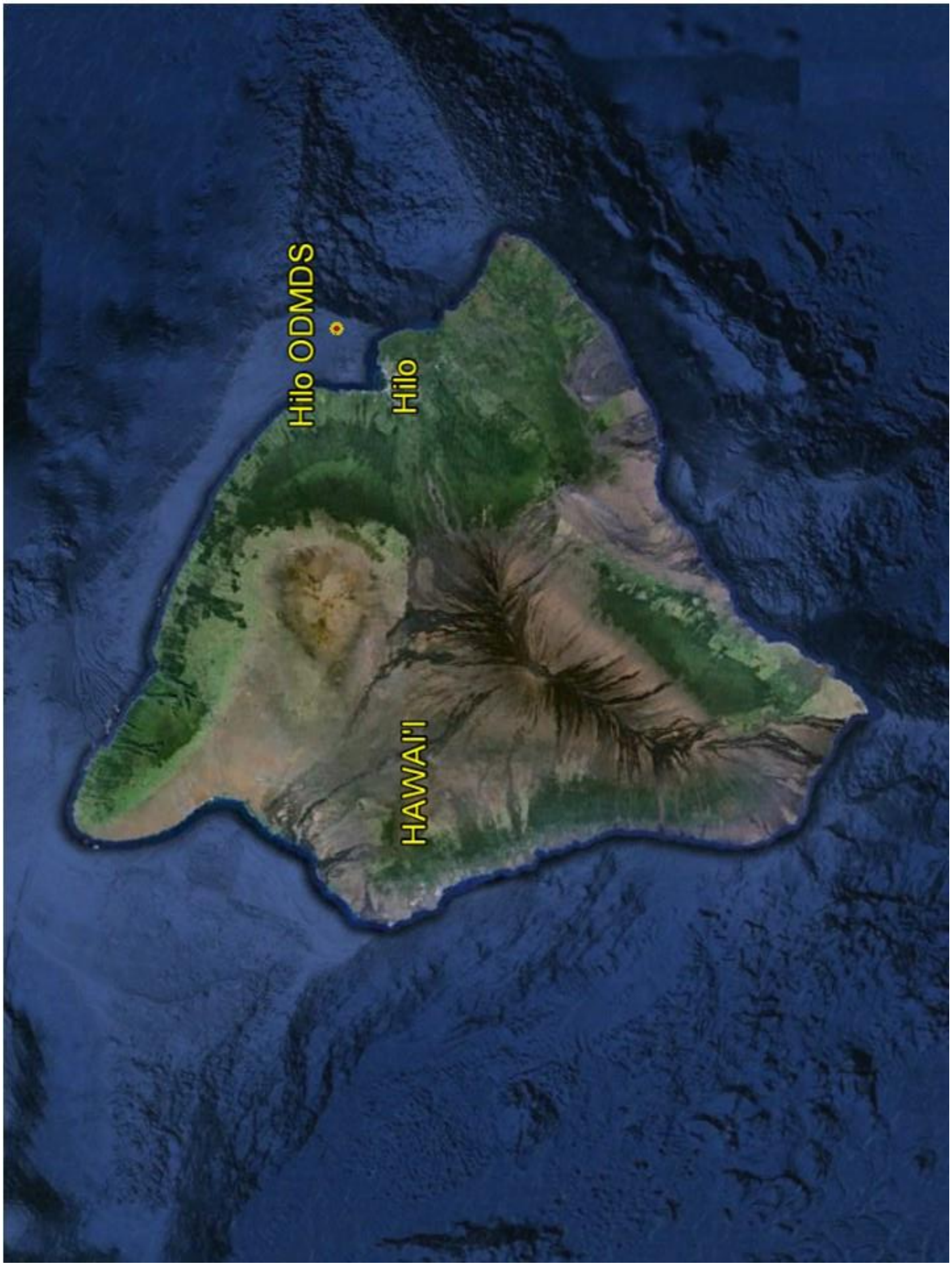

Figure 12. Planned and actual sample station locations at the Hilo ODMDS:

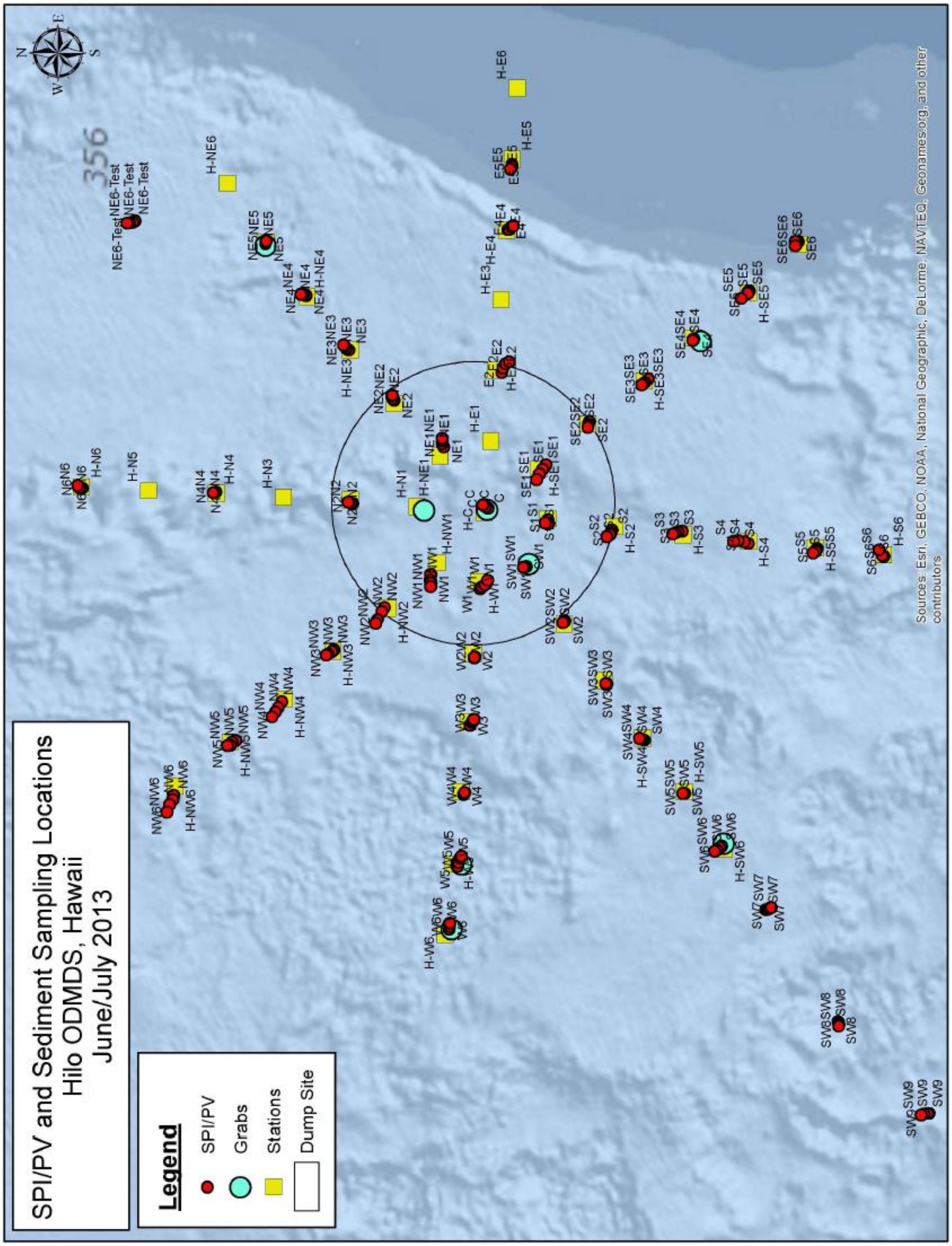

Table 3. **Hilo ODMDS Sampling Station Coordinates (NAD83). SPI and PVP photographic samples at all stations; sediment grab samples at highlighted stations.**

Station ID	Latitude	Longitude	Notes
C	19 48.315 N	154 58.340 W	SPI-PV only (grab failed)
N1	19 48.565 N	154 58.320 W	SPI-PV and sediment grab
N2	19 48.815 N	154 58.295 W	SPI-PV only
N3	19 49.065 N	154 58.285 W	Station not occupied
N4	19 49.315 N	154 58.270 W	SPI-PV only
N5	19 49.570 N	154 58.260 W	Station not occupied
N6	19 49.820 N	154 58.245 W	SPI-PV only
S1	19 48.075 N	154 58.365 W	SPI-PV only
S2	19 47.825 N	154 58.395 W	SPI-PV only
S3	19 47.570 N	154 58.425 W	SPI-PV only
S4	19 47.325 N	154 58.450 W	SPI-PV only
S5	19 47.075 N	154 58.475 W	SPI-PV only
S6	19 46.820 N	154 58.500 W	SPI-PV only
W1	19 48.335 N	154 58.600 W	SPI-PV only
W2	19 48.355 N	154 58.870 W	SPI-PV only
W3	19 48.375 N	154 59.125 W	SPI-PV only
W4	19 48.400 N	154 59.385 W	SPI-PV only
W5	19 48.430 N	154 59.655 W	SPI-PV only (grab failed)
W6	19 48.460 N	154 59.920 W	SPI-PV and sediment grab
E1	19 48.290 N	154 58.075 W	Station not occupied
E2	19 48.270 N	154 57.810 W	SPI-PV only
E3	19 48.250 N	154 57.545 W	Station not occupied
E4	19 48.230 N	154 57.285 W	SPI-PV only
E5	19 48.210 N	154 57.020 W	SPI-PV only
E6	19 48.190 N	154 56.755 W	Station not occupied
NW1	19 48.490 N	154 58.530 W	SPI-PV only
NW2	19 48.675 N	154 58.700 W	SPI-PV only
NW3	19 48.880 N	154 58.860 W	SPI-PV only
NW4	19 49.060 N	154 59.040 W	SPI-PV only
NW5	19 49.265 N	154 59.200 W	SPI-PV only
NW6	19 49.470 N	154 59.365 W	SPI-PV only
NE1	19 48.480 N	154 58.130 W	SPI-PV only
NE2	19 48.650 N	154 57.935 W	SPI-PV only

Table 3, continued. **Hilo ODMDS Sampling Station Coordinates (NAD83). SPI and PVP photographic samples at all stations; sediment grab samples at highlighted stations**.

NE3	19 48.815 N	154 57.735 W	SPI-PV only
NE4	19 48.975 N	154 57.535 W	SPI-PV only
NE5	19 49.130 N	154 57.330 W	SPI-PV and sediment grab
NE6	19 49.275 N	154 57.110 W	Station not occupied
SW1	19 48.155 N	154 58.540 W	SPI-PV and sediment grab
SW2	19 48.015 N	154 58.760 W	SPI-PV only
SW3	19 47.865 N	154 58.970 W	SPI-PV only
SW4	19 47.720 N	154 59.185 W	SPI-PV only
SW5	19 47.565 N	154 59.385 W	SPI-PV only
SW6	19 47.415 N	154 59.600 W	SPI-PV and sediment grab
SW7	19 47.257 N	154 59.827 W	SPI-PV only (station added in field)
SW8	19 46.989 N	155 00.245 W	SPI-PV only (station added in field)
SW9	19 46.648 N	155 00.587 W	SPI-PV only (station added in field)
SE1	19 48.110 N	154 58.180 W	SPI-PV only
SE2	19 47.925 N	154 58.010 W	SPI-PV only
SE3	19 47.715 N	154 57.850 W	SPI-PV only
SE4	19 47.530 N	154 57.690 W	SPI-PV and sediment grab
SE5	19 47.325 N	154 57.520 W	SPI-PV only
SE6	19 47.135 N	154 57.340 W	SPI-PV only

