

Fisheries Management Field Studies
Wrangell-St. Elias National Park and Preserve

Aerial Survey for Adult Sockeye Salmon at Tanada Lake,
Wrangell-St. Elias National Park and Preserve,
Alaska, 1998

Randall Raeder
Vicki Rood



United States Department of the Interior
National Park Service
Wrangell-St. Elias National Park and Preserve
Resource Management Division

September 1998

**Aerial Survey for Adult Sockeye Salmon at Tanada Lake,
Wrangell - St. Elias National Park and Preserve, Alaska, 1998**

Randall Raeder
Vicki Rood

National Park Service
Resource Management Division
P.O. Box 439
Mile 105.5 Old Richardson Hwy.
Copper Center, Alaska 99573

Abstract - On August 19, 1998 an aerial survey was conducted on Tanada Lake to estimate sockeye salmon escapement. A total of 4,470 live salmon was observed, representing the combined numbers for the two stocks known to spawn at this lake. The survey was carried out in conjunction with the Tanada Creek fish weir project.

Introduction

Over 124 stocks of sockeye salmon have been identified in the Copper River system (Roberson 1987). Each stock must return to the spawning site in adequate numbers to insure that population levels are maintained and that spawning habitat is fully utilized. Monitoring the yearly distribution of spawning fish can insure that no run segment is over harvested by commercial and non-commercial fisheries (Whitmore 1992). Since 1966, Alaska Department of Fish and Game has used aerial surveys to evaluate relative yearly run strength on index spawning streams. Tanada Lake is one of 15 to 20 index sites monitored by ADF&G in the Copper River Basin for sockeye salmon (Morstad pers. comm. 1997). In addition, fish weirs were operated by the ADF&G on Tanada Creek in 1975, 1978 and 1979. Appendix A shows weir counts and aerial estimates from 1962 to 1998.

Sockeye salmon escapement is found almost exclusively in streams that connect with lakes (Morrow 1980). Individual stocks of salmon spawn in selected areas, including lakes, streams and stream outlets. Two groups of salmon are known to spawn in Tanada Lake. One of the stocks reproduce near the shores of the main body of the lake. The other stock spawns near the outlet to Tanada Creek.

The National Park Service, with technical assistance from Alaska Department of Fish and Game, conducted an aerial survey on Tanada Lake on August 19, 1998. This survey was made in

conjunction with the Tanada Creek fish weir project in a continuing effort to establish a reliable correlation between aerial estimates of salmon on Tanada Lake and weir counts of salmon on Tanada Creek. The weir was in operation from June 23 to July 19, 1997 and from June 2 to August 22, 1998. Installation, monitoring and results are described by Raeder (1997) and Raeder et al. (1998).

Tanada Lake is located in the upper Copper River Basin at approximately 62° 27' N, 143° 23' W. Several small streams flow into the lake including Goat Creek. Tanada Creek runs about 30 km from the outlet of the lake northwest to the Copper River. The area of the lake is approximately 13 km² (Figure 1).

Methods

Weather and lake surface conditions including water clarity, light penetration and wind ripple effects were noted during the overflights. Survey conditions were additionally rated on a 1 to 5 scale developed by ADF&G, with 1 being optimal. This system ranks conditions in three categories; sky, water, and overall survey conditions (Whitmore 1992). The surveyor made separate counts for each stock. Counts were made with a running tally as groups of salmon were sighted. The pilot also participated in spotting and independently offered an estimate for the combined stocks.

The aircraft used in the operation was an Arctic Tern (Interstate) fixed-wing aircraft. The perimeter of the lake was flown at a speed of approximately 97 to 104 km/hr (60 to 65 mph) and at an elevation of about 91 to 122 meters (300 to 400 ft.) Concentrations of salmon were reexamined by circling the area once or twice at lower speeds.

Results

The survey was conducted under clear, sunny skies between 1200 and 1230 hour. A light wind of 3 to 4 knots created a slight surface riffle that did not adversely effect visibility. Turbidity was minimal and salmon were visible to a depth of about 2 to 2.5 meters. Most of the salmon had not yet assumed their bright red spawning color, so they did not contrast markedly with the lake substrate and aquatic vegetation. The survey was rated 1, 2, 2 on the ADF&G system, indicating near optimal conditions for observing salmon.

