DREDGED MATERIAL MANAGEMENT PROGRAM

State of Washington

including

Puget Sound
Grays Harbor, Willapa Bay and the Pacific Coast
Columbia River Basin

BIENNIAL REPORT

Dredging Years 2022/2023

PREPARED BY THE DMMP AGENCIES

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WASHINGTON STATE DEPARTMENT OF NATURAL RESOURCES

DEPARTMENT OF ECOLOGY State of Washington

EPA United States Environmental Protection Agency

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List of Abbreviations

BiOp	Biological Opinion
BT	Bioaccumulation Trigger
COCs	Chemicals of Concern
CY	Cubic Yard
Dioxin	Dioxins and furans
DMMO	Dredged Material Management Office
DMMP	Dredged Material Management Program
DMMU	Dredged Material Management Unit
DNR	Washington Department of Natural Resources
DY	Dredging Year
Ecology	Washington Department of Ecology
EPA	Environmental Protection Agency
ESA	Endangered Species Act
ML	Maximum Level
MPR	Management Plan Report
MPRSA	Marine Protection, Research and Sanctuaries Act
NMFS	National Marine Fisheries Service
PAH	Polynuclear Aromatic Hydrocarbon
PSDDA	Puget Sound Dredged Disposal Analysis
PSET	Portland Sediment Evaluation Team
QA/QC	Quality Assurance/Quality Control
SAP	Sampling and Analysis Plan
SDM	Suitability Determination Memorandum
SMARM	Sediment Management Annual Review Meeting
SMS	Sediment Management Standards
SRKW	Southern Resident Killer Whale
SSD	Supplemental Suitability Determination
SL	Screening Level
SQS	Sediment Quality Standard
TEQ	Toxicity Equivalence
TBT	Tributyltin
USACE	US Army Corps of Engineers
USFWS	US Fish and Wildlife Service
WDFW	Washington Department of Fish and Wildlife

1 Introduction & Project Overview

1.1 Introduction

The Dredged Material Management Program (DMMP) is an interagency program that manages dredged material in the State of Washington. The four cooperating agencies are: U.S. Army Corps of Engineers (USACE), Seattle District; U.S. Environmental Protection Agency (EPA), Region 10; Washington Department of Ecology (Ecology); and Washington Department of Natural Resources (DNR). The DMMP agencies apply dredged material evaluation guidelines to federal and permitted projects in Washington State and co-manage the DMMP open-water disposal sites. The dredged material evaluation guidelines were originally developed for the Puget Sound Dredged Disposal Analysis (PSDDA) program in the 1980s and expanded to cover Grays Harbor and Willapa Bay in 1995. The DMMP agencies modify the evaluation guidelines, as needed, through an annual review process.

The DMMP evaluates projects in Puget Sound, on the Washington Coast, non-port projects on the Washington side of the Columbia River, and all other water bodies within the state of Washington. Port projects on the Washington side of the Columbia River and all projects on the Oregon side are evaluated by the Portland Sediment Evaluation Team (PSET). PSET is headquartered at the USACE Portland District, and functions similarly to the DMMP for Oregon projects.

This report summarizes DMMP activities for Dredging Years (DY) 2022 and 2023. As defined by the DMMP agencies, DY22 covers the period from June 16, 2021 to June 15, 2022. DY23 covers the period from June 16, 2022 to June 15, 2023.

1.2 Projects Overview

During DY22/23 the DMMP agencies completed a suitability determination or other action (**Tables 1 and 2)** for a total of **40 projects** (17 in DY22; 23 in DY23). Many projects included full characterizations, intended to assess the suitability of the proposed dredged material for open-water disposal and to evaluate the quality of the sediment to be exposed by dredging. Full characterizations result in a suitability determination memorandum (SDM), signed by the DMMP agencies, that summarizes the results of the characterization and provides an official determination regarding suitability for open-water disposal. Other common DMMP actions include volume revisions, recency extensions, Tier 1 evaluations, and standalone antidegradation evaluations.

Project locations for DY22 and DY23 are plotted in **Figures 1 and 2**, respectively.

Another ten projects began the DMMP evaluation process during or before DY22/23, but suitability determinations or other actions for these projects were not completed before the end of DY23. These projects are listed in **Table 3** but are not discussed in the remainder of the report.

Chapter 2 presents an overall assessment of sampling and testing activities, including tables related to project ranking, sampling, testing, results, and suitability determinations.

Chapter 3 provides details of projects that were complex in nature or where the application of best professional judgment by the agencies was necessary.

Chapter 4 presents dredged material disposal information and reviews disposal-site monitoring activities during DY22/23. The status of coordination under the Endangered Species Act is also discussed.

Appendices A and B include the chemical and biological evaluation guidelines used during DY22/23.

Appendix C tabulates exceedances of those guidelines.

1.3 DMMP Process and Timeline

For many dredging projects, DMMP sediment sampling and testing are a part of the regulatory requirements under Section 404 of the Clean Water Act. One of the most common questions from dredging projects/applicants is how much time is required to perform DMMP sampling and testing and ultimately obtain a suitability determination or equivalent decision document (the "DMMP Process").

Table 4 summarizes the time required for four common sequential tasks of the DMMP process for a total of 18 DY22/23 projects that conducted DMMP sampling and testing and culminated in a suitability determination, antidegradation determination, or advisory determination memo. Each task is described in more detail below. Many factors can affect the time required, and both the project applicant and DMMP must be actively engaged to achieve a successful outcome in a timely manner.

- **Task 1 - Sampling and Analysis Plan (SAP) Development**. The applicant prepares a draft SAP for characterization of the proposed dredged material. The time required for SAP development is highly variable and almost completely within control of the dredging applicant.
- **Task 2 - SAP Review, Revisions, and Approval**. DMMP agencies review the draft SAP and provide comments to the applicant; the applicant revises the SAP to address the comments, and the revised SAP is submitted to the agencies for approval. More than one round of revision is frequently needed to adequately address all agency comments. Once the SAP is finalized, an approval letter or email message is sent to the applicant. At that point, sampling and analysis may proceed.
- **Task 3 - Sampling and Analysis and Data Compilation/Interpretation**. The applicant conducts field sampling and chemical/biological analysis following the procedures documented in the approved SAP. At the completion of sampling and testing, the applicant compiles and submits a draft data report to the DMMP. Sampling, chemical and/or biological testing, and draft report preparation consume a substantial portion of the overall DMMP process.
- **Task 4 - Data Report Review/Revisions and Suitability Determination Completion.** Upon receipt of the draft data report, the DMMP agencies review the data report for completeness and accuracy, provide review comments to the applicant, and if required, the applicant revises the data report to address the comments. Multiple revision/review cycles of the data report may be needed to ensure that the report addresses all data questions and issues. Once the data report has been finalized, the Dredged Material Management Office (DMMO) drafts a SDM for review and signature by the DMMP agency representatives. The suitability determination is a Memorandum for Record documenting the determination reached on the suitability/unsuitability of each of the dredged material management units for unconfined open-water disposal. The suitability determination also includes an evaluation of the sediment surface that will be exposed by dredging in relation to the State of Washington's antidegradation standard. For projects with upland disposal, a standalone antidegradation determination is prepared instead of a suitability determination. For special studies, an advisory (or similar) determination is prepared.

Summary statistics (median, minimum, and maximum number of days) are available for tasks 2, 3, and 4 described above; task 1 (draft SAP development) is primarily an applicant-driven activity and is not tracked by the DMMP.

Overall (for DY22/23 projects), the median total elapsed time required for tasks 2, 3, and 4 was 264 days (ranging from 131 to 1036 days), with the largest amount of time consumed by sampling, testing (chemical and biological), and draft data report preparation by the applicant (task 3). Multiple factors can impact task 3, including 1) weather; 2) sampling difficulties; 3) laboratory capacity and turn-around

time; 4) QA problems arising during chemical and biological testing; 5) data validation; 6) decision-making by the applicant based on testing results; and 7) report compilation time.

Tasks 2 (SAP review, revisions, and approval) and 4 (data report revisions and SDM completion) require project and DMMP engagement, but they were still generally much shorter in duration than task 3. More than half of the SAPs required two or more revision and review cycles. Factors influencing the time required for tasks 2 and 4 include project complexity and contractor/consultant knowledge/expertise.

2 DY22/23 Project Summary & Data Assessment

2.1 Ranking

Project ranking is based on the likelihood of sediments in a project area having concentrations of chemicals of concern (COCs) with the potential to cause adverse biological effects. Sampling and analysis requirements are determined, to a large extent, by the project ranking. The DMMP agencies have established ranks for geographic areas (e.g., Elliott Bay) and activities (e.g., marinas) based on historical data or the presence of active sources of contamination. Ranking guidance for Puget Sound, the Columbia River, Grays Harbor and Willapa Bay can be found in the 2021 DMMP User Manual (DMMP, 2021b).

Adjustments to project ranking can be made if changes in the sediment chemical quality are demonstrated by two or more sampling events. Projects that underwent DMMP sediment sampling and testing in DY22/23 and had an adjustment to their initial rank are shown in **Table 5**. This biennieum the DMMP made ranking determinations for two large federal navigation projects that do not easily fit into these general ranking categories.

Ranking decisions define three aspects of characterization: field sampling density, the number of analyses, and recency. These three variables are applied to proposed dredge volumes to assess the potential risks for placing material at an open-water disposal site. If one rank is applied to a large project with varied influences and conditions, it's likely that areas of lower risk will be over-characterized while areas of greater risk are under-characterized. The DMMP evaluated current and historical information to adopt project-specific rankings for both the Snohomish and Swinomish Federal Navigation channels. These project-specific ranks incorporate the relevant and unique aspects of each project and setting and are intended to most efficiently characterize channel sediments to inform appropriate placement of dredged material, as described below.

Snohomish River Federal Navigation Channel. Previously ranked Low, but with modifications made in portions of the channel for two out of the last three characterizations, the project-specific rank and sampling guidelines for future characterizations have been standardized to:

1. One DMMU/100,000 cy of proposed dredged material
2. One sample/20,000 cy of proposed dredged material
3. 7-year recency period
4. COC list for channel areas downstream of Station 0+240 (Stations 0+00 to 240+00) will include all routine DMMP marine chemicals of concern. Dioxins/furans (Dioxin) or TBT analyses are not required unless a Tier 1 analysis identifies potential sources.
5. COC list for channel areas upstream of Station 240+00 (Stations 240+00 to 381+88) will be tiered: every other characterization event, only sediment conventionals will be required for analysis, unless conventionals results show that sediment does not meet exclusion criteria (i.e., total fines ≤ 5% and TOC ≤ 0.5%). Analysis of all current DMMP COCs will be done at least every 14 years.
6. A Tier 1 analysis (review of current information) must be done every 7 years as part of the scheduled sampling to evaluate whether conditions have changed for any part of the channel. Changes could include spills, potential new contaminant sources, or addition of new chemicals of concern. The sampling event will be modified as necessary should the Tier 1 evaluation indicate the need for higher density sampling in any part of the channel, or for analysis of additional chemicals of concern.

Swinomish Federal Navigation Channel. Previously ranked Low throughout, the DMMP has developed a project-specific rank for the Swinomish Channel with the following characterization guidelines:

1. Four DMMUs, one encompassing each of the following channel sections:
    a. Southern Entrance (approximately stations 0+00 to 90+00)
    b. Southern Main Channel (approximately stations 90+00 to 190+00)
    c. Main Channel (approximately stations 190+00 to 400+00)
    d. Northern Entrance (approximately stations 400+00 to 690+00)
2. A minimum of three grab samples per DMMU that target current shoals or potential areas of concern
3. COC list to include all routine DMMP marine chemicals of concern. Dioxin or TBT analyses are not required unless a Tier 1 evaluation identifies potential sources
4. 10-year recency period
5. Tier 1 evaluation prior to each dredge event to confirm that conditions have not changed such that the previous characterization no longer represents the dredge prism (e.g., due to spills, changes in chemicals of concern or land uses, etc.)

2.2 Sampling and Analysis Plans

A SAP must be prepared by the applicant and approved by the DMMP agencies before sediment samples are collected. The sampling and analysis requirements are determined by the volume of surface and subsurface dredged material and the rank. The minimum number of field samples and dredged material management units (DMMUs) for full characterization are calculated as shown in **Table 6**.

The applicant presents a conceptual dredging plan in the SAP with the dredging area divided into the required number of DMMUs. The number of samples and DMMUs may need to be increased beyond the minimum to address site-specific considerations. Sampling locations are identified, and a compositing plan is presented. Protocols for station positioning, decontamination, field sampling, sample compositing, chemical analysis, biological testing, quality assurance/quality control (QA/QC), and data submittal requirements are also included. Once completed, the DMMO coordinates review and approval of the plan with the DMMP agencies. **Table 7** contains data for sampling plans approved for projects with DY22/23 DMMP decision document outcomes.

2.3 Chemical Testing

Table 8 and **Appendix C** summarize the COCs and projects with DMMP guideline exceedances from DY22/23. There are 57 individual chemicals or groups of chemicals that have DMMP evaluation guidelines and are considered standard COCs for marine projects. For projects in freshwater, there are 33 individual chemicals. **Appendix A** provides a list of these COCs. While tributyltin (TBT) is not considered a standard COC for marine projects, it is often required on a case-by-case basis. Dioxin analysis is also required on a case-by-case basis in both marine and fresh water. **Table 9** summarizes the guidelines used for the evaluation of dioxin in DY22/23.

Marine Projects. 12 marine projects were tested in DY22/23; among these projects, 19 COCs were detected or had non-detect values at concentrations above DMMP screening levels (SL), maximum level (ML), and/or bioaccumulation triggers (BT). BT exceedances occurred for fluoranthene and dioxins.

Freshwater Projects. Six freshwater projects were tested in DY22/23; with no SL1 exceedances.

Z-Sample Testing. Testing of Z-samples for antidegradation evaluations were triggered in 2 projects (Schnitzer Steel and Lake Washinghton Ship Canal). Lake Washington Ship Canal exceeded the guidelines for multiple COCs and failed to meet the State of Washington antidegradation standard.

Dioxin Exceedances. Schnitzer Steel is the only project with dioxin exceedances. They did not pursue bioaccumulation testing.

2.4 Biological Testing – Bioassays

If a project's chemical testing results indicate the potential for unacceptable adverse environmental or human health effects, the project proponent may opt to further pursue potential suitability for in-water disposal through biological testing. Bioassays are used to evaluate potential toxicity effects on benthic invertebrates. Bioassays are typically only conducted on those DMMUs having one or more exceedance of DMMP screening levels.

Table 10 summarizes the DMMP projects with DY22/23 decision documents for which bioassay testing (marine or freshwater) was performed. **Appendix B** includes the DMMP bioassay interpretative guidelines used in these evaluations and **Appendix C** includes the results for the three projects for which bioassays were conducted in DY22/23.

Marine toxicity (bioassay) testing was conducted on nine DMMUs from two dredging projects in DY22/23 (USACE Lake Washington Ship Canal [7 DMMUs] and USACE Neah Bay Entrance Channel [2 DMMUs]). For the USACE Lake Washington Ship Canal project, a hit under the one-hit rule (major hit) occurred in the larval bioassay for DMMU 7. This DMMU was deemed unsuitable for open-water disposal. DMMU 5 had a hit under the two-hit rule (minor hit) in the larval bioassay and DMMU 6 had a minor hit in the 10-day amphipod mortality test. The two DMMUs from the USACE Neah Bay project had minor hits in the larval bioassay. All of the minor hits had no corroborating hits in the other tests, so "passed" bioassays.

Freshwater bioassay testing was conducted on 1 DMMU from the Chambers Creek Dam project. All test results met performance criteria, so "passed" bioassays.

2.5 Biological Testing – Bioaccumulation

Bioaccumulation testing may be initiated for projects in which one or more COCs exceed the DMMP's marine BT. No BTs exist for freshwater projects, so bioaccumulation testing is triggered for marine projects, or freshwater projects proposing disposal in the marine environment.

During DY22/23, only two chemicals were reported at concentrations above the marine BT in dredged material samples – fluoranthene and dioxin. The following projects had BT exceedances in one or more DMMUs:

- USACE Lake Washington Ship Canal - Fluoranthene
- Schnitzer Steel – Dioxin

The dredging proponents chose not to pursue bioaccumulation testing in the affected DMMU(s), and the material was determined unsuitable for open-water disposal.

2.6 Suitability Determinations

Table 11 summarizes the 19 projects for which the DMMP completed a suitability determination in DY22/23.

A suitability determination summarizes the evaluation procedures used in the characterization of project sediments; evaluates chemical and biological testing data and associated QA/QC data; and

documents the interpretation of testing results. The suitability determination is a technical memorandum, drafted by the Corps' DMMO and then reviewed and signed by representatives from the DMMP agencies. It documents the suitability of proposed dredged sediments for open-water disposal. The suitability determination does not however, constitute final project approval by the agencies. Comprehensive agency comments on the overall project are provided through the regulatory public notice and review process.