Appendix 3 to EPA Consultation with USFWS

for Continued Use of Five Existing Ocean Dredged Material Disposal Sites (ODMDS)

in Waters Offshore of Hawaii

Preliminary Chemistry Results from the 2017 Monitoring Survey
of the Nawiliwili, Kahului, and Port Allen Ocean Disposal Sites

2017 EPA Monitoring Survey of the Kahului, Nawiliwili, and Port Allen Ocean Disposal Sites in Hawai‘i: Preliminary Chemistry Results

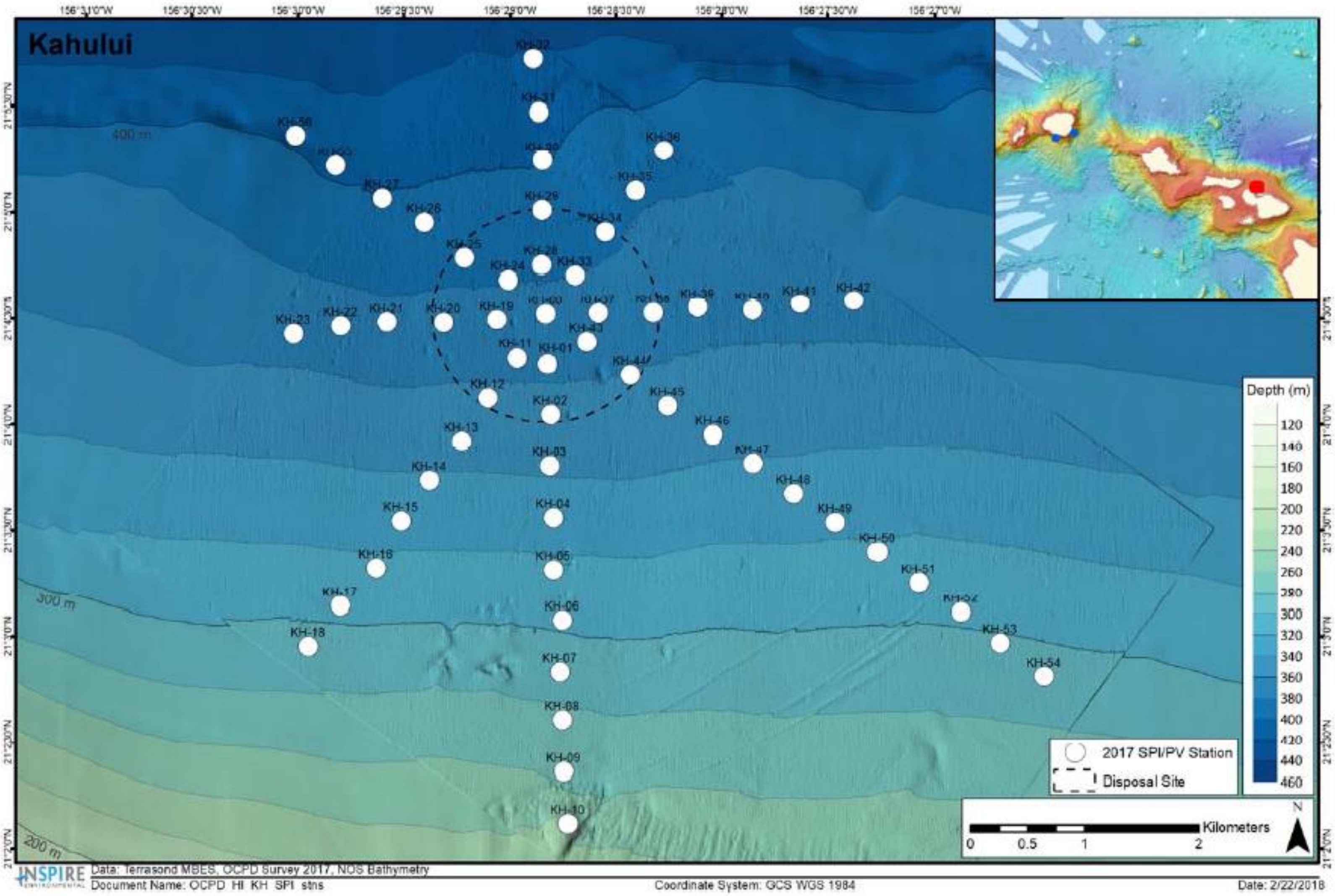

Figure 1. Map of the stations in the Kahului ocean disposal site survey area. A subset of these stations was selected for sediment grabs.

Table 1. Sediment chemistry results from the Kahului ocean disposal site (first of two tables).

