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2021 Addendum to Quality Assurance Monitoring Plan

The Puget Sound Sediment Monitoring Program

February 2021

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Data for this project will be available on Ecology's Environmental Information Management (EIM) website at EIM Database. Search Study IDs PSEMP_LT (Long-Term program from 2016) and UWI (Urban Bays program from 2007).

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2021 Addendum to Quality Assurance Monitoring Plan

The Puget Sound Sediment Monitoring Program

by Margaret Dutch

February 2021

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Signatures are not available on the Internet version.
EAP: Environmental Assessment Program

1.0 Table of Contents

Note: The numbered headings in this document correspond to the headings used in the original QAMP. Only relevant sections are included. This is why some numbered headings are missing.

2.0 Abstract

This addendum to the 2018 Quality Assurance Monitoring Plan (QAMP) developed for the Puget Sound Sediment Monitoring Program (Sediment Program) provides details about changes to be implemented in 2021 to the Long-Term and Urban Bays elements of the program. Long-Term monitoring will continue to assess sediment and benthic invertebrate condition at 50 stations Puget Sound-wide, while Urban Bays monitoring will assess the condition at 36 stations in Elliott Bay. Information regarding leveraged sampling to be conducted for a number of regional and national partners is also provided.

Quality assurance elements not mentioned in this addendum remain unchanged for the Sediment Program and are as designated in the 2018 QAMP (Dutch et al., 2018).

New safety protocols to protect our sampling crew from COVID-19 transmission while conducting field work are also referenced in this addendum.

4.0 Project Description

Puget Sound Sediment Monitoring Program

Monitoring elements of the Sediment Program include:

- **Long-Term monitoring:** Annual characterization and change over time of sediment quality and the condition of benthic invertebrates (benthos) Puget Sound-wide as estimated from samples collected from 50 randomly and non-randomly selected stations. Four station locations have been moved slightly, as described in Section 7, below. Samples will be collected in April 2021 and measured for the standard suite of parameters as described in Dutch et al., 2018.
- **Urban Bays monitoring:** Periodic characterization and change over time of sediment quality and benthos condition bay-wide as estimated from samples collected from one of six urban bays sampled on an annual rotational basis. Thirty-six samples will be collected from the Elliott Bay sampling frame in June 2021 and measured for the standard suite of parameters as described in Dutch et al., 2018.

Partnerships with other monitoring programs: Leveraged sampling and data

To gain additional scientific knowledge from our field efforts and collected samples, we have formed partnerships with regional and national scientists to generate data for other sediment and benthos parameters. The additional parameters will help with interpretation of conditions and changes over time in Puget Sound sediment and benthos. For the 2021 Sediment Program, we provide sediment samples to these collaborators who conduct the following projects:

Dead-shell assemblages to reconstruct past benthic conditions

Partners: Dr. Susan Kidwell, University of Chicago (since 2019)

We provide Dr. Kidwell with the residual sediment remaining from our sieved samples after the "live"[1] benthic invertebrates in the samples have been removed. Dr. Kidwell and her students sort and radiocarbon date the "dead"[2] bivalve shells that were present in these samples. These shells are identified to the lowest possible taxon and counted. Calculated "live:dead" ratios are used to estimate the assemblage structure of past populations of bivalves, providing evidence of changes in assemblages over time and past ecosystem pressures and stressors that may have influenced these assemblages (Kidwell, 2009).

Microplastics

Partner: Ms. Julie Masura, University of Washington – Tacoma (since 2015)

We provide Ms. Masura and her students with approximately 200 mL of sediment collected from the surface 1 cm at each station sampled. Plastics are recovered from the sediments, counted, measured, and mapped annually.

