

## Dioxin/Furan Bioaccumulation Reference Sample Locations

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### Introduction

The DMMP agencies adopted a natural background-based site management objective of 4 pptr TEQ for dioxins/furans (D/F) in 2010 (DMMP, 2010). Proposed dredging projects with sediment exceeding the thresholds allowed at the DMMP non-dispersive open-water disposal sites in Puget Sound have the option of conducting bioaccumulation testing to further evaluate whether the material may be suitable for open-water disposal. Instructions on how to conduct bioaccumulation testing for DMMP projects is provided in Chapter 10 of the DMMP User Manual (DMMP, 2021).

### Problem Identification

For projects conducting bioaccumulation testing for dioxins/furans to evaluate suitability of sediments for open-water disposal, collection and analysis of a suitable reference sample is required because there is no established target tissue level (TTL) for dioxins/furans. Specific information on where and how to collect a reference sediment sample for bioaccumulation testing is lacking in the DMMP User Manual.

### Background

A common location for collection of bioassay reference is in Carr Inlet. Data collected during the 2008 OSV Bold background survey indicated dioxin/furan concentrations in Carr Inlet ranged from 0.5 to 5.2 pptr TEQ (DMMP, 2009). Therefore, past projects conducting bioaccumulation testing for D/F have also collected a reference sediment from Carr Inlet, starting with a sediment dioxin survey conducted by the Port of Everett for the first DMMP dioxin bioaccumulation test (DMMP, 2017).

Table 1 provides a summary of D/F bioaccumulation reference samples collected for DMMP projects. Figure 1 shows the Carr Inlet locations where sediment D/F data is available. Measured sediment D/F concentrations in Carr Inlet vary from <1 pptr TEQ to around 6 pptr TEQ.

*Table 1. Summary of dioxin/furan bioaccumulation reference samples collected for DMMP*

<b>Project</b>	<b>Year</b>	<b>Sampled Reference Location Description</b>	<b>Reference sample D/F concentration (pptr TEQ)</b>	<b>Reference Sediment D/F concentration used for evaluation (pptr TEQ)</b>
<i>Port of Everett, Central Marina</i>	2016	Three locations off Fox Island	4.63, 2.57, 4.42	4.2
<i>USACE Kenmore Navigation Channel</i>	2019	Three locations off Fox Island	2.35, 5.34, 6.03	5.34
<i>Port of Tacoma, Pierce County Terminal</i>	2022	Single location off Raft Island	0.49	0.49

<i>Duwamish Yacht Club</i>	2023	Three locations off Fox Island	2.2, 5.1, 5.94	--- <sup>1</sup>
<i>Port of Tacoma TOTE Maritime</i>	2023	Composite of FoxRef2 and FoxRef4	4.4	--- <sup>2</sup>
<i>Day Island Yacht Club</i>	2024	Composite of FoxRef2 and FoxRef4	3.01	3.01 <sup>3</sup>

### Proposed Clarification

For D/F bioaccumulation reference sediment collection:

- The targeted D/F concentration for the reference sediment is 4 pptr TEQ.
- The recommended locations for collection of reference sediments for D/F bioaccumulation testing is shown in Figure 2. These locations are in 400+ feet of water. Other locations in Carr Inlet, or other approved reference locations, may be collected with DMMP agency approval.
- Previously sampled locations are given in Table 2, along with the location names that should be used moving forward when reporting data and submitting data for EIM. Additional locations within the area shown in Figure 2 should use the same naming convention.
- Collection of more than one reference location is recommended to increase chances of obtaining a concentration of 4 pptr TEQ. A sample composite from multiple reference locations may be used, targeting 4 pptr TEQ.
- If a composite of reference sediment locations is used for the bioaccumulation reference sample, analysis of the composited sediment for D/F is required.

*Table 2. Recommended Carr Inlet D/F Bioaccumulation Reference Location Details*

<b>Current Location Name</b> (Use going forward)	<b>Historical location names</b> (in EIM)	<b>Latitude</b> (NAD83 HARN)	<b>Longitude</b> (NAD83 HARN)	<b>D/F Concentrations</b> (pptr TEQ)
FoxRef1	R_CAR_5	47.241388	-122.641249	5.07, 5.15
FoxRef2	POEMA16CI-8	47.246376	-122.649347	4.42, 5.1, 5.34
FoxRef3	POEMA16CI-6	47.248631	-122.651848	4.63, 5.94, 6.03
FoxRef4	POEMA16CI-7	47.255287	-122.657507	2.2, 2.35, 2.57

<sup>1</sup> Bioaccumulation testing was abandoned due to negative bioassay results.

<sup>2</sup> Bioaccumulation testing was initiated but not completed.

<sup>3</sup> Bioaccumulation testing is on-going.

