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NORTHERN PIKE SURVEY IN EAGLE RIVER FLATS, JOINT BASE ELMENDORF-RICHARDSON, ALASKA, 2016

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Introduction

Planning for the Otter Lake Salmon Restoration Project began in the spring of 2011. The restoration was to occur in two steps. The first step was to remove invasive northern pike (*Esox lucius*) from Otter Lake, and the second step was to make the lake accessible to both adult and juvenile salmon. Step one was completed in October 2015 when Otter Lake was treated with rotenone to remove invasive northern pike. However, before step one was completed, a pike was spotted in Otter Creek at the tree line of Eagle River Flats (ERF). This posed the question as to whether or not pike were utilizing the roughly 17.2 acres of water found in the southeast corner of ERF. Prior to step two, Joint Base Elmendorf-Richardson (JBER) was asked by the Alaska Department of Fish and Game (ADF&G) to investigate the area in ERF for the presence of pike. In order to meet this request, JBER conducted an Environmental DNA (eDNA) analysis in October 2015, before treatment, and again in May of 2016 with the help from the U.S. Army's Engineer Research and Development Center (ERDC).The draft results from the 2015 eDNA sampling event showed no positive hits for pike within ERF. Since eDNA is relatively new, ADF&G requested that gillnetting also take place in ERF as a second detection method for pike. The analysis from the spring 2016 eDNA sampling was not complete by the time gillnetting occurred.

Objective

To detect the presence or absence of northern pike in the southeast corner of ERF.

Study Site

JBER is a military installation encompassing 73,013 acres in southcentral Alaska, adjacent to Anchorage and the town of Eagle River (Figure 1). The Knik Arm of Cook Inlet borders the northwest side of the installation, and Chugach State Park lies to the south and southeast. The town of Eagle River lies along the northeast border. Anchorage and Cook Inlet form the western boundary.

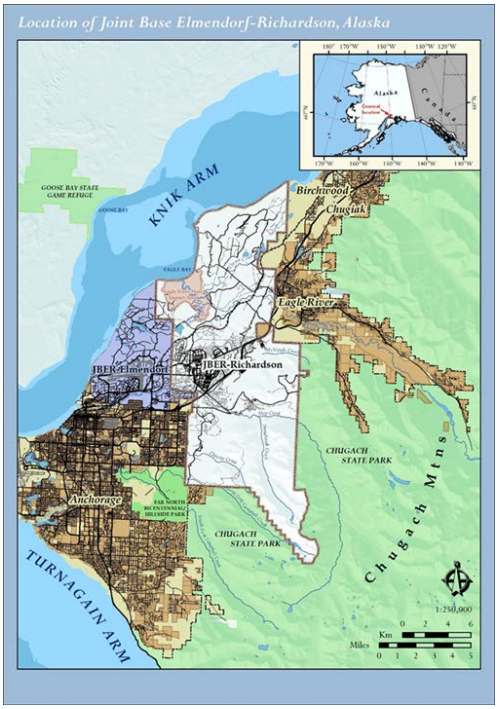

Figure 1. Location of JBER, Alaska.

ERF Impact Area is located on JBER, centered at latitude 61° 19.05’ N and longitude 149° 43.56’ W (Figure 2). Glacially-fed Eagle River flows through ERF before discharging into Eagle Bay of the Knik Arm in Upper Cook Inlet. ERF, at the outflow of Eagle River along the coast of Eagle Bay, is about 1.6 miles wide and gradually narrows inland for approximately 2.6 miles upriver from the mouth. ERF has been used since the 1940s as an impact area, but because ERF is off-limits to the public, no development has occurred, preserving much of the ecosystem.

