

Aerial Monitoring of Dolly Varden overwintering abundance in the
Anaktuvuk, Ivishak, Canning, Hulahula, and Kongakut rivers.

Annual Report for Study 06-108

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ABSTRACT

Aerial counts of overwintering Dolly Varden char *Salvelinus malma* were conducted by helicopter in the Ivishak and Anaktuvuk rivers September 18-21, 2006. In the Ivishak River, 5,411 fish were counted in the 28 km overwintering index area. In the Anaktuvuk River, 5,477 fish were counted in the 40 km overwintering index area. A preliminary survey of the Canning River was attempted, but poor water quality prevented completion of the survey. The 2006 aerial count in the index area of the Ivishak River (5,411) was in the mid-range of recent comparable counts and the 2006 aerial count in the index area of the Anaktuvuk River (5,477) was slightly higher than recent comparable counts.

INTRODUCTION

Anadromous Dolly Varden *Salvelinus malma* inhabit most of the major drainages of the Eastern Beaufort Sea (Figure 1). These fish spawn and rear in fresh water prior to smolting, but feed as adults in marine waters, and return to overwinter in fresh water each winter. Because these fish cannot tolerate the super-cooled temperatures of arctic sea water during winter, they must overwinter in fresh water five or more winters before spawning. Overwintering habitat is limited to areas with groundwater upwelling, and major overwintering concentrations are currently only known in specific areas of several larger drainages.

The Ivishak, Kongakut, and Anaktuvuk rivers support the largest documented overwintering populations of anadromous Dolly Varden of all the drainages of the Beaufort Sea west of Demarcation Point (Bendock 1980, 1982, 1983; Craig 1989; Furniss 1975; Yoshihara 1972, 1973). The Hulahula and Canning rivers also support overwintering populations for which there is no abundance information (Craig 1977, 1989).

These stocks provide for subsistence fisheries utilized by residents of Kaktovik, Nuiqsut, Barrow, and Anaktuvuk Pass (Craig 1987; Pedersen 1990; Fall and Utermohle 1995; Brower and Opie 1996, 2000). Subsistence harvests occur in marine fisheries during the summer, and in freshwater in the summer and winter. These fish are an important component of the subsistence diet in many areas, and in Kaktovik, Dolly Varden harvests represent up to 40% of the total subsistence fish harvest (Pedersen 1990). Overwintering and spawning populations also provide for sport fisheries accessed by the Dalton Highway, and on guided and unguided float trips.

From 2001 to 2003, aerial index counts of the Ivishak overwintering population were conducted by ADF&G, in conjunction with mark-recapture abundance estimates (Viavant 2005). Results of that project showed that, for that specific circumstance, aerial surveys of overwintering Dolly Varden had relatively high precision and consistently counted (including the variation in both methods) between 16% to 31% of the estimated abundance as measured by mark-recapture methods. During the 3 years of the project, estimated abundance within the index area of the Ivishak River declined by about 70%. Because of the short timeframe of the study, and the complex life history of Dolly Varden, it is not clear if this decline is within the typical range of

variation for these stocks, or if this decline should be cause for concern or future management action.

Because there are significant subsistence harvests from these populations, there is a need for a minimal level of continued monitoring of these stocks. This project provides for index monitoring of the overwintering abundance of Dolly Varden stocks from four of the five major overwintering systems on the North Slope.

OBJECTIVES

The objectives of the first year of this project were:

- 1) Conduct a single aerial count of overwintering Dolly Varden in established index areas of the Ivishak and Anaktuvuk rivers.
- 2) Establish the boundaries of overwintering index areas on the Hulahula and Canning rivers.

METHODS

Study Areas

Aerial counts were conducted in index areas established during previous aerial surveys on the Ivishak and Anaktuvuk rivers (Viavant 2005). These index areas are defined by upstream and downstream boundaries (Figures 2 and 3). Index areas were to be established on the Canning and Hulahula rivers, based on the geographic extent of the presence at least 90% of observed overwintering Dolly Varden during initial aerial surveys of the drainages. During the initial survey of the Canning River, poor water quality (turbidity) prevented a complete survey; however, an upstream boundary was established. Poor weather and budget limitations prevented a survey from being conducted on the Hulahula River.

Survey Methods

Counts were conducted from a helicopter by two observers, each counting only the fish present on one side of the river. All counts were conducted from upstream to downstream, flying at 40 km/hr, at approximately 125 m above ground level. In portions of the rivers where multiple channels exist, the main channel with the majority of the fish present were counted. Counts were recorded on mechanical counters. In order to eliminate conscious or unconscious bias, the faceplates of the mechanical counters were covered, and counts recorded by the helicopter pilot after the counts were completed.