Harmful algal blooms

Partners: Dr. Cheryl Greengrove and Ms. Julie Masura, University of Washington – Tacoma (since 2013)

We provide Dr. Greengrove and Ms. Masura with approximately 200 mL of sediment collected from each station sampled. They and their students examine the abundance and distribution of *Alexandrium* sp. cysts in these sediments. *Alexandrium* sp. is a dinoflagellate that spends part of its life-cycle as a cyst in the sediment before germinating to become a vegetative cell. This species produces a suite of neurotoxins that can accumulate in the tissues of filter-feeding shellfish and can be lethal to humans if ingested. This ongoing study evaluates whether the location or concentration of cysts exhibit patterns that can be associated with shellfish bed closures due to the presence of paralytic shellfish toxins (PSTs) above regulatory limits in shellfish.

Foraminifera monitoring

Partners: Dr. Liz Nesbitt and Dr. Ruth Martin, University of Washington (since 1997)

We provide Dr. Nesbitt and Dr. Martin with approximately 200 mL of sediment collected from each station sampled. They and their students examine the type, abundance, and distribution of foraminifera identified in these samples. Foraminifera, marine protozoans with calcium carbonate or agglutinated sediment particle tests (shells), are an important component of the benthos. Their community structure and physical condition are sensitive indicators of chemical pollution and ocean acidification.

[1] "Live" includes those benthos that were alive at the time of sample collection.
[2] "Dead" includes those bivalves that were dead at the time of sample collection.

5.0 Organization and Schedule

5.1 Key individuals and their responsibilities

Changes to *Table 2. Organization of project staff and responsibilities*, listed in Dutch et al., 2018, include:

- Removed Angela Eagleston, Taxonomist. She has left this position.
- Replaced Carol Maloy, Unit Supervisor for the Project Manager, with Julianne Ruffner, 360-407-6154, Acting Unit Supervisor.
- Replaced Dale Norton, Section Manager for the Project Manager, with Stacy Polkowske, 360-407-6730, Section Manager.
- Replaced Tom Gries, Acting Ecology Quality Assurance Officer, with Dr. Arati Kaza, 360-407-6964; Ecology Quality Assurance Officer.

5.4 Proposed project schedule

The project schedule for the Long-Term monitoring described in Table 3 of Dutch et al., 2018 is modified to better define the window of time in which the field work will be completed. The original "April/early May" designation is changed to specify that sampling will begin on the Monday of the first full week in April (April 5) and will conclude by May 14. The Elliott Bay monitoring schedule will follow the Urban Bays schedule as described in Dutch et al., 2018.

5.5 Budget and funding

The expected budget for Fiscal Year 2021 sampling and analyses is provided in Table 1.

Table 1. Puget Sound Sediment Monitoring Program budget – FY2021.

Funding Category Parameter	**Long-Term $**	**Urban Bays $**	**Grand Total $**
Manchester Lab (MEL)	**38,890.00**	**57,265.00**	**96,155.00**
Nutrients*	8,990.00	6,665.00	15,655.00
Metals/Organics	29,900.00	50,600.00	80,500.00
Research vessel	**14,940.00**	**5,976.00**	**20,916.00**
Skookum	14,940.00	5,976.00	20,916.00
Sediment contracts	**18,825.00**	**12,750.00**	**31,575.00**
$\delta^{13}C$ and $\delta^{15}N$ stable isotopes, biogenic silica	3,710.00	2,730.00	6,440.00
Grain Size	5,565.00	4,095.00	9,660.00
QA Taxonomy	9,550.00	5,925.00	15,475.00
Travel	**3,040.00**	**3,624.00**	**6,664.00**
Field travel	3,040.00	3,624.00	6,664.00
Grand Total	**75,695.00**	**79,615.00**	**155,310.00**

* Total carbon, total organic carbon, total inorganic carbon, total nitrogen, total sulfides

6.0 Quality Objectives

6.2 Measurement quality objectives

6.2.1 Targets for precision, bias, and sensitivity

6.2.1.3 Sensitivity

The lowest concentration of interest in Table 6 of Dutch et al., 2018 is revised to 0.03% dry weight for total nitrogen (TN), based on review of 2017 through 2019 TN values. For total carbon and total organic carbon, the lowest concentration of interest remains at 0.1% dry weight.

