

**Proposed Westham Island Canoe Pass Tidal Marsh Project  
 Boat and Standwatch Surveys: Waterbirds – 2013 and 2014**

<b>Report Date</b>	July 7, 2014
<b>Survey Dates &amp; Times</b>	<p><b><u>Boat Surveys</u></b></p> <p><b>Date:</b> April 24, 2013  <b>Sunrise/Sunset:</b> 06:03/20:19 (<a href="http://www.nrc-cnrc.gc.ca/eng/services/sunrise/">http://www.nrc-cnrc.gc.ca/eng/services/sunrise/</a>)  <b>Survey Time:</b> 14:12 – 14:30</p> <p><b>Date:</b> May 6, 2013  <b>Sunrise/Sunset:</b> 05:42/20:37 ( <a href="http://www.nrc-cnrc.gc.ca/eng/services/sunrise/">http://www.nrc-cnrc.gc.ca/eng/services/sunrise/</a>)  <b>Survey Time:</b> 13:00 – 13:25</p> <hr/> <p><b><u>Standwatch Surveys</u></b></p> <p><b>Date:</b> May 5, 2014  <b>Sunrise/Sunset:</b> 05:44/20:35(<a href="http://www.nrc-cnrc.gc.ca/eng/services/sunrise/">http://www.nrc-cnrc.gc.ca/eng/services/sunrise/</a>)  <b>Survey Time:</b> 15:35 – 19:26</p> <p><b>Date:</b> May 6, 2014  <b>Sunrise/Sunset:</b> 05:42/20:37 ( <a href="http://www.nrc-cnrc.gc.ca/eng/services/sunrise/">http://www.nrc-cnrc.gc.ca/eng/services/sunrise/</a>)  <b>Survey Time:</b> 15:00 – 18:42</p> <p><b>Date:</b> May 7, 2014  <b>Sunrise/Sunset:</b> 05:41/20:38 ( <a href="http://www.nrc-cnrc.gc.ca/eng/services/sunrise/">http://www.nrc-cnrc.gc.ca/eng/services/sunrise/</a>)  <b>Survey Time:</b> 15:40 – 19:36</p>
<b>Weather &amp; Tidal Conditions</b>	<p><b><u>Boat Surveys</u></b></p> <p><b>April 24, 2013</b></p> <p>Based on climate data from Vancouver Island International Airport, the survey was conducted under cloudy skies, with wind speeds of approximately 12 km/hr, and an approximate temperature of 14 °C. (<a href="http://climate.weather.gc.ca/climateData/hourlyData_e.html?timeframe=1&amp;Prov=BC&amp;StationID=889&amp;hlyRange=1953-01-01 2013-06-13&amp;Year=2013&amp;Month=4&amp;Day=24">http://climate.weather.gc.ca/climateData/hourlyData_e.html?timeframe=1&amp;Prov=BC&amp;StationID=889&amp;hlyRange=1953-01-01 2013-06-13&amp;Year=2013&amp;Month=4&amp;Day=24</a>)</p> <p>The survey was conducted during a rising tide. Based on the Sand Heads tidal predictions, a low tide of 1.4 m above chart datum occurred at 11:14, rising to a high tide of 4.1 m above chart datum at 17:59. (<a href="http://www.waterlevels.gc.ca/eng/station?type=0&amp;date=2013%2F04%2F24&amp;sid=7594&amp;tz=PDT&amp;pres=1">http://www.waterlevels.gc.ca/eng/station?type=0&amp;date=2013%2F04%2F24&amp;sid=7594&amp;tz=PDT&amp;pres=1</a>)</p>