## References

- DMMP, 2009. *OSV Bold Summer 2008 Survey, Final Data Report*. Prepared by the Dredged Material Management Program with the assistance of Science Applications International Corporation, Avocet Consulting and TerraStat Consulting. June 25, 2009.
- DMMP, 2016. *Dredged Material Management Program New Interim Guidelines for Dioxins*. Prepared by the DMMP Agencies. Originally published December 6, 2010, Revised September 25, 2016.
- DMMP, 2017. *Determination Regarding the Suitability of Proposed Dredged Material from the Port of Everett Marina, Evaluated Under Section 404 of the Clean Water Act, for Placement at the Dredged Material Management Program's Unconfined Open-Water Disposal Site in Port Gardner*. Prepared by the DMMP Agencies. March 30, 2017.
- DMMP, 2021. *Dredged Material Evaluation and Disposal Procedures User Manual*. Prepared by the Dredged Material Management Office, U.S. Army Corps of Engineers, Seattle District for the DMMP Agencies. July 2021.

# Figure 1. Sediment Dioxin/Furan Concentrations in Carr Inlet

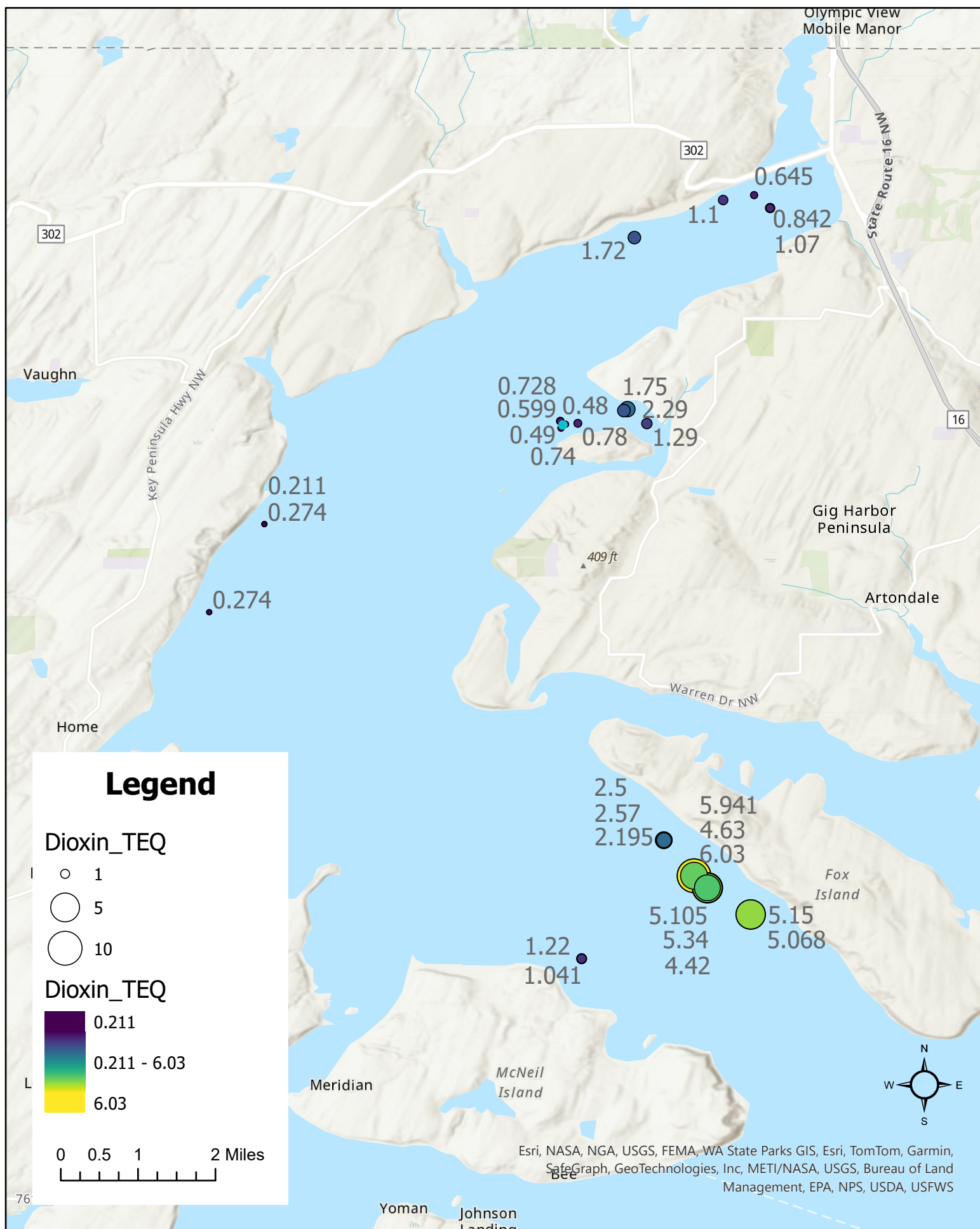


Figure 2. Recommended D/F Reference Sampling Locations