Kahului site		"Inside"														Reference Site	NOAA Screening	
Analyte	**Units (dw)**	KH00	KH01	KH12	KH20	KH28	KH28	KH34	KH37	KH44	KH03	KH21	KH27	KH30	KH39		**ER-L**	**ER-M**
TOC	mg/kg	3430.00	4020.00	4170.00	5270.00	3970.00	3460.00	3510.00	4160.00	3520.00	4210.00	7220.00	4000.00	3400.00	4240.00	0.58	--	--
Arsenic	mg/kg	16.00	16.00	22.00	17.00	17.00	18.00	22.00	16.00	17.00	22.00	18.00	20.00	23.00	18.00	40	8.2	70
Cadmium	mg/kg	0.36	0.36	0.40	0.38	0.37	0.37	0.38	0.34	0.37	0.40	0.39	0.41	0.41	0.38	ND	1.2	9.6
Chromium	mg/kg	55.00	54.00	80.00	64.00	59.00	61.00	69.00	46.00	59.00	79.00	68.00	80.00	67.00	65.00	68	81	370
Copper	mg/kg	23.00	23.00	31.00	26.00	26.00	25.00	26.00	20.00	23.00	29.00	27.00	31.00	24.00	25.00	22	34	270
Lead	mg/kg	4.70	5.30	13.00	7.20	5.40	6.60	6.90	3.40	7.70	11.00	8.30	12.00	6.50	7.90	19	46.7	218
Mercury	mg/kg	0.02	0.03	0.05	0.03	0.03	0.03	0.05	0.02	0.06	0.04	0.03	0.05	0.03	0.03	0.09	0.15	0.71
Nickel	mg/kg	52.00	56.00	54.00	52.00	50.00	55.00	53.00	57.00	47.00	54.00	50.00	51.00	42.00	51.00	37	20.9	51.6
Selenium	mg/kg	1.50	1.40	1.60	1.50	1.50	1.50	1.50	1.40	1.50	1.60	1.60	1.70	1.60	1.50	ND	--	--
Silver	mg/kg	0.73	0.71	0.79	0.76	0.74	0.74	0.76	0.69	0.75	0.80	0.79	0.83	0.81	0.77	ND	1	3.7
Zinc	mg/kg	41.00	43.00	47.00	65.00	44.00	43.00	46.00	40.00	40.00	45.00	45.00	48.00	44.00	44.00	52	150	410
Dioxins & Furans	TEQ	0.93	4.24	0.88	0.53	0.78	0.56	0.89	0.79	1.01	1.17	1.01	1.02	0.94	0.70	1.06		
Total DDTs	ug/kg	14.40	13.80	15.60	15.00	14.40	15.00	15.00	13.80	15.00	52.00	15.60	16.20	16.20	15.00	ND	1.58	46.1
Total Organotins	ug/kg	806.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.00	0.00	0.00	0.00	0.00	0.71	--	--
Total PAHs	ug/kg	53.40	67.10	92.00	54.20	48.80	68.30	84.20	51.60	91.80	71.00	55.00	73.70	73.00	60.20	344	4022	44792
Total PCBs	ug/kg	0.00	0.00	0.30	0.00	0.00	0.00	0.00	0.31	0.00	0.00	0.00	2.73	0.00	8.32	6.07	22.7	180

* Note: Inside denotes stations inside the dredged material footprint, as determined by the SPI taken. Outside denotes stations outside of the dredged material footprint, as determined by the SPI taken.

Table 2. Sediment chemistry results from the Kahului ocean disposal site (second of two tables).

Kahului site		"Outside"														Reference Site	NOAA Screening	
Analyte	Units (dw)	KH05	KH09	KH14	KH16	KH23	KH32	KH36	KH41	KH41	KH46	KH48	KH50	KH53	KH56		ER-L	ER-M
TOC	mg/kg	5380.00	3680.00	4440.00	5630.00	4900.00	3700.00	3950.00	4230.00	4250.00	3610.00	3200.00	2700.00	2610.00	4500.00	0.58	--	--
Arsenic	mg/kg	33.00	32.00	21.00	24.00	20.00	23.00	21.00	20.00	24.00	19.00	30.00	29.00	33.00	23.00	40	8.2	70
Cadmium	mg/kg	0.39	0.37	0.41	0.42	0.41	0.41	0.38	0.40	0.41	0.39	0.40	0.38	0.36	0.41	ND	1.2	9.6
Chromium	mg/kg	82.00	74.00	75.00	89.00	78.00	68.00	69.00	74.00	86.00	68.00	78.00	78.00	67.00	72.00	68	81	370
Copper	mg/kg	24.00	20.00	27.00	31.00	29.00	25.00	25.00	28.00	30.00	24.00	24.00	24.00	19.00	26.00	22	34	270
Lead	mg/kg	6.90	4.70	11.00	13.00	11.00	4.80	8.30	9.20	16.00	9.10	8.60	5.80	4.10	8.30	19	46.7	218
Mercury	mg/kg	0.03	0.02	0.05	0.05	0.04	0.02	0.05	0.05	0.05	0.05	0.06	0.05	0.02	0.05	0.09	0.15	0.71
Nickel	mg/kg	52.00	50.00	47.00	55.00	51.00	41.00	46.00	49.00	55.00	46.00	52.00	53.00	57.00	47.00	37	20.9	51.6
Selenium	mg/kg	1.60	1.50	1.60	1.70	1.70	1.60	1.50	1.60	1.60	1.60	1.60	1.50	1.40	1.60	ND	--	--
Silver	mg/kg	0.79	0.74	0.82	0.84	0.83	0.82	0.77	0.79	0.82	0.79	0.80	0.76	0.72	0.82	ND	1	3.7
Zinc	mg/kg	43.00	38.00	41.00	43.00	47.00	45.00	41.00	44.00	43.00	40.00	45.00	44.00	41.00	46.00	52	150	410
Dioxins & Furans	TEQ	1.13	0.61	1.40	0.97	0.88	0.48	0.55	0.88	1.00	1.03	0.92	0.58	0.70	0.76	1.06	--	--
Total DDTs	ug/kg	15.60	14.40	16.20	16.80	16.20	16.20	15.00	15.60	50.50	15.60	15.60	15.00	14.40	16.20	ND	1.58	46.1
Total Organotins	ug/kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.71	--	--
Total PAHs	ug/kg	59.00	58.40	71.00	61.80	52.80	60.00	59.20	79.00	81.80	70.80	68.00	64.20	33.40	65.80	344	4022	44792
Total PCB	ug/kg	0.00	0.00	0.00	35.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.46	0.31	4.27	6.07	22.7	180

* Note: Inside denotes stations inside the dredged material footprint, as determined by the SPI taken. Outside denotes stations outside of the dredged material footprint, as determined by the SPI taken.

