



**Niblett Environmental Associates Inc.**  
Biological Consultants

January 19, 2012

**Re: Lizard Creek 2011 Fall Salmonid Spawning Assessment Results**

NEA is pleased to submit the results of the MNR endorsed *2011 Fall Salmonid Spawning Assessment Protocol- Lizard Creek* survey, dated Aug 12, 2011. Salmon spawning was observed in the lower reach of Lizard Creek (Reach 1) and downstream of the HWY 17 bridge in the Serpent River.

The following information was gathered to support the Lizard Creek Hydropower Project agency meeting discussion on January 24, 2012.

If you have any questions prior to the meeting please feel free to contact the office.

Sincerely,

A handwritten signature in cursive script that reads "Amanda Smith".

Amanda Smith  
Fisheries Biologist,  
Niblett Environmental Associates  
Phone (705) 878-9399 ext. 204

## **2011 FALL SALMONID SPAWNING ASSESSMENT SURVEY RESULTS**

### **1.0 Introduction**

The spawning assessment was conducted in selected reaches of Lizard Creek and the Serpent River. The survey included two assessment methods, visual observation and egg collection, to determine the presence/absence of spawning salmonids. Visual observation surveys monitored for spawning indicators, such as: the presence of adult fish, the occurrence of active spawning (fish present on redds) and signs that spawning had taken place (spawning depressions or redds). The egg collection surveys will determine the presence/absence of active spawning in Lizard Creek.

### **2.0 Site Location:**

Assessments were conducted in two (2) areas (Figure 1).

1. Lizard Creek: Reach 1, entire reach
2. Serpent River, first barrier south of Handispot Road bridge to Hwy 17 to the east end of the island.

### **3.0 Survey Methods:**

Detailed survey methods have been provided in the Final 2011 Fall Salmonid Spawning Assessment Protocol Lizard Creek, dated August 11, 2011.

#### **3.1 Assessment Schedule**

Visual observation and egg collection commenced when fall water temperatures of the Serpent River ranged between 20-10°C (Scott and Crossman 1973). A liberal timing widow was applied for Chinook and Pink salmon since spawning periods were unknown in the watershed. All assessments stopped when the water temperature fell below 7°C or when high flows created unsafe working conditions.

The Serpent River and Lizard Creek water temperatures were monitoring by LCPI multiple times per week to ensure the start of the spawning timing window was not missed. NEA staff began the survey August 12<sup>th</sup>, making subsequent surveys on August 19, September 8, September 22/23, October 06/07, and finalizing the survey on November 4. Survey highlights have been described in Table 1.

Table 1. Survey observation highlights.

Date	Observation
Aug 12	7 of 8 egg traps installed in Lizard Creek
Sept 8	8 <sup>th</sup> egg trap installed in Lizard Creek
Sept 22/23	Temp loggers installed in Lizard Creek, Grassy Lake and Serpent River
Sept 30	Salmon observed in Serpent River below Handispot bridge chutes
Oct 11	Salmon observed in Lizard Creek
Oct 18	Spawning confirmed in Lizard Creek. Salmon eggs collected. Spawning confirmed in Serpent River.
Oct 30	Spawning period ended in Lizard Creek, last individual observed on Oct 27.

### Spawning Habitat Description

#### Available Habitat:

Two areas were identified as suitable salmon spawning habitat within Lizard Creek, located upstream of Serpent River and downstream of the proposed trailrace (Figure 1). In each of the potential spawning areas 4 egg baskets were installed (for location see Figure 1 Egg Trap 1 and Egg Trap 2) from August 12 to November 4. The available spawning habitat has been described in Table 2.

Table 2. Available salmon spawning habitat description (for locations see Figure 1 Egg Trap 1 and Egg Trap 2).

	Egg Trap 1	Egg Trap 2
<b>Area (m<sup>2</sup>)</b>	59.15	97.85
<b>Length (m)</b>	16.25	19.65
<b>Avg. Width (m)</b>	3.64	4.98
<b>Substrate Composition (%)</b>	80% Cobble 10% Gravel 10 % Sand	90% Cobble 5% Gravel 5 % Sand

#### Utilized Spawning Habitat:

Chinook salmon spawning was confirmed on October 18<sup>th</sup> when a redd, 4 adults, and 2 eggs were observed around the Egg Trap Area 2. The redd attributes and observations have been provided in Table 2 and 3 respectively. For redd location see L2 on Figure 1. Chinook salmon spawn in fall when water temperatures decrease from 20-7°C. However, Lizard Creek populations were found to spawn when water temperatures decreased from 13-8°C.

