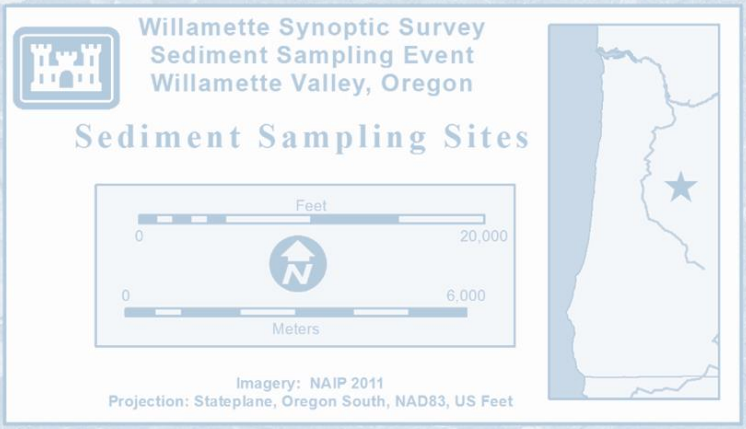
WILLAMETTE VALLEY SYSTEM

GREEN PETER AND FOSTER RESERVOIRS

US Army Corps of Engineers®
Portland District



2013 SYNOPTIC SURVEY

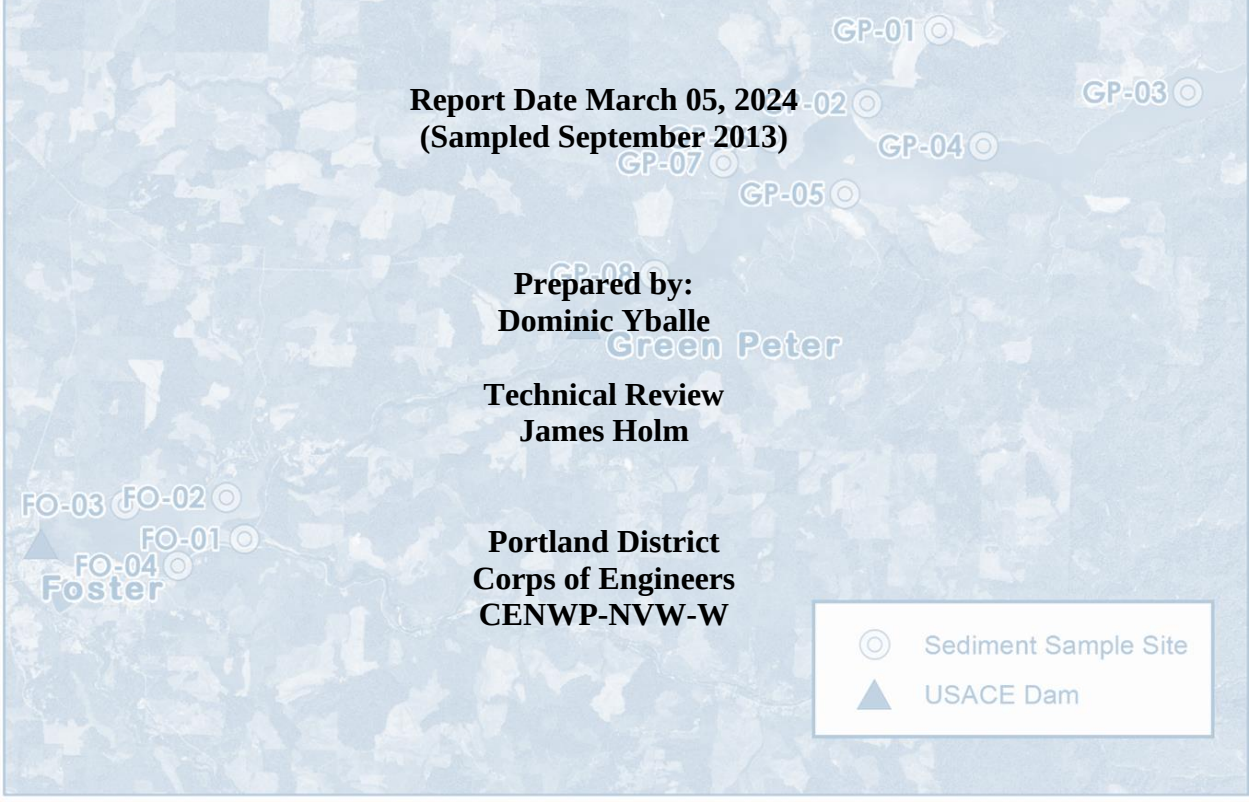
SEDIMENT QUALITY REPORT

Report Date March 05, 2024
(Sampled September 2013)