The outlet count was 1,520 sockeye salmon and the lake count was 2,950 for a total of 4,470 sockeye salmon. The pilot offered an overall estimate of between 4,000 and 5,000 salmon (Hannah, pers. comm. 1998). This represents the estimated escapement on Tanada Creek for 1998. No dead fish were observed.

Sockeye salmon returned to the Copper River Basin at above average levels this year. Preliminary sonar counts at Miles Lake indicate an escapement to the upper Copper River of over 860,000 fish, almost double the 20 year average of 454,000 (ADF&G).

Discussion

Statewide salmon surveys in Alaska average 25% of the numbers counted at associated fish weirs (Roberson 1987). The 1998 Tanada Lake aerial survey represented 15% of the total weir count of 28,992 sockeye salmon. Tanada Lake aerial estimates made by Alaska Department of Fish and Game in 1978 and 1979 were 116% and 51%, respectively, of the weir counts made by the State of Alaska on Tanada Creek. Continued aerial counts will at least serve to indicate relative abundance of spawning sockeye salmon at Tanada Lake from year to year. An applicable aerial to weir factor may emerge in further studies.

References

- Morrow, J.E. 1980. The Freshwater Fishes of Alaska. Alaska Northwest Publishing Company, Anchorage, Alaska.
- Raeder, R., V. Rood, and B. Gavitt. 1998. Abundance and Run Timing of Adult Salmon on Tanada Creek, Wrangell-St. Elias National Park and Preserve, Alaska, 1998. National Park Service, Copper Center, Alaska.
- Raeder, R. 1997. Abundance and Run Timing of Adult Salmon on Tanada Creek, Wrangell-St. Elias National Park and Preserve, Alaska, 1997. National Park Service, Copper Center, Alaska.
- Raeder, R. 1997. Aerial Survey for Adult Sockeye Salmon at Tanada Lake, Wrangell - St. Elias National Park and Preserve, Alaska, 1997. National Park Service, Copper Center, Alaska.
- Roberson, K. 1987. Affidavit of Kenneth Roberson, State of Alaska, Third Judicial District, No. A85-698 Civil, Katie John, Doris Charles and Mentasta Village Council v. State of Alaska, 1985.
- Roberson, K. 1987. Copper River Subsistence and Personal Use Salmon Fishery Management and Research - 1987, Report to the Alaska Board of Fisheries (Prince William Sound Data Report #1987-9). Alaska Department of Fish and Game, Division of Commercial Fisheries, Glennallen Alaska.
- Whitmore, D. et al., 1991. Operational Plan: Copper River Basin Salmon Escapement Studies. Alaska Department of Fish and Game. Anchorage, Alaska.

Personal Communication

- Hannah, J. 1998. National Park Service. Copper Center, Alaska.
- Morstad, S. 1997. Alaska Department of Fish and Game. Cordova, Alaska.

Table 1 - Weir counts at Tanada Creek and Aerial Surveys at Tanada Lake, 1962 - 1998 (ADF&G).

<u>Sockeye Salmon</u>		
<u>Year</u>	<u>Weir</u>	<u>Aerial</u> ¹
1962	—	1500
1963	—	1060
1964	—	1500
1965	—	3300
1966	—	10
1967	—	1
1968	—	150
1969	—	6
1970	—	1000
1971	—	3843
1972	—	480
1973	—	10
1974	—	2800
1975	128	700
1976 ²	—	2200
1977	—	2800
1978	2265	2625
1979	10244	5225
1980	—	13700
1981	—	11200
1982	—	11680
1983	—	10900
1984	—	16100
1985	—	11700
1986	—	8260
1987	—	8350
1988	—	3825
1989	—	3300
1990	—	3000
1991	—	3050
1992	—	3450
1993	—	—
1994	—	—
1995	—	—
1996	—	—
1997	27521	7875 ³
<u>1998</u>	<u>28992</u>	<u>4470</u>

¹ Peak survey count per year

² ADF&G identifies new stock of sockeye at Tanada Lake outlet. Subsequent values represent combined counts for lake and outlet

³ Aerial surveys conducted by NPS in 1997 and 1998