Weather conditions (wind and cloud cover), water clarity, and date and time of each survey were recorded for each survey.

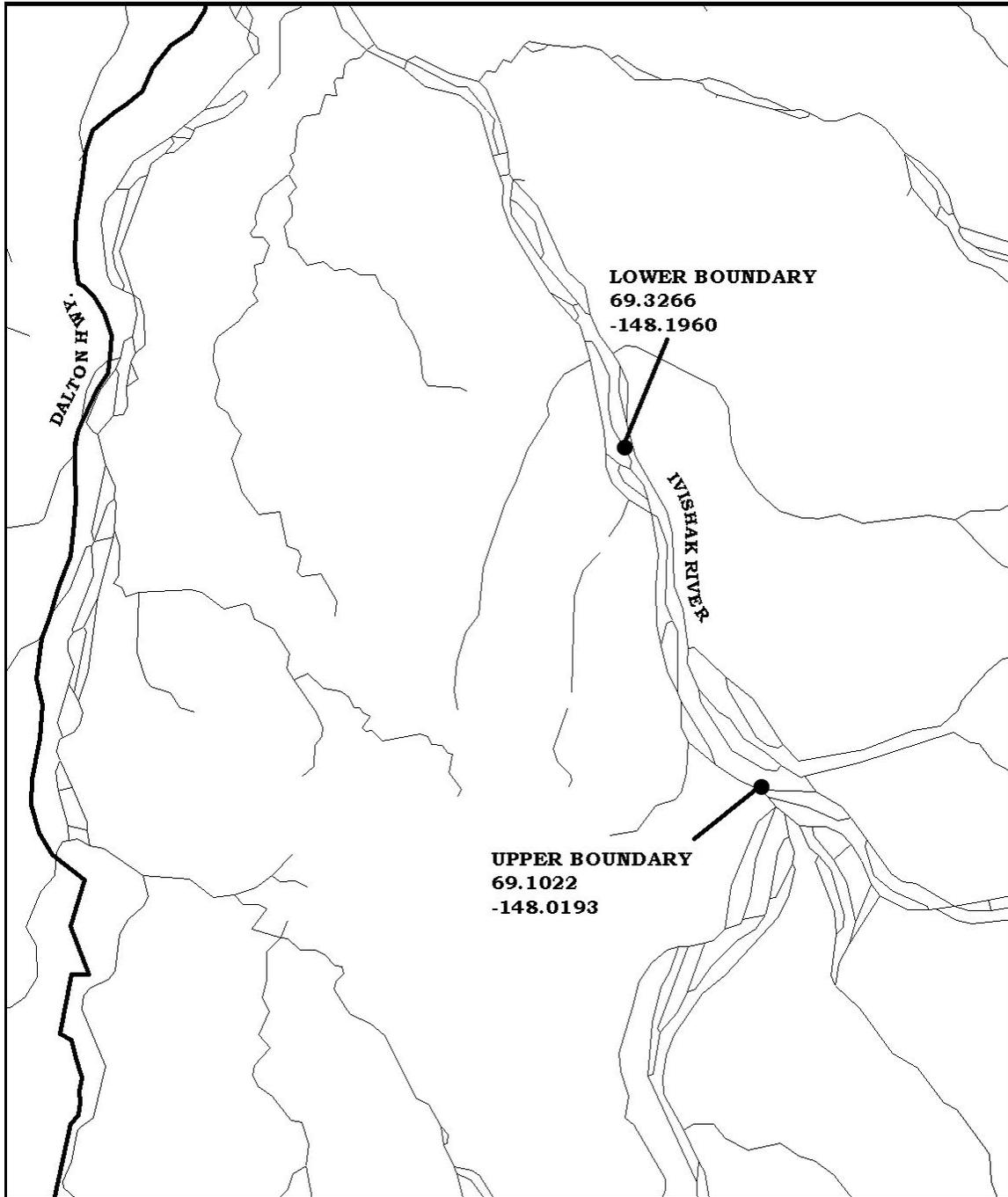


Figure 2.-Map of the Ivishak River, Alaska, showing the boundaries and subsections of the 28-km index area.