For the projects receiving suitability determinations in DY22 and DY23, two projects included material that was found unsuitable for unconfined open-water disposal. Of the 1,755,165 cubic yards (cy) of material that was covered by the 19 SDMs, 1,720,575 cy were found suitable for unconfined open-water disposal. The unsuitable volume was approximately 35,000 cy, but final volumes were not calculated due to additional characterization and/or buffers that need to be applied.

2.7 Antidegradation Evaluations

Table 12 summarizes the DMMP projects with Z-sample or post-construction confirmation analysis for which the DMMP prepared an antidegradation evaluation.

Dredging operations expose new sediment to direct contact with the water column. The exposed sediment must meet the State of Washington Sediment Quality Standards (SQS) or the antidegradation policy (WAC-173-204-120) contained in the Sediment Management Standards (SMS). All DMMP suitability determinations include a section in which antidegradation is evaluated, but not all projects require special testing to support that evaluation. Projects that received DMMP suitability determinations for open-water disposal but did not require additional testing to address antidegradation are not included in this section of the biennial report. The projects included in this section met one of the following criteria: a) upland disposal was planned, so the project did not require a DMMP suitability determination; the only DMMP action was to conduct an antidegradation evaluation; b) additional testing was conducted to support the antidegradation evaluation, including analysis of surface sediment or Z-samples prior to dredging, or analysis of post-dredge samples.

A 'Z-sample' is a sample collected from the sediment layer just below the dredging overdepth and is typically collected during sampling of heterogeneous sediments. The Z-layer is defined as the two-foot interval beyond the overdepth. The Z-samples are typically archived. Depending on the results from characterization of the overlying dredged material prism, it is sometimes necessary to analyze the Z-samples to determine whether dredging the project will result in degradation of the surface sediment condition.

In some cases, collection of Z-samples is not possible (e.g., refusal during vibracore sampling). In other cases, where DMMUs with elevated concentrations of COCs have been removed, there may be concern that residuals from the dredging operation may leave a contaminated surface. In either case, sampling and testing of the new surface sediment after dredging may be necessary.

2.8 Tier 1 Determinations

Table 13 summarizes the projects that received Tier 1 (no-test) Determinations from the DMMP in DY22/23, with dredged material from these projects being found suitable for open-water disposal and/or sediment exposed by dredging meeting the antidegradation guidelines.

All projects begin with a Tier 1 evaluation of existing information on the proposed dredging project, including the site history and all previously collected sediment data. Using the information collected in a Tier 1 evaluation, projects can be exempted from sediment testing under three different scenarios: 1) the small-project guidelines are met; 2) the proposed dredged material meets the Section 404 or Section

103 exclusionary criteria; or 3) upland disposal is planned and there are no issues with the sediment surface to be exposed by dredging.

The ***small-project*** guidelines are as follows:

Project Rank	Maximum No-Test Volume (cy)
L	8,000
LM or M	1,000

The ***exclusionary criteria*** are described in the regulations for the Marine Protection, Research, and Sanctuaries Act (MPRSA) (40 CFR 227.13) and Clean Water Act (40 CFR 230.60). Generally, relatively coarser-grained material (e.g., sand and gravel) from high-energy environments that are geographically removed from contaminant sources meet the exclusionary criteria. The DMMP agencies apply the exclusionary criteria on a case-by-case basis.

2.9 Recency Extensions

Table 14 summarizes the recency extensions that were approved by the DMMP in DY22/23.

Recency guidelines apply to material that has been sampled, tested, and approved for open-water disposal but not yet dredged, and to projects that may be dredged two or more times within the recency period. Key considerations in determining whether the existing data are still representative are the recency of the information and sources of contamination in the vicinity of the project. For High-ranked projects, the recency guidelines allow characterization data to be valid for a period of 3 years. The DMMP guidelines specify a recency period of 5, 6, 7 and 10 years for Moderate, Low-Moderate, Low and Very Low-ranked projects, respectively.

When other permitting requirements, construction delays or funding constraints prevent a project from being dredged during the recency period, extension of the recency period is considered on a case-by-case basis. When considering whether existing data continue to adequately characterize sediment from a project, the agencies review previous characterization data, any new data from the dredge site or vicinity, site use, and sources of contamination. Based on this review, the agencies may extend the recency period – typically for one to two years – for a project that has not yet been dredged or will require additional dredging beyond the expiration of the current recency period. Recency extensions may be allowed with no additional testing, or it may require some level of confirmatory testing.

2.10 Project Revisions

Table 15 summarizes the project revisions approved by the DMMP during DY22/23.

Dredging projects are dynamic by nature and shoaling continues to occur between the time of sediment characterization and the time of dredging. There may also be design changes that alter the dredging volume or footprint. When the project volume or footprint changes subsequent to full characterization, a dredging applicant may request a revision of the volume or footprint found in the suitability determination. The DMMP agencies review such requests on a case-by-case basis.

2.11 Special Studies

Table 16 summarizes the special studies that were conducted in DY22/23. Only one special study occurred:

Chambers Creek Dam (DMMP, 2022). This study supplements data collected in 2018 (DMMP, 2019), which had slight exceedances of mercury, benzyl alcohol, benzoic acid, and chlordane in one or more of the silty dredged material management units (DMMUs) and insufficient sediment volume for the full suite of bioassays (amphipod test not conducted). The polychaete (*Neanthes*) test passed while the larval (*Mytilus*) test did not. It appeared that confounding factors from acclimating freshwater sediment to marine test conditions contributed to the failure in the larval bioassay.

The DMMP provided the following recommendations for the 2021/2022 special study:

1. Use a freshwater bioassay instead of a marine larval test (impounded sediment is in freshwater).
2. Use a high-resolution pesticide method to verify chlordane exceedances.
3. Include a DMMU that represents the sandy/gravelly material comprising the majority of the upstream erosional area.

The supplemental study performed in 2021 included the collection of surface and subsurface samples of silty sediment from the same two areas as tested in the 2018 study (DMMP, 2019) as well as a 5th DMMU consisting of the sandy material upstream of the impounded sediment. This study also followed the other DMMP recommendations of using a high-resolution pesticide method and conducting freshwater bioassays on samples that exceeded DMMP guidelines or SQS.

All tests passed DMMP guidelines, but since the project was a proposed dam removal, not a sediment characterization for open-water disposal, DMMP did not issue a suitability determination. However, if this were a dredged material characterization, all 56,000 cy of material would be deemed suitable for open-water disposal and antidegradation would be met. Furthermore, the impounded sediments that would be released downstream comply with the SQS and are expected to have no adverse effects on the benthic community.

2.12 Supplemental Suitability Determinations

Table **17** lists the Supplemental Suitability Determinations (SSD) prepared in DY22/23. A brief description of each project is provided below:

Zittel's Marina. A supplemental suitability determination was prepared to document the requirement to utilize a debris screen during dredging.

3 Non-standard and/or Complex Projects

This chapter includes non-standard or complex projects requiring explanation beyond the summaries provided in Chapters 1 and 2. Projects with special considerations that required best professional judgment (BPJ) for ranking, sampling plan development, sampling, chemical/biological testing, and/or dredging are further described in this chapter.

3.1 Project Characterization

Neah Bay Navigation Improvement Project (DMMP, 2022a)
This project is a USACE/Makah Tribe plan to dredge up to 41,000 cubic yards (cy) of material from the entrance channel to Neah Bay, intended to provide safe navigation depths to vessels with a draft of > 15 feet, including emergency response vessels that are required by the state of Washington to be stationed in Neah Bay. Proposed placement of dredged material is on a local beach, with the goal of restoring intertidal habitat to an area that has degraded due to shoreline armoring and lack of sediment input. As the DMMP does not determine suitability for project-specific beneficial use options, the proposed dredged material was characterized to determine its suitability for placement at a DMMP dispersive disposal site. It was also evaluated against state sediment management standards to provide information for final beneficial use decisions by the Makah Tribe and regulatory agencies.

Material sampled from two DMMUs was mostly gravel and sands, with low total fines and TOC. Chemical analysis found detected exceedances of both DMMP guidelines and SMS criteria for 3&4-methylphenol and phenol in both DMMUs. Samples were thus subjected to bioassay testing to determine whether toxicity was present at potentially harmful levels.

Bioassay outcomes were determined using standard interpretive guidelines from the DMMP program (DMMP 2021) and interpretive criteria outlined in the 2013 SMS rule (WDOE 2013). The amphipod and infaunal growth bioassays all passed both DMMP guidelines and SMS criteria, indicating suitability for open-water dispersive disposal and potential suitability for intertidal beneficial use. There were "minor hits" for the larval development bioassay in both DMMUs -- meaning that there was not sufficient evidence to fail the bioassay unless there was a corroborating failure in another of the bioassays. Since neither the amphipod nor benthic infaunal tests showed an equivalent response, both DMMUs passed the larval bioassay under the DMMP guidelines for dispersive sites.

Under SMS criteria, larval test interpretation showed a discrepancy between criteria in the SMS rule (WDOE 2013) and that stated in implementation guidance (SCUM; Ecology, 2021). The differences in interpretation led to different outcomes for NB21-A compared to SCO criteria: under the SMS rule the material met SCO criteria, under SCUM it did not. Ecology chose to use the interpretation as it is promulgated under current state law (using the SMS rule) rather than that used in the implementation guidance (SCUM). Based on this analysis, material from both DMMUs meets SCO criteria for marine sediments and can be considered for nearshore beneficial use.

Schnitzer Steel of Tacoma (DMMP, 2022b)
Eight DMMUs were characterized from the Schnitzer Steel of Tacoma berth area on the Hylebos Waterway in Tacoma, WA for proposed disposal in Commencement Bay. Due to the project's location in a CERCLA site and known surface sediment contamination issues, the surface layer was characterized at a more rigorous level than required for standard DMMP projects. Seven surface DMMUs (0-2 ft) and one subsurface DMMU were characterized. Multiple SL exceedances throughout the surface DMMUs resulted in a patchwork of suitability, resulting in the need to establish both horizontal and vertical buffer zones. To better characterize the unsuitable layer, 0-1 and 1-2 ft intervals were analyzed in addition to the 0-2 ft intervals. This information allowed more precise application of vertical buffers.

King County, North Mercer Enatai Interceptor Upgrade Project (DMMP 2023a)
Confirmation grab samples were collected to extend the Recency period. Due to the proximity to a freshwater area impacted by the invasive species New Zealand Mudsnail (*Potamopyrgus antipodarum; NZMS),* grab samples were sieved and visually inspected by field staff. Microscopic evaluation of the sediment positively identified NZMS, which were confirmed by a Washington Department of Fish and Wildlife (WDFW) biologist. The density of NZMS was very low; just one or two visible in two of the four surface grab samples.

Per RCW 77.135.020, WDFW is the lead agency for managing invasive species statewide. Based on the information collected by King County, WDFW determined that dredged material disposal of Enatai project sediments in Elliott Bay was unlikely to cause inadvertent spread of NZMS beyond its current distribution in the Lake Washington system. WDFW issued an Aquatic Invasive Species Permit (AIS; Permit #23-001) for dredging, transport and disposal of dredged material to the Elliott Bay disposal site.

A small amount of hydraulic dredging (300 cy) was required to avoid damaging current underwater infrastructure. A specialized pump intended for moving high volume of solids (40-70% solids) was purchased for this project. The hydraulically dredged material was placed in the flat top barge with scuppers with hay bales/geotextile fabric to control turbidity. This barge was topped off with mechanically dredged sediment (approximately 800 cy), which further dewatered during the waiting period while the Ballard Locks were closed. The DMMP agencies allowed the combined hydraulically and mechanically dredged material to be disposed at the Elliott Bay disposal site.

USACE Lake Washington Ship Canal (DMMP, 2023b)
17,590 CY of proposed dredged material was characterized from seven DMMUs immediately downstream of the Hiram M. Chittenden Locks in Seattle, WA for proposed disposal in Elliott Bay. The area was ranked high due to potential sources of contamination in the area. Chemical results showed high levels of PAHs in multiple DMMUs and at multiple depths, indicating the presence of an unsuitable layer at different levels throughout the project. There were multiple SL, BT and ML exceedances for PAHs as well as multiple other exceedances of detected and non-detected parameters in various DMMUs. Z-samples were analyzed along with DMMUS due to suspected issues with increasing contamination with depth and the observation during core sampling of a sheen and petroleum odors at depth. Z-sample results confirmed elevated concentrations of PAHs in some areas.

Due to holding time constraints, bioassay analysis of all seven DMMUs was initiated prior to receiving analytical results. Bioassays passed in all DMMUs except DMMU 7.

A close examination of the sampling and analytical results revealed that a significant portion of the project was not fully characterized. Therefore, given the elevated concentrations found in some areas, the DMMP agencies determined that further characterization is needed to make a full determination of the suitability of the material in DMMUs 3-6, and that further characterization of the leave surface is needed throughout the project. In some areas bioaccumulation testing would be required to pursue open-water disposal.

3.2 Unauthorized Dredging and Disposal

Port of Seattle Terminal 5 Deepening (NWS-2015-0296-WRD) (DMMP, 2020a and DMMP, 2021c)

The Port of Seattle Terminal 5 Deepening Project Phase II dredging was conducted by Orion Marine Contractors, Inc. between December 5, 2022 and February 15, 2023. 24,430 CY of dredged material was taken to the Elliott Bay open-water disposal site, which included approximately 2,730 CY of overdredged material. The DMMP agencies reviewed the post-dredge bathymetry and determined that dredged material was removed from deeper than the authorized depths at specific locations spread throughout

the project footprint. In addition to the overdredging, a small amount of material from the buffer area previously determined to be unsuitable was also taken to the Elliott Bay disposal site. Follow-up actions are in progress and will be documented in a separate memorandum upon completion.

Shelter Bay Marina (NWS-2014-684) (DMMP, 2020b)

Shelter Bay Marina dredging was conducted by American Construction between November 4 and December 29, 2022. All 31,169 CY of dredged material were taken to the dispersive Rosario Strait disposal site. This total includes up to 200 CY of dredged material from a separate boat dock area that was only approved for upland disposal. Follow-up actions are in progress and will be documented in a separate memorandum upon completion.

Mariner's Cove Beach Club (NWS-2019-725) (DMMP, 2021d)

Mariner's Cove Beach Club dredging (dock area) was conducted by Blackwater Marine between November 3, 2022 and March 17, 2023. All 17,152 CY of dredged material was brought to a nearby upland area; no open-water disposal. During post-bathymetric survey review, it was discovered that overdredging past permitted depth (949 CY) and permitted perimeter (1,393 CY) occurred without the required approvals. Ecology sent a non-compliance letter to Mariner's Cove Beach House on May 15, 2023, documenting the required follow-up actions.

4 Disposal Site Use and Monitoring

4.1 Disposal Activity and Site Use

The DMMP manages multi-user open-water disposal sites located in Puget Sound and coastal Washington (Grays Harbor and Willapa Bay). For projects placing dredged material at these sites, the Washington State Department of Natural Resources issues site-use authorizations prior to placement. These authorizations are issued for sediments that are:

- Suitable for unconfined open-water disposal as determined by the DMMP evaluation process, and
- Associated with dredging projects that have received all other required regulatory permits (e.g., Clean Water Act 401/404 permits).

Other disposal options for open-water disposal include flow-lane disposal (used primarily in the lower Columbia River and Willapa Bay) and beneficial use. Dredged material not suitable for open-water disposal is disposed upland.

During this biennium, just over 400,000 cy of material was placed at the Puget Sound open-water disposal sites; three of the eight sites were used. The total combined disposal volume at the Grays Harbor sites was about 4 million cy, driven primarily by USACE maintenance dredging. The multi-user dispersive sites in Willapa Bay were not used. Flow-lane disposal along the Columbia River is managed by Portland District; cumulative flow-lane volumes in the Columbia River have not historically been tracked by the DMMP agencies.

Tables 18, 19, 20 and **Figures 3 and 4** summarize and graphically illustrate the disposal volumes for DY22/23 as briefly summarized below.

Dredging Year 2022 (June 16, 2021 through June 15, 2022).

- Dispersive open-water, non-dispersive open-water, beneficial use and/or upland placement was utilized in Puget Sound and Grays Harbor (Tables 18 and 20).
- The multi-user dispersive sites in Willapa Bay were not used.
- The Quillayute beneficial use sites were not used in DY2022.

Dredging Year 2023 (June 16, 2022 through June 15, 2023).

- Dispersive open-water, non-dispersive open-water, beneficial use and/or upland placement was utilized in Puget Sound and Grays Harbor (Tables 19 and 20).
- The multi-user dispersive sites in Willapa Bay were not used.
- The Quillayute beneficial use sites (First Beach and Rialto Beach) were used in DY2023.

4.2 Cumulative DMMP Disposal Site Use and Monitoring Program

The cumulative dredged material volumes disposed at each Puget Sound and Grays Harbor site since program implementation are depicted in **Figure 5** and **Figure 6** respectively and are listed in **Table 21.** Volume summaries for the Puget Sound non-dispersive sites show that site capacities appear to be sufficient to last at least 40 more years (**Table 22**).

