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Alexander Creek/Lake White Paper

Problem Statement: King salmon production in Alexander Creek has decreased significantly in the past decade. Loss of production is thought to be directly attributed to northern pike *(herein after called pike)* predation on juvenile king salmon.

Introduction

Alexander Creek *(Map 1)* is a remote system that can only be accessed via float plane or boat. The creek itself is a low velocity, winding, clearwater system that flows into the west side of the Susitna River approximately eight river miles upstream from where the Susitna River empties into Cook Inlet. The Alexander Creek drainage contains abundant emergent and submergent vegetation throughout its waters. This drainage encompasses hundreds of square miles. It comprises numerous backwater side-sloughs and oxbow channels, several tributaries, many interconnecting shallow lakes and ponds, and vast expanses of wetlands and marshes, all of which provide for optimum spawning and rearing habitat for pike. The Alexander Creek king salmon fishery, once one of the most productive in Northern Cook Inlet (NCI), was closed to king salmon fishing in 2008 by the Board of Fish (BOF), primarily to address a decade of declining king salmon returns *(Figure 1)*.

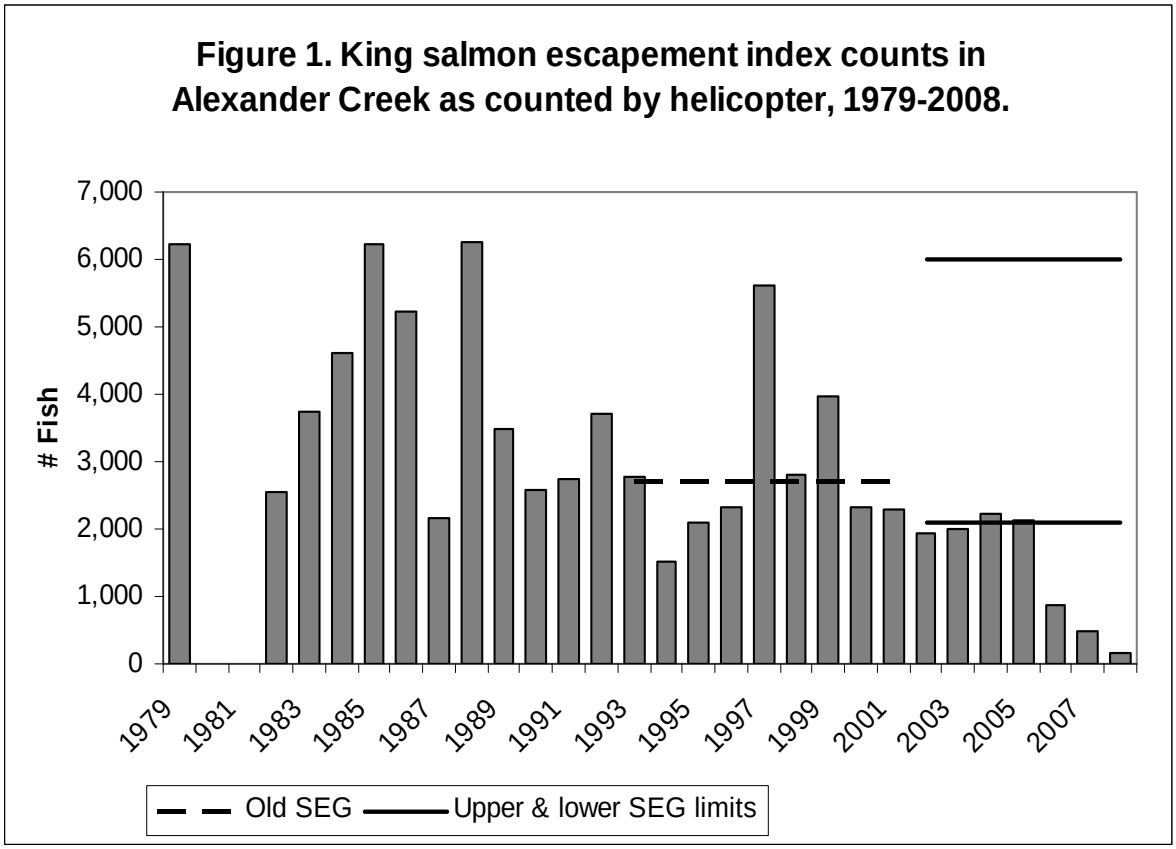
Pike were first observed in the Alexander Creek system in the late 1960s or early 1970s and since then, have colonized nearly all of this system. The establishment of pike in Alexander Creek was likely the result of an illegal introduction of pike to the Susitna River drainage in the early 1950s. Unfortunately, throughout most of this system, juvenile king salmon and pike habitat overlap.

