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Pikmiktalik River Salmon Counting Site Surveys

Final Report for Study 02-020

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ABSTRACT

A survey to find a site for a salmon weir or counting tower was conducted July 15 and 16, 2002 on Pikmiktalik River, a small system flowing into southern Norton Sound from the Yukon Delta National Wildlife Refuge. Two sites were found that would be suitable for placement of a tower or weir. One site, at 14.412'N, 162^{o} 34.341' W, was at the upper limit of travel for the outboard-powered open skiff used for the survey, while the other, at 63^{o} 14.296 N, 162^{o} 34.633 W, was further downriver at a location briefly used for a counting tower during an earlier study. The upper site was difficult to access by boat due to the narrow width and shallow depth of the river, and may be inaccessible during periods of reduced water flow. The water at this site was clear, and the bottom was composed of soft gravel suitable for salmon spawning. Water level fluctuated less than 10 cm due to tidal influence. At low water, the river was 16 m wide and 76 cm deep, with a water velocity of about 0.63 m/sec. Installing a weir or counting tower at or near this site appeared to be feasible. The lower site was much easier to access by boat, and would probably be accessible even during periods of reduced water flow. This site is also only about 150 meters by trail and 400 meters by river from the Foxy family's subsistence fish camp. The water was clear, although a slight tannic stain was detectable during high tide. While some of bottom is covered with muddy silt, there are also areas with gravel suitable for counting salmon. Water depths were about 40 cm at low tide, and rose to about 130 cm at high tide. River width at this site was about 30 m. Water velocity varied with tide stage, but did not reverse direction or stop. Maximum flow was similar to that measured at the upstream site. Pink *Oncorhynchus gorbuscha*, chum *O. keta* and chinook *O. tshawytcha* salmon were observed during the survey.

Key Words: subsistence fishery, visual salmon counting, pink salmon, *Oncorhynchus gorbuscha*, chum salmon, *O. keta*, chinook salmon, *O. tshawytcha*, Pikmiktalik River, Yukon Delta National Wildlife Refuge, Norton Sound.

INTRODUCTION

Pikmiktalik River salmon spawning escapement and harvest data are needed to address controversies regarding subsistence fishing. Various state fishery issues have been raised in this area since 1960, when the new state government included waters south of Cape Stephan (Stebbins) within the Yukon Fishing District. Federal biologists have also been interested in Pikmiktalik River salmon runs since this system flows within the Yukon Delta National Wildlife Refuge. Federal interest intensified when federal subsistence fishery management authority in Alaska was expanded on October 1, 1999, under Title VIII of the Alaska National Interest Lands Conservation Act.

The communities of Stebbins and St. Michael routinely harvest salmon for subsistence use from the Pikmiktalik River, and some residents of Kotlik also fish in this river. Currently, there are no projects that provide in- or postseason estimates of the number of chinook *Oncorhynchus tshawytcha*, chum *O. keta*, pink *O. gorbuscha*, or coho *O. kisutch*. salmon entering this river to spawn. Local residents strongly feel that availability of salmon spawning escapement information would improve management of these fishery resources and help ensure their continued sustainability.

While various studies have provided information on relative abundance and distribution of salmon spawning within Pikmiktalik River, a series of reliable and well-documented annual spawning escapement estimates is still lacking for this system. The Alaska Department of Fish and Game conducted 15 aerial surveys since 1981, as well as a float survey in 1982, to assess salmon spawning within Pikmiktalik River. The Village of St. Michael operated a counting tower on Pikmiktalik River in 1992. Most recently, Stebbins Community Association received funding from the Native American Rights Fund in 1995 to conduct surveys of local salmon systems. As part of this work, ground and aerial surveys to count salmon were conducted on the Pikmiktalik River.

This study described within this report was conducted to determine the feasibility of using a weir or tower to estimate the number of adult salmon entering Pikmiktalik River to spawn. This would be the first step in future efforts to obtain annual estimates of adult salmon spawning escapement and to determine spawning goals.

OBJECTIVES

1. Survey sites within the Pikmiktalik River to assess the feasibility of operating a resistance board weir, picket weir, or tower(s) to estimate the number of salmon entering the river to spawn.