Table 2. Lizard Creek redd attributes, observed Oct 18 (for location see L2 on Figure 1).

<b>Lizard Creek Redd</b>	
<b>Area (m<sup>2</sup>)</b>	6.0
<b>Length (m)</b>	4
<b>Avg. Width (m)</b>	1.5
<b>Substrate Composition (%)</b>	90% Cobble, 5% Gravel, 5 % Sand
<b>Location description</b>	u/s extent was bellow a pool and d/s boundary was top of a riffle bar.

Table 3. All observations at Lizard Creek redd (for location see L2 on Figure 1).

<b>Date</b>	<b># of salmon</b>	<b>Water Temp (°C)</b>	<b>Lizard Creek Flows (cms)</b>	<b>Local Depth (m)</b>	<b>Local Velocity Avg/Max (mps)</b>
<b>Oct 11/11</b>	4	12.9	0.26	-	-
<b>Oct 12/11</b>	4	13	0.117	-	-
<b>Oct 15/11</b>	3	12.2	0.095	-	-
<b>Oct 18/11</b>	4	8.6	--	U/S: 0.12 D/S: 0.15	U/S: 0.14/0.2 D/S: 0.3/0.21
<b>Oct 20/11</b>	2	<b>NEA logger</b>	0.198	-	-
<b>Oct 23/11</b>	2	<b>NEA logger</b>	3.95	-	-
<b>Oct 27/11</b>	1	7.9	3.49	U/S: 0.5 D/S: 0.55	U/S: 0.75/-- D/S: 1.6/--
<b>Oct 30/11</b>	1	7.9	3.49	-	-
<b>Nov 4/11</b>	0	6.3	>3.49	-	-

Table 4. All Lizard Creek spawning indicator observations. See Figure 1 for site code locations.

Site Code	Date	Spawning Indicator	Habitat Type	Substrate Composition (%)	Water Temp (°C)	Depth (m)	Local Velocity Avg/Max (mps)
L1	Oct 18	2 adult Chinook, ~40-50 cm TL. Observed resting above red. Slow behavior suggests post spawn individuals. Individuals had extensive tail rot and fungal growth. In egg trap site	Pool	80% Cobble 20% Gravel	8.0	1-2	--
L2	Oct 18	1 Chinook redd (1.5m x 4 m). No adults observed directly on redd 2 salmon eggs collected	Run, bottom of pool, top of riffle	90% Cobble 10% Gravel	8.0	U/S: 0.17 D/S: 0.12	U/S: 0.14/0.2 D/S: 0.3/0.21
	Oct 11,12,15, 20, 23,26	1-4 salmon observed in site vicinity			13-8.0	--	--
L3	Oct 18	Trial redd (1.5m x 0.5m) of cleaned gravel. Very shallow, no adults observed. Determined to be abandoned on last field visit.	Riffle	80% Cobble 20% Gravel	8.1	0.27	0.08/0.1
L4	Oct 18	2 adult Chinook observed resting in Egg Trap 2 site. Individuals in good physical condition, no rot or fungus.	Pool – resting under bank	80% Cobble 20% Gravel	8.1	0.5-0.8	--

Table 5. All Serpent River spawning indicator observations. See Figure 1 for site code locations.

Site Code	Date	Spawning Indicator	Habitat Type	Substrate Composition (%)	Water Temp (°C)	Depth (m)	Local Velocity Avg/Max (mps)
S1	Oct 7	1 redd (1.5m x 3m) 5 adult Chinook male and female spawning on redd. 1 adult Chinook staging d/s of chute. All fish in good physical condition.	Bottom of pool top of chutes	80% Cobble/gravel mix 20% Embedded boulders	14.4	0.5-0.8	--
	Oct 19	4 adult Chinook in area and 1 adult on redd. No new redds. All fish in good physical condition.			10.5	.700	0.31/0.40
S2	Oct 7	2 adult Chinook moving through pool/run, potentially staging.	Run/Pool	50% Silt/Sand 50% Embedded Boulders	14.6	1-4	--
	Oct 19	1 adult Chinook carcass, eaten/decomposing on exposed boulder.	--	--	--	--	--
S3	Oct 7	2 redds (3mx0.5m) side by side across gravel bar. 3-4 Adult Chinook Salmon, male and female spawning on redds. All fish is good physical condition.	Cobble Bar/Riffle	100% uniform cobble	14.6	0.33	--
	Oct 19	No adults observed. No new redds or spawning activity.			10.4	0.69	0.1/0.2
S4	Oct 7	4 redds [3 (1m x 0.5m ) and 1 (2mx3m)] 2 Adult Chinook 1 Pink Salmon (not on redd spooked through	Bottom of pool top of riffle.	50% Cobble/Gravel 25% Sand 25% embedded	14.7	0.53	--