The PSDDA Management Plan Reports (MPR 1988, 1989) recognized that intensive post-disposal monitoring surveys would be required early in the program (in the 1990's) to gather data on the adequacy of the evaluation procedures to meet the site management objectives. In accordance with the management plan, the DMMP agencies have periodically reduced the frequency and scope of monitoring based on past documented compliance with the site management objectives and volumes routinely deposited at each site. The current volume triggers for non-dispersive disposal sites are (DMMP, 2021a):

- 150,000 cy at Anderson/Ketron and Bellingham Bay (low-use sites), and
- 500,000 cy at Commencement Bay, Elliott Bay, and Port Gardner (more frequently used sites).

The monitoring triggers are considered soft triggers and may be adjusted at the discretion of the DMMP agencies based on BPJ.

The DMMP agencies have conducted a variety of post-disposal physical and environmental monitoring surveys at the non-dispersive sites in Puget Sound and bathymetric surveys at the dispersive sites since the Puget Sound sites were established in 1988/89 (**Table 23**).

Based on Puget Sound site monitoring conducted to date (including physical mapping, on- and off-site sediment chemistry, sediment toxicity, off-site infaunal bioaccumulation, off-site benthic community structure analysis, and laboratory bioaccumulation comparing on and off-site material), dredged material disposal has not caused adverse impacts at or adjacent to any of the non-dispersive sites.

The overall goals of the DMMP site monitoring program are to ensure that the DMMP-prescribed disposal site conditions are maintained and to verify that DMMP dredged material evaluation procedures adequately protect the aquatic environment. Monitoring surveys provide feedback to verify the adequacy of the DMMP dredged material evaluation procedures and management plan. The Sediment Management Annual Review Meetings (SMARM) provide a forum to report on these post-disposal survey findings conducted during any given dredging year, and to make management plan adjustments if needed.

Starting in 2017, the DMMP embarked on a focused evaluation of DMMP disposal site monitoring and management, particularly with respect to bioaccumulatives, but also with respect to other issues and inefficiencies identified in the original framework over time. The DMMP reviewed PSDDA framework documents, consulted Washington State SMS experts, and held public workshops to incorporate revisions to the original monitoring framework to:

- Incorporate lessons learned and information gained over 30 years of monitoring of the disposal sites,
- Update the monitoring program based on new technologies and approaches, and
- Comply with federal and state regulations, particularly the 2013 update of Part V of the SMS.

After a successful pilot study was conducted at the Port Gardner non-dispersive disposal site, a DMMP Issue Paper with the Revised Monitoring Framework was submitted by the DMMP agencies and presented at the May 2022 SMARM (DMMP, 2022c). No public comments were provided on the paper, and it was adopted as the new framework for the DMMP disposal site monitoring program in June 2022.

A Disposal Site Monitoring Plan is in the Draft Final stage and will be finalized after one more round of disposal site monitoring under the new framework (which is in progress as described in Section 4.4). The results of this study and any modifications to the Draft Final Disposal Site Monitoring Plan will be presented at the 2024 SMARM.

4.3 Monitoring Status at Non-dispersive Sites

Table 24 shows the monitoring status of the non-dispersive sites in Puget Sound at the end of DY2023, including the cumulative volume since the most recent monitoring event at each site, the soft monitoring triggers, and projected monitoring for DY24/25. A routine monitoring event at the Elliott Bay site is underway. Routine monitoring events at the Anderson/Ketron and/or Port Gardner sites may occur in the next biennium pending completion of dredging projects.

4.4 DY22/23 Post-Disposal Site Monitoring

One disposal site monitoring event was conducted during the DY22/23 biennium. Routine monitoring is underway for the Elliott Bay non-dispersive site. A Sediment Profile Imaging (SPI)/Plan View (PV) study was completed in March 2023, several weeks after the February 15th dredging work window closed. Chemical and biological testing is in progress, with results anticipated in January 2024.

The questions and goals from the revised framework that can be assessed by the completed SPI/PV survey are provided below:

Question 1. *Does the deposited dredged material stay onsite?*

Goal A. *Dredged material remains within the disposal site boundary.*

Goal A **is not met** if dredged material accumulation ≥3 cm is observed at or beyond the perimeter line (located one-eighth of a nautical mile beyond the disposal site boundary) OR if dredged material accumulation ≥10 cm is observed at or beyond the disposal site boundary.

The presence of dredged material is monitored using SPI. The SPI data at Elliott Bay indicated that the dredged material remains within the disposal site boundary.

Question 3*. Does use of the disposal site cause unacceptable adverse impacts to biological conditions off site?*

Goal D*. No significant decrease in off-site benthic habitat quality due to dredged material disposal.*

SPI/PV surveys included off-site stations to verify benthic habitat quality. SPI/PV results indicate typical background levels of habitat quality.

Additonal questions and goals will be evaluated using the chemical and biological data as described in the SMARM paper (DMMP, 2022c), and results will be presented in a data report and summarized in the next biennial report.

4.5 Endangered Species Act (ESA) Consultation

USACE, in coordination with the DMMP agencies, consults with the National Marine Fisheries Service (NMFS) and U.S. Fish and Wildlife Service (USFWS) under Section 7 of the Endangered Species Act (ESA) and with NMFS under Section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act as necessary. Transport to and disposal of material at DMMP multi-user sites are covered under this programmatic consultation so that use of the sites does not need to be consulted individually for each project.

A 2015 Biological Opinion (BiOp) issued by NMFS provides programmatic coverage through 2046. As part of the terms and conditions of the 2015 BiOp, the USACE (and by extension, the DMMP) must comply with biennial reporting requirements, including the submission of this biennial report and reporting of upland volumes. A more detailed summary was provided in section 5.4 of the DY14/15 biennial report.

The most recent consultation, initiated in December 2021 and concluded in February 2022, addressed the revised critical habitat designation for the Southern Resident Killer Whale (SRKW) which is adjacent to the Point Chehalis open-water disposal site at the mouth of Grays Harbor. NMFS concurred that the conditions of the biological opinion are met, and the original opinion remains in effect.

Per the BiOp, the next 5-year assessment of programmatic coverage (2026-2030) is due in 2025, with the DY24/DY25 Biennial Report. Reinitiation of consultation is required and shall be requested by USACE or by NMFS, where discretionary Federal involvement or control over the action has been retained or is authorized by law and (1) the proposed action causes take; (2) 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; (3) 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 the written concurrence; or (4) a new species is listed or critical habitat designated that may be affected by the identified action (50 CFR 402.16).

5 References

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DMMP, 2022c. Revised Monitoring Framework for Puget Sound DMMP Non-Dispersive Disposal Sites. Prepared by Inouye, Fourie, and Dunay for the DMMP. June 10, 2022.

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Ecology, 2021. *Sediment Cleanup User's Manual* (SCUM), Guidance for Implementing the Cleanup Provisions of the Sediment Management Standards, Chapter 173-204 WAC, Washington State Department of Ecology, Third Revision December 2021.

MPR, 1988. *Management Plan Report – Unconfined Open-Water Disposal of Dredged Material, Phase I (Central Puget Sound*). Prepared by the Puget Sound Dredged Disposal Analysis Agencies. June 1988.

MPR, 1989. *Management Plan Report – Unconfined Open-Water Disposal of Dredged Material, Phase II (North and South Puget Sound).* Prepared by the Puget Sound Dredged Disposal Analysis Agencies. September 1989.

Tables

Table 1. DMMP Evaluation Activities Completed in DY22.

No.	PROJECT	DMMP Action	Disposal Area/Type	Project Volume (cy)
1	Port of Everett Central Marina West	SD	PS	32,270
2	Port of Everett Marina (Central and South Docks)	RE	PS	96,150
3	Port of Everett North Marina	SD	PS	88,259
4	Port of Everett 10th St Boat Launch	SD	PS	64,698
5	Vigor Industrial Entrance Channel, Columbia River	SD	CR	20,000
6	Twin Bridges Marina	SD	PS	31,284
7	Chambers Creek Dam	SS	--	56,000
8	U.S. Navy Bangor EMMR	SD/AD	PS	22,300
9	Barbee Mill Boathouse	SD	PS	10,000
10	HME Construction Sand Mining	SD	UP/BU	100,000
11	USACE Neah Bay	SD	BU	41,000
12	Zittel's Marina	SS	--	--
13	City of Pasco WWTP Clean Water Preservation Project Phase 2	T1	BU	9,700
14	Project	T1	BU	30,400
15	Port of Grays Harbor, Terminals 1, 2, 3, and 4	SD	GH	274,000
16	Sandy Hook Marina, Whidbey Is.	VR	--	--
17	Schnitzer Steel of Tacoma	SD	PS	17,000

DMMP Actions

AD = Anti-degradation Determination
DR = Design Revision
RRD = Re-ranking Determination
RE = Recency Extension
SD = Suitability Determination
SS = Special Study
T1 = Tier 1 Evaluation
VR = Volume Revision
SSD = Supplemental Suitability Determination

Disposal Area/Type

BU = Beneficial Use
CR = Columbia River
GH = Grays Harbor
PS = Puget Sound
UP = Upland
WB = Willapa Bay
OI = Other In-Water Disposal Site
FL = Flow Lane
-- = Not applicable

Table 2. DMMP Evaluation Activities Completed in DY23

No.	PROJECT	DMMP Action	Disposal Area/Type	Project Volume (cy)
1	USACE, NWW Lower Snake/Clearwater River Navigation Channel	VR	SR	36,000
2	Port of Poulsbo Breakwater Rehabilitation, Liberty Bay	T1	UP	NA
3	Weyerhaeuser Longview	SD	CR	8,000
4	City of Longview, Cowlitz River Intake	T1	FL	< 100/yr
5	Bellingham Cold Storage (Subarea A)	RE/VR	PS	6,700
6	East Fork Lewis River Ridgefield Pits Restoration Project	T1	BU	450,000
7	Murphy's Landing Marina Maintenance Dredging	T1/SP	PS	700
8	North Mercer Enatai Interceptor Upgrade Project	RE	PS	32,000
9	Lakeside Industries	AD	UP	50
10	LeGrow Water Company	T1	UP	3,500
11	Mason's Resort Marina	T1	UP	550
12	USACE Shoalwater Emergency Dune Repair	T1	BU	460,000
13	Columbia Business Center East Slip	RE/VR	FL	8,000
14	U.S. Coast Guard Cape Disappointment Station	VR	FL	100,000
15	USACE Lake Washington Ship Canal	SD	PS	17,590
16	USACE Snohomish Navigation Channel	SD/RRD	PS, BU, UP	929,722
17	USACE Duwamish O&M (All Sections)	RE	--	--
18	Port Susan Bay Estuary Restoration	T1	BU	82,697
19	Driftwood Key	SD		
20	City of Pasco WWTP	SD		
21	CHS, Inc.	SD	OI or UP	< 5,000
22	USACE Swinomish Navigation Channel	RRD	PS	--
23	USACE Swinomish Navigation Channel	VR	PS	167,000

DMMP Actions

AD = Anti-degradation Determination
DR = Design Revision
RRD = Re-ranking Determination
RE = Recency Extension
SD = Suitability Determination
SS = Special Study
T1 = Tier 1 Evaluation
VR = Volume Revision
SSD = Supplemental Suitability Determination
SP = Small-Project No-Test Determination

Disposal Area/Type

BU = Beneficial Use
CR = Columbia River
GH = Grays Harbor
PS = Puget Sound
UP = Upland
WB = Willapa Bay
SR = Snake River (in water)
OI = Other In-Water Disposal Site
FL = Flow Lane
-- = Not applicable

Table 3. DMMP Evaluation Activities Initiated in DY22/23 but ongoing into DY24

PROJECT	Project Volume (cy)	SAP Review DY	Status at the end of DY23
U.S. Navy Bremerton NAVFAC M2D2	401,600	2022	Sampling objectives not met; resampling
Port of Tacoma PCT	27,500	2022	Waiting on data report
Sandy Hook Marina	29,141	2023	Waiting on data report
Meydenbauer Bay Yacht Club	18,500	2023	Approved SAP, sampling not yet scheduled
Anchor Cove Marina	26,900	2023	Approved SAP, sampling not yet scheduled
USACE Quillayute	97,990	2023	Sampling to occur June 2023
USACE Duwamish O&M (All Sections)	140,000	2023	Reviewing draft data report
Swinomish Commercial Fish Dock	7,800	2023	Reviewing draft data report/prep SDM
Port of Tacoma Tote Maritime	15,000	2023	Approved SAP; sampling not yet scheduled
Osprey Logistics - Smith Island Snohomish River	357,000	2023	SAP review in progress

Notes:

SAP = Sampling and Analysis Plan

Table 4. DMMP Process Times

Task No.	Task Description	Starting point	Endpoint	Roles & Responsibilities	Time Required (days)		
					Median	Min	Max
1	SAP Development	Variable	Draft SAP Submission	Project applicant	NA	NA	NA
2	SAP Review & Revision	Draft SAP Submission	SAP Approval	Project applicant and DMMP	33	8	140
3	Sampling & Testing and Data Compilation	SAP Approval	Draft data report submission	Project applicant	140	78	603
4	Data Report Review & Revisions and Completion of SDM	Draft data report submission	SDM signed	Project applicant and DMMP	63	13	293
2, 3, 4	**Total DMMP Process Time**	**Draft SAP Submission**	**SDM signed**	**Project applicant and DMMP**	**264**	**131**	**1036**

Table 5. DY 22/23 Project Rank Changes

PROJECT	DY	Location	Waterbody	Initial Rank	Final Rank
USACE Everett Snohomish River	2023	Everett	Snohomish River	L	Modified L (Project Specific)
USACE Swinomish Channel	2023	La Conner	Swinomish Channel	L	Modified L (Project Specific)

Ranking:

NT = No Test

VL = Very Low

L = Low

LM = Low-moderate

M = Moderate

H = High

Table 6. DMMP Sampling Requirements

Puget Sound, Grays Harbor, Willapa Bay and the Upper Columbia River

Project Rank	Maximum Volume Represented by a Field Sample (cy)	Heterogeneous Sediment (contamination level decreases with depth*)		Homogeneous Sediment DMMUs (cy)
		Surface[1] DMMUs (cy)	Subsurface[2] DMMUs (cy)	
Very Low	Project specific	Not applicable	Not applicable	100,000
Low	8,000	48,000	72,000	60,000
Low-Moderate	8,000	32,000	48,000	40,000
Moderate	4,000	16,000	24,000	20,000
High	4,000	4,000	12,000	8,000

Lower Columbia River

Project Rank	DMMUs
Very Low	300,000 cy
Low	100,000 cy
Low-moderate	70,000 cy
Moderate	40,000 cy
High	5,000 cy

Notes

[1]Surface is defined as the top 4 feet of the dredge prism.

[2]Subsurface is defined as that portion of the dredge prism beneath the 4-ft surface layer.

*If contamination increases with depth or there is no suspected difference between surface and subsurface contamination, project specifics will dictate the appropriate volume limits for the surface and subsurface DMMUs.

Table 7. DY22/23 Projects - Approved Sampling Plans

Project	Dredging Year (DY)[1]	Rank	Total Volume (cy)	Surface Volume (cy)	Number of Surface Samples	Number of Surface DMMUS	Subsurface Volume (cy)	Number of Sub-surface Samples	Number of Sub-surface DMMUs
Schnitzer Steel	2022	H	17,000	6,950	17	7	10,050	3	1
Port of Everett Central Marina West	2022	LM	32,270	32,270	4	1	0	0	0
Port of Everett Marina (Central and South Docks) - Appendix to Central Marina West SAP	2022	Mixed	96,150	96,150	3	NA	NA	NA	NA
Port of Everett North Marina	2022	LM	88,259	71,677	10	3	16,582	5	2
Port of Everett 10th St Boat Launch	2022	L	64,698	33,210	5	2	31,488	5	2
Vigor Industrial, Columbia River	2022	L	20,000	20,000	2	1	0	0	0
Twin Bridges Marina	2022	M	31,284	31,284	8	2	0	0	0
Chambers Creek Dam[2]	2022	LM	56,000	34,000	5	3	22,000	4	2
U.S. Navy Bangor EMMR	2022	LM	22,300	22,300	8	2	0	0	0
Barbee Mill Boathouse	2022	M	10,000	10,000	4	2	0	0	0
HME Construction Sand Mining	2022	VL	100,000						
USACE Neah Bay Entrance Channel	2022	LM	41,000	41,000	6	2	0	0	0
Port of Grays Harbor Terminals 1, 2, 3 and 4	2022	L/LM	274,000	247,380	33	7	26,620	4	1
Weyerhaeuser Longview	2023	LM	8,000	8,000	1	1	0	0	0
USACE Everett Snohomish River	2023	L	929,723	634,215	80	13	295,508	20	5
North Mercer Enatai Interceptor Upgrade Project	2023	M	32,000	32,000	4	1	0	0	0
USACE Lake Washington Ship Canal	2023	H	17,590	9,830	10	5	7,760	4	2
City of Pasco WWTP	2023	L	7,860	7,860	7	2	0	0	0
Driftwood Key Navigation Channel[3]	2023	LM	18,000	18,000	9	3	0	0	0
CHS, Inc	2023	LM	5,000	5,000	1	1	0	0	0

Notes:

[1] Approved project SAPs are listed in the DY in which their respective DMMP decision document was finalized.