<b>Weather &amp; Tidal Conditions</b>	<p><b>May 6, 2013</b></p> <p>Based on climate data from Vancouver International Airport, the survey was conducted under clear skies, with wind speeds of approximately 9 km/hr, and an approximate temperature of 21 °C. (<a href="http://climate.weather.gc.ca/climateData/hourlydata_e.html?timeframe=1&amp;Prov=BC&amp;StationID=889&amp;hlyRange=1953-01-01%7C2013-06-13&amp;Year=2013&amp;Month=5&amp;Day=6">http://climate.weather.gc.ca/climateData/hourlydata_e.html?timeframe=1&amp;Prov=BC&amp;StationID=889&amp;hlyRange=1953-01-01%7C2013-06-13&amp;Year=2013&amp;Month=5&amp;Day=6</a>)</p> <p>The survey was conducted during rising tide. Based on the Sand Heads tidal predictions, a low tide of 1.6 m above chart datum occurred at 10:17, rising to a high tide of 3.7 m above chart datum at 16:51. (<a href="http://www.waterlevels.gc.ca/eng/station?type=0&amp;date=2013%2F05%2F06&amp;sid=7594&amp;tz=PDT&amp;pres=1">http://www.waterlevels.gc.ca/eng/station?type=0&amp;date=2013%2F05%2F06&amp;sid=7594&amp;tz=PDT&amp;pres=1</a>)</p>
	<p><b>Standwatch Surveys</b></p> <p><b>May 5, 2014</b></p> <p>The survey was conducted under clear skies, and with wind speeds ranging from 1 to 2 on the Beaufort Wind Scale (1 – 11 km/hr). Based on climate data from Vancouver International Airport, the average temperature was approximately 14 °C. (<a href="http://climate.weather.gc.ca/climateData/hourlydata_e.html?timeframe=1&amp;Prov=BC&amp;StationID=51442&amp;hlyRange=2013-06-11%7C2014-06-11&amp;Year=2014&amp;Month=5&amp;Day=5">http://climate.weather.gc.ca/climateData/hourlydata_e.html?timeframe=1&amp;Prov=BC&amp;StationID=51442&amp;hlyRange=2013-06-11%7C2014-06-11&amp;Year=2014&amp;Month=5&amp;Day=5</a>)</p> <p>The survey was conducted during falling, low, and rising tides. Based on the Sand Heads tidal predictions, a high tide of 3.4 m above chart datum occurred at 09:13, falling to a low tide of 1.6 m above chart datum at 16:20, rising again to a high tide of 4.3 m at 00:17 of the following day, May 6, 2014. (<a href="http://www.waterlevels.gc.ca/eng/station?type=0&amp;date=2014%2F05%2F05&amp;sid=7594&amp;tz=PDT&amp;pres=1">http://www.waterlevels.gc.ca/eng/station?type=0&amp;date=2014%2F05%2F05&amp;sid=7594&amp;tz=PDT&amp;pres=1</a>)</p> <p><b>May 6, 2014</b></p> <p>The survey was conducted under slightly overcast skies and with wind speeds of 1 the Beaufort Wind Scale (1 – 5 km/hr). Based on climate data from Vancouver International Airport, the average temperature was approximately 14 °C. (<a href="http://climate.weather.gc.ca/climateData/hourlydata_e.html?timeframe=1&amp;Prov=BC&amp;StationID=51442&amp;hlyRange=2013-06-11%7C2014-06-11&amp;cmdB1=Go&amp;Year=2014&amp;Month=5&amp;Day=6">http://climate.weather.gc.ca/climateData/hourlydata_e.html?timeframe=1&amp;Prov=BC&amp;StationID=51442&amp;hlyRange=2013-06-11%7C2014-06-11&amp;cmdB1=Go&amp;Year=2014&amp;Month=5&amp;Day=6</a>)</p> <p>The standwatch survey was conducted during falling, low, and rising tide. Based on the Sand Heads tidal predictions, a high tide of 3.2 m above chart datum occurred at 10:19, falling to a low tide of 1.9 m above chart datum at 17:08, rising again to a high tide of 4.2 m at 01:01 on the following day, May 7, 2014. (<a href="http://www.waterlevels.gc.ca/eng/station?type=0&amp;date=2014%2F05%2F06&amp;sid=7594&amp;tz=PDT&amp;pres=1">http://www.waterlevels.gc.ca/eng/station?type=0&amp;date=2014%2F05%2F06&amp;sid=7594&amp;tz=PDT&amp;pres=1</a>)</p> <p><b>May 7, 2014</b></p> <p>The survey was conducted under clear skies, and with wind speeds ranging from 1 to 2 on the Beaufort Wind Scale (1 – 11 km/hr). Based on climate data from Vancouver International Airport, the average temperature was approximately 16 °C. (<a href="http://climate.weather.gc.ca/climateData/hourlydata_e.html?timeframe=1&amp;Prov=BC&amp;StationID=51442&amp;hlyRange=2013-06-11%7C2014-06-11&amp;cmdB1=Go&amp;Year=2014&amp;Month=5&amp;Day=7">http://climate.weather.gc.ca/climateData/hourlydata_e.html?timeframe=1&amp;Prov=BC&amp;StationID=51442&amp;hlyRange=2013-06-11%7C2014-06-11&amp;cmdB1=Go&amp;Year=2014&amp;Month=5&amp;Day=7</a>)</p> <p>The survey was conducted during falling, low, and rising tides. Based on the Sand Heads tidal predictions, a high tide of 3.0 m above chart datum occurred at 11:53, falling to a low tide of 2.1 m above chart datum at 18:03, rising again to a high tide of 4.1 m at 01:40 of the following day, May 8, 2014. (<a href="http://www.waterlevels.gc.ca/eng/station?type=0&amp;date=2014%2F05%2F07&amp;sid=7594&amp;tz=PDT&amp;pres=1">http://www.waterlevels.gc.ca/eng/station?type=0&amp;date=2014%2F05%2F07&amp;sid=7594&amp;tz=PDT&amp;pres=1</a>)</p>