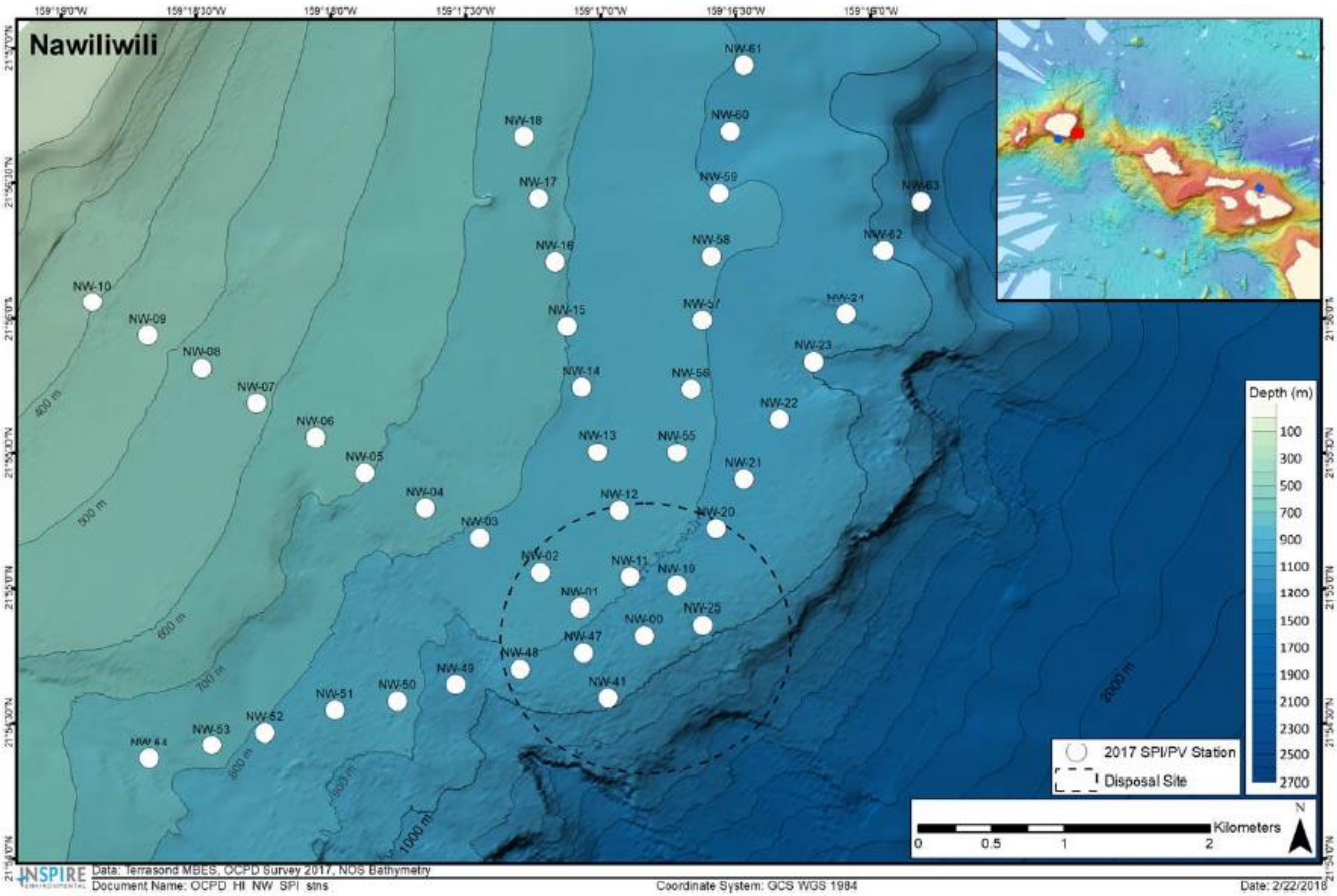

Figure 2. Map of the stations in the Nawiliwili ocean disposal site survey area. A subset of these stations was selected for sediment grabs.

Table 3. Sediment chemistry results from the Nawiliwili ocean disposal site.

Nawiliwili Site		"Inside"							"Outside"					Reference Site	NOAA Screening	
Analyte	Units (dw)	NW01	NW19	NW55	NW07	NW18	NW23	NW59	NW10	NW15	NW52	NW57	NW57D		ER-L	ER-M
TOC	mg/kg	2300	2540	1970	1320	3400	1170	2730	2200	780	3690	1260	1140	0.58	--	--
Arsenic	mg/kg	18	19	15	12	19	16	21	14	9	22	12	No data	40	8.2	70
Cadmium	mg/kg	0.37	0.35	0.38	0.37	0.39	0.41	0.40	0.36	0.42	0.41	0.40		ND	1.2	9.6
Chromium	mg/kg	84	75	80	62	110	64	120	46	31	130	52		68	81	370
Copper	mg/kg	17.00	21.00	19.00	14.00	24.00	16.00	27.00	7.20	7.30	27.00	13.00		22	34	270
Lead	mg/kg	2.20	7.90	2.30	2.40	2.40	2.40	2.40	2.10	2.50	2.40	2.40		19	46.7	218
Mercury	mg/kg	0.02	0.03	0.02	0.02	0.02	0.02	0.03	0.02	0.02	0.03	0.02		0.09	0.15	0.71
Nickel	mg/kg	88	87	100	52	100	95	110	27	32	110	54		37	20.9	51.6
Selenium	mg/kg	1.50	1.40	1.50	1.50	1.60	1.60	1.60	1.40	1.70	1.60	1.60		ND	--	--
Silver	mg/kg	0.74	0.69	0.77	0.74	0.79	0.81	0.79	0.71	0.84	0.82	0.79		ND	1	3.7
Zinc	mg/kg	43	35	43	25	48	37	53	15	17	55	29		52	150	410
Dioxins & Furans	TEQ	0.92	No data	1.26	0.66	1.03	0.61	0.69	1.03	0.56	1.09	0.62	0.65	1.06	--	--
Total DDTs	ug/kg	14.40	13.80	15.00	14.40	15.60	16.20	15.60	13.80	16.80	16.20	15.60		ND	1.58	46.1
Total Organotins	ug/kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.71	--	--
Total PAHs	ug/kg	48.40	45.60	48.20	49.40	50.00	49.00	49.00	50.40	52.80	50.00	36.40		344	4022	44792
Total PCBs	ug/kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.80	0.00	0.00	0.00	6.07	22.7	180

* Note: Inside denotes stations inside the dredged material footprint, as determined by the SPI taken. Outside denotes stations outside of the dredged material footprint, as determined by the SPI taken.