Prepared by:
Dominic Yballe

Technical Review
James Holm

Portland District
Corps of Engineers
CENWP-NVW-W



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ACRONYMS

As	Arsenic
ASTM	American Society for Testing and Materials
Cd	Cadmium
CoC	Contaminant(s) of concern
Cr	Chromium
Cu	Copper
DDD	Dichlorodiphenyldichloroethane
DDE	Dichlorodiphenyldichloroethylene
DDT	Dichlorodiphenyltrichloroethane
EPA	Environmental Protection Agency
Hg	Mercury
J	Laboratory estimated value detected between MRL & MDL
MDL	Method Detection Limit
MRL	Method Reporting Limit
PAH	Polynuclear Aromatic Hydrocarbon
Pb	Lead
PCB	Polychlorinated Biphenyl
QA/QC	Quality Assurance/Quality Control
Sb	Antimony
SEF	*Sediment Evaluation Framework for the Pacific Northwest*
SL	Screening Level
SVOC	Semi-Volatile Organic Compounds
TOC	Total Organic Carbon
TPH	Total Petroleum Hydrocarbons
U	Laboratory non-detection at MRL
Zn	Zinc

1.0 INTRODUCTION

Green Peter and Foster Reservoirs are located on the middle and south forks of the Santiam River, approximately 11 miles northeast of Sweet Home, Oregon. They are operated by the U.S. Army Corps of Engineers (Corps) as part of a system of thirteen multi-purpose dams and reservoirs that make up the Willamette Valley System. These dams and reservoirs work together for the purposes of flood damage reduction, hydropower generation, irrigation, recreation, fish and wildlife enhancement and downstream water quality improvement within the Willamette River drainage system.

Green Peter Dam is a concrete structure with a gated spillway, and Foster Dam is a rock-fill structure with a concrete gated spillway. The dams were completed in 1968 and help minimize potential flood damages. During flood season, the dams hold back water to regulate downstream flows. During summer and fall, water is slowly released from the dams to improve downstream water quality. Green Peter Dam, the principal facility, has two hydropower generating units capable of producing a total of 98,000 kilowatts. Foster Dam, located about 7 miles downstream, is used to regulate power-generating water releases from Green Peter Dam and regulate flows from the South Santiam River. Foster Dam has two generators capable of producing 24,000 kilowatts.

2.0 SAMPLING AND ANALYSIS OBJECTIVES

- Characterize sediments in accordance with the regional dredge material testing manual protocols:
    - Compare to freshwater screening levels (SLs) in the *Sediment Evaluation Framework for the Pacific Northwest* (SEF) 2009.
        - Note the 2009 SEF was updated after the 2013 sampling event and the 2018 SEF and the 2018 SLs are utilized in this report.
    - Document the sediment quality of the reservoir sediments in 2013.
- Collect, handle and analyze representative sediment in accordance with protocols and Quality Assurance/Quality Control (QA/QC) requirements of the SEF.

2.1 SAMPLING EVENT DISCUSSION (2013)

This report summarizes the 2013 sediment data from the Green Peter and Foster Reservoirs per the request of the Oregon Department of Environmental Quality (ODEQ) in its pre-enforcement letter dated December 13, 2023 (Attachment 1).

The Corps conducted a synoptic study of the Green Peter and Foster Reservoirs in 2013 to support potential drawdowns. The synoptic survey was conducted as means of establishing baseline conditions; however, the overall considerations for deep drawdowns were cancelled late 2013 at that time.

The Corps collected sediment samples in anticipated erosional areas within both the Green Peter and Foster reservoir pools to evaluate baseline conditions (Figure 1). Because the project was not a traditional dredging proposal, the full suite of SEF chemicals of concern (CoCs) were not analyzed, focusing instead on potential contaminants based on nearby current and historic land management practices. As such, total organic carbon (TOC) and groups of chemicals such as polynuclear aromatic hydrocarbon (PAHs), semi-volatile organic compounds (SVOCs), polychlorinated biphenyl (PCBs) total Aroclors, and total petroleum hydrocarbons (TPH) were not included for analyses.

