

Fred Bullen

May 5, 2017

Western Pacific Marine Ltd.

7721 Upper Balfour Rd

Balfour, BC. V0G 1C0

Re: Balfour Osprey 2000 Gear Oil Spill – Water/Sand Quality Update – May 5 2017

Water

Water quality samples were taken at seven sites on April 26, 2017 following the gear oil spill from the Balfour Osprey 2000 that occurred on April 15, 2017 (Table 1, Figure 1, Photos 1 - 9). Analytical services were provided by Caro Analytical in Richmond, BC. Samples were taken from the top 10 – 20 cm of the water column and included surface water. Samples were analyzed for light extractable petroleum hydrocarbons (LEPH) and heavy extractable petroleum hydrocarbons (HEPH). Results are presented in Attachment 1.

Water samples collected from Site 4 had detectable levels of HEPH (average 2870 µg/L). Site 4 is 2 m from shore immediately downstream from the first marina dock and oil film is observed in this area of quiet water. Detected levels of HEPH were also observed at this location on April 19. For all other samples analyzed, results for all parameters tested were below detection limits (Attachment 1).

Sand

Nine sand samples were collected from along the beach on April 21, 2017. Composite samples were collected from an area within 1.5 m above the water level, where the product has generally observed during SCAT surveys. Sample naming corresponds to the sections of beach originally delineated during the SCAT surveys. Analytical services were provided by Caro Analytical in Richmond, BC. Samples were analyzed for light extractable petroleum hydrocarbons (LEPH), heavy extractable petroleum hydrocarbons (HEPH), and polycyclic aromatic hydrocarbons (PAH). All analytes in all samples were lower than the corresponding detection limits.

Product recovered from Osprey 2000 drive.

410 L of oil/water were recovered from the drive after the unit had been removed from the Osprey 2000 and stored in two 55 gal drums. Samples from both drums were collected and analysed by CARO Analytical in Richmond, BC to estimate the percentage of oil present. Approximately 60% (250 L) of the oil/water mixture is oil.

Table 1. Water quality sampling sites.

Site	Location	UTM (11 U)	April 16	April 17	April 19	April 26	Comment
1	Balfour Beach Hotel Marina dock	503300 5496802		X	X	X	350 m upstream of ferry terminal. Sample taken 2 m from shore on d/s side of boat launch dock.
2	Dock 'n' Duck Dock	502962 5496842		X	X	X	At Dock n' Duck pub dock within terminal bay. Sampled on u/s side of dock 2 m from shore.
3	First Marina End	502711 5496703	X	X	X	X	200 m d/s. At the end of first marina dock.
4	First Marina Beach	502697 5496768		X	X	X	2 m from shore immediately d/s from first marina dock.
5	Balfour Wharf Government Dock End	502534 5496670		X	X	X	450 m d/s. Balfour Wharf at end of government dock on u/s corner.
6	Balfour Wharf Government Beach	502515 5496714		X	X	X	450 m d/s. Balfour Wharf 2 m from shore on u/s side of government dock.
7	Black Angus Farm	501065 5496461		X	X	X	1.8 km d/s of terminal on private land at West Arm pinch point.