[2] Chambers Creek Dam was characterized like a dredging project consisting of DMMUs with estimated volumes of impounded sediment that would wash downstream if the dam was removed.

[3] A Work Plan written for Ecology was provided to DMMP for comment; a formal DMMP SAP was not submitted.

Table 8. DY22/23 DMMU Chemical Testing Summary of Exceedances

	Marine						Freshwater			
CHEMICAL OF CONCERN	# of DMMUs D > SL	# of Projects D > SL	# of DMMUs D > BT	# of Projects D > BT	# of DMMUs D > ML	# of Projects D > ML	# of DMMUs D > SL1	# of Projects D > SL1	# of DMMUs D > SL2	# of Projects D > SL2
METALS										
Antimony	0	0	---	---	0	0				
Arsenic	0	0	0	0	0	0	0	0	0	0
Cadmium	0	0	---	---	0	0	0	0	0	0
Chromium	0	0	---	---	0	0	0	0	0	0
Copper	0	0	---	---	0	0	0	0	0	0
Lead	0	0	0	0	0	0	0	0	0	0
Mercury	0	0	0	0	0	0	0	0	0	0
Nickel							0	0	0	0
Selenium	---	---	0	0	---	---	0	0	0	0
Silver	0	0	---	---	0	0	0	0	0	0
ORGANOMETALLIC COMPOUNDS										
Tributyltin (bulk)	---	---	0	0	---	---	0	0	0	0
Monobutytin							0	0	0	0
Dibutyltin							0	0	0	0
Tetrabutyltin							0	0	0	0
PAHs										
Naphthalene	0	0	---	---	1	1				
Acenaphthylene	0	0	---	---	0	0				
Acenaphthene	1	1	---	---	0	0				
Fluorene	1	1	---	---	0	0				
Phenanthrene	2	1	---	---	0	0				
Anthracene	1	1	---	---	0	0				
1-Methynaphthalene							0	0	0	0
2-Methynaphthalene	0	0	---	---	0	0				
Total LPAH	1	1	---	---	0	0				
Fluoranthene	4	1	1	1	0	0				
Pyrene	3	1	1	1	0	0				
Benz(a)anthracene	0	0	---	---	1	1				
Chrysene	2	1	---	---	0	0				
Benzofluoranthenes (b,j,k)	0	0	---	---	1	1				
Benzo(a)pyrene	1	1	---	---	1	1				
Indeno(1,2,3-c,d)pyrene	3	1	---	---	1	1				
Dibenzo(a,h)anthracene	1	1	---	---	0	0				
Benzo(g,h,i)perylene	1	1	---	---	0	0				
Total HPAH	0	0	---	---	1	1				
Total PAH							0	0	0	0
CHLORINATED HYDROCARBONS										
1,4-Dichlorobenzene	0	0	---	---	0	0				
1,2-Dichlorobenzene	0	0	---	---	0	0				
1,2,4-Trichlorobenzene	0	0	---	---	0	0				
Hexachlorobenzene (HCB)	0	0	---	---	0	0				
beta-Hexachlorocyclohexane							0	0	0	0
PHTHALATES										
Dimethyl phthalate	0	0	---	---	0	0				
Diethyl phthalate	0	0	---	---	0	0				
Di-n-butyl phthalate	0	0	---	---	0	0	0	0	0	0
Butyl benzyl phthalate	1	1	---	---	0	0				
Bis(2-ethylhexyl) phthalate	1	1	---	---	0	0	0	0	0	0

Table 8. DY22/23 DMMU Chemical Testing Summary of Exceedances

	Marine						Freshwater			
CHEMICAL OF CONCERN	# of DMMUs D > SL	# of Projects D > SL	# of DMMUs D > BT	# of Projects D > BT	# of DMMUs D > ML	# of Projects D > ML	# of DMMUs D > SL1	# of Projects D > SL1	# of DMMUs D > SL2	# of Projects D > SL2
Di-n-octyl phthalate	0	0	---	---	0	0	0	0	0	0
PHENOLS										
Phenol	2	1	---	---	0	0	0	0	0	0
2-Methylphenol	0	0	---	---	0	0				
4-Methylphenol	2	1	---	---	0	0	0	0	0	0
2,4-Dimethylphenol	0	0	---	---	0	0				
Pentachlorophenol	0	0	0	0	0	0	0	0	0	0
MISCELLANEOUS EXTRACTABLES										
Benyzl alcohol	1	1	---	---	0	0				
Benzoic acid	0	0	---	---	0	0	0	0	0	0
Dibenzofuran	1	1	---	---	0	0	0	0	0	0
Hexachlorobutadiene	0	0	---	---	0	0				
N-Nitrosodiphenylamine	0	0	---	---	0	0				
Carbazole							0	0	0	0
PESTICIDES & PCBs										
4,4'-DDD	0	0	---	---	---	---				
4,4'-DDE	0	0	---	---	---	---				
4,4'-DDT	0	0	---	---	---	---				
Sum of 4,4-DDX compounds	---	---	0	0	0	0				
2,4'-DDD and 4,4'-DDD							0	0	0	0
2,4'-DDE and 4,4'-DDE							0	0	0	0
2,4'-DDT and 4,4'-DDT							0	0	0	0
Aldrin	0	0	---	---	---	---				
Total chlordane	2	1	0	0	---	---				
Dieldrin	1	1	---	---	0	0				
Heptachlor	0	0	---	---	0	0				
Endrin ketone							0	0	0	0
Total PCBs	3	2	0	0	0	0	0	0	0	0
BULK PETROLEUM HYDROCARBONS										
TPH-Diesel							0	0	0	0
TPH-Residual							0	0	0	0
DIOXINS/FURANS										
Total TEQ	---	---	6	1	---	---	0	0	0	0

Notes:

D = Detected, SL = Screening Level, BT = Bioaccumulation Trigger, ML = Maximum Level, --- = No guideline

=not a COC for water type

Analytes in **bold** indicate chemical had exceedance in one or more samples.

There are no Z-sample exceedances

Table 9. Dioxin Guidelines Utilized to Evaluate DY22/23 Projects

(a) Puget Sound Interim Guidelines for Nondispersive Sites[1]		
Disposal Sites	**Project Volume-Weighted Average**	**DMMU Maximum**
Anderson-Ketron, Commencement Bay, Elliott Bay, Port Gardner, Bellingham Bay	4 pptr TEQ	10 pptr TEQ
(b) Puget Sound Interim Guidelines for Dispersive Sites		
Disposal Sites	**DMMU Maximum**	
Port Angeles, Port Townsend, Rosario Strait	4 pptr TEQ	
(c) Grays Harbor Guidelines (Derived from 1991 Risk Assessment)		
DMMU Maximum: 2,3,7,8-TCDD = 5 pptr; and TEQ = 15 pptr		
(d) Columbia River Basin		
Comparison to Columbia River background stations downstream of Puget Island: 0.65 to 2.89 pptr TEQ		
(e) Upland Beneficial Use		
Model Toxics Control Act method B unrestricted land use level: 11 pptr TEQ		

Notes:

[1]Case-by-case determinations may be made for exceedances of these guidelines based on material placement sequencing, presence or absence of other bioaccumulatives, and frequency of disposal-site use.

Table 10. DY22/23 Bioassay (Toxicity) Testing Summary

PROJECT	Marine/ Freshwater	# of DMMUs tested	Interpretive Guidelines	Control Sediment source	Reference sediment source	DMMUs with Major or Minor Hits? *									# of tests with QA/QC rejections	# of DMMUs passed bioassays	# of DMMUs failed bioassays
						Marine						Freshwater					
						10-day Amphipod mortality		48-hr Sediment Larval		*20-day Neanthes* Growth		10-day *Hyalella* mortality	20-day *Chironomus* mortality	20-day *Chironomus* growth			
						Minor Hit	Major Hit	Minor Hit	Major Hit	Minor Hit	Major Hit						
Chambers Creek Dam	Freshwater	1 Composite	DMMP/SMS	Silica sand	Upstream of Creek							0	0	0	0	1	0
Neah Bay Entrance Channel	Marine	2	DMMP/SMS	Yaquina Bay, OR	Carr Inlet, WA	0	0	2	0	0	0				0	2	0
USACE Lake Washington Ship Canal	Marine	7	DMMP/SMS	Yaquina Bay, OR	Carr Inlet, WA	1	0	1	1	0	0				0	6	1

Notes:

* Major hit = 1-hit; Minor hit = 2-hit

Not applicable

Table 11. DY22/23 Suitability Determinations

PROJECT	Dredging Year (DY)	Rank	Total Volume (cy)	DMMUs, Chemical Analyses	DMMUs, Bioassay Analyses	DMMUs, Bioaccumulation Analyses	DMMUs Failing	Volume Failing (cy)	DMMUs Passing	Volume Passing (cy)	Proposed Disposal Site/Type
Port of Everett Central Marina West	2022	LM	32,270	1	0	0	0	0	1	32,270	PG
Port of Everett North Marina	2022	LM	88,259	5	0	0	0	0	5	88,259	PG
Port of Everett 10th St Boat Launch	2022	L	64,698	4	0	0	0	0	4	64,698	PG
Vigor Industrail, Columbia River	2022	L	20,000	1	0	0	0	0	1	20,000	CR
Twin Bridges Marina	2022	M	31,284	2	0	0	0	0	2	31,284	RS
Chambers Creek Dam (Memorandum for Record)	2022	LM	56,000	5	1	0	0	0	5	56,000	NA
U.S. Navy Bangor EMMR	2022	LM	22,300	2	0	0	0	0	2	22,300	PG
HME Construction	2022	VL	100,000	2	0	0	0	0	2	100,000	UP
Barbee Mill Boathouse	2022	M	10,000	2	0	0	0	0	2	10,000	EB
USACE Neah Bay	2022	LM	41,000	2	2	0	0	0	2	41,000	BU
Port of Grays Harbor Terminals 1,2,3 and 4	2022	L	274,000	8	0	0	0	0	8	274,000	GH
Schnitzer Steel of Tacoma	2022	H	17,000	8	0	0	5	--[1]	3	--[1]	CB
DY22 Totals			**756,811**							**739,811**	
Weyerhaeuser Longview	2023	LM	8,000	1	0	0	0	0	1	8,000	CR
USACE Snohomish Channel	2023	L	929,730	18	0	0	0	0	18	929,730	PG/BU
City of Pasco WWTP	2023	L	7,860	2	0	0	0	0	2	7,860	CR
USACE Lake Washington Ship Canal	2023	H	17,590	7	7	0	1	--[2]	6	--[2]	EB
North Mercer Enatai Interceptor Upgrade Project	2023	M	12,174	4	0	0	0	0	4	12,174	EB
Driftwood Key	2023	LM	18,000	3	0	0	0	0	3	18,000	BU/PG
CHS, Inc	2023	LM	5,000	1	0	0	0	0	1	5,000	BU or UP
DY23 Totals			**998,354**					**0**		**980,764**	
DY22/23 Totals			**1,755,165**					**0**		**1,720,575**	

Notes:

[1] Final volumes not calculated due to buffers applied between suitable and unsuitable material

[2] Final volumes not calculated due to need for additional characterization

Disposal Sites

AK = Anderson-Ketron (ND)
CB = Commencement Bay (ND)
CR = Columbia River (D)
EB = Elliott Bay (ND)
PC = Point Chehalis (D)
PG = Port Gardner (ND)
RS = Rosario Strait (D)
SJ = South Jetty (D)
SR = Snake River (ND)

Disposal Type

BU = Beneficial Use (includes both aquatic and upland)
D = Dispersive
FL = Flow Lane
ND = Non-Dispersive
UP = Upland Disposal
WB = Willapa Bay
NA = Not Applicable

Table 12. DY22/23 Projects with Z-Sample Analysis

PROJECT	DY	Rank	Type	Reason for Z-Sample Analysis, Post-Dredge Evaluation or Surface-Sediment Testing	Did the New Surface Meet SQS or Antidegradation Policy?
Schnitzer Steel of Tacoma	2022	H	Z-sample	elevated surface sediment results	Yes
USACE Lake Washington Ship Canal	2023	H	Z-sample	concern over elevated concentrations at depth	No
Lakeside Industries	2023	H	Tier 1	Known elevated concentrations in surface sediment in Salmon Bay and Lake Washington Ship Canal	No; project changes to leave 1 ft buffer of aggregate

Table 13. DY22/23 Tier 1 Determinations

PROJECT	DY	Total Volume (cy)	Rank	Reason for No-Test Determination	Proposed Disposal Site
City of Pasco WWTP Clean Water Preservation Project Phase 2	2022	9,700	LM	No known sources of contamination nearby; covering dredge/fill areas with clean "fish mix"	BU
Little Hangman Creek Restoration and Fish Habitat Enhancement Project	2022	30,400	L	Very remote area removed from known sources of contamination	BU/UP
Port of Poulsbo Breakwater Reabilitation	2023	na	na	After-the-fact permit, project removed creosote-treated piles, net benefit to environment	UP
East Fork Lewis River Ridgefield Pits Restoration Project	2023	450,000	L	On-site beneficial use, no known sources, available data show material is suitable	BU
Murphy's Landing Marina Maintenance Dredging	2023	700	M	Routine maintenance dredging, previous characterization showed it was suitable, <1,000 cy volume.	PS
Mason's Resort Marina	2023	550	L	Upland or on-site beneficial use, no known sources, available data show material is suitable	UP
City of Longview, Cowlitz River Intake	2023	< 100/yr	VL	move very small amount of material from intake screens out to river channel; no known sources	FL
LeGrow Water Company	2023	3,500	LM	Upland or on-site beneficial use, no known sources, available data show material is suitable	UP
Port Susan Bay Estuary Restoration	2023	82,697	na	On-site beneficial use, no known sources, available data show material is suitable	BU
USACE Shoalwater Emergency Dune Repair	2023	460,000	VL	Sand mining from offshore area for emergency repair of barrier dune	BU

Ranking:
VL = Very Low
L = Low
LM = Low-moderate
M = Moderate
H = High

Disposal Type
BU = Beneficial Use
FL = Flow Lane
OI = Other In-Water
UP = Upland Disposal
PS= Puget Sound

Table 14. DY22/23 Recency Extensions

PROJECT	DY	Rank	Sampling Date	Recency Time Limit (years)	End of Recency Period	Planned Dredging Period	Recency Period Extension
Port of Everett Marina (Central and South Docks)[1]	2022	Mixed	May-16	5	May-21	2024	Feb-24
Bellingham Cold Storage (Subarea A)	2023	LM	Dec-16	6	Dec-22	2022/2023	Feb-23
North Mercer Enatai Interceptor Upgrade Project[1]	2023	M	Aug-16	6	Aug-22	2023	May-27
Columbia Business Center East Slip	2023	LM	Nov-16	6	Nov-22	2024	Nov-24
USACE Duwamish O&M Section A& TB	2023	M/LM	Nov-17	6	Nov-23	2023/2024	Nov-24
USACE Duwamish O&M Section B	2023	H	Dec-20	3	Dec-23	2023/2024	Dec-24

Notes:

[1] Confirmation sampling was conducted to extend the recency more than 1 year

Table 15. DY22/23 Project Revisions

PROJECT	DY	Rank	Description of Project Revision
Sandy Hook Marina	2022	L	volume increased in DMMU 3 due to increased shoaling
Snake/Clearwater Federal Channel & Port berths	2023	L/LM	volume increases in portions of the federal/Port channel
Bellingham Cold Storage (Subarea A)	2023	LM	volume increase to maximum representative volume from 2016 sampling
Columbia Business Center East Slip	2023	LM	volume increase to maximum representative volume from 2016 sampling
U.S. Coast Guard Cape Disappointment Station	2023	LM	volume increase to accommodate rapid shoaling of sand, east of the docks

Notes:

L = low; M = moderate; H = high; ND = not determined

Table 16. DY22/23 Special Studies

Project	DY	Rank	Number of Chemistry Samples	Number of Bioassay Samples	Sample Device	COC List
Chambers Creek Dam (Memorandum for Record)[1]	2022	LM	5	1	Core/Grab	DMMP/SMS

Notes:

[1]Chambers Creek Dam was characterized like a dredging project consisting of DMMUs with estimated volumes of impounded sediment that would wash downstream if the dam were removed.

Table 17. DY22/23 Supplemental Suitability Determinations

Project	DY	Rank	Number of Chemistry Samples	Number of Bioassay Samples	Sample Device	COC List
Zittel's Marina	2021	M	0	0	Not Applicable	Not applicable. Added debris screening requirement.

