

Abundance and Run Timing of Adult Salmon in Long Lake

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PROJECT DATES: June 2003 - September 2003

GEOGRAPHIC AREA: COOK INLET/GULF OF ALASKA

LATITUDE/LONGITUDE COORDINATES: 61 deg 23' 1.68" N 143 degrees 17' 15.89" W

FEDERAL CONSERVATION UNIT: Wrangell-St. Elias National Park/Preserve (WRST)

INFORMATION TYPE: Fish stock status and trends

ISSUE ADDRESSED:

Accurate assessment of yearly run strength and migratory timing in tributaries to the Copper River is essential to the development of a management strategy that meets the mandates of the Alaska National Interest Lands Conservation Act (ANILCA). The Upper Copper River sockeye salmon populations are of particular importance to both Federally qualified and state subsistence users. The primary assessment of inriver abundance for Copper River sockeye salmon occurs at the Miles Lake sonar. However, migratory timing of sockeye salmon into the Copper River is prolonged (May-August); and subsequent assessment of escapement into some drainages is needed to determine spawning distribution.

The Chitina River drainage, approximately 5 million acres in size, is the largest anadromous drainage, contained in its entirety, within WRST. Long Lake is the only site within the drainage where long term monitoring of salmon abundance has occurred. This site has the potential to complement the work occurring in Tanada Creek as an index site for abundance and spawning distribution of sockeye salmon within the Chitina River drainage. If both sites are maintained in the future as index sites, they will provide a valuable tool to understand the response of salmon returns to management or ecological changes at substantially different points in the Copper River Basin. Proposed physical monitoring sites within WRST are anticipated to coordinate well with the Long Lake and Tanada Creek weir sites. Weirs are typically more accurate measures of salmon abundance than most other methods of measuring adult salmon escapement.

Twenty-nine years of weir data show annual variations in abundance of Long Lake runs ranging from 4400 to over 50,000 sockeye. This is the longest running data set of weir counts of salmon in the

Copper River drainage. If the weir is not operated in 2003, this continuous data set will be interrupted and its value as a future index will decrease. The sockeye salmon stock that spawns within Long Lake is the largest salmon stock within the Chitina River drainage. In 2002 the Long Lake stock composed six percent of the estimated salmon return to the entire Copper River. However, in other years it has composed less than four tenths of a percent of the entire Copper River return (Table 1). This demonstrates the need for stock specific monitoring sites in addition to broad scale sonar sites estimating mixed stock returns. This system is an excellent candidate to use for insight into the status of Chitina River salmon stocks. Weir counts of salmon are a simple and basic data set and therefore likely to provide valuable data far beyond the foreseeable future.

The Long Lake population has the longest known annual spawning duration (August through April) of any sockeye salmon population in North America (Ken Roberson, personal communication). Wrangell-St.Elias National Park/Preserve visitors, stakeholders and users are interested and concerned about fish populations in Long Lake. The Park has been approached by a variety of groups, interests, and individuals regarding obtaining private and state land surrounding portions of Long Lake to protect fish and water resources in Long Lake. At Federal Subsistence Board Regional Council meetings Long Lake fish populations are raised as an issue that needs attention and protection. At Copper River Watershed Project meetings Long Lake is regularly suggested as a site that should be monitored. The Wrangell Mountain Institute and the Copper River Watershed Project are partnering together to monitor water quality at this site. Clearly a monitoring project addressing salmon abundance at this site would be responsive to issues and concerns raised by our stakeholders.

QUANTIFICATION OF SUBSISTENCE USE:

Subsistence use of Copper River salmon occurs downstream of the Chitina River drainage in the Chitina Subdistrict of the Upper Copper River District. Federal subsistence users harvested slightly less than 1000 salmon here in 2002 using both fish wheels and dipnets. Harvest by as many as 10,000 households occurs in a state managed fishery that has been both a subsistence and personal use fishery harvesting as many as 125,000 salmon annually some years. These fisheries undoubtedly harvest some salmon returning to Long Lake.