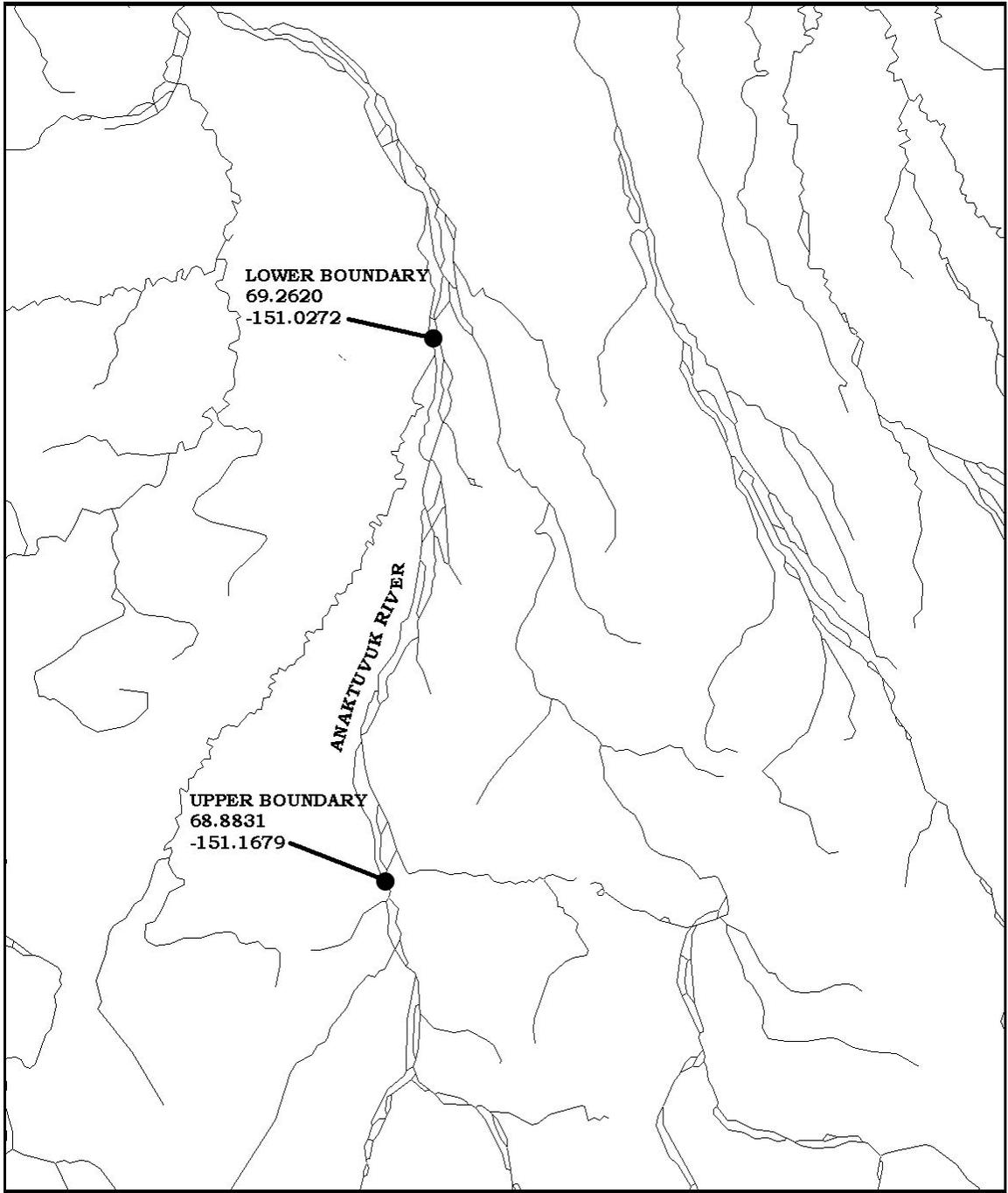


Figure 3.-Map of the Anaktuvuk River, Alaska, showing the boundaries and subsections of the 40-km index area.

RESULTS

Surveys were successfully conducted of the Ivishak and Anaktuvuk river index areas (Table 1). A preliminary survey was conducted of the Canning River to determine the extent of a suitable index area. During that survey, the upper extent of overwintering fish present in the drainage was determined, however, water clarity degraded from upstream to downstream during the survey to the point where the presence/absence of fish could not be determined. Therefore the Canning River survey was not successful at determining the downstream boundary of an index area or at conducting a complete survey. During the partial survey of the Canning River, only 140 Dolly Varden were counted. A four-day period of complete ground fog and IFR conditions, combined with budget limitations, prevented conducting a preliminary survey of the Hulahula River.

Table 1.—Aerial counts of overwintering Dolly Varden from established index areas of the Ivishak and Anaktuvuk rivers, Alaska

Year	Ivishak River ^a	Survey Date	Survey Conditions	Anaktuvuk River	Survey Date	Survey Conditions
2001	10,932	9/21/2001	Excellent	No Survey		
2002	5,408	9/20/2002	Excellent	4,576 ^b	9/22/2002	Excellent
2003	2,720	9/21/2003	Excellent	5,034	9/18/2003	Fair
2006	5,411	9/18/2006	Excellent	5,477	9/21/2006	Fair

^a Counts from 2001-2003 are averages of five replicate surveys (Viavant 2005), the survey date listed is the midpoint of the survey dates, the count from 2006 is a single count.