Table 18. Project-Specific Dredged Material Disposal and Beneficial Use Placement, DY22

Site	Proponent/Project	Dredger	Dredge Type	Disposal Volume (cy)	# Barge Loads	#Barges Disposed Inwater "Off Site"	Disposal Dates	Was a debris screen used?	Volume screened (cy)	Volume debris removed (cy)
Federal Navigation Projects										
EB	USACE Duwamish O&M (A, B, TB)	American Construction	CS	123,810	98	0	Dec. 8 - Feb. 1, 2022	N	NA	NA
PC	USACE Grays Harbor O&M	HME	CS	695,006	306	0	Aug 1, 2021 - Feb 1, 2022	N	NA	NA
SJ	USACE Grays Harbor O&M	HME	CS	616,019	280	0	July 22 - Sept 25, 2021	N	NA	NA
BU-PO	USACE Snohomish O&M	Duwamish-Pacific JV	HYD	83,459	NA	NA	Nov 22, 2021 - Jan 14, 2022	N	NA	NA
BU-JI	USACE Snohomish O&M	Duwamish-Pacific JV	HYD	22,716	NA	NA	Jan 16 - Feb 4, 2022	N	NA	NA
PC	USACE Grays Harbor O&M	Essayons/Yaquina	HD	358,911	NA	0	April 13 -May 31, 2022	N	NA	NA
BU-SB	USACE Grays Harbor O&M	Essayons/Yaquina	HD	426,603	NA	NA	April 13 -May 31, 2022	N	NA	NA
BU-HMB	USACE Grays Harbor O&M	Essayons/Yaquina	HD	68,967	NA	NA	April 13 -May 31, 2022	N	NA	NA
Section 10/404 Permitted Projects										
CR	US Coast Guard Cape Disappointment	Iyabak Construction	HYD	2,250	NA	NA	Feb. 11 - 18, 2022	N	NA	NA
EB	Port of Seattle Terminal 5 Deepening	Orion	CS	11, 726	23	0	Jan 19 - Feb 23, 2022	Y	11,726	NA
PG	Port of Everett	American	CS	33,255	39	0	Jan. 6 - Feb 15, 2022	N	NA	NA
CB	Port of Tacoma, Husky and WUT maintenance dredging	American	CS	17,368	18	0	Nov. 4 - Dec. 5, 2021	Y	17,368	NA
PC	Port of Grays Harbor T1, T2, T4	HME Construction.	CS	41,431	18	0	July 16 - July 21, 2021	N	NA	NA
PC	Port of Grays Harbor T1, T2, T4	HME Construction.	CS	41,169	20	0	Feb. 5 - Feb 11, 2022	N	NA	NA
UP-RSL	Pacific Fishermen Shipyard	Blackwater Marine	CS	1,022	3	0	Oct 21, 2021- Dec 15, 2021	NA	NA	NA

Open-Water Disposal Sites
EB = Elliott Bay CR = Columbia River (flow-lane disposal)
PG = Port Gardr BC = Bay Center (flow-lane disposal)
A/K = Anderson Ketron
CB = Commencement Bay
PC = Point Chehalis

Upland Disposal Sites
UP-RSL = Republic Services Landfill

Beneficial Use Sites
SB = South Beach
JI = Jetty Island
PO = Parcel O
BN = Beach Nourishment
HMB = Half Moon Bay

Dredge Types
CS = Clamshell Dredge
HD = Hopper Dredge
HYD = Hydraulic Dredge

NA = Not applicable

Table 19. Project-Specific Dredged Material Disposal and Beneficial Use Placement, DY23

Site	Proponent/Project	Dredger	Dredge Type	Disposal Volume (cy)	# Barge Loads	#Barges Disposed Inwater "Off Site"	Disposal Dates	Was a debris screen used?	Volume screened (cy)	Volume debris removed (cy)
Federal Navigation Projects										
PG	USACE Snohomish O&M Lower Settling Basin	American Construction	CS	203,577	142	0	Dec 16- Jan 19, 2023	No	NA	NA
SR	USACE Snake/Clearwater River & Ports	HME Construction	CS	218,286	144	NA	Jan 5 - Feb 26, 2023	No	NA	NA
SJ	USACE Grays Harbor Inner Harbor	HME	CS	386,676	176	0	July 30 - Sept 22, 2022	No	NA	NA
PC	USACE Grays Harbor Inner Harbor	HME	CS	63,510	28	0	July 30 - Sept 22, 2022	No	NA	NA
PC	USACE Grays Harbor Inner Harbor	HME	CS	396,753	171	0	Dec 17 - Feb 4, 2023	No	NA	NA
PC	USACE Grays Harbor Outer Harbor	Essayons/Yaquina	HD	360,425	NA	0	April 4 -28, 2023	N	NA	NA
BU-SB	USACE Grays Harbor Outer Harbor	Essayons/Yaquina	HD	433,059	NA	NA	April 4 -28, 2023	N	NA	NA
BU-HMB	USACE Grays Harbor Outer Harbor	Essayons/Yaquina	HD	28,299	NA	NA	April 4 -28, 2023	N	NA	NA
BU-BN	USACE Quillayute	Portable Hydraulic Dredge	HD	51,141	NA	NA	9/7/2022 - 10/3/2022	NA	NA	NA
UP-S&G	Mariners Cove Beach Club	Blackwater Marine	CS	17,152	63	NA	Nov 3, 2022 - Mar 15, 2023	NA	NA	NA
RS	Shelter Bay Marina	American Construction	CS	31169[a]	37	0	Nov 4 - Dec 29, 2022	Yes	31,169	0
RS	Bellingham Cold Storage Section A	American Construction	CS	4,206	5	0	Dec 31, 2022 - Jan 6, 2023	Yes		
PC	Port of Grays Harbor Round 1	HME Construction	CS	53,496	26	0	July 17 - 24, 2022	No	NA	NA
PC	Port of Grays Harbor Round 2	HME Construction	CS	27,430	9	0	Feb 4 to 8, 2023	No	NA	NA
EB	Port of Seattle Terminal 5 Deepening	Orion Marine Contractors	CS	24781[b]	49	0	Dec 7, 2022 - Feb 11, 2023	Yes	24,781	NA[1]

[a] This includes 200 cy of unauthorized disposal

[b] This includes 2,730 cy of unauthorized disposal

[a] 200cy of unauthorized occurred

[1] Debris removed included chain and wire rope cables, large woody debris, steel debris, concrete and large rock

Open-Water Disposal Sites

EB = Elliott Bay
PG = Port Gardner
A/K = Anderson Ketro
CB = Commencement Bay
PC = Point Chehalis
RS = Rosario Strait (D)
SR = Snake River
CR = Columbia River (flow-lane disposal)
BC = Bay Center (flow-lane disposal)
SR = inwater bench placement

Beneficial Use Sites

SB = South Beach
JI = Jetty Island
PO = Parcel O
BN = Beach Nourishment
HMB = Half Moon Bay

Dredge Types

CS = Clamshell Dredge
HD = Hopper Dredge
HYD = Hydraulic Dredge

Table 20. DY22/23 Disposal/Placement Summary

Disposal/Placement Sites						
			DY2022		DY2023	
Dredging Location	**Placement Site**	**Type**	**# of Projects**	**Total Volume (cy)**	**# of Projects**	**Total Volume (cy)**
Puget Sound	Commencement Bay	OW-ND	1	17,368	1	0
	Elliott Bay	OW-ND	2	123,810	1	0
	Port Gardner	OW-ND	1	33,255	1	203,577
	Rosario Strait	OW-D	0	0	2	4,206
	Parcel O	BU	1	83,459	0	0
	Jetty Island	BU	1	22,716	0	0
	Beach Nourishment	BN	0	0	0	0
	Upland	UD	1	1,022	1	17,152
Grays Harbor	Point Chehalis	OW-D	4	1,136,517	5	901,614
	South Beach	BU	1	426,603	1	433,059
	South Jetty	OW-D	1	616,019	1	386,676
	Half Moon Bay	BU	1	68,967	1	28,299
	near Westport	UD	0	0	0	0
Willapa Bay	Tokeland flow lane	OW-D	0	0	0	0
Quillayute	First Beach	BU	0	0	1	358
	Rialto Beach	BU	0	0	1	50,783
Columbia River Basin	Baker Bay	FL	1	2,250	0	0
Snake River	RM 118 near Bishop Bar	OP-ND	0	0	1	218,286
Disposal/Placement Types - SubTotals						
Puget Sound	Total open-water disposal		4	174,433	5	207,783
	Total beneficial use		2	106,175	0	0
	Total upland disposal		1	1,022	1	17,152
Grays Harbor	Total open-water disposal		5	1,752,536	6	1,288,290
	Total beneficial use		2	495,570	2	461,358
	Total upland disposal		0	0	0	0
Willapa Bay	Total open-water disposal		0	0	0	0
Quillayute	Total beneficial use		0	0	2	51141
Columbia River Basin	Total flow-lane disposal		1	2,250	0	0
Snake River	Total open-water non-dispersive		0	0	1	218,286
Disposal/Placement Types - Grand Totals						
All sites	Grand total open-water disposal			1,926,969		1,496,073
	Grand total beneficial use			601,745		512,499
	Grand total upland disposal			3,272		17,152
		Grand total all disposal/placement:		2,531,986		2,025,724

Notes:

This Biennial Report does not include dredging volumes for projects in which DMMP had no involvement (e.g. Superfund dredging with upland disposal)

BU = Beneficial Use OW-D = open-water, dispersive OW-ND = open-water, non-dispersive UD = upland disposal

Table 21. Cumulative Site-Use Summary

Disposal Site	Dredging Years Used	Volume Disposed DY 2022/2023	Cumulative Volumes Disposed (cy)	Average Annual Disposal Volume (cy)
PUGET SOUND (Central)	**1989 – 2023 (34 yrs)**			
Commencement Bay (ND)	89, 91, 95, 96, 98, 99, 00, 01, 03, 04, 05, 06, 07, 08, 09, 10, 11, 12, 13, 16, 17, 21, 22	17,368	8,711,912	256,233
Elliott Bay (ND)	90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 00, 01, 02, 04, 05, 06, 07, 08, 09, 10, 11, 12, 13, 14, 16, 18, 20, 21, 22, 23	123,810	3,369,050	99,090
Port Gardner (ND)	90, 91, 93, 94, 95, 96, 97, 02, 06, 07, 08, 09, 10, 11, 12, 13, 15, 16, 17, 19, 20, 21, 22, 23	236,832	4,123,626	121,283
PUGET SOUND (North / South)	**1990 – 2023 (33 yrs)**			
Anderson/Ketron (ND)	93, 95, 04, 05, 07, 08, 12, 14	0	157,215	4,764
Bellingham Bay (ND)	93, 96, 98	0	78,883	2,390
Port Angeles (D)	96	0	22,344	677
Port Townsend (D)	93, 98, 99, 07, 09, 10	0	54,777	1,660
Rosario Strait (D)	91, 92, 93, 94, 95, 96, 98, 99, 02, 03, 04, 05, 06, 07, 09, 11, 12, 13, 15, 16, 18, 19, 20, 23	4,206	2,657,458	80,529
PUGET SOUND (Total)		**382,216**	**19,175,265**	**566,626**
GRAYS HARBOR	**1996 – 2023 (27 yrs)**			
Point Chehalis (D)	96, 97, 98, 99, 00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23	2,038,131	26,568,239	984,009
South Jetty (D)	96, 97, 98, 99, 00, 01, 02, 03, 04, 05, 06, 07, 09, 11, 12, 17, 18, 19, 20, 21, 22, 23	1,002,695	14,931,054	553,002
Half Moon Bay (BU)	96, 97, 98, 99, 02, 03, 04, 05, 06, 07, 08, 09, 10, 11, 12, 13, 17, 21, 22, 23	97,266	3,339,069	123,669
South Beach (BU) (2001-2023)	01, 02, 04, 05, 06, 09, 10, 11, 12, 13, 14, 15, 16, 18, 20, 22, 23	859,662	5,670,190	257,736
Southwest (3.9 Mile) Ocean Site (D)	03, 04	0	97,831	3,623
GRAYS HARBOR (Total)		**3,997,754**	**50,606,383**	**1,922,039**
WILLAPA BAY	**1996 – 2023 (27 yrs)**			
Cape Shoalwater (D)	00, 03	0	251,095	9,300
Goose Point (D)	99, 03, 06	0	205,977	7,629
Tokeland (FLD) (2010-2023)	10, 11, 15, 16, 19	0	134,500	10,346
Bay Center (FLD) (2010-2023)	14, 17	0	20,500	1,577
WILLAPA BAY (Total)		**0**	**612,072**	**28,852**
QUILLAYUTE	**2008 – 2023 (15 yrs)**			
Sites A, 1, 2A, B, First Beach, Rialto Beach (BU)	08, 10, 15, 16, 18, 21, 23	51,141	332,231	22,149
QUILLAYUTE (Total)		**51,141**	**332,231**	**22,149**
Totals (all sites)		**4,431,111**	**70,725,951**	**2,539,666**

Notes:

ND = non-dispersive; D = dispersive; BU = beneficial use; FLD = flow lane disposal

Table 22. Puget Sound Non-dispersive Sites: Cumulative Disposal Volumes vs. Site Capacity

Disposal Site	Range of Years Open	# of Years Open	Cumulative Volume (cy)	Average Annual Volume (cy/yr)	Site Capacity[1] (cy)	Percent of Site Capacity	Estimated Time to Reach Site Capacity[2] (Years)
Port Gardner	1989-2022	34	4,123,626	121,283	9,000,000	46%	40
Elliott Bay	1989-2022	34	3,369,050	99,090	9,000,000	37%	57
Bellingham Bay[3]	1990-2022	33	78,883	2,390	9,000,000	1%	> 100
Commencement Bay	1989-2022	34	8,711,912	256,233	23,000,000	38%	56
Anderson/Ketron	1990-2022	33	157,215	4,764	9,000,000	2%	> 100

[1] Site capacity estimated in Phase I and II Disposal Site Selection Technical Appendices for non-dispersive sites is approximately 9,000,000 cubic yards.

[2] Estimated Time to Reach Site Capacity = (Site Capacity – Cumulative Volume)/average annual disposal volume.

[3] The Bellingham Bay disposal site has not been used since 1998

[4] The capacity of the Commencement Bay site was increased from 9 to 23 million cubic yards following finalization of a 2010 NEPA/SEPA Supplemental Environmental Impact Statement.

Table 23. Puget Sound Disposal Site Monitoring Survey History

Year	Disposal Site	Type of Survey
1988	Port Gardner, Elliott Bay, Commencement Bay	Initial Baseline Surveys: Full
1989	Bellingham Bay, Anderson/Ketron Island	Initial Baseline surveys: Full
1990	Bellingham Bay	Dungeness Crab Density Study
1990	Port Gardner	Full
1990	Elliott Bay	Partial
1991	Rosario Strait	Bathymetric Survey
1991	Port Gardner, Bellingham Bay	Special Study: New Benchmark Station (PG); Tissue Chemistry Protocol (PG/BB)
1992	Elliott Bay	Full
1993	Bellingham Bay	Partial, Side-Scan Sonar Survey
1994	Port Gardner	Tiered-Full
1994	Rosario Strait	Bathymetric Survey
1995	Elliott Bay	Side-Scan Sonar Survey (debris evaluation)
1995	Commencement Bay	Full (new baseline)
1996	Commencement Bay	Partial
1998	Commencement Bay	SPI Survey
1999	Rosario Strait	Bathymetric Survey
2000	Elliott Bay	Full, Special PCB Congener Study, 45-day Bioaccumulation
2001	Commencement Bay	Full + Bathymetric Survey
2002	Elliott Bay	Tiered-Full, BCOC special study (Lists 1 & 2)
2003	Commencement Bay	Tiered-Full, List 1 & 2 BCOCs
2004	Commencement Bay	Partial + Bathymetric Survey
2005	Commencement Bay	SPI Survey + Special Phenol Study
2005	Anderson/Ketron Island	Full (new baseline), List 1 & 2 BCOCs
2005	Elliott Bay	Special Onsite Chemistry Study
2006	Port Gardner	Full, Dioxin Baseline, List 1 & 2 BCOCs
2006	Commencement Bay	MBS
2007	Commencement Bay	Full + MBS + Tissue BCOCs + Dioxin Baseline
2007	Bellingham Bay and Elliott Bay	Dioxin Baseline
2008	Anderson/Ketron Island	Post-Disposal Dioxin Evaluation (part of OSV Bold Survey)
2009	Rosario Strait	MBS
2010	Port Gardner	Tiered-Full, List 1 & 2 BCOCs
2010	Puget Sound Dispersive Sites	Fate & Transport Study
2013	Commencement Bay	SPI Survey + MBS
2013	Elliott Bay	Partial + MBS
2014	Anderson/Ketron Island	Fate & Transport Study
2014	Anderson/Ketron Island	MBS
2014	Elliott Bay	ROV Debris Inspection
2014/15	Anderson/Ketron Island	Benthic Trawl Survey
2017	Commencement Bay	Tiered-Full + MBS
2019	Rosario Strait	MBS
2019	Port Gardner	MBS
2020	Port Gardner	SPI Survey + Pilot Monitoring + SPME special study
2023	Elliott Bay	SPI Survey + Pilot Monitoring + SPME special study

Notes:

BCOC = Bioaccumulative Chemical of Concern

MBS = Multibeam Bathymetric Survey

ROV = Remotely Operated Vehicle

SPI = Sediment Profile Imaging

PG = Port Gardner

BB = Bellingham Bay

Table 24. Cumulative Disposal Volumes Since Last Monitoring and Projected 2024/2025 Monitoring Events