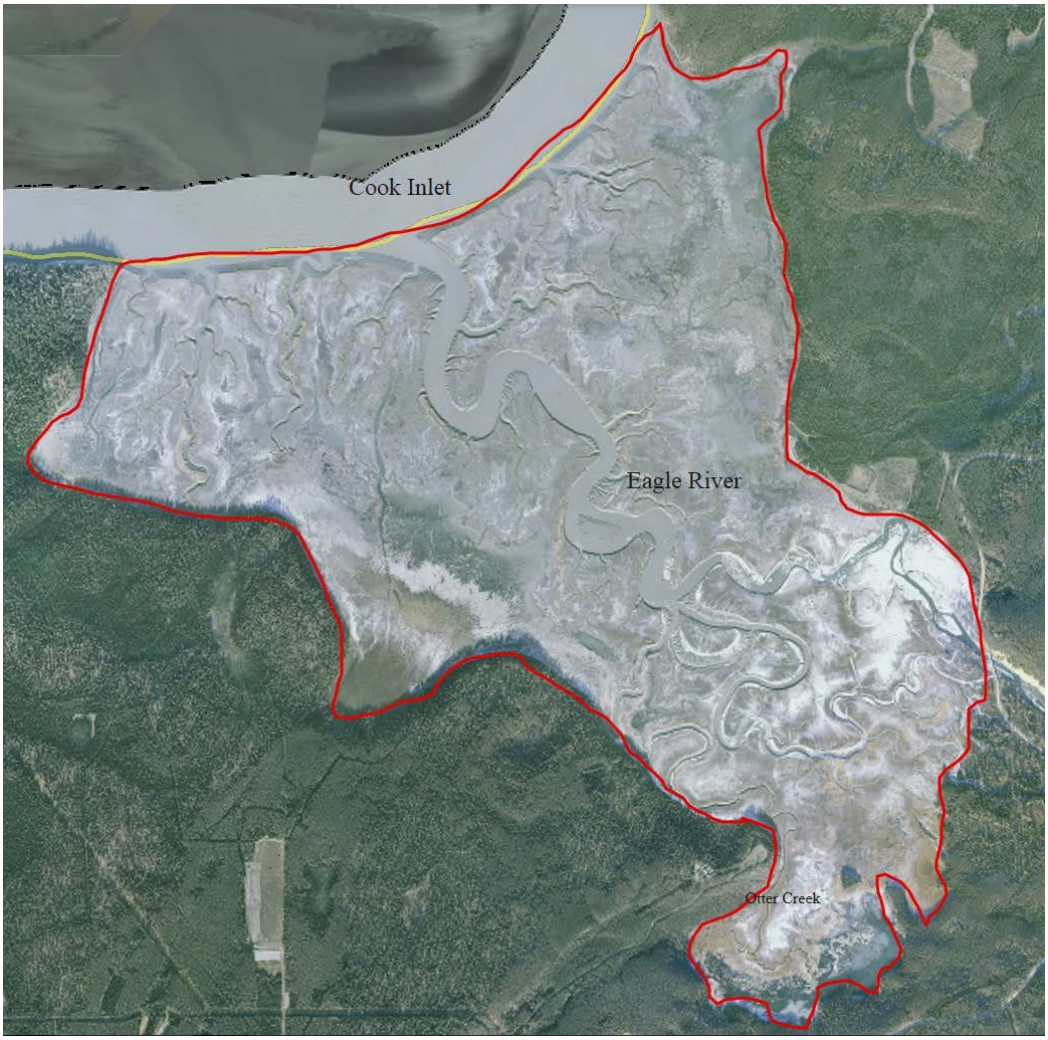

Figure 2. Aerial view of Eagle River Flats outlined in red.

ERF has been characterized into seven major physiographic zones. Physiographic zones include: Coastal (littoral coastline of ERF along Eagle Bay), Riverine (Eagle River and banks), Mudflat/Tidal Gully (silt-covered mudflats directly bordering Eagle River and along the coast), Interior Lowland (well vegetated, low embayment occupying southern 30% of ERF), Sedge Meadow (narrow band of continuous sedge meadow between mudflats along river and pond/marsh), Pond/March (area of lower elevation along the middle and outer edges of ERF, characterized by permanently inundated pounds and associated marches) and Border (abrupt upland border of ERF) (Racine and Brouillette 1995).