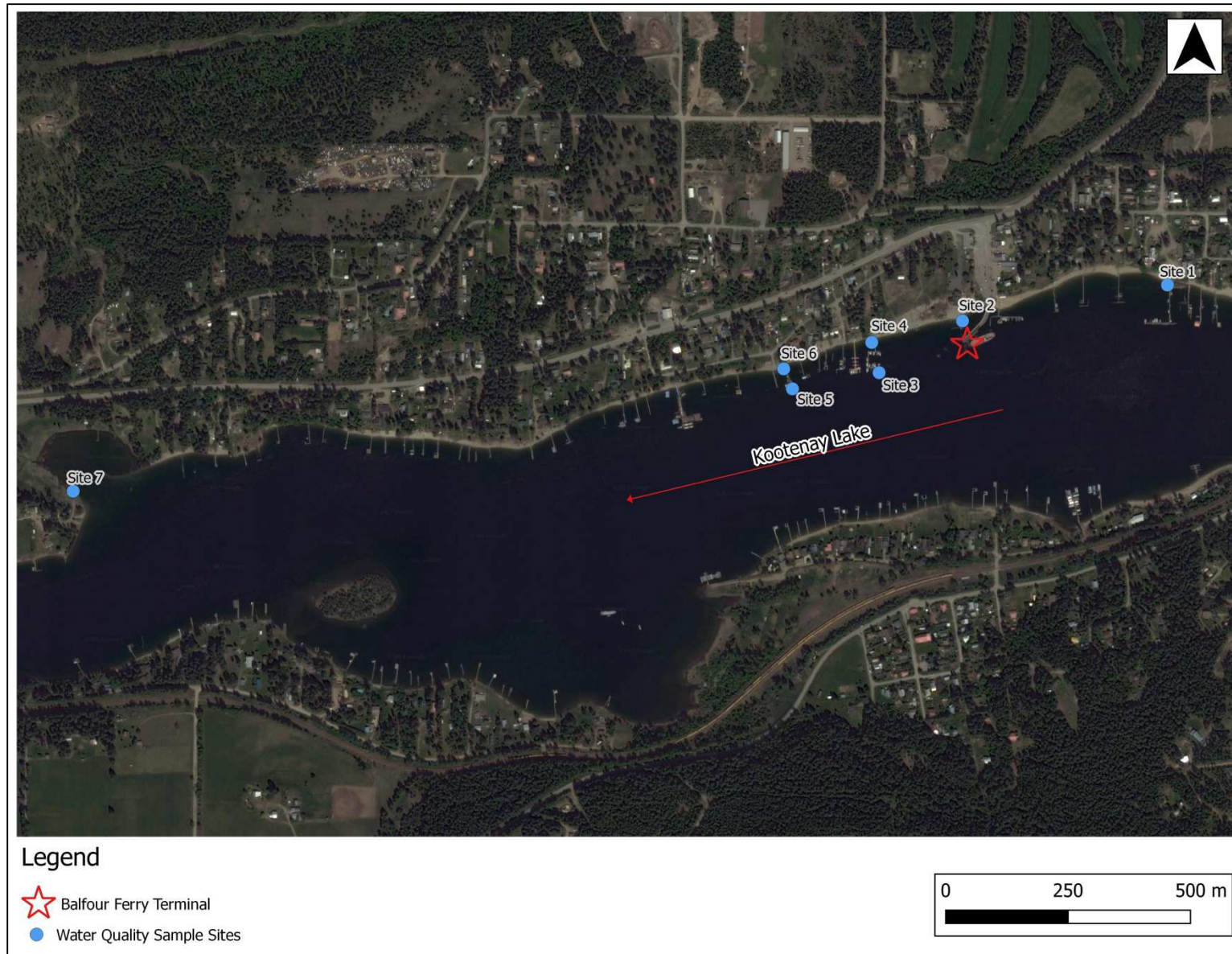
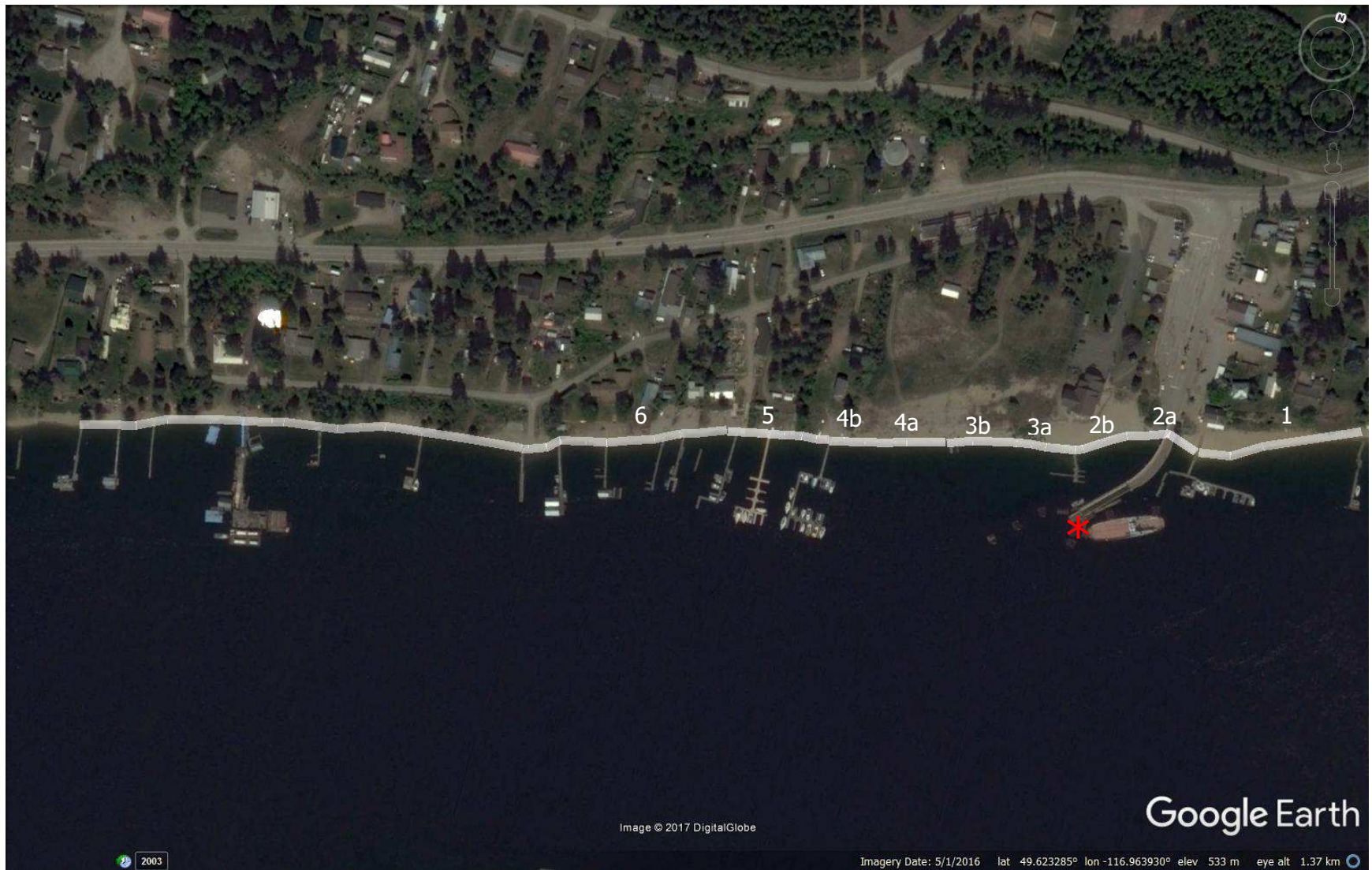