2. Provide recommendations on feasibility, methods, and costs to conduct annual salmon counting operations.

METHODS

A survey of the Pikmiktalik River was conducted to determine the feasibility of installing and operating a resistance board weir, picket weir, or counting tower(s) to estimate the number of salmon entering this river to spawn (Figure 1). We accessed the river using a propeller-driven outboard powered 6 m open aluminum boat, operated by the owner, and chartered through Stebbins Community Association (Figure 2). The Foxy family's subsistence fishing camp was used as a base while conducting the survey. Efforts were made to locate a suitable counting site as close to the river mouth as possible, above most areas where salmon subsistence fishing occurs and below most areas where salmon spawn. We surveyed about a 1.6 km section of the river upstream of the Foxy's camp by boat and by foot for suitable counting sites. Two potential counting sites were located, including a site used in a past tower counting study, and the following information was obtained for each: location (latitude and longitude), river width (m), river depth (cm), bottom substrate type (descriptive), water velocity (m/s), water clarity (descriptive), and riverbank suitability (descriptive). A Global Positioning System receiver was used to determine latitude and longitude, and a fiberglass tape measure was used to determine river width and depth. Investigators assessed water clarity by standing on shore and determining how far across the river they could see the bottom. River bank suitability was assessed by determining whether the bank appeared stable and dry, and by looking for signs of flooding or erosion. Original plans called for measuring river velocity at 0.5 ft stage height increments using a water-flow meter and top-setting wading rod, and making a stream depth profile at each site by measuring water depth at 10 ft intervals across the river. However, a water-flow meter was not available, so surface water velocity was roughly estimated by timing the passage of floating sticks over a measured distance several times. Since the river was shallow and narrow, we determined that a stream depth profile was not needed. Instead, a single measurement was made at the deepest point encountered while wading across each site. Finally, original plans called for two or more visits to each candidate site during the potential counting period to measure maximum flow rates and water depths that would be encountered. However, additional visits were not needed since we decided, after consultations with Stebbins Community Association, that future counting efforts should be focused on chum salmon, and this run had already peaked prior to the time of our survey.

RESULTS

Pink, chum, and chinook salmon were observed throughout the section of river being surveyed. Pink salmon were the most abundant species, and schools comprised of over 100 individuals were seen. Chum salmon seemed to be about 10 times less abundant than that of pink salmon, and very few chinook salmon were seen. While this may have reflected actual abundance of these species, it was also influenced by the presence of suitable spawning areas within the section of river surveyed. Most chum and chinook salmon spawn above the section of river surveyed and, since the study was conducted about one week after the peak of these runs, had probably already migrated upstream. Pink salmon probably spawn throughout the drainage, including the lower section of river included in the survey.

The chartered boat arrived at the Foxy's camp at high tide, and was able to travel about 0.8 km beyond the camp before the water became too shallow to navigate. The boat operator indicated that he could travel much further upriver, sometimes as far as the hills 12.9 km to the east, in late August when the water level was higher. During the boat trip, it became apparent that there were several suitable locations to install and operate a weir or tower to count salmon. The furthest up stream site was at the upper limit of boat travel, located at 63^{o} 14.412'N, 162^{o} 34.341' W. The water at this site was clear, and the bottom was composed of soft gravel suitable for salmon spawning.

The actual site selection and documentation survey was conducted on foot from the Foxy's camp. We set out at low tide and traveled further up river than we had by boat. While we found several locations that appeared suitable for a weir or tower, we also came upon an old village site on the east side of the river, including two small cemeteries. This community was active as late as the 1950s, and there is also an older village site, which we did not pass near, on the west side of the river (Pete family, Stebbins, personal communication). We decided that locating a counting project near archeological sites was to be avoided, if a suitable site was available further downriver.

We made various measurements and observations at 63^{o} 14.412'N, 162^{o} 34.341' W, the site at the upper limit of boat travel. Water level at this site fluctuated less than 10 cm due to tidal influence. Water clarity was not affected by tide stage, and it was easy to see to the bottom from the shore. The bank and surrounding land appeared to be stable and not prone to flooding during the time counting would be conducted. At low tide, the river here was about 16 m wide and 76 cm deep. Water velocity was about 0.63 m/s. It appeared to be feasible to install and operate either a weir or counting tower at or near this site. However, a site lower in the river would be preferred since it would be easier to access and further from archeological sites.