A complex interaction of physical forces acts on ERF, including those exerted by a high tidal range, glaciofluvial influences from Eagle River, sedimentation from turbid waters of Knik Arm and Eagle River, and the subarctic coastal climate of southcentral Alaska (Lawson et al.1996). Anthropogenic

influences on ERF include military training, both historic (Army artillery impact area since 1949) and current (winter firing of artillery into flats), as well as activities associated with remediation of white phosphorus residues.

The combination of these forces and influences presents a complex and dynamic environment to organisms living within and around ERF. Despite this challenging physical environment, this area supports a variety of birds (approximately 68 species), mammals, fish, and macro invertebrates (approximately 30 species of benthic macro invertebrates) and is a staging area for spring and fall migrations of thousands of waterfowl (Racine et al. 1993).

Methods and Materials

ERF is an active impact area; therefore, two Explosive Ordnance Disposal (EOD) technicians were required to ensure the safety of the personnel accessing the area. Four canoes with two or three personal in each canoe entered the area on an outgoing tide and left the area on a high tide. This ensured that enough water was available to get in and out of the area safely. Three gillnets were to be set for the duration of the allowable time in the southeast corner of ERF; this was based off of tidal changes. Three of the four canoes carried a gillnet. The gillnets' overall sizes and mesh was based off available nets on hand. One gillnet was 125' long by 9' tall with variable mesh that ranged from ½" - 3"; the second gillnet was 100' long by 6' tall with variable mesh ranging from ¾" - 2" mesh; and the third gillnet was 37' long by 5.5' tall with a uniform mesh of 2".

The gillnets were set perpendicular to shore with the small mesh closest to the shoreline, so that smaller fish could be sampled. The gillnets were not anchored due to the lack of current and the nets had a float line and a sink line. The nets were set from the shoreline first with the person in the front of the canoe feeding the net out while the person in the back of the canoe would paddle the canoe backwards. Once the net was set, GPS coordinates for both ends of the nets were taken and the time of the net set was recorded in a field notebook. An estimation of the water depth was to also be recorded in the field notebook.

After the gillnets were set and the necessary data was recorded, the personnel waited in canoes, watching the nets and disturbing the vegetation to flush fish that may have been hiding into the nets. Disturbing the vegetation consisted of the personnel in the canoe moving through the vegetation immediately adjacent to the net, striking the water with their paddles, and in general making loud noises. While doing this, personnel scanned the water looking for fish or fish movements.

Any pike caught were to be measured from mid eye to tail fork using a cloth tape and killed. Once sampling was completed, the pike were to be donated to the captive Bald eagles (*Haliaeetus leucocephalus*) on JBER or to educators for use in dissections. Pike not donated were to be cut in half and returned to capture site waters well away from human dwellings. ADF&G's Area Management Biologist (AMB), along with Kristine Dunker (Research Fishery Biologist) were to be notified that day along with site capture information, if a pike was captured.

If non-target fish species were caught, they were to be removed from the nets immediately to reduce mortality. Any unintended mortalities of non-target fish were to be recorded and returned to the capture site waters. In an instance of >10% unintended mortality of non-target fish, sampling was to cease and the ABM was to be contacted.

Results

Gillnetting occurred on Wednesday 13 July 2016. The high tide on this day occurred at 1515 and reached 22.67 feet, not high enough to reach the study area (Figure 3).