BACKGROUND:

ADFG initially operated the Long Lake weir in 1974 and 1975. Cliff Collins, a private citizen, voluntarily took over operation of the weir in 1976 when ADFG was no longer able to fund the operation of the weir and has operated the weir continuously since 1976 (Table 1). Cliff Collins is now 93 years old and is no longer able to continue operating the weir. Wrangell-St.Elias National Park/Preserve has managed to find funding to operate the weir in cooperation with Mr. Collins and the Copper River Watershed Project in 2003 but will not be able to continue to solely fund the work in the future. The Park scraped together funding to continue this project in 2003 because we value the long running uninterrupted data set.

Year	Miles Lake Sonar estimates (fish)	Long Lake Weir Counts (sockeye salmon)
1974		4501
1975		6786
1976		24689
1977		8772
1978	107,011	15458
1979	237,173	46110
1980	276,538	38978
1981	535,263	12687
1982	467,306	28064
1983	545,724	28003
1984	536,806	10729
1985	436,313	21431
1986	509,275	16947
1987	483,478	13323
1988	488,398	7065
1989	607,797	17760
1990	581,895	21399
1991	579,435	11501
1992	601,952	10141
1993	797,902	16101
1994	715,181	18289
1995	599,265	17933
1996	906,867	6209
1997	1,148,079	4433
1998	866,957	8531
1999	848,921	12922
2000	587,592	8665
2001	833,569	26939
2002	819000	50000

Table 1. Long Lake weir counts and Miles Lake sonar estimates.

OBJECTIVES:

1. To enumerate the number of sockeye salmon entering Long Lake from July 15 to mid-September, thereby continuing a data set initiated in 1974.
2. To measure the entry pattern of sockeye salmon to Long Lake and compare the entry pattern to the historic entry pattern data set to test for change in the interannual run timing.
3. To estimate age-sex-length composition of the Long Lake sockeye salmon population by sampling fish during 3 sampling windows as follows:
 - a. July 15 – August 20, 2003 = 540 fish

- b. August 21 – September 5, 2003 = 540 fish
 - c. September 6 – October 15, 2003 = 540 fish
- 4. To correlate run timing and numbers of sockeye entering Long Lake with similar data from the Miles Lake sonar.
 - 5. To test the hypothesis that there is a correlation between run timing and stream temperature.
 - 6. To estimate the contribution of Long Lake sockeye to the Federal subsistence and State personal use fishery in the Chitina Subdistrict of the Copper River.

METHODS:

Study Design

The project will use a weir to enumerate the number of salmon migrating into Long Lake and to sample age, sex and length of a portion of the salmon migrating through the weir.

Long Lake, located at 480 m asl, at latitude 61 deg 23' 1.68" N and longitude 143 degrees 17' 15.89" W, flows into the Lakina River, a tributary of the Chitina River in the Copper River drainage (Figure 1). Long Lake is located adjacent to the McCarthy Road and is .5 km wide and 8.5 km long.

Weir Operation

A rigid picket weir is operated at the outlet of the lake. The weir has a picket spacing of 3.75 cm and to count fish, 3-4 pickets are removed, and the fish are enumerated as they swim through the opening. The weir will be put in place in late June and operate until the end of the run in mid-September. The weir will be monitored daily. During periods of peak passage, the monitoring time will be extended accordingly. The weir will be closed when it is not monitored.

The site is extremely conducive to the operation of a rigid picket weir. Flows fluctuate only slightly, water velocity is always low, and the stream is shallow and easily waded. A large log lays across the stream immediately upstream of the weir and a weir operator can stand on the log and count migrating salmon simply by removing a few pickets from the weir. The weir has been in operation for nearly 30 years so most of the needed equipment is already in place and additional equipment needs will be minimal. The weir can be safely operated by one individual.

The weir site is on Collins Family Trust land and is located within a few hundred meters of the Collins family residence. The Copper River Watershed Project intends to hire members of the Collins family so the weir operator will already be living in close proximity to the weir site and travel will not be required.