Site: (Monitoring Soft Triggers)	A/K (150k cy)	CB (500k cy)	EB (500k cy)	PG (500k cy)	BB (150k cy)
Last monitoring	Partial 2005	Tiered Full 2017	Routine 2023[a]	Routine 2020	Partial 1993
Cumulative volume since last monitoring event	129,776	21,775	0	418,539	46,000
Projected 2024-2025 monitoring	Maybe	No	No	Maybe	No

[a] Dredge estimates for DY23 exceeded the 500,000 CY soft trigger, so Ellliott Bay monitoring was triggered at the close of the dredge year

Disposal Sites

A/K = Anderson/Ketron

CB = Commencement Bay

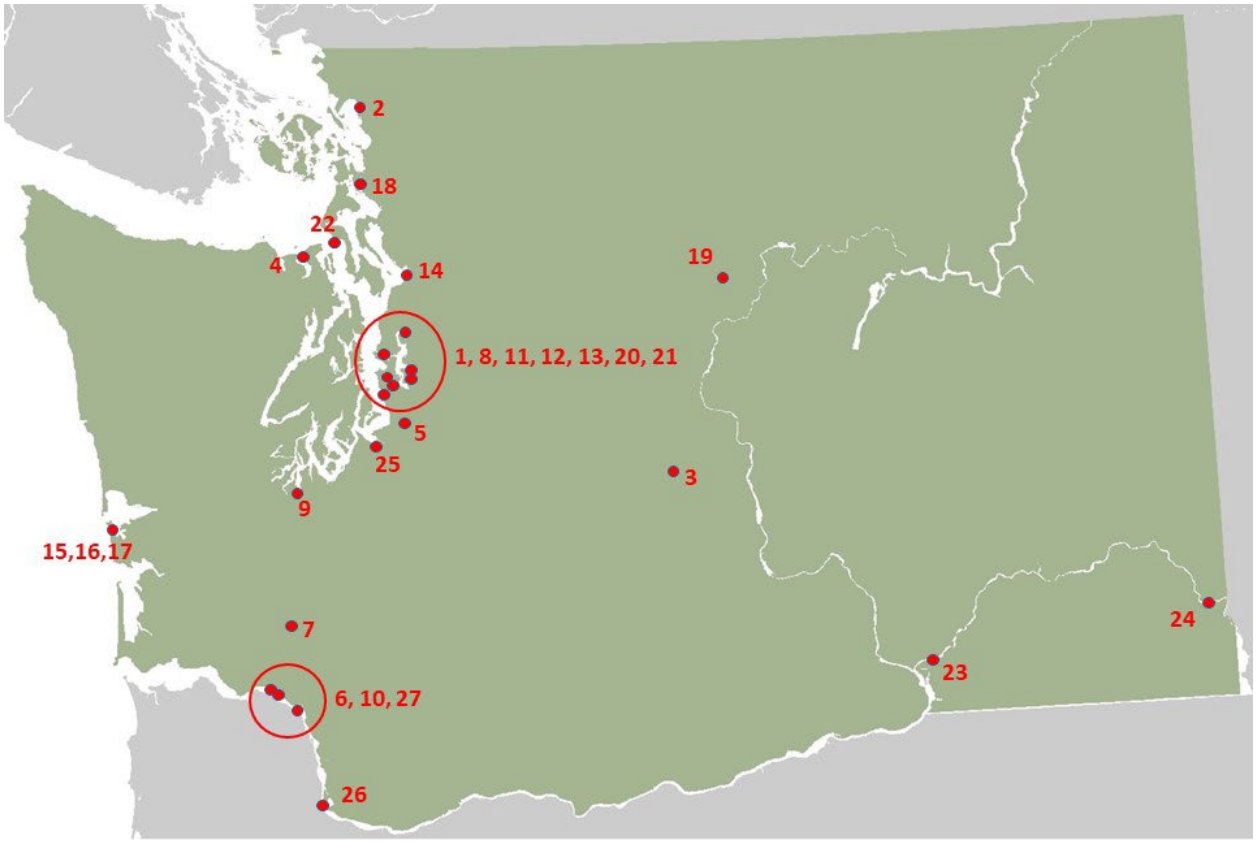
EB = Elliott Bay

PG = Port Gardner

BB = Bellingham Bay

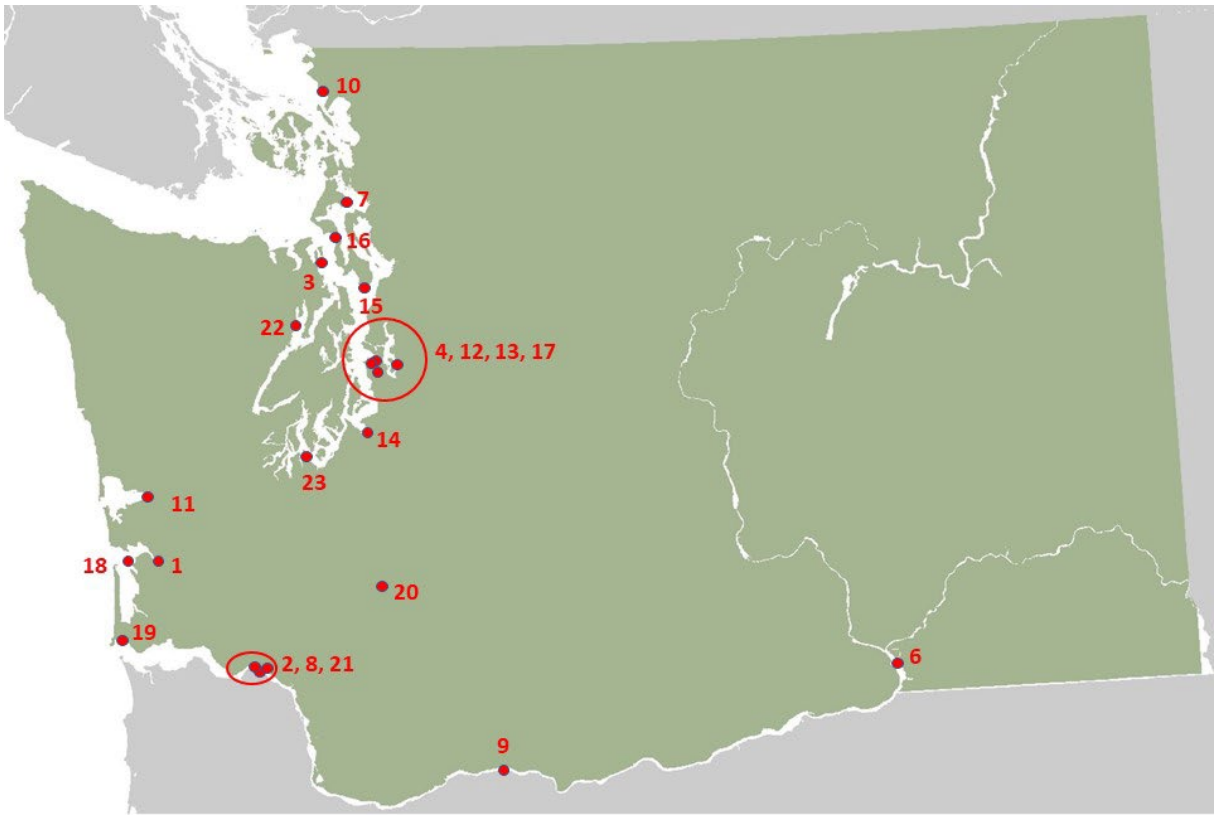
Figures

Figure 1. DY22 Project Locations



Refer to **Table 1** for project numbering key.

Figure 2. DY23 Project Locations



Refer to **Table 2** for project numbering key.

Figure 3. DY22/23 disposal volumes in Puget Sound

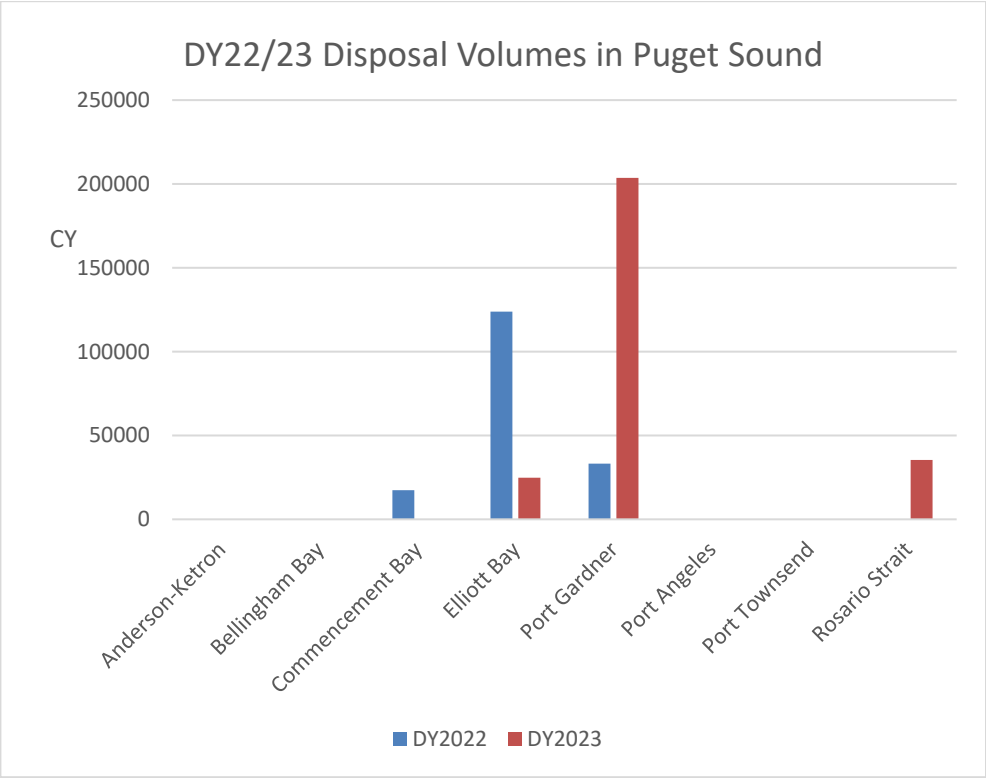


Figure 4. DY22/23 disposal volumes in Grays Harbor

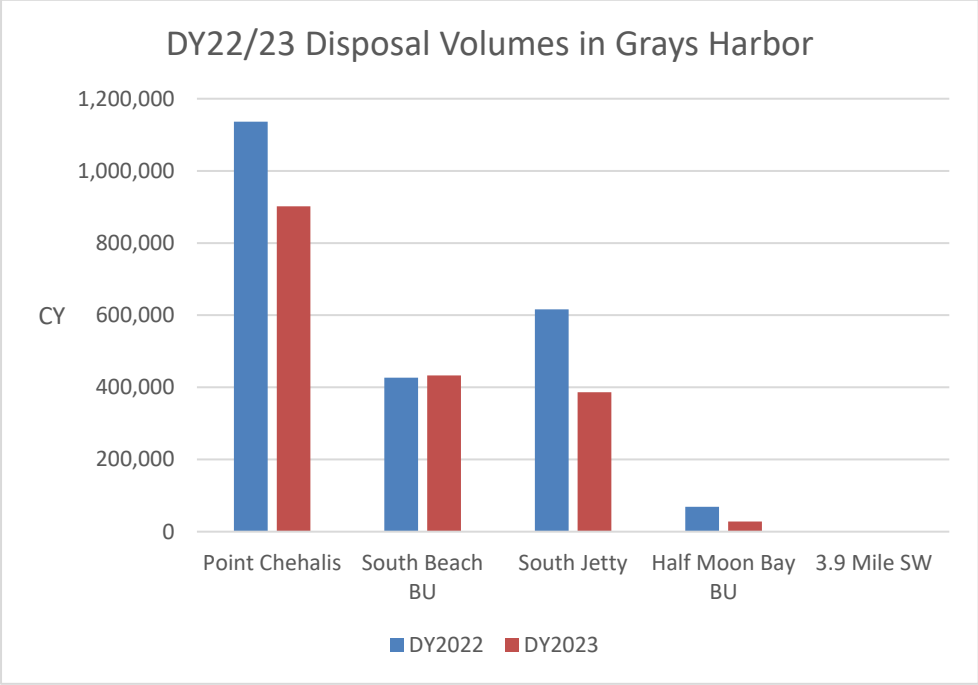


Figure 5. DMMP cumulative disposal volumes in Puget Sound 1989 – 2023

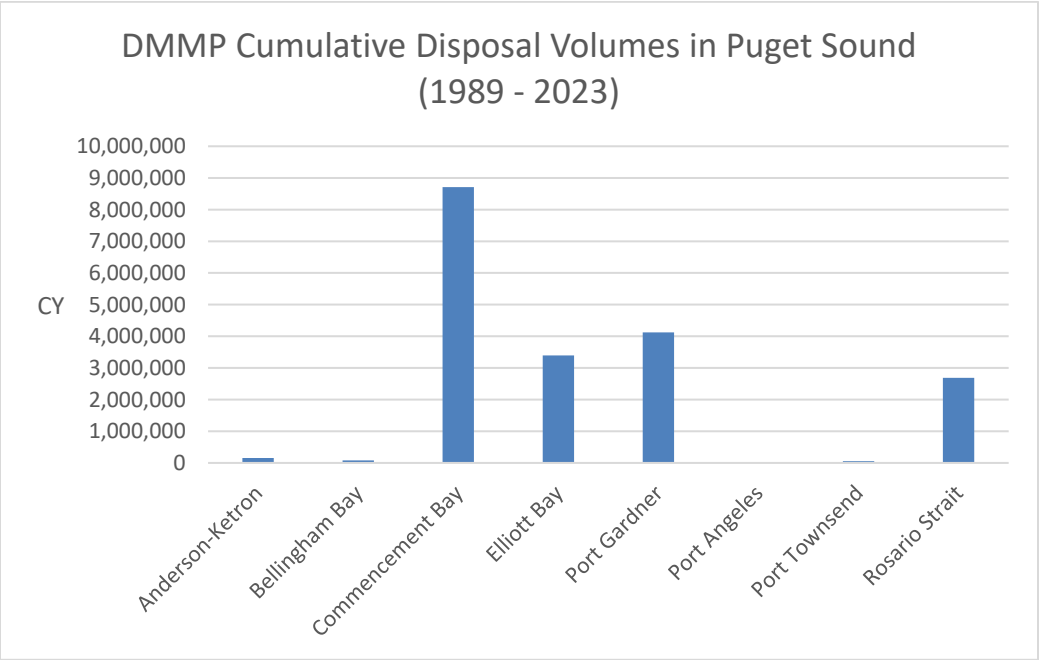
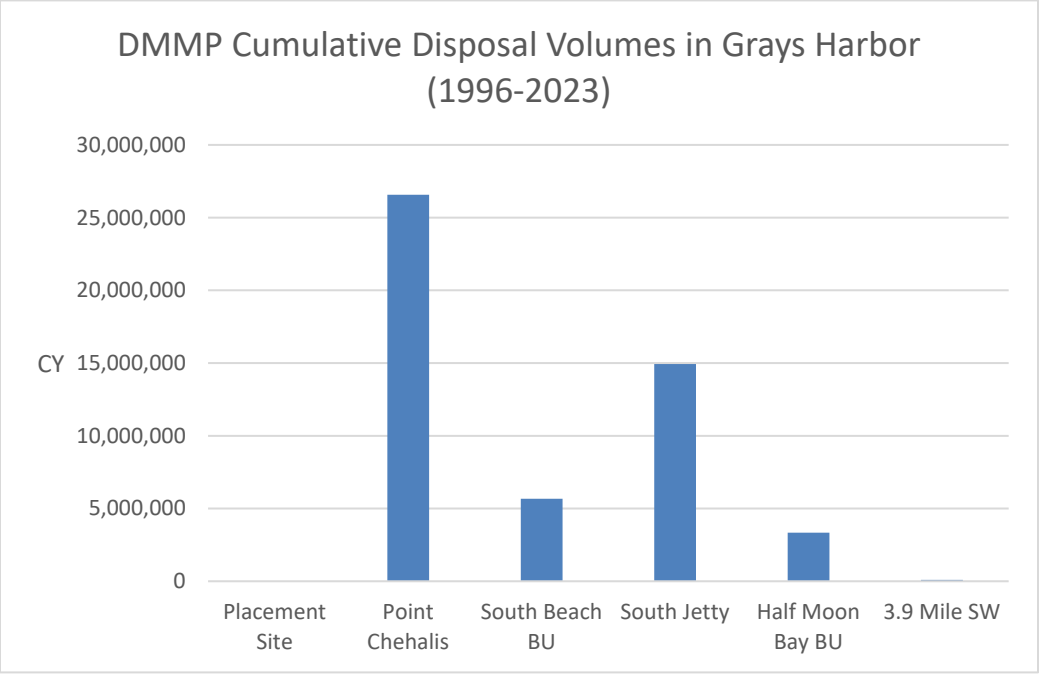