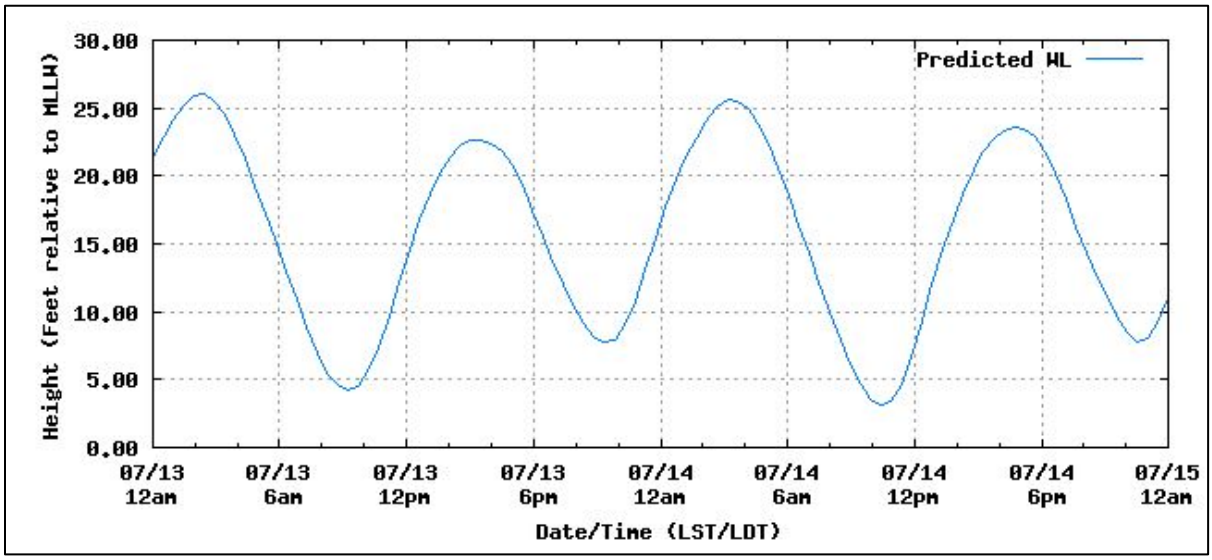

Figure 3. High and low tides for July 13, 2016, at the Port of Anchorage.

Once personnel reached the area, it was discovered that the sampling area was much larger and shallower than anticipated. Because of the larger size, the protocol was changed to fish as much of the area as feasible. Instead of setting all three nets and leaving them for the duration of the time, the nets were set for one hour in each location, then moved. Also, due to other sampling occurring in the area, one of the canoes with a net was an hour late and was only able to get two gillnet sets before time ran out. The other two canoes were able to get three net sets before time ran out.