We found the remains of an old wooden tower at the site used for a past counting study, 63^{o} 14.296 N, 162^{o} 34.633 W (Figure 3). While some of bottom was covered with muddy silt, there were also areas with gravel. Water level at this site fluctuated about 90 cm due to tidal influence. Water clarity was slightly affected tide stage. A slight tannic stain was detectable in the water during high tide but not during low tide. However, it was possible to see to the bottom from

shore during both low and high tide. The bank and surrounding land appeared to be stable and not prone to flooding during the time counting would be conducted. At low tide, the river here was about 30 meters wide and 40 cm deep. Water velocity varied with tide stage, but did not reverse direction or stop. Water velocity was similar to that of the upriver site, about 0.58 m/s. At high tide water depth rose to about 130 cm. It appeared feasible to install and operate either a weir or counting tower at or near this site. This site would be easier to access by boat than the upriver one, and would probably be accessible even during periods of reduced water flow. This site is also only about 150 m by trail or 400 m by river from the Foxy's camp.

DISCUSSION

It is our opinion that a counting tower, located at the site used in past studies, 63^{o} 14.296 N, 162^{o} 34.633 W, would be the preferred method to count salmon entering Pikmiktalik River to spawn. River conditions appear well suited for counting tower operations, and a tower would be less expensive to construct, install, and operate than a weir. Operating a counting project at the selected site would not require daily use of a boat, since personnel could be housed on site or at one of camps just downriver from the counting site. A boat would need to be chartered from Stebbins to transport personnel, supplies, and equipment at the beginning and end of the project, as well as to transport food and supplies during the season. We estimate it would require about six weeks to count the chum salmon run entering Pikmiktalik River to spawn.

While in Stebbins, we observed several gill nets being fished in front of the village as well as several racks with drying salmon. However, we could not determine the amount of fishing that occurs on Pikmiktalik River. While some camps showed signs of recent work, it was not clear whether people are visiting these camps very often to fish. The chum salmon run had peaked prior to our visit, and a tundra fire in early July had burned several fish racks and one cabin. We did see three parties of people visit the river to fish for a few hours each. All of them were using rods and reels. At least one group was associated with a youth camp staying at the Nunakogak River. One group also visited the Pikmiktalik River to get drinking water, since this river has the clearest water in the area. It would be useful to document and estimate the subsistence fish harvest from the Pikmiktalik River since this information is not available.

CONCLUSIONS

A counting tower or weir could be installed and operated at either site identified during the survey. The lower site was selected as the best one for counting salmon since it would be easier to access and supply. A tower would be the preferred method of counting salmon at this site, since it would be less expensive to build, install, and maintain than a picket or resistance-board

weir. However, consideration should be given to installing a partial picket weir or barrier that would direct and concentrate migrating salmon along a single riverbank. This would allow use of a single tower from which to count salmon, and make it easier to count and sample salmon passing the site.

RECOMMENDATIONS

1. A counting tower can be installed and operated to count salmon entering the Pikmiktalik River to spawn.
2. A partial weir or barrier should be used to direct all salmon passing the site along one bank.
3. Counting efforts should be focused on chum salmon, which may also allow an estimate to be made of chinook salmon abundance.
4. A sample of chum and chinook salmon passing the tower site should be captured with a beach seine to obtain information on the age, sex, and length of salmon within these runs.
5. If possible, efforts should be made to document subsistence salmon fishing occurring in the river and to obtain age, sex, and length information from chum and chinook salmon harvested.

