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ANNUAL SUMMARY OF STATEWIDE INSTREAM FLOW  
RESERVATION APPLICATIONS<sup>1</sup>

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## TABLE OF CONTENTS

	<u>Page</u>
LIST OF FIGURES .....	ii
ABSTRACT .....	1
INTRODUCTION .....	2
METHODS .....	3
RESULTS .....	5
DISCUSSION .....	6
ACKNOWLEDGEMENTS .....	9
LITERATURE CITED .....	10

LIST OF FIGURES

<u>Figures</u>	<u>Page</u>
1. Instream Flow Reservation Application Locations .....	4

## ABSTRACT

This report summarizes the activities performed during the third year of the Statewide Instream Flow Program.

Between 1 July 1988 and 30 June 1989 (FY 89), 13 instream flow analyses were completed. Instream flow reservation applications were submitted to and accepted by the Alaska Department of Natural Resources for the Salcha River, Ship Creek, Campbell Creek (two reaches), Kenai River (two reaches), Anchor River, Buskin River, Buskin Lake, Pillar Creek, Monashka Creek, Indian River, and Ward Creek by the Alaska Department of Fish and Game.

Six Alaska Department of Fish and Game instream flow reservation requests, filed in FY 87, have been granted by the Alaska Department of Natural Resources: Terror River, Willow Creek, Rabbit Creek, Little Rabbit Creek, Little Survival Creek, and the upper Little Susitna River. The 10 instream flow reservation applications submitted to the Alaska Department of Natural Resources by the Alaska Department of Fish and Game in FY 88 are pending adjudication: Little Susitna River (middle reach), Chena River (two reaches), Cottonwood Creek, Fish Creek (two reaches), Meadow Creek, Campbell Creek, Sawmill Creek, and Ketchikan Creek. Approval of the six FY 87 instream flow water rights applications by the Alaska Department of Natural Resources validates the methods and processes employed by the Alaska Department of Fish and Game to meet legal requirements for quantifying instream flows in river systems under Alaskan law. The Buskin Lake application will provide the first test case of a provision of the instream flow law to reserve a stage or elevation of a lake.

KEY WORDS: instream flow, flow reservation, Tennant Method, Montana Method, Willow Creek, Little Susitna River, Rabbit Creek, Little Rabbit Creek, Little Survival Creek, Terror River, Chena River, Cottonwood Creek, Fish Creek, Meadow Creek, Campbell Creek, Sawmill Creek, Ketchikan Creek, Salcha River, Ship Creek, Kenai River, Anchor River, Buskin River, Buskin Lake, Pillar Creek, Monashka Creek, Indian River, and Ward Creek.

## INTRODUCTION

This report summarizes Fiscal Year (FY) 1989 activities completed during the third year of operation of the Statewide Instream Flow Program (1 July 1988 to 30 June 1989).

The State of Alaska has abundant and diversified sport fisheries which are of considerable value to fishermen. In 1987, for example, an estimated 370,338 anglers took 1.7 million household trips, fishing 2.5 million angler days to harvest 3.2 million fish (Mills 1988). These values represent significant increases over those noted in the late seventies and early eighties (Mills 1979-1988).

Increases in private and commercial developments such as hydroelectric, recreational, mining, and agricultural projects; and residential and commercial construction, have contributed to changes in both the riparian and instream habitat of important sport fishing areas. These developments will negatively impact the production of fish unless sufficient instream flows are maintained and other important habitat characteristics are preserved.

An instream flow is defined as the quantity of water that occurs within a stream channel at a specific location during a given time period. In 1980, the Alaska State Legislature enacted the Instream Flow Bill (HB 118) which allows instream flows to be legally reserved (AS 46.15.03 and 46.15.145) for the protection of fish and wildlife habitat, migration, and propagation, or other specified uses. Regulations to implement the law were adopted by the Alaska Department of Natural Resources (ADNR) in September 1983, and forms required to file applications for instream flows were made available by the ADNR in November 1983.

To reserve instream flows, an application containing supporting data and analyses that substantiate the flows being requested must be submitted to the ADNR.

Prior to July 1986, the Alaska Department of Fish and Game (ADF&G) had insufficient personnel and financial resources to establish a formal program to collect and/or synthesize and analyze data that are necessary to obtain instream flow reservations for the protection of sport fish or other resources. However, a portion of supplemental funding received by the ADF&G in FY 87 under the recently passed Wallop-Breaux federal legislation allowed for the initiation of an instream flow program in the Statewide Research and Technical Services Unit of the Division of Sport Fish. Six instream flow reservation applications were submitted to and accepted by the ADNR during the first year of the ADF&G instream flow program (FY 87). All of them have been adjudicated<sup>1</sup> and granted. Ten reservation applications were filed during the second year of the program and are pending adjudication.