Background

Prior to 2000, Alexander Creek was one of the most productive king salmon systems in the entire NCI area. During its productive years, this system experienced more than 26,000 angler days of sport fishing effort *(Figure 2)*. In 2007, prior to its closure, only 2,666 angler days were recorded. Historically, angler harvest of king salmon from this system was as high as 6,548 fish (1991). In 2007, only 412 fish were taken *(Figure 2)*. The Alaska Department of Fish and Game *(ADF&G)* has conducted annual aerial surveys on Alexander Creek since 1979 to index the spawning escapement of king salmon. Average escapements from 1979 through 1999 were about

3,500 fish. A more recent average (2000 through 2008) was about 1,600 fish, which is less than half of the previous period's average. The Sustainable Escapement Goal (SEG) range for king salmon returning to Alexander Creek is 2,100-6,000 fish. In five of the last seven years the lower end of this goal was not achieved. King salmon escapements to this system in the past three years have been far below the SEG, with only 885, 480, and 150 fish counted, respectively *(Figure 1)*. At a time (1999-2006) when other Susitna drainage systems were experiencing strong king salmon runs, the Alexander Creek escapement was either not making the SEG, or just barely meeting the lower end of the SEG. Past escapement surveys on Alexander Creek documented fish spawning throughout the stream's course, with a large percentage of fish spawning in tributaries upstream of Alexander Lake. More recent observations indicate few fish spawning in the mainstem above or below Sucker Creek *(River mile 20; Map 1)* and no fish were observed spawning in tributaries upstream of the lake. Most of the king salmon production for Alexander Creek now takes place in lower Sucker Creek and the Wolverine fork of Sucker Creek, where very little pike habitat occurs.

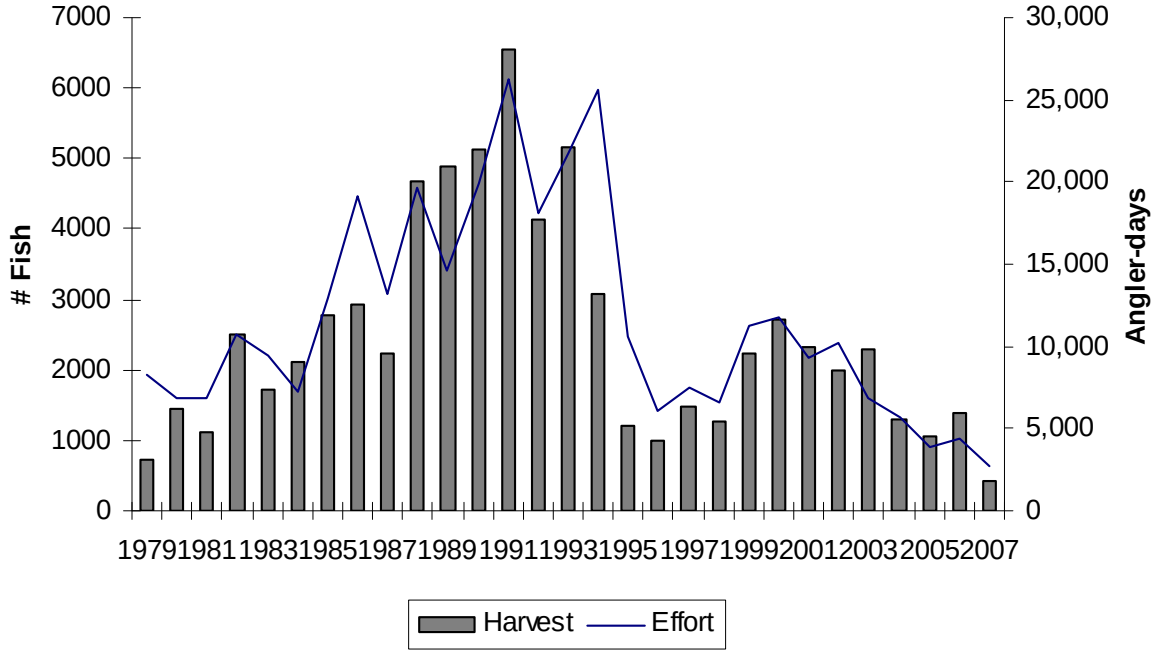
Figure 1. King salmon escapement index counts in Alexander Creek as counted by helicopter, 1979-2008.



Pike are voracious, opportunistic feeders and it has long been noted that they prey on and actually prefer salmonids over other available prey. In the absence of any refuge areas for juvenile salmon, predation by pike can lead to severe reductions in salmonid populations such as king salmon. This is likely the scenario for the loss of king salmon production in the Alexander Creek drainage. Since pike have colonized nearly all of the drainage (with the exception of lower Sucker and Wolverine creeks), king salmon production has declined significantly. Because of the tremendous overlap of pike and juvenile king salmon habitat throughout most of this system,

there is little refuge for juvenile king salmon to escape pike predation. Therefore, it is unlikely that Alexander Creek king salmon will rebound in this system without a significant decline to the pike infestation. Other salmon species and resident fish populations have deteriorated in this system as well, the extent to which is currently unknown, as ADF&G only monitors king salmon.

Figure 2. King salmon harvest and effort on Alexander Creek, 1979-2007.



User Groups

Alexander Creek king salmon are harvested by three different user groups: sport, commercial, and subsistence. The majority of the king salmon harvest can be attributed to the sport fishery prior to closing the sport fishery for king salmon on Alexander Creek in 2008 *(Table 1)*.