7.0 Study Design

7.2 Field data collection

7.2.1 Sampling locations and frequency

Long-Term monitoring stations

The Long-Term monitoring element includes a set of 50 sampling stations. Due to field conditions, some of the target and alternate station locations presented in Table 9 of Dutch et al., 2018 have been relocated, following protocols outlined in this QAMP. Table 2 provides the latitude and longitude for these revised coordinates.

Table 2. Revised coordinates for target and alternate station locations.
Latitude and longitude are reported in NAD 83, decimal degrees.

Station	Location	Latitude	Longitude	Station Type
40025	West Sound	48.62446	-122.96331	Target, randomly selected
40034	Port Townsend, mouth of Kilisut Harbor	48.09354	-122.73316	Target, randomly selected
40039	Gedney Island	48.02361	-122.31735	Alternate, randomly selected
40043	So. Possession Sound	47.83917	-122.39947	Alternate, randomly selected

Urban Bays monitoring stations

Prior to the 2020 COVID-19 pandemic, the MSMT had planned to implement a new *Bays of Ecological Importance* monitoring element into the June sampling rotation. We had planned to sample 30 stations in Padilla Bay in June 2020 and to shift the Urban Bays rotation outlined in Table 23 in Dutch et al., 2018 back by one year. With postponement of all 2020 sampling, the team now plans to turn back to the six-station Urban Bays rotation (see Table 3 below) to avoid letting too much time lapse between visits to each sampling frame. The team will reconsider when to implement the *Bays of Ecological Importance* element, including sampling in Padilla Bay, at a later date.

Table 3. Revised Puget Sound Sediment Monitoring Program sampling schedule.

Monitoring Program	Sampling Year/Number of stations					
Sampling Frame	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**
Long-Term						
Puget Sound	50	50	50	50	50	50
Urban Bays rotation						
Budd Inlet					30	
Port Gardner/Everett Harbor						30
Elliott Bay	36					
Commencement Bay		30				
Bainbridge Basin			33			
Bellingham Bay				30		

7.2.2 Field parameters and laboratory analytes to be measured

For Long-Term monitoring, chemistry analyses will be conducted on sediments from ten stations previously designated for testing in 2020 but postponed due to the COVID-19 pandemic, and on sediments from ten stations designated for testing in 2021 (see Table 24 of Dutch et al., 2018). A revised version of the 50-station sampling rotation for sediment chemistry for 2021 through 2024 is presented as Table 4, below. No tissue samples will be collected or analyzed.

Table 4. 2021 through 2024 revised sampling rotation for sediment chemistry analysis.

Sampling Year Station IDs				
2021*	**2021**	**2022**	**2023**	**2024**
40021	3	19	191	21
40022	4	52	281	34
40025	13	119	40005	40
40026	29	209R	40006	40013
40027	38	222	40007	40015
40028	44	252	40008	40016
40029	49	265	40009	40017
40030	40036	305R	40010	40018
40032	40037	BLL009	40011	40019
40034	40038	HCB003	40012	40020

*Samples from these stations were originally scheduled for chemical analysis in 2020, but sampling was postponed due to the COVID-19 pandemic.

Chemistry analyses will be performed on sediments collected from all 36 stations in Elliott Bay.

All environmental parameters to be measured or analyzed remain unchanged from Table 25 in Dutch et al., 2018.

7.5 Possible challenges and contingencies

7.5.1 Logistical problems

The following amendments are added to section 7.5.1 in Dutch et al., 2018, to underscore logistical problems that may occur during the Long-Term sediment sampling proposed for 2021:

Research vessel, size, condition, sea state, and availability of vessel

During Long-Term sampling, the small size of Ecology's 26' research vessel (R/V) *Skookum* can impact sediment sampling during strong wind and high wave conditions. Under these conditions, the captain and scientific crew will work together to alter the sampling schedule. Contingency days will be chosen to reattempt sampling at missed stations during the sampling window defined in Section 5.4, above. All sampling will be constrained to this window of time to maintain a consistent sampling window for the benthic invertebrate communities which will be compared over time. Limitations on the sampling time window will also minimize (1) the impact on other projects requiring use of the R/V *Skookum*, and (2) the burden placed on the R/V *Skookum* captains, whose time to pilot the vessel is limited.