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<sup>1</sup> Administrative process to determine whether to approve, modify, or deny an application for instream flow water rights.

The goal of this program is to protect the instream and related habitat of sport fish species by reserving sufficient instream flows.

The program objective for FY 89 was to apply for instream flow reservations for the protection of sport fishery resources in a minimum of eight rivers of the state.

Twelve stream reaches and one lake were selected for reservations during FY 89: Salcha River, Ship Creek, Campbell Creek (two reaches), Kenai River (two reaches), Anchor River, Buskin River, Buskin Lake, Pillar Creek, Monashka Creek, Indian River, and Ward Creek (Figure 1).

#### METHODS

Locations for reserving instream flows were nominated as described in the 1984 Instream Flow Work Plan (ADF&G 1984; Estes 1985), and as modified in 1986 (Instream Flow Committee 1986). The final selection of sites was made by the Division of Sport Fish by evaluating the importance of nominated streams to the sport fishery, the likelihood of competition for an out-of-stream appropriation<sup>1</sup>, and review of the quantity and quality of existing data necessary for the submission of an application. The sites selected for FY 89 included: Salcha River, Ship Creek, Campbell Creek (two reaches), Kenai River (two reaches), Anchor River, Buskin River, Buskin Lake, Pillar Creek, Monashka Creek, Indian River, and Ward Creek.

Applications for instream flows were prepared following procedures described in ADNR (1985). A modification of the Tennant Method (Tennant 1972)<sup>2</sup> was employed in FY 89 to apply for instream flows for the rivers and streams. The Estes and Hoffmann Lake Method (ADF&G 1989b) was used to prepare the instream flow reservation for Buskin Lake.

In Alaska, specific methods are not designated or required for supporting an instream flow reservation. The burden of proof for selecting a method and providing hydrologic and biologic data required to support an instream flow reservation is placed upon the applicant (ADNR 1985; Estes and Harle 1987). Accordingly, the selection of the methods for the 13 FY 89 reservation was based on the philosophy that any valid application of an instream flow method or combination of them could be used to calculate instream flow requirements if two assumptions were met: hydrologic data were calibrated to the site or area studied; and, fish habitat criteria represented the species/life phases of fish found in the vicinity of the targeted water body (Estes 1984; Estes and Orsborn 1986). Other considerations included the availability of data, previous analyses, and financial resources. Following these guidelines, the Tennant Method and the Estes and Hoffmann Lake Method were selected because they were the most cost effective approaches for

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<sup>1</sup> Diversions, impoundments, or withdrawals of water from or within a water body.

<sup>2</sup> Also referred to as the Montana Method in earlier literature.