<b>Survey Areas</b>	<p>Port Metro Vancouver's (PMV's) Habitat Enhancement Program – Westham Tidal Marsh, Delta, BC.</p> <p>The proposed enhancement site is located on the north bank of Canoe Pass, on the south side of Westham Island. The proposed enhancement area is approximately 550 m long (west to east) and 200 m wide (north to south). The entire Canoe Pass area was assessed on 2 separate days in 2013. During spring of 2014, a total of four smaller survey areas were assessed on 3 consecutive days, including the enhancement area and three adjacent reference sites of a relatively similar size (one upstream and two downstream of proposed enhancement site).</p>
<b>Survey Team</b>	<p>Rena Mackas (2014 standwatch surveys) and Toby St. Clair (2013 boat surveys), Biologists (Hemmera)</p>
<b>Scope of Work</b>	<p>The proposed project will involve converting an existing unvegetated intertidal area (predominantly sandflat) into a more productive brackish marsh, thereby improving the overall productivity of the site. This will be accomplished through construction of a containment berm followed by the placement of fill material to the appropriate elevation for the establishment of intertidal marsh vegetation. The Project will result in the creation of approximately 40,200 m<sup>2</sup> (4.0 ha) of high-quality intertidal marsh habitat.</p> <p>Boat surveys of Canoe Pass were conducted on April 24 and May 6, 2013 as part of a larger survey effort to monitor waterbird usage of habitats within the Fraser River Estuary.</p> <p>Standwatch bird surveys were conducted from May 4-6, 2014 to further document pre-restoration avian use of the proposed project site and adjacent areas. These surveys build upon previous overwintering bird surveys conducted in the latter part of winter 2013/14 (January 31 to March 31, 2014).</p> <p>Both the boat and standwatch surveys were intentionally conducted during the northward shorebird (specifically Western Sandpiper) migration period. The surveys focused on use of the area by waterbirds (i.e., shorebirds, waterfowl, and wading birds); however, additional avian species were also documented: In the 2013 boat surveys, all raptor species interacting with the intertidal zone and marsh were also recorded. For the 2014 standwatch surveys, all avian species interacting with the restoration and reference sites were documented.</p>
<b>Survey Methods</b>	<p>Two different types of surveys are reported within this summary, previous boat surveys (2013) and standwatch surveys (2014):</p> <p><b><u>Boat Surveys (April 24 and May 6, 2013):</u></b></p> <p>A single observer conducted approximately 25-minute long surveys from a motorboat as it was piloted through Canoe Pass. During the 2013 boat surveys, the north side of Canoe Pass was surveyed as an entire site (<b>Figure 2</b>). As a result, these surveys did not differentiate between the proposed enhancement site and adjacent areas.</p> <p><b><u>Standwatch Surveys (May 4 – 6, 2014):</u></b></p> <p>A single observer conducted 30-minute long standwatches at the proposed restoration site and three reference sites in the Canoe Pass area (<b>Figure 1</b>). Standwatches were conducted from the dike located on the south side of Canoe Pass, which ranges approximately 200 to 300 m from the survey areas. On each survey date, a total of six standwatches were completed, with the proposed enhancement site and one reference</p>

<p><b>Survey Methods</b></p>	<p>site being surveyed twice (two 30-minute intervals) <b>(Table 1)</b>.</p> <p>Binoculars and a spotting scope were used to identify birds near or interacting with the survey areas. For each bird documented, the following information was recorded: species, and number. During the standwatch surveys, time of observation, and behavior(s) were also recorded. If the surveyor was unable to identify a bird to species during surveys, the bird was identified to the most specific species group such as unknown duck, or “peep” (Least Sandpiper (<i>Calidris minutilla</i>), Western Sandpiper (<i>Calidris mauri</i>), or Semipalmated Sandpiper (<i>Calidris pusilla</i>)).</p> <p>There is some potential during standwatch surveys to miss some birds or record some of the same birds more than once. However, most of the waterbirds observed remained still or slow-moving during surveys, and were thus able to be counted relatively accurately. Although these surveys may not provide the absolute total count of birds occupying the sites, it is expected that they still provide a relatively accurate indication regarding the level of use by waterbirds.</p> <p>For the sake of data presentation/analyses, bird species were grouped into six species groups: Gull and Terns, Herons, Raptors, Shorebirds (dunlin, peeps, killdeer and dowitchers), Waterfowl (ducks, geese, and swans), and Other.</p>
<p><b>Results</b></p>	<p>A brief summary of results are described below. For detailed survey results, see <b>Tables 2-5</b>.</p> <p>The majority of observations during the 2013 boat surveys were Shorebirds, followed by Waterfowl (<b>Table 2, Figure 3</b>). The highest number of shorebirds observed in Canoe Pass was 1,500, on April 24 (roughly even number of Dunlin and Western Sandpiper). Detailed notes were not taken which describe the location of shorebirds during these surveys, but the surveyor recalls that most shorebirds were present west of the area surveyed during the standwatch surveys.</p> <p>The majority of observations during the 2014 standwatch surveys were Waterfowl, followed by Shorebirds (<b>Tables 3-5</b>). Within the proposed enhancement site, the species group with the highest number of birds observed per hour of observation was Waterfowl (n=53), followed by Shorebirds (n=8) and Herons (n=7). The highest number of shorebirds observed per hour was at <i>Reference-Downstream-West</i> (n=53). Comparing all four sites, the total number of birds observed per hour decreased from west to east, with the highest numbers observed at the <i>Reference Downstream-West</i>, and the lowest numbers observed at the <i>Reference Upstream</i> survey area.</p>
<p><b>Summary &amp; Recommendations</b></p>	<p>Unvegetated flats within the proposed enhancement site are predominantly sand, similar to the <i>Reference-Upstream</i> survey area. In contrast, the flats overlapping with <i>Reference Downstream - East</i> and <i>Reference Downstream-West</i> survey areas appear to be characterized more by finer silts (mud). Given these general differences, it has been previously anticipated that shorebird habitat values would be higher downstream than within the proposed enhancement site. These survey efforts, including both the 2013 boat surveys and the more recent standwatch surveys, appear to confirm this.</p> <p>Regarding the 2014 observations, it appears likely that these standwatch surveys did not capture the peak northward migration period of Western Sandpipers. Data from other Hemmera field studies conducted in the Roberts Bank area in 2014 suggest that peak northward migration likely occurred during the week previous to the standwatch surveys. Hemmera field studies conducted in the Roberts Bank area in the previous two years have documented peak southward migration of Western Sandpiper to occur</p>

<b>Summary &amp; Recommendations</b>	between July 7 to 21 (adults) and August 18 to September 10 (juveniles). If feasible, it is recommended that additional standwatch surveys be conducted during the southward migration period, to further characterize the bird habitat values associated with this project.
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**Table 1.** Dates of surveys conducted at Canoe Pass/ South Westham Island during 2013 boat surveys and 2014 standwatch surveys; Delta, BC.

