

Amendment to Quality Assurance Project Plan (QAPP) for Status and Trends Monitoring of Marine Nearshore Mussels for the Regional Stormwater Monitoring Program and Pierce County

September 11, 2017

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This amendment documents changes to the QAPP for Status and Trends Monitoring of Marine Nearshore Mussels for the Regional Stormwater Monitoring Program and Pierce County (WDFW Publication no. FPT 15-04) for the 2017/18 Stormwater Action Monitoring Mussel Monitoring survey. The Regional Stormwater Monitoring Program changed its name to Stormwater Action Monitoring (SAM) in 2017 in recognition of SAM's broader role – using the results of monitoring and studies to inform policy decisions and identify the most effective management actions.

Global changes to all sections of the QAPP

- We change the acronym RSMP to SAM (Stormwater Action Monitoring).
- We change all references to the winter of 2015/16 to the winter of 2017/18.
- We change all deployment dates from October 2015 to November 2017, and all retrieval dates from February 2016 to February 2018.

WDFW, Pierce County and Ecology Roles (page 6)

The 2017/18 SAM Mussel Monitoring will occur within the period of November 2017 to February 2018.

Table 1. Key completion dates for QAPP, monitoring activities, and reports for status and trends monitoring in the Puget Sound nearshore.

Due	Item	Description
August 10, 2017	Draft QAPP amendment submitted	WDFW submits draft QAPP to Ecology for review.
August 31, 2017	Final QAPP amendment approved	Final QAPP completed and accepted by Ecology.
September 30, 2017	Site selection and verification	WDFW and Pierce County have confirmed all sites to be monitored, including sufficient additional sites to sample if sampling attempted at any of the original sites is unsuccessful. Send site list to SAM Coordinator.

November 2017	Mussel cages deployed	WDFW and Pierce County deploy mussel cages at the required number of nearshore sites.
February 2018	Mussel cages retrieved and mussels delivered to WDFW	WDFW and Pierce County retrieve mussel cages from the required number of nearshore sites and deliver the mussels, alive on ice, to the WDFW Marine Resources Laboratory in Olympia on the morning following retrieval.
February - March, 2018	Send samples to laboratories.	WDFW submits frozen mussel tissue samples to the RSMP contracted laboratories for chemical analysis.

Documentation of Site Evaluations (page 16)

Site evaluators will provide a table listing the decisions and reasons for site selection or disqualification resulting from the site evaluations to the SAM Coordinator by September 30, 2017.

Quality Objectives (page 18)

Table 2. Summary of mussel tissue composites to be collected and analyzed for chemical contaminants during this study.

Purpose	Location	Timing	Composites	Replicates
Baseline samples	Aquaculture source	November	6	6
SAM mussel sites	Various	February	40	1 per site
Pierce County sites	Various	February	8	1 per site
Lab QA samples	Various	Aliquots taken during chemical analysis	5	5 ^a
Total			59	

^a two QA samples per batch of 12

Field Measurements (page 19)

We will no longer measure several parameters on site during the mussel cage deployment, including the height of the most recent low tide, precipitation, aquatic vegetation coverage or type, adjacent upland land use type, or man-made structures on the beach. The shortened list of parameters to be measured is described below in the updated Table 5.

Table 3. Mussel monitoring field parameters: field methods, reporting limits, and QA/QC procedures. See 2015/16 RSMP Mussel Monitoring Datasheet (Appendix D).

Parameter	Expected Range Of Results	Technique/ Instrument	Measurement Method	QA/QC
Time of cage deployment and retrieval	12:00 – 24:00	Clock	Read from clock and reported in military time	Careful observation
GPS coordinates	N/A	GPS device or mobile device with GPS application	Set GPS device to NAD83 , record in decimal degrees (e.g. 47.5893, -122.3953)	Record accuracy of coordinates at reading (e.g. ±15ft)
Wave energy	Flat, calm, wind chop, swells, breaking waves	Visual examination	Visual examination of sea near cage	Careful observation
Beach exposure level	Exposed, moderately exposed, sheltered	Visual examination	Visual examination of beach within ½ mile in either direction of cage	Careful observation
Time zero tide (MLLW)	12:00 – 24:00	NOAA tides and currents website http://www.protid.es.com/washington/	Read from harmonic or subordinate tidal gauge station nearest to monitoring site	Accurate reading of information from website
Majority (>50%) Substrate Type	Bedrock-hardpan, cobble-gravel mix, sand-gravel mix, sand, sand-mud mix, mud-silt	Visual examination	Visual examination within 200 foot radius of cage	Careful observation
Freshwater inputs	Natural streams, rivers, outfalls	Visual examination	Visual examination within 200 foot radius of cage	Careful observation, may include mix of types
Erosion control structures	None, hard, soft. Includes materials used	Visual examination	Visual examination of beach within ½ mile in either direction of cage	Careful observation and documentation
Abandoned or derelict structures	No/Yes, type	Visual examination	Visual examination of beach within ½ mile in either direction of cage	Careful observation and documentation