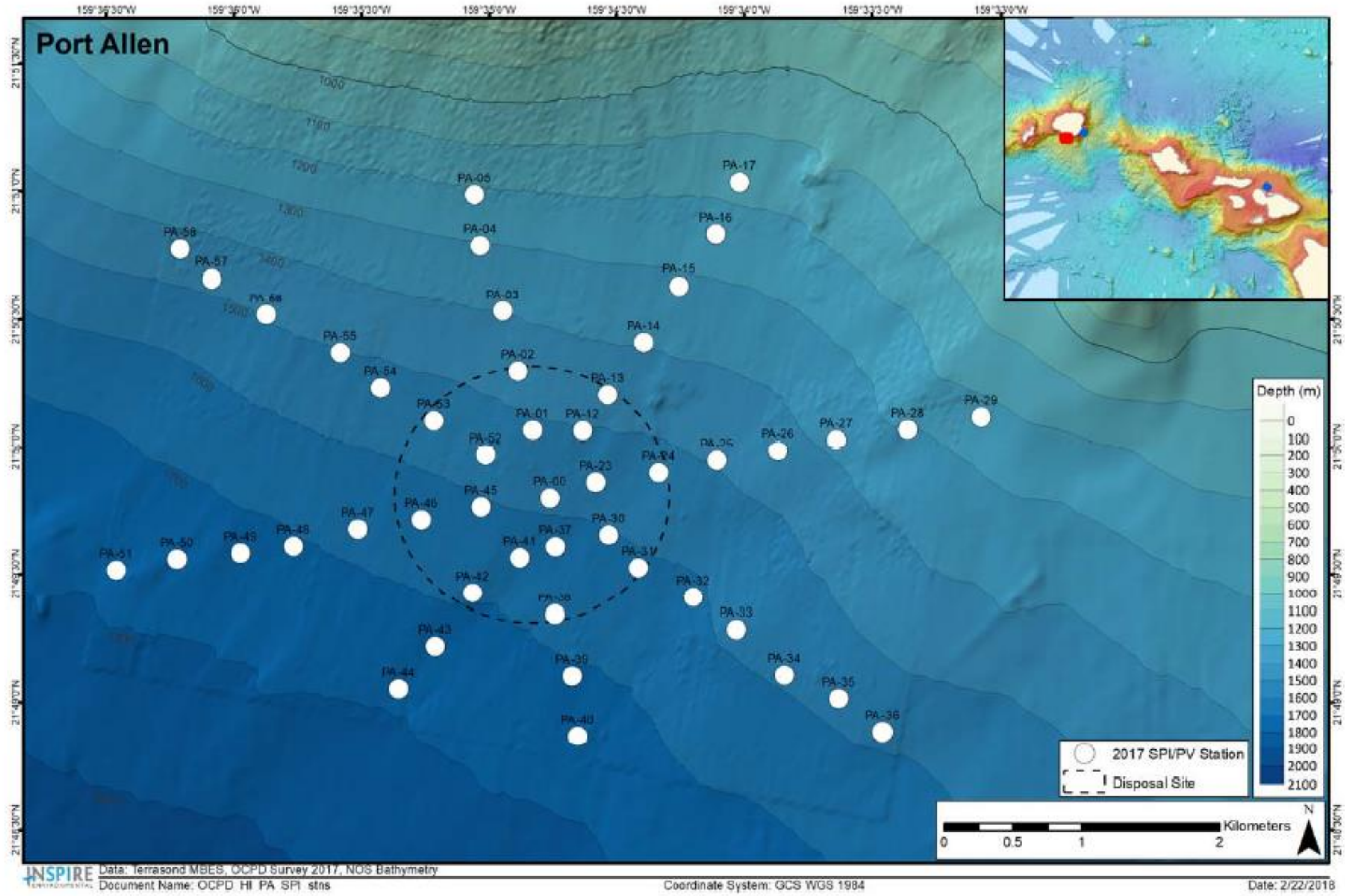

Figure 3. Map of the stations in the Port Allen ocean disposal site survey area. A subset of these stations was selected for sediment grabs.

Table 4. Sediment chemistry results from the Port Allen ocean disposal site.

Port Allen Site		**"Inside"**					**"Outside"**						**Reference Site**	**NOAA Screening**	
Analyte	**Units (dw)**	PA00	PA13	PA31	PA53	PA15	PA27	PA29	PA34	PA49	PA51	PA55		**ER-L**	**ER-M**
TOC	mg/kg	4400	6500	3770	6000	2340	6200	5000	3700	4160	5200	6070	0.58	--	--
Arsenic	mg/kg	19	19	18	23	14	21	21	17	22	23	23	40	8.2	70
Cadmium	mg/kg	0.46	0.43	0.42	0.50	0.38	0.44	0.42	0.42	0.47	0.48	0.55	ND	1.2	9.6
Chromium	mg/kg	150	160	130	180	72	170	140	140	150	190	180	68	81	370
Copper	mg/kg	42	46	41	54	15	46	37	45	52	63	53	22	34	270
Lead	mg/kg	4.00	4.20	3.00	6.00	2.30	5.90	4.20	4.00	6.90	6.80	7.70	19	46.7	218
Mercury	mg/kg	0.10	0.09	0.08	0.11	0.02	0.09	0.05	0.06	0.11	0.10	0.10	0.09	0.15	0.71
Nickel	mg/kg	190	140	130	190	65	150	120	120	130	180	170	37	20.9	51.6
Selenium	mg/kg	1.60	1.70	1.70	1.70	1.50	1.80	1.70	1.70	1.70	1.80	1.80	ND	--	--
Silver	mg/kg	0.82	0.86	0.84	0.85	0.75	0.88	0.85	0.85	0.87	0.88	0.88	ND	1	3.7
Zinc	mg/kg	62.00	65.00	56.00	76.00	28.00	66.00	55.00	58.00	62.00	83.00	70.00	52	150	410
Dioxins & Furans	TEQ	3.03	3.66	1.61	5.72	1.32	2.53	1.84	3.82	2.67	4.07	7.24	1.06	--	--
Total DDTs	ug/kg	16.20	16.80	16.80	16.80	15.00	17.40	16.80	16.80	17.40	17.40	17.40	ND	1.58	46.1
Total Organotins	ug/kg	0.00	5.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.71	--	--
Total PAHs	ug/kg	76.30	73.00	83.60	88.50	70.10	82.20	74.50	59.80	89.60	116.80	80.40	344	4022	44792
Total PCBs	ug/kg	28.61	29.00	29.00	30.00	25.00	32.00	27.21	25.00	25.29	26.00	26.59	6.07	22.7	180