^b Survey conducted in 2002 was an incomplete survey.

DISCUSSION

The 2006 survey results from the Ivishak River fall almost in the middle of the range of results from comparable surveys conducted from 2001-2003 (Viavant 2005). The number of fish counted in 2006 was still less than half of the highest comparable count (2003), but was also almost twice the lowest comparable count (2001). Based on the established relationship between these index counts and abundance as measured by mark/recapture methods (Viavant 2005), the count for 2006 indicates an overwintering abundance of 22,928 fish.

The results from the 2006 Anaktuvuk River survey are very similar, although slightly higher, to comparable survey results from 2003. The initial survey conducted on the Anaktuvuk in 2002 did not survey the entire index area due to helicopter fuel and range limitations, so that survey is not directly comparable.

The aerial counts from both the Ivishak and Anaktuvuk from 2001-2006 can not be compared directly to the historical counts from 1971-1995 (Table 2). This is because both the survey methods (all of the older surveys were conducted by a single observer, and some were conducted by fixed-wing aircraft) and the area surveyed were not standardized and may not have been the same as those used in 2001-2006. Although counts made since 2001 cannot be compared directly to historical counts, it is noteworthy that for both the Anaktuvuk and Ivishak rivers, the aerial index counts from 2006 are at or below the lower end of the range of historical counts, and that even the highest recent count from the Ivishak (2001) is near the low end of the range of historical counts from 1971-1995. It is also at least somewhat reassuring that the 2006 count from the Ivishak River is near the mid-range of recent comparable counts, and that the 2006 count from the Anaktuvuk River is slightly higher than the last comparable count.

Table 2.—Historical aerial counts of overwintering Arctic char from the Ivishak, Anaktuvuk, and Kongakut rivers, Alaska^a.

Year	Date	Ivishak River	Anaktuvuk River	Kongakut River	Survey Aircraft	Survey Rating	Data Source
1971	22-Sept.	24,470			H	Good	Yoshihara 1972
1972	24-Sept.	11,937			H	Good	Yoshihara 1973
1973	11-Sept.	8,992			H	Excellent	Furniss 1975
1974	10-Sept.	11,000			H	Not Rated	Furniss 1975
1975	22-Sept.	8,306			H	Not Rated	ADF&G <i>Unpublished</i>
1976	22-Sept.	8,570			H	Fair	ADF&G <i>Unpublished</i>
1979	22-Sept.	24,403	15,717		FW	Excellent	Bendock 1980
1981	22-Sept.	24,873	10,536		FW	Excellent	Bendock 1982
1982	22-Sept.	36,432	6,222		FW	Excellent	Bendock 1983
1983	22-Sept.	27,820	8,743		FW	Excellent	Bendock and Burr 1984
1984	22-Sept.	24,818	5,462		FW	Excellent	Bendock and Burr 1985
1986	No survey			8,900		Not Rated	USFWS <i>Unpublished</i>
1989	22-Sept.	12,650		6,355	H	Good	ADF&G <i>Unpublished</i>
1993	3-Sept.	3,057			H	Good	USFWS <i>Unpublished</i>
1995	27-Sept.	27,036		14,080	H	Good	ADF&G <i>Unpublished</i>

^a No surveys were done for years not listed. Survey aircraft was either a helicopter (H) or fixed wind aircraft (FW: Piper Super Cub).

CONCLUSIONS

Although the assessments conducted by this and previous aerial surveys of overwintering Dolly Varden char in North Slope rivers should be viewed only as indicators of relative abundance, they are useful in comparing stock status over time. Survey results from the Ivishak and Anaktuvuk rivers during September, 2006 indicate overwintering abundances within the range of historical comparable estimates. Because there is only a short and incomplete time series of comparable survey counts, it is difficult to make conclusions regarding stock status from available data; however, the 2006 index area counts from the Ivishak and Anaktuvuk rivers do indicate that there have not been significant declines in overwintering abundance from recent available numbers.

These fish stocks provide for significant subsistence harvests. Because of the potential for effects on these stocks from increased use by recreational users and habitat effects from resource development or climate change, there is an ongoing need for some minimal level of stock status monitoring. Although aerial monitoring of overwintering index areas in a few major drainages provides only a relative assessment of stock status, when these surveys are conducted over time, such a relative assessment does allow the detection of significant changes in stock status.

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