The Wrangell-St.Elias National Park/Preserve Superintendent considers the information collected at this weir to be important to both his role as the in-season Federal subsistence fisheries manager and his duties to manage fish and wildlife populations within the Park in a natural and healthy state. Therefore the Park is committed to providing resources to support this project as well, as demonstrated by finding funding to support the operation of the weir in 2003. The Park intends to hire a local rural resident from the McCarthy area to provide additional support to the operation of the weir as needed.

A *HOBO*[®] *TEMP* data logger will be placed in submersible cases to collect water temperature data throughout the summer. A staff gauge located at the weir will also be read daily.

Fish migrating through the weir will be counted and identified to species. Three sampling windows have been established following consultation with the Commercial Fisheries Division of ADFG in Cordova. Length and scale samples will be collected from 540 sockeye salmon during each sampling window and sex will be estimated based on visual characteristics. Sampled fish will be trapped in a live box attached to the weir, removed from the box using a dipnet, and will be released immediately following sampling.

Data Collection and Reduction

Completed data sheets will be returned to the weir operator's place of residence daily. Weekly these data sheets will be sent to the Headquarters office in Copper Center where they will be photocopied and the photocopies stored separately. Salmon counts and sample data will be entered into an Excel spreadsheet weekly through the season. Thermographs will be downloaded at the end of the season and both temperature and flow data will be placed in an Excel spreadsheet.

Data Analysis

Escapement estimates collected using the picket weir will be analyzed using standard procedures and techniques similar to the analysis presented by Veach and Scotton (2001). Past daily weir counts will be obtained from Mr. Collins as part of the project. Data will be analyzed to determine a historic range of annual sockeye salmon abundance, determine if trends exist in median return dates, and if trends exist in the interannual variation in abundance among returns. Analysis is expected to follow methods similar to those used by Unwin and Glova (1997) and Merritt and Roberson (1986). Once a historic range is determined, this information can be used to establish an escapement objective.

Scale samples will be aged by the ADFG Commercial Fisheries Division in Cordova, AK. Age and length data will be presented for both sexes.