Due to demand for use of the R/V *Skookum* during April and time limitations imposed by COVID-19 restrictions, EAP managers and the Marine Monitoring Unit are considering the possibility of using other government agency research vessels which may be available. Possible vessels include the R/V *Zoea* (Shannon Point Marine Lab), the R/V *Sound Guardian* (King County), and the R/V *Salish Rover* (WA Dept. of Fish and Wildlife).

Station prioritization

While we plan to collect from 50 stations during the Long-Term sampling, wind and wave conditions in April may limit sampling to fewer stations. The sampling team will prioritize collection at 22 monitoring stations. These include 20 that are currently co-located with the Marine Monitoring Unit's Marine Waters monitoring stations and two that are part of the set of ten original historical Long-Term sediment monitoring stations sampled since 1989. The 22 stations are: 3, 4, 133, 19, 21, 29, 34, 38, 40, 44, 49, 52, 119, 191, 209R, 222, 252, 265, 281, 305R, BBL009, HCB003.

These 22 stations are located throughout the entire breadth of the Puget Sound sampling frame. The team's sampling itinerary (Appendix) progresses from south to north through the sound, prioritizing collection of samples from the set of 22 co-located stations, with flexible collection of samples from the remaining set of 28 stations as time allows each day.

8.0 Field Procedures

8.3 Containers, preservation methods, holding times

At the request of the laboratory technician who processes the stable isotopes of carbon and nitrogen, Table 27 is now modified as follows for this parameter:

Minimum Quantity Required: 2 mL (no greater than 5 mL of sample should be collected and sent to the lab)

Container: 15-mL polyethylene centrifuge tubes

8.8 Other activities

COVID-19 safety protocols

New Ecology safety protocols were developed in 2020 to protect our staff from COVID-19 exposure while conducting field work. Several agency web pages provide evolving safety protocols for general fieldwork, carpooling, working aboard the R/V *Skookum*, and overnight lodging when working far from home. All protocols are considered "living" documents and are subject to change as pandemic conditions change. Each will be reviewed by all field staff prior to conducting field work. Sampling under these protocols is subject to reevaluation and cancellation by EAP management based on current or changing pandemic conditions.

The following web pages provide overall agency guidance:

Ecology guidance for fieldwork under Governor's Safe Start Phases

http://awwecology/sites/execi/COVID19/Pages/Fieldwork-Procedures-and-Guidance.aspx

This site includes information and links on Ecology Employee Safety Procedures for Field Work:

- Guidance for overnights
- Respiratory protection matrix
- Mask and glove use
- Vehicle use/carpooling
- Daily procedure for field work
- Approved field work (formerly Phase 1 and 2)
- Phase 3 Field Work

Environmental Assessment Program Boat Operations and Safety Guidelines:

http://teams/sites/EAP/OperationsCenter/Pages/boats.aspx

This EAP SharePoint "Boats" site contains links to three documents that describe the EAP COVID-19 safety plan for boating, including:

- EAP Boat COVID-19 Plan
- Skookum COVID-19 Procedures Q&A
- Cleaning Checklist

All of the safety documents will be read and implemented by those participating in 2021 field work. Updated versions of these protocols will be read and implemented as they are made available.