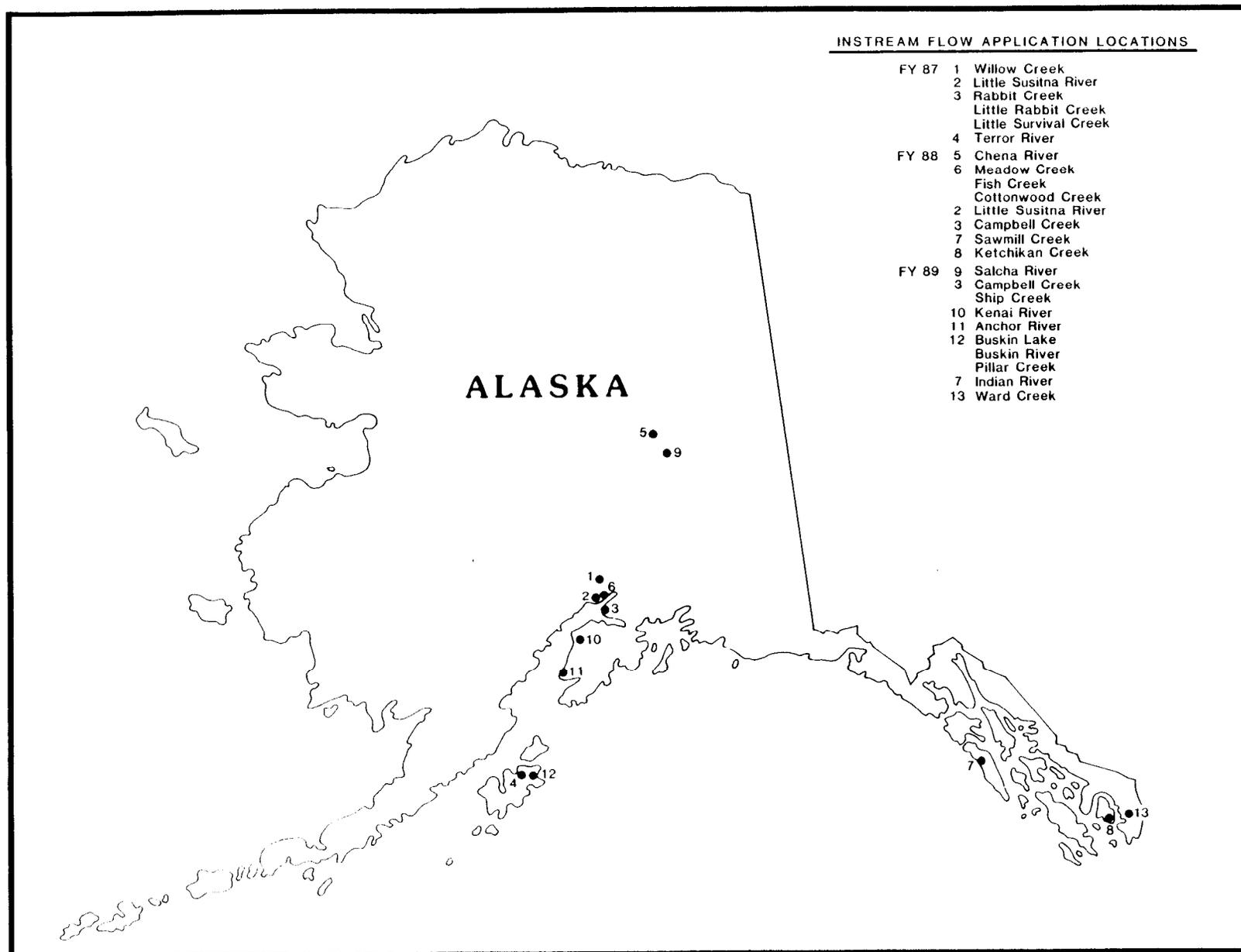


Figure 1. Instream Flow Reservation Application Locations.

recommending flow regimes and lake stage for the applications prepared in FY 89. These methods are summarized below; a more detailed description of procedures is presented in individual instream flow applications (ADF&G 1989a, b, c, d, e, f, g, h, i, j, k, l, m).

The Tennant Method was developed by Tennant (1972, 1976). It has been successfully tested in court, requires minimal expenditures of resources and can be used with limited or extensive hydrologic and fishery data bases. Five ADF&G reservation applications filed in FY 87 were based upon this method and approved by the ADNR. The Tennant Method is considered one of the simplest techniques for selecting or qualitatively evaluating instream flows for fish and wildlife. Eight flow classifications were established by Tennant by analyzing a series of field measurements and observations. Each is assigned a percentage or percentage range of the average annual flow (QAA). Seven of the classifications characterize habitat quality for fish and wildlife and the eighth provides for a flushing flow. The percentages of QAA for habitat quality range from <10% (Severe Degradation) to 60%-100% (Optimum Range). The flushing flow classification equals 200% of the QAA. Research by Estes (1984), however, suggests the flushing flow value should be increased to 400% or more of the QAA for a duration of three to seven days. Flushing flows, although important to maintain fish habitat, cannot be reserved unless a stream system has a control structure. This is because an instream flow can only be reserved at a designated location for a specified time period. Flushing flows are usually associated with a one in two year period peak flood flow; therefore, one cannot predict the exact timing of an event.

The Tennant Method requires that the QAA be calculated from an existing or synthesized data base. A flow recommendation is established by selecting the desired classification and multiplying the QAA by the percentage or percentage range for that classification.

The Estes and Hoffmann Lake Method (ADF&G 1989b) is based on defining fish habitat suitability as functions of water surface area and stage of the lake. Spawning habitat locations are located visually with the use of aerial color infrared photography and groundtruthing. These areas are mapped and digitized. Water depths of spawning sites are calculated. Suitability criteria for spawning are derived from a combination of these data, literature reviews of spawning habitat criteria, and professional judgement of biologists. Lake morphometry is calculated, mapped, and digitized. Water surface elevation of the lake is determined by standard surveying procedures. The relationship between water depth and spawning suitability is then used to calculate spawning habitat availability area as functions of total lake water surface area and stage of the lake. Presence of upwelling is also evaluated in this analysis.