Site	Date	Observation Period(s)
Canoe Pass (Boat Survey)	Apr-24-2013	14:12 - 14:30
	May-06-2013	13:00 - 13:25
Proposed Enhancement Site (Standwatch Surveys)	May-05-2014	16:17 - 16:47
		18:20 - 18:50
	May-06-2014	16:25 - 16:55
		17:35 - 18:05
	May-07-2014	15:50 - 16:10
		18:00 - 18:30
Reference Upstream (Standwatch Surveys)	May-05-2014	15:35 - 16:05
		18:56 - 19:26
	May-06-2014	17:00 - 17:30
	May-07-2014	18:36 - 19:06
Reference Downstream - East (Standwatch Surveys)	May-05-2014	16:55 - 17:25
	May-06-2014	15:41 - 16:11
		16:14 - 16:44
Reference Site - Downstream - West (Standwatch Surveys)	May-07-2014	17:28 - 17:58
		17:35 - 18:05
	May-05-2014	15:00 - 15:30
Reference Site - Downstream - West (Standwatch Surveys)	May-06-2014	18:12 - 18:42
	May-07-2014	16:51 - 17:21

**Table 2.** Species observed in Canoe Pass during the April 24 and May 6, 2013 boat surveys; Delta, BC.

Date	Species Group	Common Name	Latin Name	Abundance of Species	Abundance of Species Group
April-24-13	Gull and Terns	Gull species	-	40	40
	Raptors	Northern Harrier	<i>Circus cyaneus</i>	1	1
	Shorebirds	Dunlin	<i>Calidris alpina</i>	885	1,500
		Western Sandpiper	<i>Calidris mauri</i>	615	
	Waterfowl	American Widgeon	<i>Anas americana</i>	30	650
		Brant	<i>Branta bernicla</i>	20	
Unknown Waterfowl		-	600		
May-06-13	Gull and Terns	Gull species	-	2	2
	Herons	Great Blue Heron	<i>Ardea herodias</i>	6	6
	Shorebirds	Dunlin	<i>Calidris alpina</i>	40	384
		Western Sandpiper	<i>Calidris mauri</i>	344	
	Waterfowl	American Widgeon	<i>Anas americana</i>	45	222
		Duck Species	-	100	
		Green-winged Teal	<i>Anas crecca</i>	44	
		Mallard	<i>Anas platyrhynchos</i>	12	
Mute Swan		<i>Cygnus olor</i>	1		
Northern Shoveler	<i>Anas clypeata</i>	20			

**Table 3.** Species observed during May 5, 2014 standwatch survey of South Westham Island ; Delta, BC.

Site	Pass	Species Group	Common Name	Latin Name	Behaviour	Abundance of Species	Abundance of Species Group
Proposed Enhancement Site	1	Herons	Great Blue Heron	<i>Ardea herodias</i>	perched on piling	1	1
		Raptors	Bald Eagle	<i>Haliaeetus leucocephalus</i>	flyover, flapping, standing	2	2
		Waterfowl	Duck species	-	flyover	1	1
	2	Herons	Great Blue Heron	<i>Ardea herodias</i>	flyover, flapping, landing	11	11
		Shorebirds	Killdeer	<i>Charadrius vociferus</i>	flyover	1	1
		Waterfowl	Duck species	-	flyover	4	8
			Mallard	<i>Anas platyrhynchos</i>	feeding, swimming	2	
Red-breasted Merganser	<i>Mergus serrator</i>		Feeding, swimming	2			
Reference Upstream	1	Herons	Great Blue Heron	<i>Ardea herodias</i>	standing, hunting, being harrassed	6	6
		Raptors	Bald Eagle	<i>Haliaeetus leucocephalus</i>	flyover, standing, hunting	2	2
		Waterfowl	Canada Goose	<i>Branta canadensis</i>	Feeding, swimming	2	10
			Green-winged Teal	<i>Anas crecca</i>	flapping, feeding, swimming	7	
			Northern Shoveler	<i>Anas clypeata</i>	being harassed, swimming	1	
			Gull and Terns	Gull species	-	flyover	
	2	Herons	Great Blue Heron	<i>Ardea herodias</i>	standing, hunting	6	6
		Shorebirds	Killdeer	<i>Charadrius vociferus</i>	feeding, walking	3	3
		Waterfowl	Gadwall	<i>Anas strepera</i>	preening, feeding	2	2
Reference Downstream - East	1	Shorebirds	Killdeer	<i>Charadrius vociferus</i>	flyover, feeding, walking	3	18
			Peep	-	feeding, flapping	15	
		Waterfowl	American Wigeon	<i>Anas americana</i>	loafing/resting, standing	22	51
			Green-winged Teal	<i>Anas crecca</i>	loafing/resting, feeding, walking	27	
			Northern Shoveler	<i>Anas clypeata</i>	loafing/resting, standing	2	
Reference Downstream - West	1	Shorebirds	Least Sandpiper	<i>Calidris minutilla</i>	feeding, flapping	4	58
			Western Sandpiper	<i>Calidris mauri</i>	feeding, flapping	54	
		Waterfowl	American Wigeon	<i>Anas americana</i>	loafing/resting, standing	42	48
			Green-winged Teal	<i>Anas crecca</i>	loafing/resting, standing	4	
			Mallard	<i>Anas platyrhynchos</i>	Standing, swimming	2	