Figure 1. Water quality sites



Location of sand samples



Photo 1. Site 1 - Balfour Beach Hotel Marina dock.



Photo 2. Site 2 - Dock 'n' Duck Dock.



Photo 3. Site 3 - First Marina End.



Photo 4. Site 4 - First Marina Beach



Photo 5. Site 5 - Balfour Wharf Government Dock End.



Photo 6. Site 6 - Balfour Wharf Government Beach



Photo 7. Site 7 - Black Angus Farm.

If you have any questions or comments please feel free to contact us.

Sincerely,

Ico de Zwart, RPBio

Masse Environmental Consultants

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Attachment 1
Water/Sand Quality Data

Water Data

Site ID			Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Site 4 (Dup)
LAB ID			7041878-01	7041878-02	7041878-03	7041878-04	7041878-05	7041878-06	7041878-07	7041878-08
CLIENT ID			BBI	Rec Beach	Moore 1 End	Moore 1 End	Gov Dock End	Gov Dock Beach	Black Angus	Moore 1 End
DATE SAMPLED			2017-04-26	2017-04-26	2017-04-26	2017-04-26	2017-04-26	2017-04-26	2017-04-26	2017-04-26
DATE RECEIVED			2017-04-27	2017-04-27	2017-04-27	2017-04-27	2017-04-27	2017-04-27	2017-04-27	2017-04-27
Analyte	Units	RDL	Water	Water	Water	Water	Water	Water	Water	Water
EPHw10-19	ug/L	250	<250	<250	<250	<250	<250	<250	<250	<250
EPHw19-32	ug/L	250	<250	<250	<250	3250	<250	<250	<250	2490

Sand (Soil) Quality Data

Site ID			S1	S2a	S2b	S3a	S3b	S4a	S4b	S5	S6
LAB ID			7041879-01	7041879-02	7041879-03	7041879-04	7041879-05	7041879-06	7041879-07	7041879-08	7041879-09
CLIENT ID			Section 1	Section 2 u/s	Section 2 d/s	Section 3 u/s	Section 3 d/s	Section 4 u/s	Section 4 d/s	Section 5	Section 6
DATE SAMPLED			2017-04-21	2017-04-21	2017-04-21	2017-04-21	2017-04-21	2017-04-21	2017-04-21	2017-04-21	2017-04-21
DATE RECEIVED			2017-04-27	2017-04-27	2017-04-27	2017-04-27	2017-04-27	2017-04-27	2017-04-27	2017-04-27	2017-04-27
Analyte	Units	RDL	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Moisture	% wet	0.1	21.9	21	21.8	20.1	18.9	15.5	14.5	17.8	17.5
EPHs10-19	mg/kg	50	<50	<50	<50	<50	<50	<50	<50	<50	<50
EPHs19-32	mg/kg	50	<50	<50	<50	<50	<50	<50	<50	<50	<50
LEPHs	mg/kg	50	<50	<50	<50	<50	<50	<50	<50	<50	<50
HEPHs	mg/kg	50	<50	<50	<50	<50	<50	<50	<50	<50	<50
Acenaphthene	mg/kg	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Acenaphthylene	mg/kg	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Anthracene	mg/kg	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benz(a)anthracene	mg/kg	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(a)pyrene	mg/kg	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(b)fluoranthene	mg/kg	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(b+j)fluoranthene	mg/kg	0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Benzo(g,h,i)perylene	mg/kg	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(k)fluoranthene	mg/kg	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Chrysene	mg/kg	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Dibenz(a,h)anthracene	mg/kg	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Fluoranthene	mg/kg	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Fluorene	mg/kg	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Naphthalene	mg/kg	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Phenanthrene	mg/kg	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Pyrene	mg/kg	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

Composition of Oil/Water recovered from drive

Sample	Drum 1-1	Drum1-2	Drum 2-1	Drum 2-2
Oil (%)	62	60.8	59.6	59.6
Water (%)	38	39.2	40.4	40.4