The team's draft itineraries for both the Long-Term sampling effort in April and the Elliott Bay sampling in June are provided in Appendix A-1 and A-2, respectively. They include details relevant to the COVID-19 safety protocols, including number of staff on the research vessel, carpooling, travel destinations (e.g., marina/boat launch locations), and overnight lodging details. Overnight lodging away from home will be needed by the field crew during the April Long-Term monitoring field season. This is necessary for time-efficient sampling of stations located in central and northern Puget Sound (from Seattle north). Options for such lodging include use of the Guesthouse at the Padilla Bay National Estuarine Research Reserve (PBNERR), the bunkhouse rooms at the Shannon Point Research station, or hotel rooms. The best option will be decided at a later date based on the research vessel being used and where it is moored, and based on current COVID-19 restrictions and guidance.

9.0 Laboratory Procedures

9.1 Lab procedures table

The Reporting Limit (RL) provided in Table 28 (Dutch et al., 2018) for total carbon and total organic carbon is 0.1% dry weight, while the RL for total nitrogen will range from 0.03% to 0.1% dry weight, depending on the mass of sample loaded into the analyzer. A sample size of 10 mg will result in a total nitrogen RL value of 0.1% dry weight, while a larger sample size will result in a correspondingly reduced RL. For example, a 30 mg sample will result in an RL value of 0.03% dry weight (Momohara, 2019; *personal communication*). The mass that can be loaded into the analyzer is sample-dependent and will vary from station to station.

10.0 Quality Control Procedures

10.1 Table of field and laboratory quality control

The quality control sample types and frequency for physical, biogeochemistry, and chemistry parameters in bulk sediments presented in Table 33 in Dutch et al., 2018 is updated in Table 5, below:

Table 5. Quality control sample types and frequency for physical, biogeochemistry, and chemistry parameters – bulk sediments.

Type	Field Replicate	Analytical (Laboratory) Replicate	Laboratory Control Sample (LCS)	Laboratory Control Sample Duplicate (LCSD)	Certified Reference Material (CRM)	Matrix Spike (MS)	Matrix Spike Duplicate (MSD)	Surrogate Spike	Method Blank
Grain size	Duplicate analysis for 5% of samples	Triplicate analysis/batch of 20 samples	1/batch of 20	NA	NA	NA	NA	NA	1/batch of 20
TC/TOC/ TIC/TN	Duplicate analysis for 5% of samples	1/batch of 20 samples	1/batch of 20	NA	1/batch of 20 for TOC only	NA	NA	NA	1/batch of 20
Total Sulfides	Duplicate analysis for 5% of samples	1/batch of 20 samples	1/batch of 20	NA	NA	1/batch of 20	NA	NA	1/batch of 20
Biogenic silica	Duplicate analysis for 5% of samples	Duplicate analysis/batch of 20 samples	1/batch of 20	NA	1/batch of 20	1/batch of 20	1/batch of 20	NA	1/batch of 20
Stable isotopes	Duplicate analysis for 5% of samples	Duplicate analysis/batch of 20 samples	1/batch of 20	NA	1/batch of 20	1/batch of 20	1/batch of 20	NA	1/batch of 20
Metals	Duplicate analysis for 5% of samples	NA	1/batch of 20	1/batch of 20	NA	1/batch of 20	1/batch of 20	NA	1/batch of 20
Organics	Duplicate analysis for 5% of samples	Duplicate analysis/batch of 20 samples	1/batch of 20	1/batch of 20	1/batch of 20	1/batch of 20	1/batch of 20	Every organics sample, blank, and QC sample	1/batch of 20

15.0 References

Dutch, M.E., V.A.ME, VA Partridge, S. Weakland, D. Burgess, and A. Eagleston. 2018. Quality Assurance Monitoring Plan: The Puget Sound Sediment Monitoring Program. Washington State Department of Ecology, Olympia, WA. Publication 18-03-109. 126 pp.

Kidwell, S. M. Evaluating human modification of shallow marine ecosystems: Mismatch in composition of molluscan living and time-averaged death assemblages. In: Dietl G.P., Flessa K.W., editors. Conservation Paleobiology: Using the Past to Manage for the Future. The Paleontological Society Papers; Portland, Oregon: 2009. pp. 113–131.

Momohara, D. 2019. Personal communication. Email discussion regarding lowering of total nitrogen reporting limits.