Parameter	Expected Range Of Results	Technique/ Instrument	Measurement Method	QA/QC
Current shoreline use	Wide range of choices (see Appendix C)	Visual examination	Visual examination of beach within ½ mile in either direction of cage.	Careful observation, may include mix of types
Construction of structures on beach touching water	Treated wood, concrete, steel, other	Visual examination	Visual examination of beach within ½ mile in either direction of cage.	Careful observation, may include mix of types
Outfalls	N/A	Visual examination	Visual examination of beach within ½ mile in either direction of cage.	Careful observation, may include mix of types
Potential sources of pollutants	N/A	Visual examination	Visual examination of beach within ½ mile in either direction of cage.	Careful observation, may include mix of types

*Field-measured parameters follow manufacturer’s website guidelines for calibrations

Field Datasheets (page 26)

WDFW and Pierce County will make a *2017/18 SAM Mussel Monitoring Datasheet* (Appendix D) available to the volunteers and partners in digital format, as an online/mobile survey form, and on water-resistant paper for each verified and usable site.

Chain of Custody (page 26)

Chain of custody signatures will now be recorded on the retrieval portion (backside) of the revised study datasheet.

Mussel Presort (page 28)

The presorting, measuring, and bagging described below will take place during October, 2017 prior to deployment, allowing time for inclement weather.

We will select mussels that fall within the desired size range by comparing them to mussel length templates, provided by WDFW for this purpose.

Measuring (page 29)

We will no longer measure and record the individual shell length of all mussels in the study. Instead, during each day of bagging WDFW staff and volunteers will measure the shell length of 50 mussels from the presorted cooler using a digital calipers with measurement accuracy of 0.1 mm. The length measurements for these mussel will represent the average starting length of

mussels used in the 2017/18 SAM Mussel Monitoring survey. Lengths will be recorded onto a waterproof data sheet or on a digital specimen form.

Bagging (page 29)

WDFW staff will no longer affix a unique ID tag to each finished mussel bag. The ID tag was used to track the individual measured mussel lengths, which we are no longer taking.

Presoak period (page 29)

We will no longer need to indicate the range of bag ID numbers hanging on each line of finished mussel bags.

Deployment/Retrieval Dates (page 30)

Table 4. Potential deployment and retrieval dates for RSMP mussel monitoring in 2015/16. Dates are based on predicted low tides at Seattle, Elliott Bay harmonic station (NOAA).

Low Tide Event	Deployment Dates	Retrieval Dates
Preferred	November 3 – 9, 2017	February 13-15, 2018
Alternate	November 17 – 21, 2017	February 25 28, 2018

Deployment (page 30)

We will no longer initiate a chain of custody form at deployment, instead, chain of custody signatures will be collected on the retrieval portion (backside) of the revised study datasheet.

Field Measurement Procedures (page 36)

The table below no longer contains precipitation, aquatic vegetation cover and types, or adjacent upland land use. This is consistent with changes to the Field Measurements on page 19.

Table 5. Field measurement and observation parameters.

Field Measurements
Time of cage deployment/retrieval
GPS coordinates and accuracy
Field Observations/Estimates
Wave energy
Beach exposure
Substrate Type
Freshwater inputs
Erosion control structures
Shoreline use
Anthropogenic structures on beach
Outfalls present

Retrieval (page 37)

Chain of custody signatures will now be collected on the retrieval portion (backside) of the revised study datasheet.

Lab Forms (page 37)

Electronic tablets (e.g., iPads) with digital versions of the WDFW Specimen Form and Tissue Resection Log will be used in place of printed paper to record all laboratory measurements.

Stable Isotopes (page 44)

We will not measure stable isotopes in mussels for the 2017/18 SAM Mussel Monitoring survey, so this section is no longer applicable.

Field QC (page 46)

We will no longer utilize the chain of custody forms.

Field Data (page 48)

Monitoring site data will be recorded either in digital format through WDFW's online/mobile survey form or printed on waterproof paper.

Laboratory Data (page 48)

WDFW staff will record laboratory data on electronic tablets (e.g., iPads) with digital versions of the Specimen Form and Tissue Resection Log.

2015/16 RSMP Mussel Monitoring Summary Report (page 51)

The 2017/18 SAM Mussel Monitoring summary report is due to Ecology on July 30, 2018. In addition, the results will be compared with results from the previous 2015/16 RSMP/SAM Mussel Monitoring efforts, and with WDFW's Toxic Contaminants in Puget Sound's Nearshore Biota: A Large-Scale Synoptic Survey Using Transplanted Mussels (*Mytilus trossulus*) (Lanksbury et al. 2014) report, where appropriate.