**Table 4.** Species observed during May 6, 2014 standwatch survey of South Westham Island; Delta, BC.

Site	Pass	Species Group	Common Name	Latin Name	Behaviour	Abundance of Species	Abundance of Species Group
Proposed Enhancement Site	1	Herons	Great Blue Heron	<i>Ardea herodias</i>	standing	1	1
		Waterfowl	American Wigeon	<i>Anas americana</i>	loafing/resting	12	43
			Cinnamon Teal	<i>Anas cyanoptera</i>	loafing/resting	1	
			Duck species	-	flyover	2	
			Gadwall	<i>Anas strepera</i>	loafing/resting	2	
			Green-winged Teal	<i>Anas crecca</i>	loafing/resting, walking	8	
			Northern Shoveler	<i>Anas clypeata</i>	loafing/resting, feeding, swimming	14	
	Red-breasted Merganser	<i>Mergus serrator</i>	Feeding, swimming	4			
	2	Shorebirds	Killdeer	<i>Charadrius vociferus</i>	standing	1	3
		Waterfowl	Peep	-	feeding	2	15
			American Wigeon	<i>Anas americana</i>	loafing/resting, swimming, flapping	8	
			Gadwall	<i>Anas strepera</i>	flapping, loafing/resting	2	
			Green-winged Teal	<i>Anas crecca</i>	standing	1	
			Northern Shoveler	<i>Anas clypeata</i>	loafing/resting	2	
Red-breasted Merganser	<i>Mergus serrator</i>	Feeding, swimming	2				
Reference Upstream	1	Herons	Great Blue Heron	<i>Ardea herodias</i>	standing	4	4
		Raptors	Bald Eagle	<i>Haliaeetus leucocephalus</i>	hunting, standing	1	1
		Shorebirds	Killdeer	<i>Charadrius vociferus</i>	preening	1	13
			Peep	-	standing, feeding	12	
		Waterfowl	Canada Goose	<i>Branta canadensis</i>	Walking, swimming	5	8
			Gadwall	<i>Anas strepera</i>	loafing/resting	2	
			Mallard	<i>Anas platyrhynchos</i>	landing, feeding	1	
		Gull and Terns	Gull species	-	walking	1	1
Other	Northwestern Crow	<i>Corvus caurinus</i>	harassing another, standing	2	2		
Reference Downstream - East	1	Herons	Great Blue Heron	<i>Ardea herodias</i>	standing	2	2
		Raptors	Bald Eagle	<i>Haliaeetus leucocephalus</i>	flyover, circling	3	3
		Waterfowl	Green-winged Teal	<i>Anas crecca</i>	feeding, loafing/resting, swimming	12	23
			Mallard	<i>Anas platyrhynchos</i>	feeding	2	
			Northern Shoveler	<i>Anas clypeata</i>	loafing/resting	7	
			Red-breasted Merganser	<i>Mergus serrator</i>	feeding, swimming	2	
Reference Downstream - West	1	Herons	Great Blue Heron	<i>Ardea herodias</i>	standing, hunting	6	6
		Shorebirds	Peep	-	flapping	25	25
		Waterfowl	Mallard	<i>Anas platyrhynchos</i>	feeding	2	3
			Red-breasted Merganser	<i>Mergus serrator</i>	feeding, swimming	1	
	Gull and Terns	Gull species	-	flyover	2	2	
	2	Shorebirds	Peep	-	flyover (flock of 20), feeding (4)	24	24
		Waterfowl	Gadwall	<i>Anas strepera</i>	loafing/resting	2	10
			Green-winged Teal	<i>Anas crecca</i>	loafing/resting	5	
Mallard			<i>Anas platyrhynchos</i>	Feeding, standing, swimming	3		