ACKNOWLEDGEMENTS

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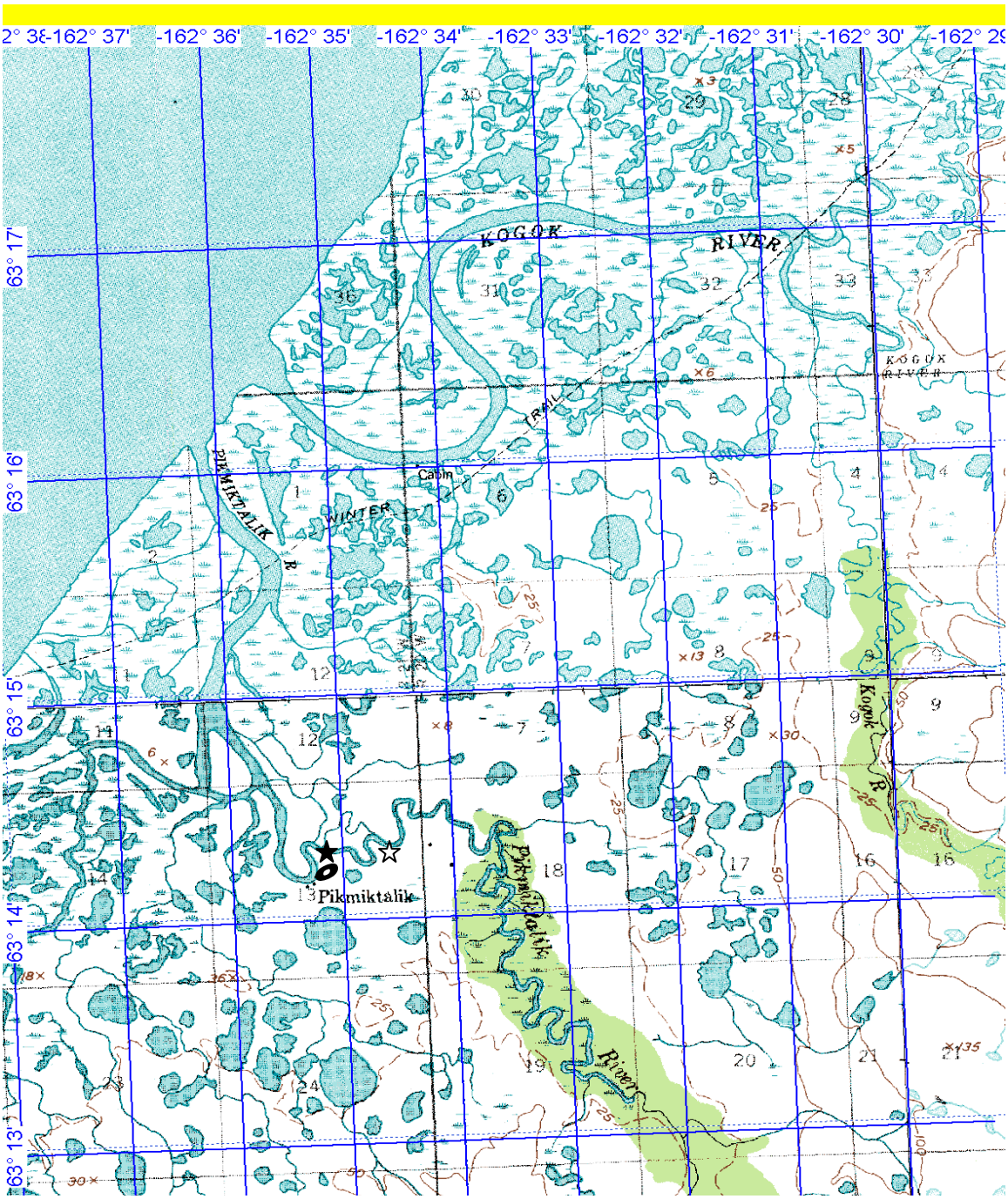

Figure 1. Approximate locations of the Foxy family's camp (black oval) and the two sites (stars) identified for potential placement of a weir or tower to count chum salmon entering the Pikmiktalik River to spawn (U.S. Geological Survey map). The lower site (black star), closest to the Foxy family's camp, is the preferred location for counting chum salmon.

Photo by Tim Roettiger

Figure 2. View from the Foxy family's camp during low tide on Pikmiktalik River. The boat shown is owned and operated by Larry Murray and was used to transport the salmon counting site survey crew from Stebbins.

Photo by Tim Roettiger

Figure 3. View downstream toward Foxy family's camp at the preferred location for a chum salmon-counting site on Pikmiktalik River.