Appendix D. Study Datasheet

A revised study datasheet is shown below. This datasheet will be available to volunteers and study partners in digital format through WDFW's online/mobile survey form and on waterproof paper (see next page for example of datasheet).

Appendix E . Chain of Custody Form

Chain of custody signatures will now be recorded on the retrieval portion (backside) of the revised study datasheet, see below.

**Washington State 2017/18 SAM
Mussel Monitoring Site Datasheet**

DEPLOYMENT INFORMATION			
Site ID:	Site Name:		
Deployers name(s):			
Recorder name:			
Deployment date:			
Estimated time of zero tide:		Time cage anchored:	
Cage GPS location (decimal degrees)	Latitude:	Longitude:	Accuracy (± XX feet):
GPS make/model or app name: (please set to datum NAD83)			
Anchors Used (type and number):			
HABITAT (visible from mussel cage)			
Sea Conditions: <input type="checkbox"/> Flat <input type="checkbox"/> Calm <input type="checkbox"/> Wind chop <input type="checkbox"/> Swells <input type="checkbox"/> Breaking waves			
Beach Exposure: <input type="checkbox"/> Exposed <input type="checkbox"/> Moderately exposed <input type="checkbox"/> Sheltered			
Substrate – select ONE that describes the majority (50%) of substrate around cage: <input type="checkbox"/> Bedrock, hardpan <input type="checkbox"/> Cobble-gravel mix <input type="checkbox"/> Sand-gravel mix <input type="checkbox"/> Sand <input type="checkbox"/> Sand-mud mix <input type="checkbox"/> Mud, silt			
Stream or River present: <input type="checkbox"/> No <input type="checkbox"/> Yes			
Other Habitat Comments/Observations:			
ANTHROPOGENIC STRUCTURES AT SHORELINE (visible from mussel cage)			
Erosion Control/Shoreline Armoring: <input type="checkbox"/> None <input type="checkbox"/> Hard (bulkhead, riprap, etc.) <input type="checkbox"/> Creosote Included			
Abandoned/Derelict Structures on Beach (e.g. old pilings, docks, etc.) <input type="checkbox"/> No; <input type="checkbox"/> Yes, describe:			
Current Shoreline Use (check all that apply): <input type="checkbox"/> Boat ramp/launch; <input type="checkbox"/> Boathouse/shed; <input type="checkbox"/> Bridge; <input type="checkbox"/> Breakwater; <input type="checkbox"/> Dock/pier/wharf; <input type="checkbox"/> Floating home; <input type="checkbox"/> Marina; <input type="checkbox"/> Mooring buoy; <input type="checkbox"/> Outfall; <input type="checkbox"/> Piling/dolphin; <input type="checkbox"/> Raft/float; <input type="checkbox"/> Road; <input type="checkbox"/> Shipyard or terminal; <input type="checkbox"/> Utilities; <input type="checkbox"/> Other:			
Dock/Pier/Wharf/Piling Material (if present): <input type="checkbox"/> Creosote <input type="checkbox"/> Other treated wood; <input type="checkbox"/> Concrete; <input type="checkbox"/> Steel; <input type="checkbox"/> Other:			
Tires present: <input type="checkbox"/> No <input type="checkbox"/> Yes			
Outfall Present (pipe, culvert, point of flow onto beach): <input type="checkbox"/> No <input type="checkbox"/> Yes			
Other obvious sources of pollution (oil slicks, seeps, etc.):			
Additional comments/observations (it's a good idea to note landmarks that will help you find the cage later!):			
TAKE PHOTOS of the deployed cage and surrounding substrate, including any interesting observations!			

**Washington State 2017/18 SAM
Mussel Monitoring Site Datasheet**

RETRIEVAL INFORMATION (TAKE PHOTO of the mussel cage BEFORE removal, to document condition of cage.)			
Site ID:	Site Name:		
Retrievers name(s):			
Recorder name:			
Retrieval date:		Time cage removed:	
Cage GPS location (decimal degrees)	Latitude:	Longitude:	Accuracy (± XX feet):
GPS make/model or app name: (must be set to datum NAD83)			
ANY NEW obvious sources of pollution (oil slicks, seeps, etc.)?			
Additional comments/observations (including condition of CAGE on retrieval, major changes in habitat or structures around cage):			
Mussel Chain of Custody Signatures			
Mussel Cage Retriever: _____		Date: _____	
Mussel Runner: _____		Date: _____	
WDFW Personnel: _____		Date: _____	