A standard Ponar grab sampler was used to collect the samples along the periphery of the reservoirs. All discrete samples were submitted for physical analysis (grain size), and composites of the samples were analyzed only for metals and pesticides based on potential past land uses upstream of the reservoirs, such as agriculture, mining, and forestry.

Table 1. Sample Locations

Project	Sample Name	Date / Time Collected	Water Depth (ft)	Latitude	Longitude	Location Description	Material Description
Green Peter	GP-01	18-Sept-2013 / 08:20	25	44.49802	122.47341	Quartz Upper Arm	broken shale rock, brown pebbles and med sands
	GP-02	18-Sept-2013 / 08:35	25	44.48611	122.48892	Quartz Lower Arm	brown sand and pebbles
	GP-01 COMP	18-Sept-2013 / 08:35	--	composite of GP-01 and GP-02			
	GP-03	18-Sept-2013 / 09:02	15	44.48914	122.41787	Upper Santiam Arm	fine brown sand and fines
	GP-04	18-Sept-2013 / 09:23	22	44.47979	122.46292	Lower Santiam Arm	brown med sand and fines
	GP-05	18-Sept-2013 / 09:36	22	44.47174	122.49339	Rumbaugh Cr	brown med sand and fines
	GP-06	18-Sept-2013 / 09:50	25	44.48031	122.50967	Whitcomb Cr	red-brown gravel (85%) and coarse sand (15%)
	GP-02 COMP	18-Sept-2013 / 09:50	--	composite of GP-03, GP-04, GP-05, and GP-06			
	GP-08	18-Sept-2013 / 10:02	21	44.45819	122.53508	Green Peter Cr	red-brown silty sand with wood chips/splinters
	GP-07	18-Sept-2013 / 10:15	26	44.47612	122.52048	Thistle Cr	red-brown silty sand and red-brown gravels
	GP-03 COMP	18-Sept-2013 / 10:15	--	composite of GP-07 and GP-08			
Foster	FO-01	18-Sept-2013 / 11:16	12	44.41458	122.62453	South Santiam River	gray sandy silt
	FO-02	18-Sept-2013 / 11:30	18	44.42109	122.62878	Upper Foster Reservoir	gray silt with conifer twigs and muck
	FO-01 COMP	18-Sept-2013 / 11:30	--	composite of FO-01 and FO-02			
	FO-03	18-Sept-2013 / 11:50	17	44.41946	122.6511	Gedney Cr	brownish-gray silt with muck layer, no odor/debris
	FO-04	18-Sept-2013 / 12:02	24	44.41008	122.63909	Ralston Cr	brown-gray silt
	FO-02 COMP	18-Sept-2013 / 12:02	--	composite of FO-03 and FO-04			

3.0 RESULTS

3.1 Physical Grain Size (ASTM D422) and Total Solids

Discrete sample locations were collected and submitted for particle size and total solids. Sediment size is graded by phi scale but summarized as gravel (>75 mm diameter), sand (0.0625 to 75 mm diameter) and fines (<0.0625 mm diameter). Total solids ranged from 49.6% to 76.7% in Green Peter and from 37.5% to 48% at Foster. The physical analytical results are summarized in Table 2 below.

Table 2. Physical Parameters: Green Peter and Foster (2013)

Decision unit (Sample ID):	GP01	GP02	GP03	GP04	GP05	GP06	GP07	GP08
Grain size (% gravel, sand, fines)								
gravel	15.85	36.68	0.01	6.97	18.54	97.82	52.53	22
sand	50.02	33.69	49.6	40.2	57.06	5.26	40.69	64.77
fines	32.26	30.66	50.27	49.32	24.97	2.28	12.9	18.44
Total solids (%)	49.6	55.7	62.2	54.8	60.8	76.7	57.2	60.6

Decision unit (Sample ID):	FP01	FP02	FP03	FP04
Grain size (% gravel, sand, fines)				
gravel	0.97	8.04	3.99	0.0
sand	26.6	45.61	62.33	24.66
fines	71.36	50.47	37.57	75.72
Total solids (%)	46.4	37.5	48	40.8

3.2 Metals (EPA method 6010C/6020B/7471B), Pesticides (EPA method 8081B)

Samples from Green Peter and Foster reservoirs were composited and then submitted for metals and pesticides testing. Only the 4,4' DDx isomers were analyzed. Data is presented in Table 3. Metal and pesticide concentrations did not exceed the 2018 SEF freshwater SLs.