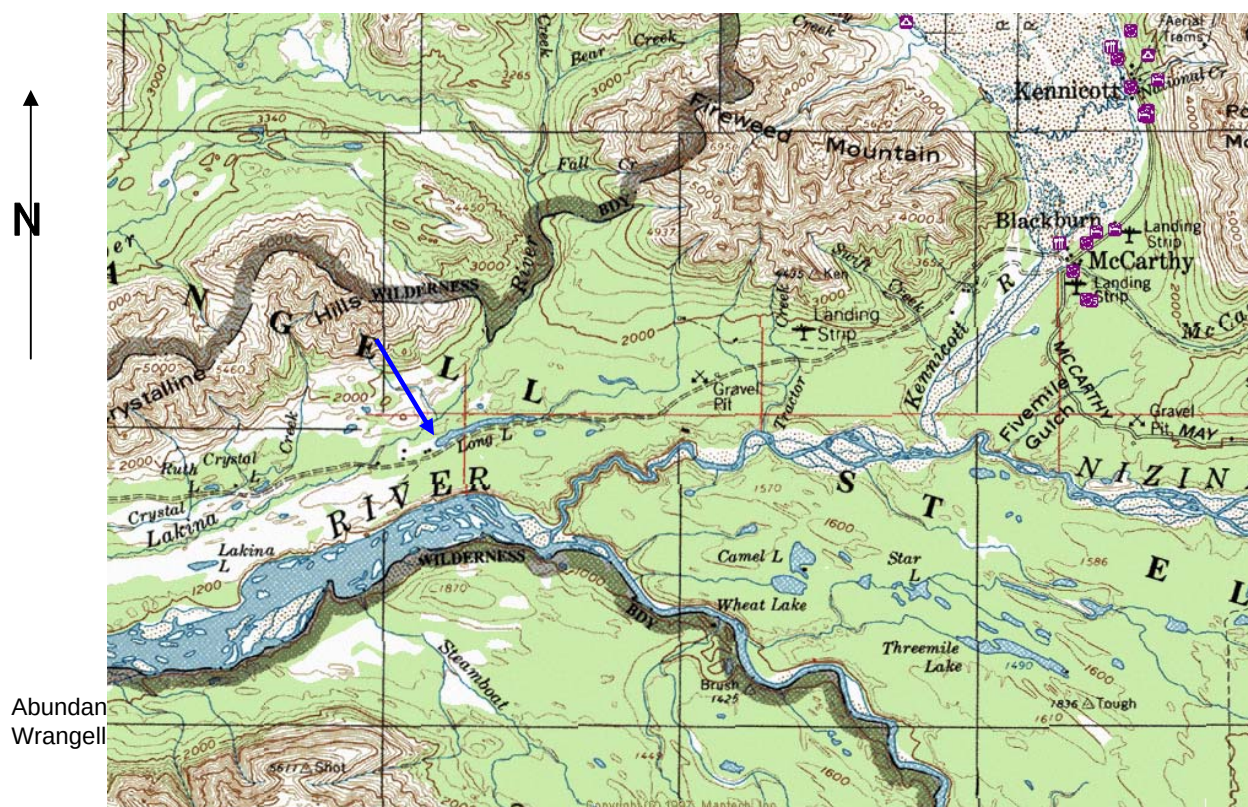


Figure 1. Map of study site.

PERFORMANCE ABILITY:

WRST has implemented similar projects in 2000 through 2002 and is currently preparing for the 2003 season. The principal investigator of the project has 13 years of experience performing fisheries monitoring programs, his assistant has three years of experience performing fisheries monitoring programs. The Copper River Watershed Project has experience performing fisheries monitoring projects in the Copper River watershed and will have gained a year of experience by operating this specific weir in conjunction with WRST during the 2003 season.

CONSULTATIONS: Consultations regarding this project have occurred with the South Central Regional Council, Wrangell-St. Elias National Park Subsistence Resource Commission, and Cordova District Fishermen United. All are in support of this project.

POTENTIAL FOR PARTNERSHIP AND CAPACITY DEVELOPMENT: The Park will partner with the Copper River Watershed Project to perform this project. The project should result in increased capacity of the Copper River Watershed Project, a non-profit group that works with the support of the State of Alaska, Federal agencies and local organizations to monitor fish and fish habitat within the Copper River watershed. The Park sees this site as integral to monitoring Park resources and intends to utilize both the Principal Investigator and his staff to assist in the operation of this weir and analysis of data and will fund these individuals through Park base funds.

PROJECT DELIVERABLES / PRODUCTS: Annual progress reports will be written and reproduced in electronic and text format. Copies of the reports will be submitted to the Fishery Information Service, U.S. Fish and Wildlife Service, and Alaska Resource Library and Information System. Data, reports and slides will be archived according to NPS standards.

SCHEDULE:

Task	June	July	August	September
Start up	Mid-June			
Set up Weir	Mid- June			
Operate weir		Run starts mid-July	All month	Mid-September
Weir take down/ Clean up				Mid-September
Write report				Mid-Sept. to Mid-December

KEY WORD REFERENCING:

1. Copper River, Chitina River, Long Lake
2. Sockeye, Escapement,

3. Use, Stock/Status and Trends

LITERATURE CITED:

- Merritt, M.F. and K. Roberson. 1986. Migratory timing of Upper Copper River sockeye salmon stocks and its implications for the regulation of the commercial fishery. *North American Journal of Fisheries Management* **6**: 216-225.
- Unwin, M. J. and G. J. Glova. 1997. Changes in life history parameters in a naturally spawning population of chinook salmon (*Oncorhynchus tshawytscha*) associated with natural releases of hatchery-reared fish. *Canadian Journal of Fisheries and Aquatic Sciences* **54**, 1235-1245.
- Veatch, E.R. and S. Scotton. 2001. Abundance and Run Timing of Adult Salmon in Tanada Creek, Wrangell-St. Elias National Park and Preserve. Wrangell - St. Elias National Park and Preserve, Annual Report No. FIS00-01-3, Copper Center, Alaska.