* Note: Inside denotes stations inside the dredged material footprint, as determined by the SPI taken. Outside denotes stations outside of the dredged material footprint, as determined by the SPI taken.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Pacific Islands Fish and Wildlife Office
300 Ala Moana Boulevard, Room 3-122
Honolulu, Hawaii 96850

In Reply Refer To:
01EPIF00-2020-I-0465

January 28, 2021

Ellen Blake
Assistant Director, Water Division
U.S. Environmental Protection Agency
Region IX
75 Hawthorne Street
San Francisco, CA 94105-3901

Subject: Programmatic Consultation for Five Existing Hawai‘i Ocean Dredged Material Disposal Sites

Dear Ellen Blake:

The U.S. Fish and Wildlife Service (USFWS) received your November 16, 2020 email request for consultation. You requested our concurrence with your "may affect, but not likely to adversely affect" determination for five existing ocean dredged material disposal sites, in Hawai‘i. These sites are off the islands of O‘ahu, Hawai‘i, Maui, and Kaua‘i (Figure 1). Specifically, you requested consultation for the following Hawaiian seabirds, including

- Short-tailed albatross (*Phoebastria albastrus*)
- ‘Ua‘u (Hawai‘i) or Hawaiian petrel (*Pterodroma sandwichensis*)
- ‘A‘o (Hawai‘i) or Ta‘i‘o (Sāmoa) or Newell's shearwater (*Puffinus auricularis newelli*)
- ‘Akē‘akē (Hawai‘i) or Hawai‘i distinct population segment (DPS) of band-rumped storm-petrel (*Oceanodroma castro*)

We based our analysis and decisions on the Biological Assessment for this project and other pertinent data. A complete consultation record is on file at our office. Our response is in accordance with section 7 of the Endangered Species Act of 1973 (Act), as amended (16 U.S.C. 1531 *et seq*.).

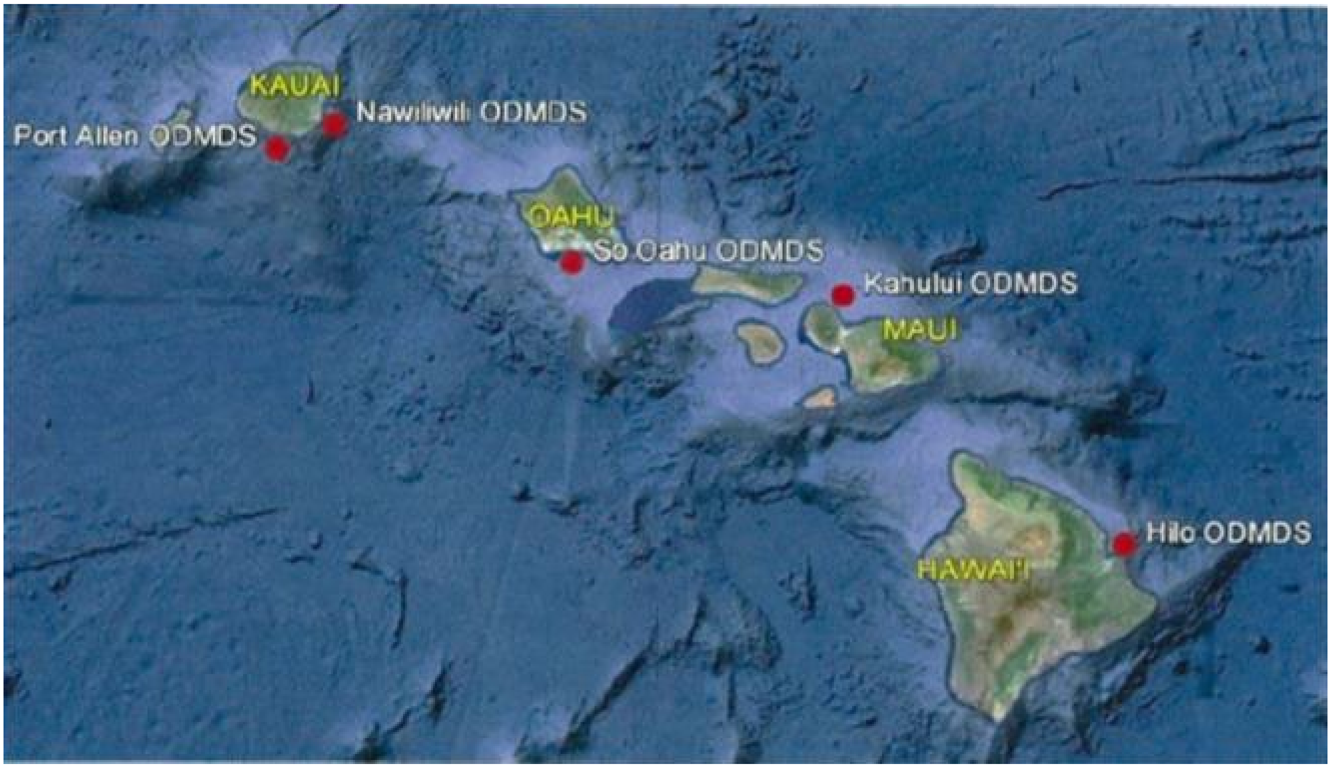

Figure 1. Vicinity map, showing the five existing Hawaiʻi EPA-designated ocean disposal sites.