Figure 6. DMMP cumulative disposal volumes in Grays Harbor 1996 – 2023



Appendix A. DY22/23 Guideline Values

- Table 8-3 from the 2023 DMMP User Manual
- Sediment Management Standards Chapter 173-204 WAC Benthic Criteria

TABLE 8-3. DMMP COCS AND REGULATORY GUIDELINES

	CHEMICAL	CAS[1] NUMBER	USE FOR MARINE PROJECTS			USE FOR FRESHWATER PROJECTS WITHIN DMMP JURISDICTION	
			DMMP MARINE GUIDELINES			SMS FRESHWATER	
			SL	BT	ML	SL1	SL2
STANDARD CHEMICALS OF CONCERN	METALS (mg/kg dry weight)						
	Antimony	7440-36-0	150	---	200	---	---
	Arsenic	7440-38-2	57	507.1	700	14	120
	Cadmium	7440-43-9	5.1	--	14	2.1	5.4
	Chromium	7440-47-3	260	--	---	72	88
	Copper	7440-50-8	390	--	1,300	400	1,200
	Lead	7439-92-1	450	975	1,200	360	> 1,300
	Mercury	7439-97-6	0.41	1.5	2.3	0.66	0.8
	Nickel	7440-02-0	---	---	---	38[2]	110
	Selenium	7782-49-2	---	3	---	11	>20
	Silver	7440-22-4	6.1	--	8.4	0.57	1.7
	Zinc	7440-66-6	410	--	3,800	3,200	>4,200
	ORGANOMETALLIC COMPOUNDS[3]						
	Tributyltin ion (interstitial water; ug/L)	36643-28-4	---	0.15	---	---	---
	Tributyltin ion (bulk; ug/kg)[4]	36643-28-4	---	73	---	47	320
	Monobutyltin ion (bulk; ug/kg)	78763-54-9	---	---	---	540	>4,800
	Dibutyltin ion (bulk; ug/kg)	10-53-502	---	---	---	910	130,000
	Tetrabutyltin ion (bulk; ug/kg)	1461-25-2	---	---	---	97	>97
	PAHs (µg/kg dry weight)						
	Naphthalene	91-20-3	2,100	---	2,400	---	---
	Acenaphthylene	208-96-8	560	---	1,300	---	---
	Acenaphthene	83-32-9	500	---	2,000	---	---
	Fluorene	86-73-7	540	---	3,600	---	---
	Phenanthrene	85-01-8	1,500	---	21,000	---	---
	Anthracene	120-12-7	960	---	13,000	---	---
	1-Methylnaphthalene[5]	90-12-0	---	---	---	---	---
	2-Methylnaphthalene[5]	91-57-6	670	---	1,900	---	---
	Total LPAH	—	**5,200**	—	**29,000**	---	---
	Fluoranthene	206-44-0	1,700	4,600	30,000	---	---
	Pyrene	129-00-0	2,600	11,980	16,000	---	---
	Benz(a)anthracene	56-55-3	1,300	---	5,100	---	---
	Chrysene	218-01-9	1,400	---	21,000	---	---
	Benzofluoranthenes (b, j ,k)	205-99-2 205-82-3 207-08-9	3,200	---	9,900	---	---
	Benzo(a)pyrene	50-32-8	1,600	---	3,600	---	---
	Indeno(1,2,3-c,d)pyrene	193-39-5	600	---	4,400	---	---
	Dibenz(a,h)anthracene	53-70-3	230	---	1,900	---	---
	Benzo(g,h,i)perylene	191-24-2	670	---	3,200	---	---

TABLE 8-3. DMMP COCS AND REGULATORY GUIDELINES

	CHEMICAL	CAS[1] NUMBER	USE FOR MARINE PROJECTS			USE FOR FRESHWATER PROJECTS WITHIN DMMP JURISDICTION	
			DMMP MARINE GUIDELINES			SMS FRESHWATER	
			SL	BT	ML	SL1	SL2
	Total HPAH	—	**12,000**	—	**69,000**	---	---
	Total PAHs[6]	—	—	—	—	**17,000**	**30,000**
	CHLORINATED HYDROCARBONS (µg/kg dry weight)						
	1,4-Dichlorobenzene	106-46-7	110	---	120	---	---
	1,2-Dichlorobenzene	95-50-1	35	---	110	---	---
	1,2,4-Trichlorobenzene	120-82-1	31	---	64	---	---
	Hexachlorobenzene (HCB)	118-74-1	22	168	230	---	---
	beta-Hexachlorocyclohexane	319-85-7	—	—	—	7.2	11
	PHTHALATES (µg/kg dry weight)						
	Dimethyl phthalate	131-11-3	71	---	1,400	---	---
	Diethyl phthalate	84-66-2	200	---	1,200	---	---
	Di-n-butyl phthalate	84-74-2	1,400	---	5,100	380	1,000
	Butyl benzyl phthalate	85-68-7	63	---	970	---	---
	Bis(2-ethylhexyl) phthalate	117-81-7	1,300	---	8,300	500	22,000
	Di-n-octyl phthalate	117-84-0	6,200	---	6,200	39	>1,100
STANDARD CHEMICALS OF CONCERN	PHENOLS (µg/kg dry weight)						
	Phenol	108-95-2	420	---	1,200	120	210
	2-Methylphenol	95-48-7	63	---	77	---	---
	4-Methylphenol	106-44-5	670	---	3,600	260	2,000
	2,4-Dimethylphenol	105-67-9	29	---	210	---	---
	Pentachlorophenol	87-86-5	400	504	690	1,200	>1,200
	MISCELLANEOUS EXTRACTABLES (µg/kg dry weight)						
	Benzyl alcohol[7]	100-51-6	57	---	870	---	---
	Benzoic acid	65-85-0	650	---	760	2,900	3,800
	Dibenzofuran	132-64-9	540	---	1,700	200	680
	Hexachlorobutadiene	87-68-3	11	---	270	---	---
	N-Nitrosodiphenylamine	86-30-6	28	---	130	---	---
	Carbazole	86-74-8	—	—	—	900	1,100
	PESTICIDES & PCBs (µg/kg dry weight)						
	4,4'-DDD 4,4'-DDE 4,4'-DDT sum of 4,4'-DDD, 4,4'-DDE, 4,4'-DDT	72-54-8 72-55-9 50-29-3 ---	16 9 12 ---	--- --- --- 50	--- --- --- 69	---	---
	2,4'-DDD and 4.4'-DDD 2,4'-DDE and 4,4'-DDE 2,4'-DDT and 4,4'-DDT	--- --- ---	---	---	---	310 21 100	860 33 8,100
	Aldrin	309-00-2	9.5	---	---	---	---

TABLE 8-3. DMMP COCS AND REGULATORY GUIDELINES

	CHEMICAL	CAS[1] NUMBER	USE FOR MARINE PROJECTS			USE FOR FRESHWATER PROJECTS WITHIN DMMP JURISDICTION	
			DMMP MARINE GUIDELINES			SMS FRESHWATER	
			SL	BT	ML	SL1	SL2
	Total Chlordane (sum of cis-chlordane, trans-chlordane, cis-nonachlor, trans-nonachlor, oxychlordane)	5103-71-9 5103-74-2 5103-73-1 39765-80-5 27304-13-8	2.8	37	---	---	---
	Dieldrin	60-57-1	1.9	---	1,700	4.9	9.3
	Heptachlor	76-44-8	1.5	---	270	---	---
	Endrin ketone	53494-70-5	---	---	---	8.5	>8.5
	Total PCBs (Aroclors)	---	130	38 [8]	3,100	110	2,500
	BULK PETROLEUM HYDROCARBONS (mg/kg)						
	TPH – Diesel	---	---	---	---	340	510
	TPH – Residual	---	---	---	---	3,600	4,400
CASE-BY-CASE COCs [9]	DIOXINS/FURANS						
	Total TEQ (ng/kg dry weight)	---	Puget Sound: see **8.3.2** Grays Harbor: see **8.3.3** Other Waters: see **8.3.4**			See **8.3.4**	

[1] Chemical Abstract Service Registry Number
[2] The Nickel SL1 value is based on the 90th percentile of soil background data from WA state (Ecology, 1994), and was adopted by the DMMP agencies at the 2014 SMARM (DMMP/RSET, 2014b)
[3] TBT and dioxins/furans are not standard COCs for marine projects. They may be required on a case-by-case basis (see **8.3 and 8.4**). All butyltins are required for freshwater projects unless their absence is demonstrated in Tier 1 analysis.
[4] Bulk sediment measurement of TBT is recommended for dredged material and Z-sample evaluations, although porewater TBT remains an option. See **8.4.2** for further details.
[5] 1-Methylnaphthalene and 2-Methylnaphthalene are included in the summation of total PAH for freshwater projects. 2-Methylnaphthalene is analyzed for marine projects but is not included in the summation for total LPAHs. 1-Methylnaphthalene is not analyzed for marine projects.
[6] Total PAHs for freshwater projects include the sum of all PAHs listed.
[7] DMMP agencies will use BPJ to determine the need for biological testing for projects in which benzyl alcohol is the only COC present in project sediments (DMMP, 2016a).
[8] This value is normalized to total organic carbon and is expressed in mg/kg carbon.
[9] Analyses required only when there is sufficient reason-to-believe for presence in a given project or location.
Analytes printed in blue apply ONLY to freshwater.

Table 8-1. Marine and freshwater sediment chemical criteria for protection of the benthic community.

	SMS Freshwater Sediment[a]		SMS Marine Sediment[b]		AETs Marine Sediment[c,d]	
Analyte	**SCO**	**CSL**	**SCO**	**CSL**	**SCO**	**CSL**
Conventional Pollutants	**mg/kg dw**					
Ammonia	230	300				
Total sulfides	39	61				
Metals	**mg/kg dw**		**mg/kg dw**		**mg/kg dw**	
Arsenic	14	120	57	93	57	93
Cadmium	2.1	5.4	5.1	6.7	5.1	6.7
Chromium	72	88	260	270	260	270
Copper	400	1,200	390	390	390	390
Lead	360	>1,300[e]	450	530	450	530
Mercury	0.66	0.8	0.41	0.59	0.41	0.59
Nickel	26	110				
Selenium	11	> 20[e]				
Silver	0.57	1.7	6.1	6.1	6.1	6.1
Zinc	3200	>4,200[e]	410	960	410	960
Organometallics	**µg/kg dw**					
Monobutyltin	540	>4,800[e]				
Dibutyltin	910	130,000				
Tributyltin	47	320				
Tetrabutyltin	97	>97[e]				
Organic and Chlorinated Organic Chemicals	**µg/kg dw**		**µg/kg dw**		**µg/kg dw**	
2,4-Dimethylphenol			29	29	29	29
2-Methylphenol			63	63	63	63
4-Methylphenol[f]	260	2,000	670	670	670	670
Benzoic acid	2,900	3,800	650	650	650	650
Benzyl alcohol			57	73	57	73
Pentachlorophenol	1,200	>1,200[e]	360	690	360	690
Phenol	120	210	420	1,200	420	1200
Organic and Chlorinated Organic Chemicals (cont.)	**µg/kg dw**		**mg/kg OC**		**µg/kg dw**	
1,2,4-Trichlorobenzene			0.81	1.8	31	51
1,2-Dichlorobenzene			2.3	2.3	35	50
1,4-Dichlorobenzene			3.1	9	110	110
Dibenzofuran	200	680	15	58	540	540
Hexachlorobenzene			0.38	2.3	22	70
Hexachlorobutadiene			3.9	6.2	11	120
N-nitrosodiphenylamine			11	11	28	40

Table 8-1 (cont). Marine & freshwater sediment chemical criteria for protection of the benthic community.

	SMS Freshwater Sediment[a]		SMS Marine Sediment[b]		Marine Sediment AETs[c,d]	
Analyte	**SCO**	**CSL**	**SCO**	**CSL**	**SCO**	**CSL**
Phthalates[d]	**µg/kg dw**		**mg/kg OC**		**µg/kg dw[d]**	
Bis(2-Ethylhexyl)phthalate	500	22,000	47	78	1,300	1,900
Butylbenzyl phthalate			4.9	64	63	900
Diethyl phthalate			61	110	200	>1,200[e]
Dimethyl phthalate			53	53	71	160
Di-n-butyl phthalate	380	1,000	220	1,700	1,400	1,400
Di-n-octyl phthalate	39	>1,100[e]	58	4,500	6,200	6,200
Pesticides and PCBs	**µg/kg dw**		**mg/kg OC**		**µg/kg dw**	
beta-Hexachlorocyclohexane	7.2	11				
Carbazole	900	1,100				
Dieldrin	4.9	9.3				
Endrin ketone	8.5					
Total Aroclor[g]	110	2,500	12	65	130	1,000
Total o,p' and p,p' dichlorodiphenyldichloroethanes (DDDs)	310	860				
Total o,p' and p,p' dichlorodiphenyldichloroethylenes (DDEs)	21	33				
Total o,p' and p,p' dichlorodiphenyltrichloroethanes (DDTs)	100	8,100				
Polycyclic Aromatic Hydrocarbons	**µg/kg dw**		**mg/kg OC**		**µg/kg dw**	
Total PAHs	17,000	30,000				
Total LPAH			370	780	5,200	5,200
2-Methylnaphthalene			38	64	670	670
Acenaphthene			16	57	500	500
Acenaphthylene			66	66	1,300	1,300
Anthracene			220	1,200	960	960
Fluorene			23	79	540	540
Naphthalene			99	170	2,100	2,100
Phenanthrene			100	480	1,500	1,500
Total HPAH			960	5,300	12,000	17,000
Benz[a]anthracene			110	270	1,300	1,600
Benzo[a]pyrene			99	210	1,600	1,600
Benzo[g,h,i]perylene			31	78	670	720
Chrysene			110	460	1,400	2,800
Dibenzo[a,h]anthracene			12	33	230	230
Fluoranthene			160	1,200	1,700	2,500
Indeno[1,2,3-c,d]pyrene			34	88	600	690
Pyrene			1,000	1,400	2,600	3,300
Total benzofluoranthenes			230	450	3,200	3,600

Table 8-1 (cont.). Marine/freshwater sediment chemical criteria for protection of the benthic community.

	SMS Freshwater Sediment[a]		SMS Marine Sediment[b]		Marine Sediment AETs[c,d]	
Analyte	**SCO**	**CSL**	**SCO**	**CSL**	**SCO**	**CSL**
Bulk Petroleum Hydrocarbons	**mg/kg dw**					
TPH-Diesel	340	510				
TPH-Residual	3,600	4,400				

a, All freshwater values are dry weight normalized.

b, Marine values are dry weight normalized for metals and polar organics and normalized to total organic carbon for nonpolar organics.

c, When total organic carbon is outside the range of 0.5 – 3.5%, Ecology may compare to both the TOC normalized criteria and the dry-weight AET values. When total organic carbon values are $\geq$ 5%, analysis of total volatile solids is recommended.

d, Dry weight AETs for phthalates are derived from Barrick et.al, 1988. The SCO is established as the lowest AET and the CSL is the 2nd lowest AET, consistent with the dry weight AETs for the other SMS chemicals. These differ from the DMMP values for phthalates which were updated in 2005, based on additional bioassay endpoints and synoptic chemistry/bioassay data. Bioassays may be used in place of these AETs if necessary.

e, "greater than" value indicates that the upper bound toxicity level is unknown, but is known to be above the concentration shown.

f, 3-methylphenol and 4-methylphenol may not be able to be separated. In this case 4-methylphenol may be reported as the sum of the 3- and 4-methylphenol isomers. See Appendix N for more detail.

g, Upon approval by Ecology on a case-by-case basis, Total PCB congeners may be used as a direct substitute for Total PCB Aroclors to verify compliance with the CSL benthic criteria (i.e., the sum of Total congeners value can substitute for the sum of Total Aroclors), but not the SCO benthic criteria. If the benthic SCO is exceeded, bioassays should be analyzed.