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		site)		boulders			
	Oct 19	1 adult Chinook, darting through site No spawning activity No new redds since Oct 7 <sup>th</sup> visit			10.3	0.64	0.56/0.60
S5	Sept 30	1 salmon bottom of chutes, staging. (6-7lb) 2 smaller salmon at bottom chute	Rapids	100% bedrock outcropping	15.0	--	--
	Oct 7	1 adult Pink salmon (51cm TL) 1 adult Chinook salmon NEA staff creel survey with anglers. Confirmed salmon present above and below chutes.			14.4	--	--
S6	Oct 7	1 adult Chinook carcass with 3 lamprey scars (71cm TL). No clips or fin clips.	Pool	80% silt/sand 20% aquatic vegetation	14.4	0.5	--

**Additional Data:** Additional baseline information related to fall salmonid spawning will be provided in full within the Lizard Creek Hydropower Baseline Document.

Additional data will include:

- Survey photographs from spawning assessment
- Thermal data (hourly) during spawning assessment.
- Lizard Creek system flow data during spawning assessment

**Potential Impacts:**

Of the four spawning indicator sites, L2 was identified as sensitive habitat susceptible to adverse impacts caused by the proposed hydrogenating project (Table 6). Fall salmon spawning should be monitored annually. If salmon do not spawn in Reach 1 within a given year then operational mitigation should not apply for that given year.

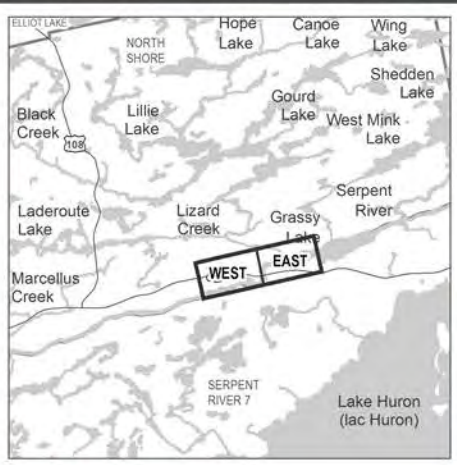
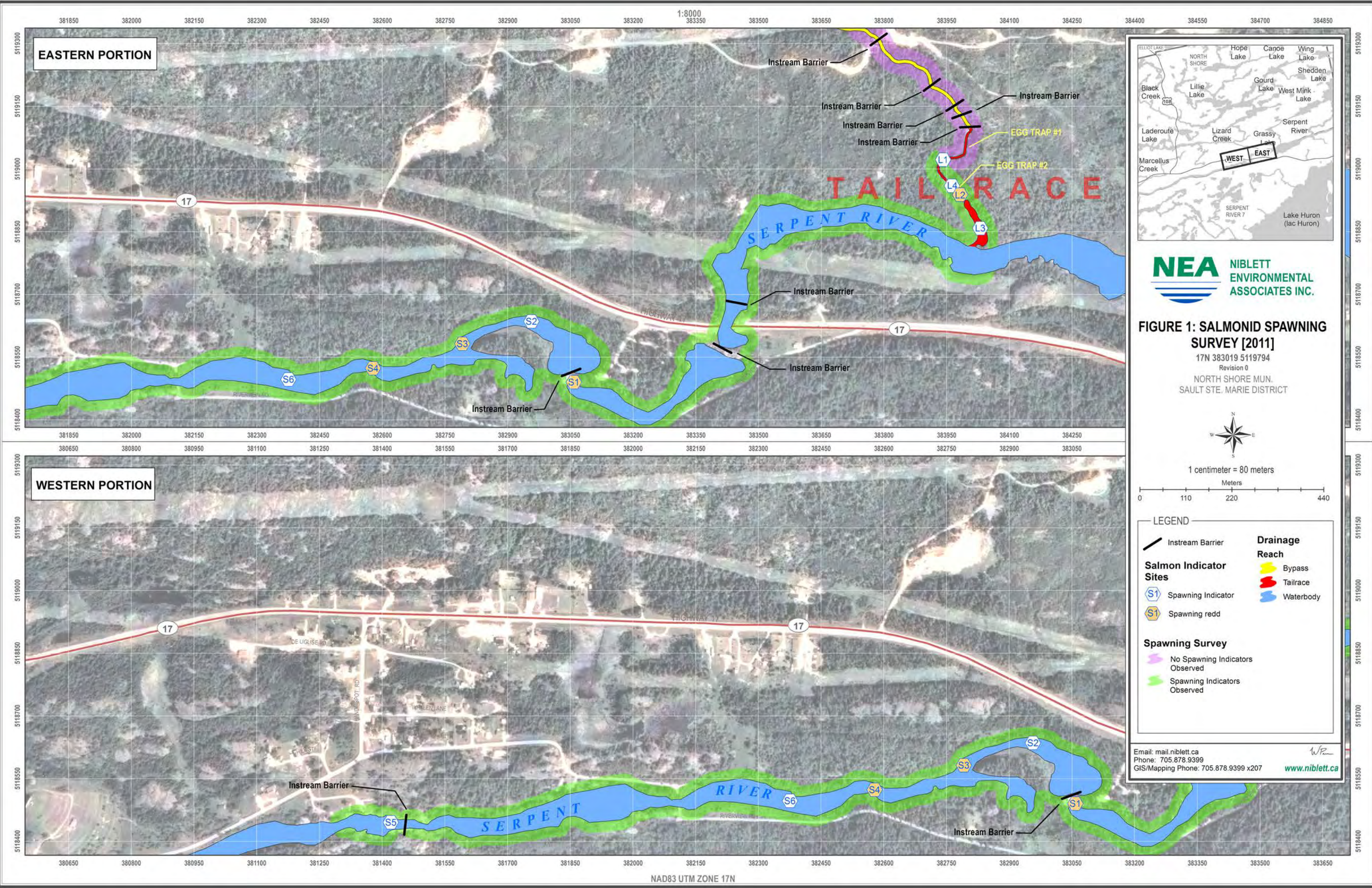
Table 6. Potential Impacts to Lizard Creek Chinook salmon spawning area (L2) below proposed powerhouse.