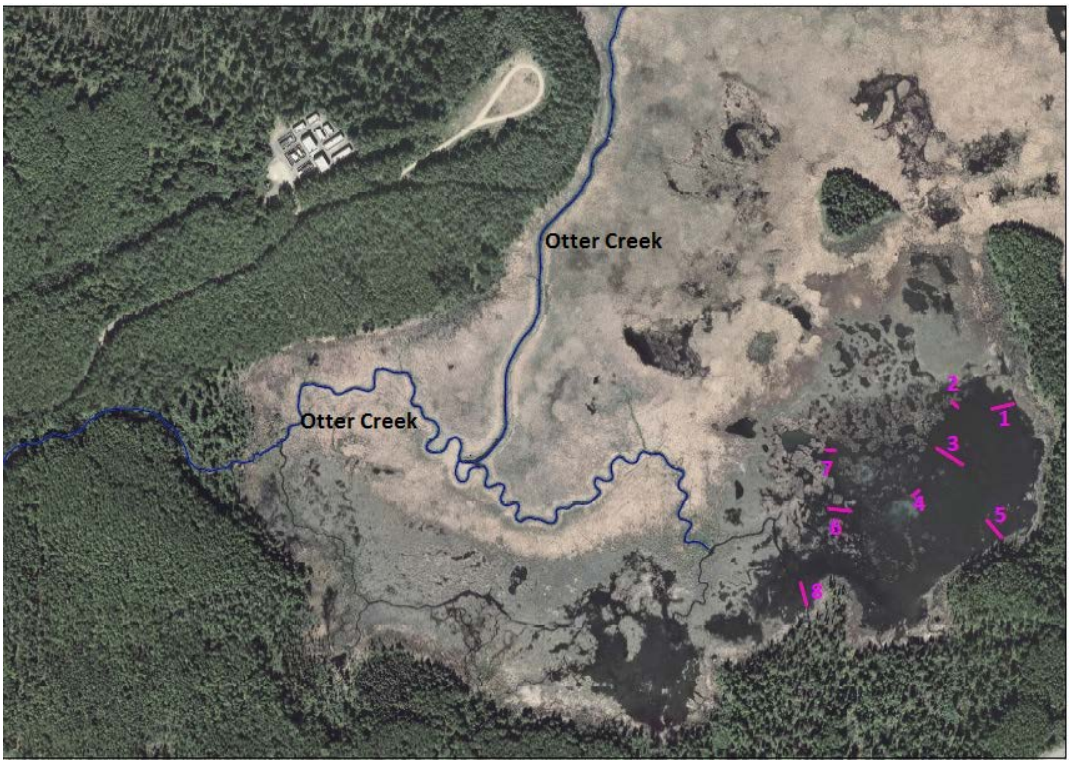

Figure 4. Net orientations.

A total of eight 1-hour sets were completed. Each end of the nets was documented using a GPS so orientation of the nets could be gathered (Figure 4). An estimate of water depth was gathered at each end of the net for each set. The water depth ranged from approximately 2 inches to 21 inches (Appendix 1). Water depth was difficult to calculate because there was a thick vegetation mat covering the wetted areas (Figure 5).

Figure 5. Example of net set and the depth of the water.

Of the eight sets, no fish species were caught. However, stickleback (*Gasterosteidae* spp.) were visually seen swimming in the area. Additionally, some larger fish were observed jumping as canoes and personnel entered the area, but the species could not be identified. No visual observations of pike in the area were made by personnel members.

Discussion and Conclusion

Based on the results of this gillnet effort and the results from ERDC's (2017) eDNA sampling, it can be reasonably assumed there are no pike in this area. Based on observations, this area is very interesting in terms of fish assemblage. Further investigations are needed to address the tidal interplay, water temperature, salinity, and dissolved oxygen to see if it is feasible for juvenile salmon (*Oncorhynchus* spp.) to overwinter in this area.

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Appendix 1

Table A-1. Data collected

Set	Time set	Time pulled	Water depth (in)	UTM cardiants	Number of fish caught	Comments
1A	1103	1200	6	06 V0355582 6799161	Zero fish were caught in this set	Saw a lot of swimming sticklebacks
1B	1103	1200	15	06 V0355556 799155		
2A	1121	1224	14	06 V 0355508 6799164	Zero fish were caught in this set	
2B	1125	1224	19	06 V0355515 6799157		
3A	1210	1310	11	06 V0355521 6799088	Zero fish were caught in this set	small sticklebacks swimming around
3B	1210	1310	20	06 V0355489 6799108		
4A	1232	1340	14	06 V 0355460 6799050	Zero fish were caught in this set	
4B	1240	1340	21	06 V 0355468 6799057		
5A	1227	1330	4	06 V 0355568 6799000	Zero fish were caught in this set	small sticklebacks
5B	1227	1330	8	06 V 0355550 6799021		
6A	1320	1425	12	06 V 0355386 6799032	Zero fish were caught in this set	
6B	1320	1425	17	06 V 0355359 6799035		
7A	1346	1452	14	06 V 0355356 6799106	Zero fish were caught in this set	
7B	1352	1452	16	06 V 0355367 6799105		
8A	1350	1445	2	06 V 0355336 6798930	Zero fish were caught in this set	
8	1350	1445	6	06 V 0355309 6798922		