Table 3. Metals and Pesticides

Decision unit (Sample ID):	GP-01 Comp	GP-02 Comp	GP-03 Comp	FO-01 Comp	FO-02 Comp	**2018 SEF SL1[F]**
Metals (mg/kg)						
Arsenic	8.82	2.97	4.92	3.12	3.43	14
Cadmium	0.112	0.102	0.06	0.115	0.141	2.1
Chromium	13.1	15.2	13.1	12.4	10.1	72
Copper	22.3	25	29.5	21.1	23.3	400
Lead	14.1	6.53	8.57	7.81	9.91	360
Mercury	0.097	0.033	0.046	0.054	0.054	0.66
Nickel	10.4	23.3	6.81	14.4	8.17	26
Silver	0.085	0.059	0.043	0.06	0.06	0.57
Zinc	42.7	45.4	25.7	44.3	57.4	3,200
Pesticides (ug/kg)						
DDDs (4,4' isomer)*	0.87 U (0.25)	0.85 U (0.25)	0.81 U (0.25)	1.31 U (0.31)	1.2 U (0.3)	310
DDEs (4,4' isomer)*	0.87 U (0.25)	0.87 U (0.25)	0.81 U (0.25)	1.3 U (0.31)	1.2 U (0.3)	21
DDTs (4,4' isomer)*	0.87 U (0.25)	0.85 U (0.25)	0.81 U (0.25)	1.3 U (0.31)	1.2 U (0.3)	100
Dieldrin	0.87 U (0.4)	0.85 U (0.4)	0.81 U (0.4)	1.3 U (0.5)	1.2 U (0.48)	4.9

* The 2018 SEF summations for DDx include both the 2,2' and 4,4' isomers, but only the 4,4' isomers were reported in 2013; U = non-detection at method reporting limit (method detection limit included).

4.0 CONCLUSIONS

This 2013 evaluation followed procedures set forth in the 2009 SEF which is the regional implementation manual for federal guidance on dredged material evaluations in the Ocean Testing Manual (Corps 1991) and Inland Testing Manual (Corps 2003). The SEF was developed jointly with regional federal and state agencies to address Clean Water Act and Marine Protection Research and Sanctuaries Act compliance associated with dredging and dredged material management in the Pacific Northwest. The Corps compared the results to the 2018 SEF SLs for the specific contaminants analyzed as they are the most recent standards.

The analytical results for metals and pesticides are far below 2018 SEF SLs for both detections and non-detections with sufficiently low method reporting limits. As such, the surface sediments of the reservoirs would likely be suitable for unconfined aquatic placement without further testing.

The post-dredge surface material is inferred to be suitable as well since there are no known events which would have contributed CoCs at concentrations that would exceed the SEF freshwater SLs. Comparisons between analytical results from Green Peter and downstream Foster Reservoirs do not indicate an apparent difference or trend of contaminant levels, suggesting Green Peter Reservoir is not a potential source of contaminants to Foster Reservoir.

The reservoirs may have been designated as “very low” management ranking due to the fact the waterbodies are not near sources of contamination. The data recency is valid for 10 years from the date of sampling (expired September 2023).

5.0 REFERENCES

U.S. Army Corps of Engineers (Corps), U.S. Environmental Protection Agency. 1991. *Evaluation of Dredged Material Proposed for Ocean Disposal – Testing Manual* (referred to as "Green Book"). February 1991.

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Corps, U.S. Environmental Protection Agency, Washington Department of Ecology, Washington Department of Natural Resources, Oregon Department of Environmental Quality, Idaho Department of Environmental Quality, National Marine Fisheries Service, and U.S. Fish and Wildlife Service. 2018. *Sediment Evaluation Framework for the Pacific Northwest*. 183 pp with Appendices. May 2018.

Figure 1. Green Peter and Foster Sampling Stations – 2013