Activity	Impact	Mitigation	Net Effect
Alteration of natural flow regime	Change in flows post spawning, altering salmon spawning cues	The operational plan should allow the natural incoming flows to exist below the powerhouse when fall water temperatures decrease to 15°C. Natural flows should be maintained until water temperatures decrease to 6°C. A buffer of 2°C on either side of the known spawning temperature should compensate for annual variance. The buffer will be verified based on post construction monitoring results. In summary, Chinook spawning temperature window is suggested from 15-6°C The plant should not be turned on/off within the spawning temperature window. Sudden changes in water levels effect salmon spawning cues and their selection of spawning sites.	None-low
	Change in available spawning habitat area	Maintain wetted width During the spawning temperature window the water depth should stay within 0.10 – 0.7m. During the spawning temperature	None-low



		<p>window the local velocity should be stabilized, relative to incoming flows. Flows may range between 0.1-1.0m/sec.</p>	
	<p>Changes to flows during incubation and development.</p>	<p>-Maintain wetted width and minimum water depth of 0.1m -avoid sudden water depth and velocity changes daily.</p> <p>Chinook salmon eggs spend the fall and winter buried in the red (nest). They turn into fry and leave the spawning site in the spring. To protect fertilized eggs and developing young, unnatural fluctuation of water levels should be minimized over the winter and early spring. Any changes in water depth or velocity should occur slowly over multiple days.</p> <p>Temperature for Chinook emergence is unknown for Lake Huron populations. Specifics should be determined at the permitting stage.</p>	<p>Low : Duration of TBD during permitting/approval stage</p>
	<p>Impacts to overwintering embryos</p>	<p>To ensure the eggs do not freeze or suffocate over the winter and early spring, a minimum local water depth should be established with MNR to maintain over the spawning area when available in the system.</p>	<p>Low</p>

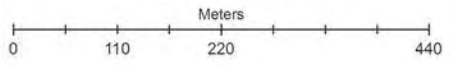
Fall salmon spawning should be monitored annually. If salmon do not spawn in Reach 1 within a given year then operational mitigation should not apply for that given year.



**FIGURE 1: SALMONID SPAWNING SURVEY [2011]**  
 17N 383019 5119794  
 Revision 0  
 NORTH SHORE MUN.  
 SAULT STE. MARIE DISTRICT



1 centimeter = 80 meters



**LEGEND**

Instream Barrier	<b>Drainage Reach</b>
Spawning Indicator	Bypass
Spawning redd	Tailrace
No Spawning Indicators Observed	Waterbody
Spawning Indicators Observed	

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