Appendix B. Bioassay Performance Standards and Evaluation Guidelines

- Marine Bioassays (Table 9-7 from the 2021 DMMP User Manual)
- Freshwater Bioassays (Table 9-9 from the 2021 DMMP User Manual)

Table 9-7. Marine Bioassay Performance Standards and Evaluation Guidelines

	For each test to be considered valid, control and reference must meet the following standards:		Test failure assessment guidelines:			
			Dispersive Disposal Site Interpretation Guidelines		Non-dispersive Disposal Site Interpretation Guidelines	
Bioassay	Negative Control Performance Standard	Reference Sediment Performance Standard	1-hit rule	2-hit rule	1-hit rule	2-hit rule
Amphipod Mortality	$M_C \leq 10\%$	$\lvert M_R - M_C \rvert \leq 20\%$	$\lvert M_T - M_C \rvert > 20\%$ and M_T vs. M_R SD (p=.05) AND			
			$M_T - M_R > 10\%$		$M_T - M_R > 30\%$	NOCN
Larval Development	$N_C \div I \geq 0.70$	$N_R \div N_C \geq 0.65$	$N_T \div N_C < 0.80$ and N_T/N_C vs. N_R/N_C SD (p=.10) AND			
			$N_R/N_C - N_T/N_C > 0.15$	NOCN	$N_R/N_C - N_T/N_C > 0.30$	NOCN
Juvenile Infaunal Polychaete growth test (*Neanthes*)	$M_C \leq 10\%$ and $MIG_C \geq 0.38$	$M_R \leq 20\%$ and $MIG_R \div MIG_C \geq 0.80$	$MIG_T \div MIG_C < 0.80$ and MIG_T vs. MIG_R SD (p=.05) AND			
			$MIG_T/MIG_R < 0.70$	NOCN	$MIG_T/MIG_R < 0.50$	$MIG_T/MIG_R < 0.70$

Subscripts:
M = mortality
N = normal larvae
I = initial count
MIG = mean individual growth rate (mg/individual/day)
SD = statistically significant difference
NOCN = no other conditions necessary
R = reference sediment
C = negative control
T = test sediment

Table 9-9. Freshwater Bioassay Performance Standards and Evaluation Guidelines

Biological Test/ Endpoint [a]	Performance Standard[b] Control[c]	Performance Standard[b] Reference	Screening Level 1 (SL1)	Screening Level 2 (SL2)
Hyalella azteca				
10-day mortality	$M_C \leq 20\%$	$M_R \leq 25\%$	$M_T - M_C > 15\%$ and M_T vs M_C SD ($p \leq 0.05$)	$M_T - M_C > 25\%$ and M_T vs M_C SD ($p \leq 0.05$)
28-day mortality	$M_C \leq 20\%$	$M_R \leq 30\%$	$M_T - M_C > 10\%$ and M_T vs M_C SD ($p \leq 0.05$)	$M_T - M_C > 25\%$ and M_T vs M_C SD ($p \leq 0.05$)
28-day growth	$MIG_C \geq 0.15$ mg/ind	$MIG_R \geq 0.15$ mg/ind	$(MIG_C - MIG_T)/MIG_C > 0.25$ and MIG_T vs MIG_C SD ($p \leq 0.05$)	$(MIG_C - MIG_T)/MIG_C > 0.40$ and MIG_T vs MIG_C SD ($p \leq 0.05$)
Chironomus dilutus				
10-day mortality	$M_C \leq 30\%$	$M_R \leq 30\%$	$M_T - M_C > 20\%$ and M_T vs M_C SD ($p \leq 0.05$)	$M_T - M_C > 30\%$ and M_T vs M_C SD ($p \leq 0.05$)
10-day growth	$MIG_C \geq 0.48$ mg/ind	$MIG_R/MIG_C \geq 0.8$	$(MIG_C - MIG_T)/MIG_C > 0.20$ and MIG_T vs MIG_C SD ($p \leq 0.05$)	$(MIG_C - MIG_T)/MIG_C > 0.30$ and MIG_T vs MIG_C SD ($p \leq 0.05$)
20-day mortality	$M_C \leq 32\%$	$M_R \leq 35\%$	$M_T - M_C > 15\%$ and M_T vs M_C SD ($p \leq 0.05$)	$M_T - M_C > 25\%$ and M_T vs M_C SD ($p \leq 0.05$)
20-day growth	$MIG_C \geq 0.60$ mg/ind	$MIG_R/MIG_C \geq 0.8$	$(MIG_C - MIG_T)/MIG_C > 0.25$ and MIG_T vs MIG_C SD ($p \leq 0.05$)	$(MIG_C - MIG_T)/MIG_C > 0.40$ and MIG_T vs MIG_C SD ($p \leq 0.05$)

Notes:

M = Mortality; C = Control; R = Reference; T = Test; F = Final; MIG = Mean Individual Growth at time final; ind = individual; mg = milligrams; SD = statistically significant difference.

[a] These tests and parameters were developed based on the most updated American Society for Testing and Materials protocols.

[b] Reference performance standards are provided for times when Ecology or DMMP has approved a freshwater reference sediment site(s) and reference results will be substituted for control in comparing test sediments to guidelines.

[c] The control performance standard for the 20 day test (0.60 mg/individual) is more stringent than for the 10 day test and the agencies may consider, on a case-by-case basis, a 20 day control has met QA/QC requirements if the mean individual growth is at least 0.48 mg/individual.

Appendix C. DY22/23 Marine and Freshwater Guideline Exceedances

- Legend
- Marine DMMU guideline exceedances
- Marine Z-sample guideline exceedances
- Freshwater DMMU guideline exceedances

APPENDIX C - LEGEND		
S	=	reported concentration exceeds the marine screening level
S^{SL1}	=	reported concentration exceeds the freshwater screening level 1
S^{SL2}	=	reported concentration exceeds the freshwater screening level 2
S^{SQS}	=	reported concentration exceeds the marine sediment quality standard
B	=	reported concentration exceeds the bioaccumulation trigger (and SL, if it exists for that COC)
M	=	reported concentration exceeds maximum level
M^{CSL}	=	reported concentration exceeds marine cleanup screening level
BM	=	reported concentration exceeds bioaccumulation trigger and maximum level
U	=	detection limit exceeds either the screening level, bioaccumulation trigger, or maximum level
J	=	estimate
NA	=	not applicable
ND	=	not determined
--	=	not tested
NTR	=	no testing required
NH	=	no hit (bioassay)
2H	=	a hit under the two-hit interpretation guideline (bioassay)
1H	=	a hit under the one-hit interpretation guideline (bioassay)
DMMU Suitability Determination Qualifiers		
PASS	=	test sediment passes DMMP guidelines for open-water unconfined disposal
$PASS^{VWA}$	=	test sediment passes DMMP dioxin guidelines for open-water unconfined disposal based on project volume-weighted average
$PASS^{BPJ}$	=	test sediment passes DMMP guidelines for open-water unconfined disposal based on best professional judgment
$PASS^{BA}$	=	test sediment passes DMMP guidelines for open-water unconfined disposal based on bioaccumulation testing
$PASS^{RR}$	=	test sediment passes DMMP guidelines for beneficial use based on implementation of risk reduction measures
$FAIL^{B}$	=	test sediment fails DMMP guidelines for open-water unconfined disposal on the basis of bioassay results
$FAIL^{C}$	=	DMMU found unsuitable for open-water disposal on the basis of chemistry data (and the absence of biological testing data)
$FAIL^{D}$	=	DMMU found unsuitable for open-water disposal on the basis of dioxin concentration (and the absence of bioaccumulation testing data)
$FAIL^{M}$	=	DMMU found unsuitable for open-water disposal due to exceedance of MTCA cleanup level
$FAIL^{VWA}$	=	test sediment fails DMMP dioxin guidelines for open-water unconfined disposal based on project volume-weighted average

Appendix C. Marine Guideline Exceedances - DMMUs

PROJECT:	Port of Everett North Marina					Chambers Creek Dam Sediment Characterization					Neah Bay Entrance Channel	
Date of SD:	8/12/2023	8/13/2023	8/14/2023	8/15/2023	8/16/2023	2/8/2022					1/27/2022	
DY:	2022	2023	2024	2025	2026	2022					2022	
Freshwater/Marine:	Marine	Marine	Marine	Marine	Marine	Marine					Marine	
DMMU or Sample ID:	DMMU1	DMMU2	DMMU3	DMMU4	DMMU5	DMMU-1	DMMU-2	DMMU-3	DMMU-4	DMMU-5	NB21-A	NB21-B
Assessment Rank:	LM	LM	LM	LM	LM	LM					LM	
METALS (mg/kg)												
Mercury												
PAHs (ug/kg)												
Benz(a)anthracene												
Benzo(a)pyrene												
Benzo(g,h,i)perylene												
Chrysene												
Dibenzo(a,h)anthracene												
Fluoranthene												
Indeno(1,2,3-c,d)pyrene												
Pyrene												
Total benzofluoranthenes (b,j,k)												
Total HPAH												
Naphthalene												
Acenaphthene												
Fluorene												
Phenanthrene												
Anthracene												
Total LPAH												
CHLORINATED HYDROCARBONS (ug/kg)												
Hexachlorobenzene												
1,2,4-Trichlorobenzene												
MISCELLANEOUS EXTRACTABLES (ug/kg)												
2,4-Dimethylphenol											40 U	40 U
4-Methylphenol											940 J	2,200 J
Benzyl Alcohol				80								
Benzoic Acid											810 UJ	810 UJ
Phenol											690 J	890
Dibenzofuran												
Hexachlorobutadiene												
N-Nitrosodiphenylamine												
PHTHALATES (ug/kg)												
Bis(2-ethylhexyl) phthalate												
Butyl benzul phthalate												
PESTICIDES AND PCBs (ug/kg)												
Aldrin												
Total chlordane						8.73 J			4.16 J			
4,4'-DDT												
Dieldrin												
Total PCBs (ug/kg)												
Total PCBs (ug/kg normalized to organic carbon)												
OTHER CHEMICALS OF CONCERN												
Tributyltin (ug/kg bulk)												
Dioxins/Furans (ng/kg TEQ; u=1/2 DL)						--	--	--	--	--		
BIOASSAYS						See Freshwater DMMU table for bioassay results						
Amphipod (marine)												
Larval (marine) - standard protocol											2H	2H
Neanthes Growth Rate (marine) - AFDW endpoint												
Bioassay Result:												
BIOACCUMULATION												
Bioaccumulation result (P/F)												
OVERALL DMMU PASS/FAIL:	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS
z-sample or underlying DMMU						NA	NA	NA	NA	NA	NA	NA
Anti-Degradation PASS/FAIL	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS
VOLUME (CY):						56,000					41,000	

1 Passes with volume-weighted averaging

Appendix C. Marine Guideline Exceedances - DMMUs

PROJECT:	Schnitzer Steel of Tacoma								USACE Lake Washington Ship Canal						
Date of SD:	6/2/2022								6/2/2023						
DY:	2022								2023						
Freshwater/Marine:	Marine								Marine						
DMMU or Sample ID:	DMMU 1	DMMU 2	DMMU 3	DMMU 4	DMMU 5	DMMU 6	DMMU 7	DMMU 8	DMMU 1	DMMU 2	DMMU 3	DMMU 4	DMMU 5	DMMU 6	DMMU 7
Assessment Rank:	H								H						
METALS (mg/kg)															
Mercury															
PAHs (ug/kg)															
Benz(a)anthracene															11,000
Benzo(a)pyrene											1,800				16,000
Benzo(g,h,i)perylene															3,200
Chrysene									1,800						12,000
Dibenzo(a,h)anthracene															1,700
Fluoranthene									2,800	2,800	2,300			2,700	20,000
Indeno(1,2,3-c,d)pyrene									780		1,500			700	9,600
Pyrene									5,700		3,500			2,900	24,000
Total benzofluoranthenes (b,j,k)															22,600
Total HPAH															120,100
Naphthalene														3,200	
Acenaphthene														940	
Fluorene														1,300	
Phenanthrene														3,500	3,200
Anthracene															1,300
Total LPAH														9,497	
CHLORINATED HYDROCARBONS (ug/kg)															
Hexachlorobenzene															43 U
1,2,4-Trichlorobenzene															34 U
MISCELLANEOUS EXTRACTABLES (ug/kg)															
2,4-Dimethylphenol															82 U
4-Methylphenol															
Benzyl Alcohol															64 U
Benzoic Acid															1300 U
Phenol															
Dibenzofuran														970	
Hexachlorobutadiene															39 U
N-Nitrosodiphenylamine															42 U
PHTHALATES (ug/kg)															
Bis(2-ethylhexyl) phthalate													2,000		
Butyl benzul phthalate			98												
PESTICIDES AND PCBs (ug/kg)															
Aldrin		12 U													
Total chlordane	2.9 U	2.9 U	3.1 U		3.9 U		4.6 U		12 U		9.8 U		7.8 U		5.9 U
4,4'-DDT											24 U				
Dieldrin									2.3						
Total PCBs (ug/kg)		145	201						144						
Total PCBs (ug/kg normalized to organic carbon)															
OTHER CHEMICALS OF CONCERN															
Tributyltin (ug/kg bulk)															
Dioxins/Furans (ng/kg TEQ; u=1/2 DL)	6.1/9.3	91	86	34	37	1.7	20	0.12							
BIOASSAYS															
Amphipod (marine)									pass	pass	pass	pass	pass	2H	pass
Larval (marine) - standard protocol									pass	pass	pass	pass	2H	pass	1H
Neanthes Growth Rate (marine) - AFDW endpoint									pass	pass	pass	pass	pass	pass	pass
Bioassay Result:									PASS	PASS	PASS	PASS	PASS	PASS	FAIL
BIOACCUMULATION															
Bioaccumulation result (P/F)									---	---	---	---	---	---	---
OVERALL DMMU PASS/FAIL:	PASS[1]	FAIL	FAIL	FAIL	FAIL	PASS	FAIL	PASS	PASS	PASS	further characterization needed				FAIL
z-sample or underlying DMMU	DMMU 8	DMMU 8	YES	DMMU 8	DMMU 8	DMMU 8	DMMU 8	NA	z-sample	z-sample	DMMU 4	z-sample	DMMU 6	z-sample	z-sample
Anti-Degradation PASS/FAIL	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
VOLUME (CY):	500					1,250		10,050	800	3,810	6,315		5,885		800

1 Passes with volume-weighted averaging

Appendix C. Marine Guideline Exceedances - Z-samples

PROJECT:	**Schnitzer Steel of Tacoma**	**USACE Lake Washington Ship Canal**				
Date of SD:	6/2/2022	6/2/2023				
DY:	2022	2023				
Freshwater/Marine:	Marine	Marine				
DMMU or Sample ID:	S3-2 Z	DMMU 1 z-sample	DMMU 2 z-sample	DMMU 4 z-sample	DMMU 6 z-sample	DMMU 7 z-sample
Assessment Rank:						
METALS (mg/kg)						
Mercury						
PAHs (ug/kg)						
Acenaphthene						
Anthracene						
Benz(a)anthracene		2,100	2,800			
Benzo(a)pyrene		2,200	3,300			
Benzo(g,h,i)perylene			770			
Chrysene		2,400	2,700			
Dibenzo(a,h)anthracene			430			
Fluoranthene		4,600	5,700			
Fluorene						
Indeno(1,2,3-c,d)pyrene		1,100	2,100			
Phenanthrene			3,300			
Pyrene		6,500	8,000			
Total benzofluoranthenes (b,j,k)		3,670	4,900			
Total HPAH		23,140	30,700			
Total LPAH						
CHLORINATED HDROCARBONS (ug/kg)						
1,2-Dichlorobenzene			36 UJ			
1,2,4-Trichlorobenzene			39 UJ			
Hexachlorobenzene			49 UJ			
MISCELLANEOUS EXTRACTABLES (ug/kg)						
Benzyl Alcohol			73 UJ			
Benzoic Acid			1500 UJ			
Hexachlorobutadiene			45 UJ			
N-Nitrosodiphenylamine			48 UJ			
PESTICIDES AND PCBs (ug/kg)						
Total chlordane		9.6 U				11 U
Total PCBs (ug/kg)						
Total PCBs (ug/kg normalized to organic carbon)						
OTHER CHEMICALS OF CONCERN						
Tributyltin (ug/kg bulk)						
Dioxins/Furans (ng/kg TEQ; u=1/2 DL)						
BIOASSAYS						
Amphipod (marine)						
Larval (marine) - standard protocol						
Neanthes Growth Rate (marine) - AFDW endpoint						
Bioassay Result:						
BIOACCUMULATION						
Bioaccumulation result (P/F)						
Anti-Degradation PASS/FAIL	PASS	FAIL	FAIL	further characterization needed		

Appendix C. Freshwater Guideline Exceedances

PROJECT:	Chambers Creek Dam Sediment Characterization FW Bioassay
Date of SD:	2/8/2022
DY:	22
Freshwater/Marine:	freshwater
DMMU or Sample ID:	DMMU-1/4
Assessment Rank:	LM
METALS (mg/kg)	
Arsenic	
Cadmium	
Chromium	
Copper	
Lead	
Mercury	
Nickel	
Silver	
ORGANOMETALLIC COMPOUNDS (ug/kg bulk)	
Tributyltin ion	
Dibutyltin ion	
Tetrabutyltin ion	
PAHs (ug/kg)	
Total PAHs	
Phthalates (ug/kg)	
Bis(2-ethylhexyl) phthalate	
Phenols (ug/kg)	
Phenol	
4-Methylphenol	
Miscellaneous Extractables (ug/kg)	
Dibenzofuran	
Carbazole	
PCBs (ug/kg)	
Total PCBs	
Bulk Petroleum Hydrocarbons (mg/kg)	
TPH-Diesel	
TPH-Residual	
OTHER CHEMICALS OF CONCERN	
Dioxins/Furans (ng/kg TEQ; u=1/2 DL)	
BIOASSAYS	
Chironomus (freshwater) growth	PASS
Chironomus (freshwater) mortality	PASS
Hyalella (freshwater)	PASS
Bioassay Result:	
BIOACCUMULATION	
Bioaccumulation result (P/F)	
OVERALL DMMU PASS/FAIL:	
z-sample or (underlying DMMU) assoc. with this DMMU	
OVERALL ANTI-DEGRADATION PASS/FAIL	
VOLUME (CY):	