16.0 Appendix: Draft Sampling Itineraries

A-1. Long-Term monitoring, April 2021

See Table on the following page.

Sample group (see map tab)	Proposed sampling date	Preferred sampling order	Station (Chem station) (Priotrity stations in blue)	Location	Station Depth (m)	Field crew	Departure time from operations center	Marina to depart from	Ending marina	Hotel Information	Transportation	Field vehicles	Samples for MEL pickup next morning at OC	Comments	Potential Zoea day
	Monday, April 5, 2021	1	49 (Chem)	Inner Budd Inlet	6.1	Valerie, Grace	7:00:00 AM	Swantown	Swantown	None		boat truck	no	Load in early AM then launch in Budd Inlet	
		2	40016	Henderson Inlet	2.3										
		3	40028	Totten Inlet	7.0										
	Tuesday, April 6, 2021	1	44 (Chem)	East Anderson Island	25.5	Valerie, Grace	7:00:00 AM	Zittels	Zittles	None		boat truck	yes		
		2	52 (Chem)	W of Devils Head, E end Nisqually Reach	109.6										
		3	252 (Chem)	Case Inlet	55.6										
		4	40032	Inner Case Inlet, Rocky Bay	19.0										
	Wednesday, April 7, 2021	1	265 (Chem)	Carr Inlet	109.1	Valerie, Grace	7:00:00 AM	Point Defiance	Point Defiance	None		boat truck and Brandee's green van	yes		
		2	40008	Carr Inlet, NE of Gertrude Island	131.1										
		3	281	Commencement Bay	38.7										
		4	40	Thea Foss Waterway	12.9										
	Thursday, April 8, 2021	1	38 (Chem)	Point Pully (3-Tree Point)	202.0	Valerie, Grace	7:00:00 AM	Point Defiance	Point Defiance	None			yes		
		2	40036 (Chem)	Des Moines	183.6										
		3	40012	Elliott Bay, Smith Cove	15.4										
		4	191	Central Elliott Bay	98.4										
	Friday, April 9, 2021														
	Saturday, April 10, 2021														
	Sunday, April 11, 2021														
	Monday, April 12, 2021	1	40006	Murden Cove	79.7	Sandy, Dany	7:00:00 AM	Port Orchard	Port Orchard	None		boat truck and Brandee's green van	yes		
		2	34	Sinclair Inlet	10.0										
		3	40022	Brownsville	19.5										
		4	40030	Sinclair Inlet	10.4										
	Tuesday, April 13, 2021	1	40020	Shilshole Bay	86.7	Sandy, Dany	6:00:00 AM	Kingston	Kingston	None			yes		
		2	40038 (Chem)	North Central Basin	188.3										
		3	29 (Chem)	Shilshole	202.0										
		4	40011	Central Basin, N of Shilshole	202.8										
	Wednesday, April 14, 2021	1	222 (Chem)	Hood Canal, N of Seabeck	118.0	Sandy, Dany	6:00:00 AM	Launch in North Hood Cannal ask captains where they think??		None			yes		X, if Port Angeles and Pt Townsend are sampled with Skookum
		2	13 (Chem)	North Hood Canal, S of Bridge	17.8										
		3	40027	Admiralty Inlet, N of Rose Point	20.2										
		4	119 (Chem)	Admiralty Inlet, south	220.0										
	Thursday, April 15, 2021	1	40026	Dabob Bay	190.0	Sandy, Dany	6:00:00 AM	Union	Union	None			yes		
		2	40010	Central Hood Canal, S of Triton Cove	132.0										
		3	HCB003 (Chem)	Hood Canal, Central	132.0										
		4	40018	Hood Canal, Hoodsport	131.0										
		5	305R (Chem)	Lynch Cove	21.0										
	Friday, April 16, 2021			Back-up day to finish Hood Cannal if needed		Sandy, Dany									
	Saturday, April 17, 2021														