Project Description

This project includes five designated disposal sites that serve the state of Hawaiʻi and provide critical maritime access to navigable waters of Hawai'i. The disposal sites are located approximately 4 to 6.5 nautical miles offshore of the islands of Oʻahu, Hawaiʻi, Maui, and Kauaʻi (Figure 1), in water depths ranging from 1,100-to 5,300-ft deep. Each site includes a small zone where disposal actions are required to occur, and also include a larger site boundary where any drifting sediments are intended to deposit. Annually, approximately 220,000 cubic yards of dredged sediments are deposited across the five sites combined. The specific quantities of deposited sediments differ at each site and are based on the dredging needs of each island. For example, the south Oʻahu site serves the U.S. Navy facilities at Pearl Harbor and the commercial port complex in Honolulu harbor. This site is the most heavily used, with dredging and disposal occurring for 22 of the past 40 years, accounting for over 80 percent of Hawaiʻi's dredged sediment disposal. The remaining disposal sites receive less than 10 percent of the dredged materials. Use of these disposal sites includes only suitable, non-toxic sediment dredged by the U.S. Army Corps of Engineers (USACE) and U.S. Navy from navigable waters of Hawaiʻi.

Over a 10-year period, a total of 1.24 million cubic yards of sediments were disposed of at the five Hawaiʻi sites combined (2009 through 2018). This level of dredging required between 495 and 2,475 total transits to and from the Hawaiʻi ocean disposal sites over this period, representing less than one percent of the total commercial vessel transits currently occuring in these locations. When disposal vessels arrive at an ocean disposal site, each disposal occurs for less than five minutes.

Conservation Measures

The following conservation measures will occur to avoid and minimize impacts to listed species and their habitats:

Water Quality - Protection of Marine Areas Potentially Used by Seabirds

- Avoid disposal within existing fisheries and shellfisheries.
- Water quality monitoring occurs to ensure water quality resumes ambient levels before sediments reach any marine sanctuary or known geographically fishery or shellfisheries. Disposal vessels use sensors to avoid leakage or spilling dredged materials during transit to disposals sites.
- The footprint, or total area of the disposal sites are minimized to ensure effective monitoring may occur and to control effects. Disposal vessels are tracked using a Global Positioning System (GPS) to ensure disposals occur in the correct locations.
- Selection of the disposal sites considered whether marine species use the areas for breeding, spawning, nursing, feeding, or migration, for all life stages.
- Each sediment sample is tested to ensure it meets acceptable criteria for classification as nontoxic, and deposition will avoid contaminating marine areas and species.
- Debris is removed from dredged materials prior to disposal, including entanglement hazards (i.e., derelict nets).

Effects of the Proposed Action

The short-tailed albatross, ‘ua‘u (Hawaiian petrel), ‘a‘o (Newell’s shearwater), and ‘akē‘akē (Hawai‘i DPS of band-rumped storm-petrel) (collectively known as Hawaiian seabirds) may be present and exposed to disposal of the dredged sediments.

Disturbance

Hawaiian seabirds may forage or loaf in the areas where dredged sediments are disposed. Any birds present may flush, prompted by approaching disposal vessels. Flushed birds may temporarily experience missed feedings or increased levels of stress. Disposal of dredged sediments occurs for less than five minutes, and occurs within the same designated disposal locations. The disposal events are predictable, short term, and infrequent relative to baseline commercial vessel traffic. We expect any flushed birds would resume their normal activities quickly and would not experience decreased fitness from the disturbances.

Prey Resources

Some dredged materials may contain sources of prey that attract diving seabirds to the disposal areas such as polychaetes, crustaceans, molluscs, and aquatic invertebrates. The seabirds may be attracted to the disposal areas during disposal and dive to capture any incidental prey resources present. The birds may be exposed to elevated levels of turbidity and be disoriented underwater; however, this is not expected to cause injury or harm to the seabirds.

Disposal of the sediments may occur in areas that provide prey resources to the seabirds (i.e., fish). Sediments containing toxins can poison prey resources, including fish that these seabirds consume. Only sediments that are deemed suitable for open-water disposal (i.e., nontoxic) are permissable in these locations. The Hawaiian seabirds are unlikely to be exposed to toxins associated with disposal of the dredged sediments.

Disposal of dredged sediments can bury aquatic prey resources when disposal occurs in shallow marine areas (i.e., where water depth is shallow enough for sunlight to allow aquatic vegetation to photosynthesize and grow). These areas can attract fish and provide rearing and foraging areas. The disposal areas associated with this consultation are several miles offshore and are located outside these sensitive marine areas.

Therefore, effects to Hawaiian seabirds from disturbance and effects to prey resources are discountable and insignificant.

Summary

We have reviewed our data and conducted an effects analysis of your project. By incorporating the conservation measures listed above, adverse effects to listed species are extremely unlikely to occur, and are therefore insignificant and discountable. Because impacts from the proposed project are insignificant and discountable, we concur with your determination that the proposed action may affect, but is not likely to adversely affect the short-tailed albatross, ‘ua‘u (Hawaiian petrel), ‘a‘o (Newell’s shearwater), and ‘akē‘akē (Hawai‘i DPS of band-rumped storm-petrel).

Reinitiation of consultation is required and shall be requested by the Federal agency or by the Service, where discretionary Federal involvement or control over the action has been retained or is authorized by law and: (1) new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered; (2) if the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this letter; or (3) if a new species is listed or critical habitat designated that may be affected by the identified action.

We appreciate your efforts to conserve endangered species. If you have any questions concerning this consultation, please contact Lindsy Asman, Fish and Wildlife Biologist, at 808-792-9490 or by email at lindsy_asman@fws.gov. When referring to this project, please include this reference number: 01EPIF00-2020-I-0465.

Sincerely,

Darren LeBlanc
Planning and Consultation Team Manager