**Table 5.** Species observed during May 7, 2014 standwatch survey of South Westham Island; Delta, BC.

Site	Pass	Species Group	Common Name	Latin Name	Behaviour	Abundance of Species	Abundance of Species Group
Proposed Enhancement Site	1	Hérons	Great Blue Heron	<i>Ardea herodias</i>	standing, hunting	9	9
		Raptors	Bald Eagle	<i>Haliaeetus leucocephalus</i>	standing	1	1
		Shorebirds	Dowitcher species	-	feeding, preening, walking	6	6
		Waterfowl	Duck species	-	flyover	11	38
			Gadwall	<i>Anas strepera</i>	flapping	2	
			Green-winged Teal	<i>Anas crecca</i>	Flapping, swimming	8	
			Northern Shoveler	<i>Anas clypeata</i>	standing	16	
	Red-breasted Merganser	<i>Mergus serrator</i>	standing, preening	1			
	Gull and Terns	Gull species	-	Standing, swimming	3	3	
	2	Hérons	Great Blue Heron	<i>Ardea herodias</i>	standing	1	1
		Shorebirds	Dowitcher species	-	feeding	4	14
			Killdeer	<i>Charadrius vociferus</i>	standing	1	
			Peep	-	feeding, flapping	9	
		Waterfowl	Canada Goose	<i>Branta canadensis</i>	standing	1	54
Cinnamon Teal			<i>Anas cyanoptera</i>	loafing/resting, standing	1		
Duck species			-	flyover	25		
Green-winged Teal	<i>Anas crecca</i>		loafing/resting, standing	12			
Mallard	<i>Anas platyrhynchos</i>	flyover	1				
Northern Shoveler	<i>Anas clypeata</i>	loafing/resting, standing	14				
Reference Upstream	1	Hérons	Great Blue Heron	<i>Ardea herodias</i>	standing, hunting	5	5
		Shorebirds	Peep	-	feeding	4	4
		Waterfowl	Gadwall	<i>Anas strepera</i>	Feeding, swimming	2	4
			Red-breasted Merganser	<i>Mergus serrator</i>	Feeding, swimming	2	
Reference Downstream - East	1	Hérons	Great Blue Heron	<i>Ardea herodias</i>	flapping, feeding	3	3
		Shorebirds	Killdeer	<i>Charadrius vociferus</i>	feeding, standing	1	1
		Waterfowl	Bufflehead	<i>Bucephala albeola</i>	swimming	3	32
			Cinnamon Teal	<i>Anas cyanoptera</i>	flapping, standing	1	
			Gadwall	<i>Anas strepera</i>	feeding, walking	2	
			Green-winged Teal	<i>Anas crecca</i>	feeding, swimming, standing	23	
			Northern Shoveler	<i>Anas clypeata</i>	flapping, feeding	2	
	Red-breasted Merganser	<i>Mergus serrator</i>	swimming	1			
	Gull and Terns	Gull species	-	hunting, flapping	3	3	
	2	Raptors	Bald Eagle	<i>Haliaeetus leucocephalus</i>	landing, standing	2	2
		Shorebirds	Killdeer	<i>Charadrius vociferus</i>	landing, standing	2	2
		Waterfowl	Bufflehead	<i>Bucephala albeola</i>	swimming	3	33
			Duck species	-	flyover	6	
			Gadwall	<i>Anas strepera</i>	swimming	4	
Green-winged Teal			<i>Anas crecca</i>	standing, taking off	20		
Gull and Terns		Gull species	-	flyover	1	1	
Reference Downstream - West	1	Hérons	Great Blue Heron	<i>Ardea herodias</i>	flyover, standing, hunting	2	2
		Raptors	Bald Eagle	<i>Haliaeetus leucocephalus</i>	soaring	2	2
		Waterfowl	Duck species	-	flyover	38	42
			Gadwall	<i>Anas strepera</i>	standing	2	
			Mallard	<i>Anas platyrhynchos</i>	swimming, feeding	2	