Economic Impacts

During the productive years of the king salmon fishery on Alexander Creek there were as many as nine fulltime lodges. In addition to the lodge operations, this fishery also supported several float plane charter operations out of Lake Hood, numerous boat charter/guide operations, and a cabin and boat rental business. Today, few if any of these operations are still in existence. The king salmon sport fishery on this system likely supported a multimillion dollar sport fishing industry. However, with the decline in king salmon production, this industry is no longer in existence.

Northern Pike Management Practices

ADF&G's sport fish harvest management strategy for pike in all Cook Inlet waters is considered very liberal. There are no bag or possession limits, spears and bow and arrows are allowed, and on many lakes anglers are allowed to use up to five lines when fishing through the ice. The only lake in the entire management area that deviates from these regulations is Alexander Lake *(Table 2)*. On Alexander Lake, a slot limit was instituted by the BOF in an effort to investigate potential management strategies that would provide opportunities for anglers to harvest large sized pike *(> 30 inches)*, but at the same time reduce the number of small sized pike which are primarily responsible for decimating salmonid populations. This scenario maintains angler interest by still providing the opportunity to catch a large pike while at the same time keeping as many small pike as they desire. Without the opportunity to catch large pike, anglers typically lose interest in fishing the area and pike populations continue to increase. At higher densities and in the absence of large sized pike, pike growth tends to become stunted. The result is a large population of small, undesirable pike that few anglers want to fish for.

Table 1. King Salmon Regulatory History

Year	Regulatory change
1977	All NCI- harvest > 20 inches closed
1978	All NCI- harvest > 20 inches closed
1979	King fishing open; seasonal limit of 5 over 20 inches.
1980	Bag changed from 1 to 2 over 20 inches; only 1 over 28 inches
1981	Bag/possession changed back to 1 daily/2 possession over 20 inches.
1986	Bag/possession changed to 2 per day/4 possession over 16 inches; only 1 daily/2 possession over 28 inches.
1987	Season extended from July 6 to July 13
1990	No seasonal limit
1992	Seasonal limit of 5 over 16 inches; Bag/possession changed to 1 daily/ 2 possession over 16 inches
1995	Bait prohibited; Bag/possession 1 over 16 inches; Fishing allowed 6 am-11 pm; Closed upstream of Trail Creek.
1996	Season ends June 30; Harvest allowed downstream of Granite Creek only.
1999	Harvest area extended upstream of Granite Creek to Trail Creek.
2008	Fishery closed.

Table 2. Northern pike regulatory history for Alexander Creek/Lake

Year	Regulatory change
1989	Bag/Possession limit 10/10
1997	May use 5 lines in lake
	Bag/Possession limit 10/10 repealed (no bag/possession limit)
1998	Slot limit implemented- Pike 22-30 inches may not be retained; < 22 inches, no limit; >30 inches, 1 per day/1 in possession
	Number of lines reduced to 2. Spears, bow/arrows prohibited.

Future of Alexander Creek King Salmon

There is a chance that king salmon production to this system could be increased by initiating an ADF&G pike removal program aimed at side-slough channels and select reaches of the mainstem of Alexander Creek using gillnets, hoop traps, and electro-fishing gear. This option would be a costly program and would likely need to be repeated on an annual basis. Without a pike removal program it is likely that lower Sucker and Wolverine creeks will remain the only viable king salmon production areas on this system. Chemical treatment methods for pike removal from Alexander Creek, such as the use of rotenone or antimycin have been discussed; however, these methods currently are not valid options, because this system encompasses hundreds of square miles of interconnecting lakes and ponds, numerous streams and vast wetlands and marshes. Alexander Creek is also a tributary of the Susitna River which also contains pike, making it likely that a reinfestation of pike would likely occur. Additionally, chemical treatment would also decimate all remaining native fish stocks that reside within this system.

Pike Studies in Alexander Lake/Creek

1. **Lake- 1995**- abundance estimate was 12,959 (SE=2,216); 36 fish/hectare.
2. **Lake- 1995**- stomach content analysis would likely be similar to other type 2 habitat (slow moving streams and shallow lakes with abundant vegetative mats) sampled in NCI during 1994-1995.
3. **Creek- 2006**- stomach contents of side channel slough dwelling pike in 10-mile stretch upstream of Sucker Creek confluence. Sampled 9 sloughs. Caught 68 pike from which 53 stomachs were dissected. 15% of stomachs contained salmonids and 76% of stomachs contained invertebrates.
4. **Lake- 2008**- evaluation of 12-year slot limit effect on size structure. In 2008, 1,305 pike >12 inches were caught, of which about 22% were >22 inches and 5% >30 inches. Historic size structure appears to be maintained 1996 and 2008.
5. **Creek- 2009**- control netting feasibility/mapping of side channel sloughs planned along a 10-mile stretch downstream of Sucker Creek confluence. Goal is 85% reduction over 3-week period.

Map 1. Map depicting the Alexander Creek Drainage.