	Sunday, April 18, 2021														
	Monday, April 19, 2021		Travel Day	Possibly working on Zoea out of Shannon Pt. ML		Valerie, Grace					Travel to Shannon PT.				
	Tuesday, April 20, 2021	1	BLL009 (Chem)	Bellingham Bay, Pt. Frances (Portage Is.)	19.2	Valerie, Grace		Shannon PT.	Shannon PT.	Shannon PT. Guesthouse		boat truck and Brandee's green van	no		X
		2	40029	North Samish Bay	22.8										X
		3	4 (Chem)	Bellingham Bay	24.1										X
	Wednesday, April 21, 2021		40013	Reads Bay	10.4	Valerie, Grace	6:00:00 AM	Shannon PT.	Shannon PT.	Shannon PT. Guesthouse			no		X
			40025	West Sound	22.5										X
	Thursday, April 22, 2021	1	3 (Chem)	Strait of Georgia, N of Patos Island	223.1	Valerie, Grace	need to catch slack tide 9:30 for station 3	Shannon PT.	Shannon PT.	Shannon PT. Guesthouse			Yes		X
		2	40017	Boundary Bay	16.5										X
		3	40009	Strait of Georgia, outer Birch Bay	28.5										X
	Friday, April 23, 2021			Weather backup		Valerie, Grace									
	Saturday, April 24, 2021														
	Sunday, April 25, 2021														
	Monday, April 26, 2021		Travel Day			Sandy, Dany					Travel to Shannon PT.				
	Tuesday, April 27, 2021	1	40007	Saratoga Passage, north, Camano Island	54.1	Sandy, Dany	Slack tide for station 209R is at 11:48	Shannon PT.	Shannon PT.	Shannon PT. Guesthouse		boat truck and Brandee's green van	no	catch the early tide for 209R	X
		2	209R (Chem)	Skagit Bay	20.7										X
		3	40021	Crescent Harbor	12.2										X
		4	40037 (Chem)	Saratoga Passage, Race Lagoon	53.5										X
	Wednesday, April 28, 2021	1	40019	South Possession Sound	90.0	Sandy, Dany		Shannon PT.	Shannon PT.	Shannon PT. Guesthouse			no		X
		2	21	Port Gardner/Everett Harbor	21.2										X
		3	40015	Saratoga Passage, South	108.2										X
		4	19 (Chem)	Saratoga Passage	121.5										X
	Thursday, April 29, 2021	1	40034	Port Townsend, mouth of Kilisut Harbor	2.0	Sandy, Dany		Port Angeles and Port	Port Angeles and Port		If using Ecy boat, sample		yes		X
		2	40005	Inner Port Angeles Harbor	24.0										X

A-2. Elliott Bay monitoring, June 2021

Marine Sediment Team June 2021
Sampling Itinerary, Elliott Bay

Daily departure time: Depart OC 7:15 meet boat at marina by 8:45
Marina: Elliott Bay Marina, 2601 W Marina Pl, Seattle, WA 98199
Field Vehicles: Boat truck and Brandee's green van

Proposed sampling date	Captain	Deck Hand	Activity	Field crew	AM MEL sample pickup
Monday, June 7, 2021	assigned Skookum captain	assigned deck hand	Sample 4 stations	2 sediment team staff	No
Tuesday, June 8, 2021			Sample 5 stations		Yes
Wednesday, June 9, 2021			Sample 6 stations		Yes
Thursday, June 10, 2021			Sample 5 stations		Yes
Friday, June 11, 2021			Backup day		Yes
Saturday, June 12, 2021					
Sunday, June 13, 2021					
Monday, June 14, 2021	assigned Skookum captain	assigned deck hand	Sample 4 stations	2 sediment team staff	No
Tuesday, June 15, 2021			Sample 6 stations		Yes
Wednesday, June 16, 2021			Sample 6 stations		Yes
Thursday, June 17, 2021			Backup day		Yes
Friday, June 18, 2021			Backup day		