### Figures

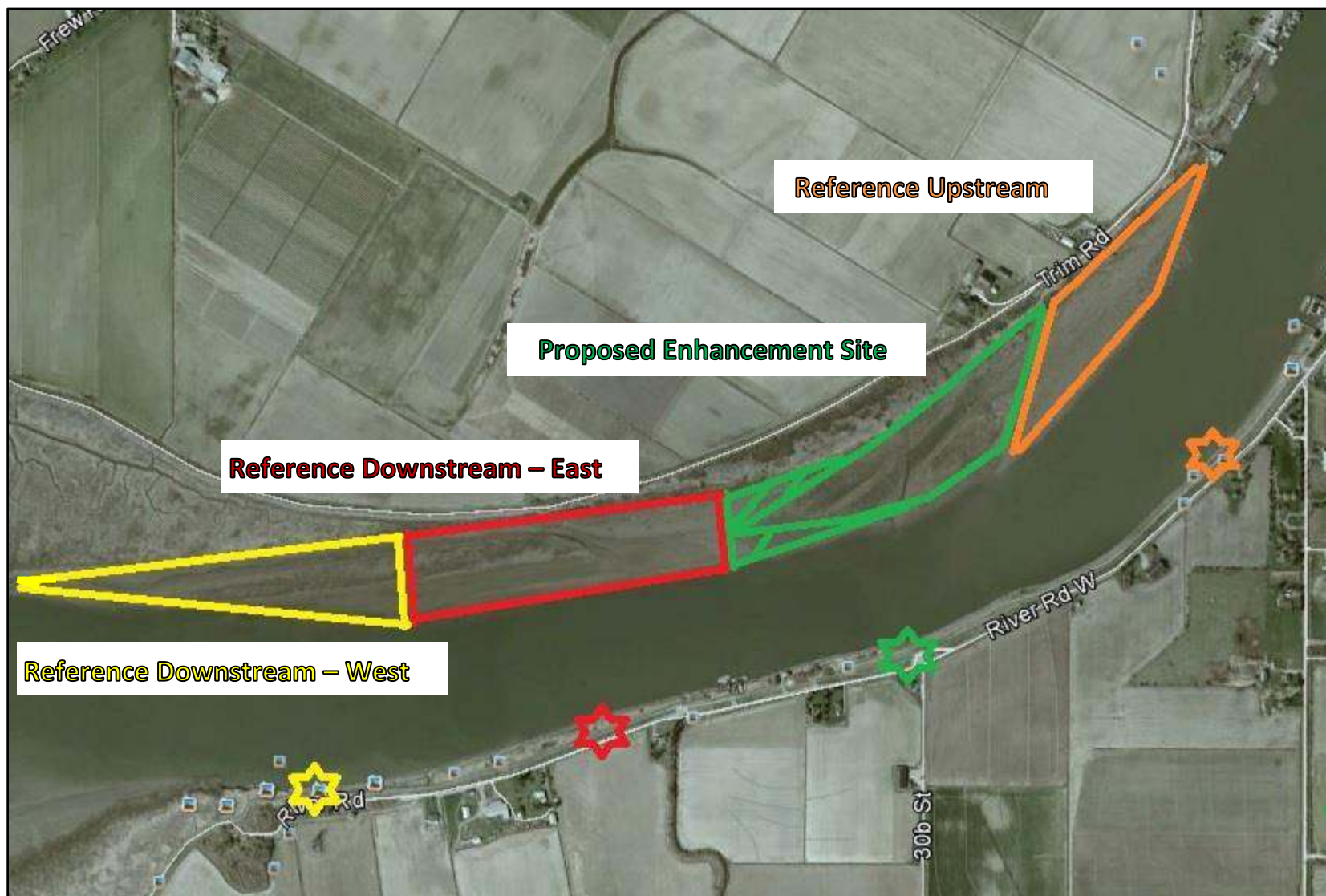
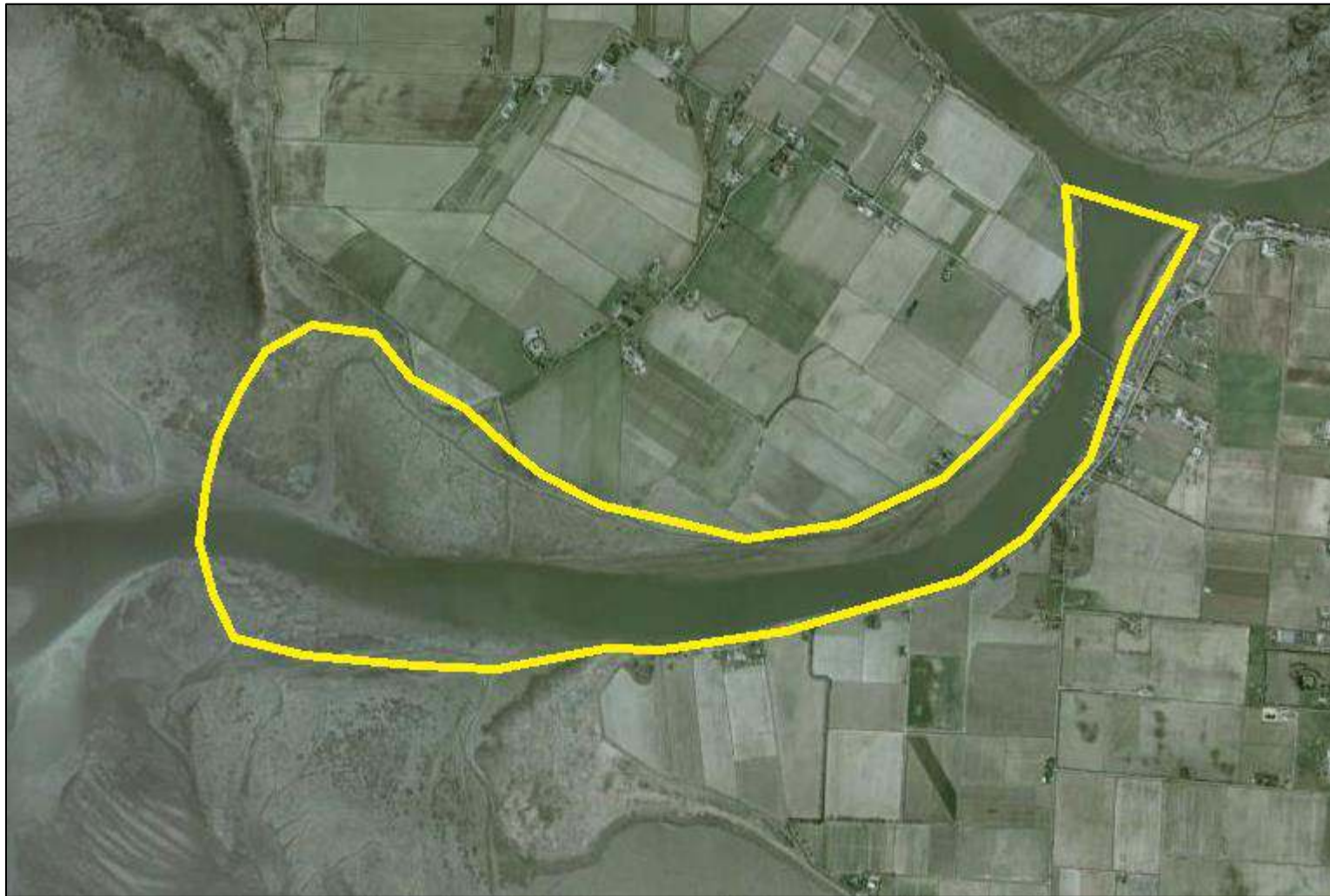
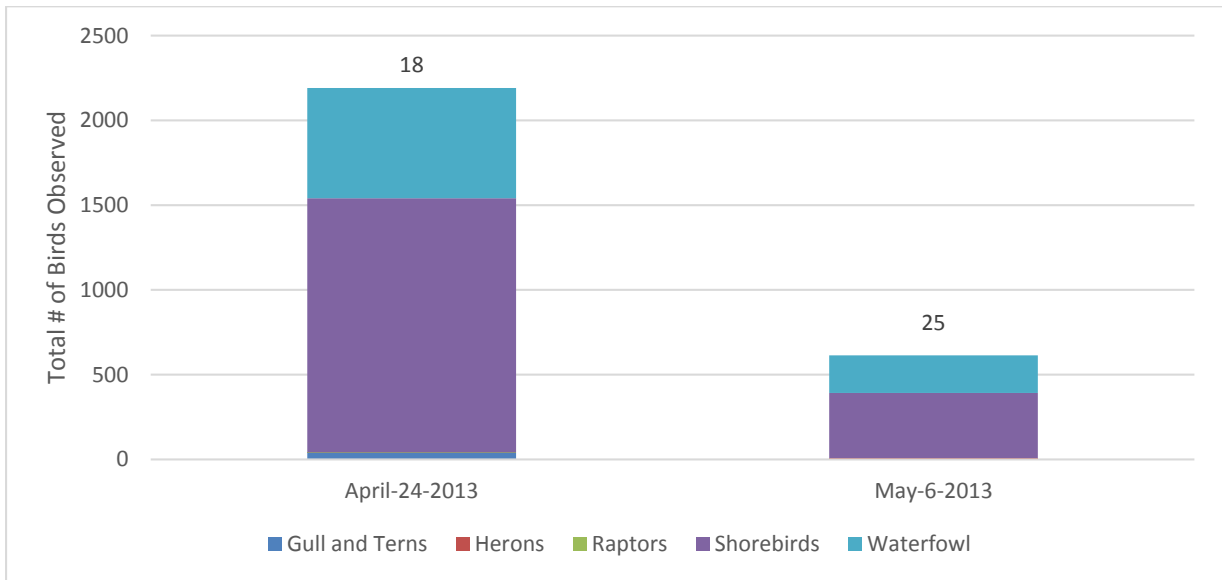


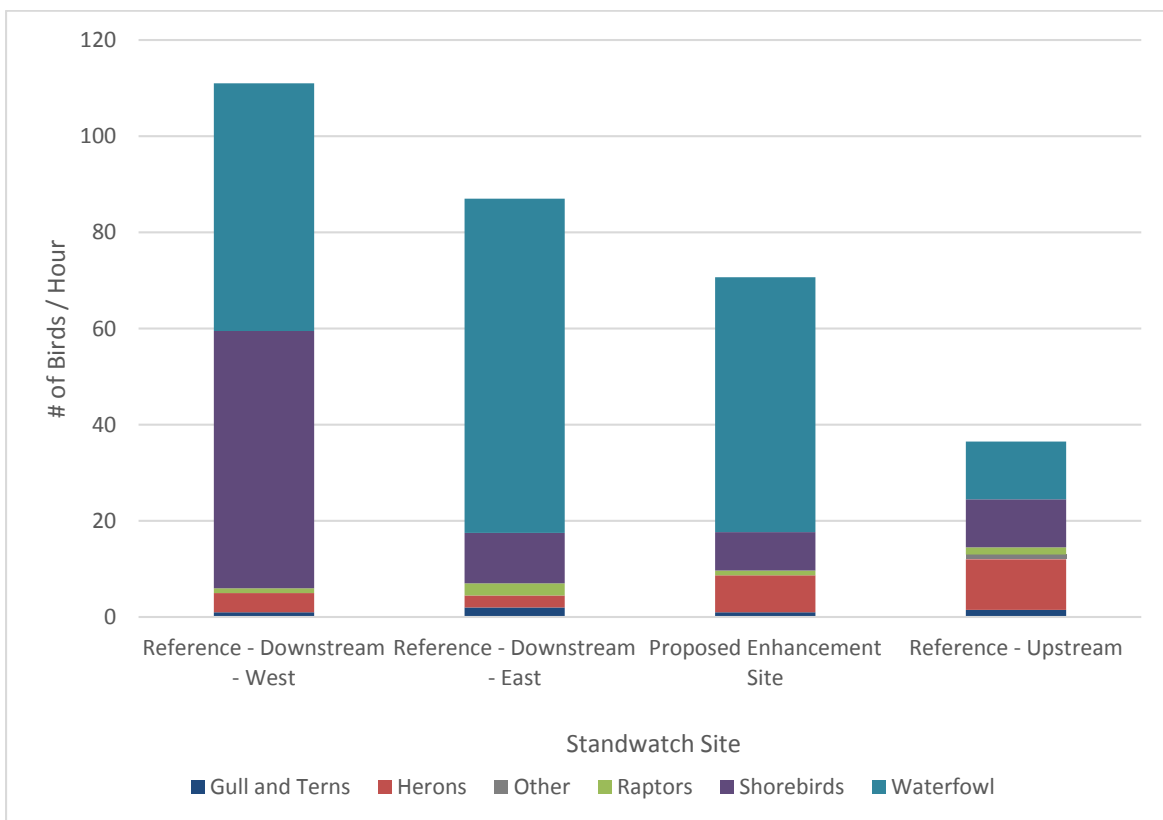
Figure 1. South Westham Island areas assessed during the May 5, 6 and 7, 2014 standwatch surveys; Delta, BC. Stars indicate the approximate location of where the surveyor conducted standwatches.



**Figure 2.** Approximate area of Canoe Pass surveyed during the April 24 and May 6, 2013 boat surveys; Delta, BC.



**Figure 3.** Abundance of Species Groups observed during 2013 boat surveys of Canoe Pass; Delta, BC. The duration of surveys (minutes) are indicated above the bar for the corresponding date.



**Figure 4.** Abundance of Species Groups observed per hour during 2014 standwatch surveys of South Westham Island; Delta, BC.