## RESULTS

Analyses for 13 instream flow reservation sites were completed: Salcha River, Ship Creek, Campbell Creek (two reaches), Kenai River (two reaches), Anchor River, Buskin River, Buskin Lake, Pillar Creek, Monashka Creek,

Indian River, and Ward Creek. The completed applications were submitted to the ADNR for adjudication (ADF&G 1989a, b, c, d, e, f, g, h, i, j, k, l, m).

#### DISCUSSION

Alaskan water law is unique and progressive when compared with other states because it provides the opportunity for private individuals and organizations, in addition to state, federal, and local government agencies, to acquire instream flow reservations for rivers, streams, and lakes. Nonetheless, the process still needs improvement. Applications can be submitted to the ADNR to protect one or a combination of the following uses and values:

- 1) fish and wildlife habitat, migration, and propagation;
- 2) recreation and parks;
- 3) navigation and transportation; and
- 4) water quality.

Thirty-nine instream flow reservation applications have been submitted to the ADNR since passage of enabling legislation in 1980. Twenty-nine of the applications were filed by the ADF&G (six in FY 87, 10 in FY 88, and 13 in FY 89); one by the Bureau of Land Management (BLM); four by the Anchorage Audubon Society; and two by private individuals (Estes 1987, 1988; Harle 1988). Only the applications prepared by the ADF&G and the BLM have met all technical requirements. The other applications were rejected: two were filed before the regulations were adopted in 1983; documentation was insufficient to support the reservation request in three of the applications; and the instream flow reservation desired was not specified in one of them (Harle 1988).

The initial six FY 87 ADF&G applications for instream flow water rights have been granted by the ADNR: Willow Creek, Little Susitna River (upper reach), Rabbit Creek, Little Rabbit Creek, Little Survival Creek, and Terror River. The FY 88 and 89 applications will probably be adjudicated during FY 90 and 91. Approval of the FY 87 ADF&G instream flow applications in river systems validates the methods employed by the ADF&G to meet legal requirements under Alaskan law. Accordingly, methods used in the FY 87 applications (the Tennant and U.S. Fish and Wildlife Service Physical Habitat Simulation System, Bovee 1982) can now serve as examples for others who wish to reserve instream flows. The Buskin Lake application will provide the first test case for reserving a stage (elevation) of a lake.

Experience gained through preparation and adjudication of instream flow applications during the past three years has improved the ability of the ADF&G to acquire instream flow water rights without necessitating expansion of its program. However, in spite of past achievements, the ADF&G program, at its current funding and personnel resources level, is at a stage where

data limitations and administrative processes may limit the annual number of future reservation applications submitted to the ADNR to 10 or less. In fact, the restrictions of the current process become apparent by comparing the combined number of instream flow applications filed by the ADF&G and others (39) with the over 12,000 Alaskan streams and rivers so far identified as being eligible for instream flow protection of anadromous and resident fish species (ADF&G 1985, 1988).

Many factors contribute to the inability of the ADF&G and others to file for a greater number of reservations. The dearth of hydrologic data for most streams in Alaska reduces the ability to evaluate naturally occurring hydrologic patterns with confidence. Additionally, estimating flow characteristics of streams with a limited or non-existent data base is more time consuming than summarizing data for streams having adequate historical records. Only 316 stream gaging sites are maintained in Alaska. Of these, 171 have a continuous flow record of 10 or more years, 55 have a record of 5 to 9 years, and 90 have a record shorter than 4 years (Emery 1989). The U.S. Geological Survey (USGS) considers a 10-year record as the minimum required to support a statistically reliable regional flow analysis. Alaska has an average of one stream gage per 7,000 square miles, compared to an average of one gage per 400 square miles in the lower forty-eight states (Emery 1987). Flow characteristics for the numerous ungaged stream reaches in Alaska must be estimated using regional hydrologic models. Reliability of flow estimates calculated using these models is usually highest for regions having greater concentrations of gaging stations. It is clear that additional gaging stations are required to improve the data base used to formulate instream flow recommendations.

Competition for water in some water bodies, and the associated lengthy adjudication process, can also hamper the ability of the ADF&G to apply for reservations given limited staffing and funding. Additionally, after an instream flow reservation is granted it must be reviewed by the ADNR every 10 years to determine whether it should be modified. This periodic review requires applicants to store original data and analyses used to calculate and defend reservations. Documentation must be sufficient to enable applicants or their representatives (who may be unfamiliar with the original work) to defend reservations each time they are reviewed. This data storage requirement represents a costly burden to applicants. Moreover, if additional data and analyses are needed by the ADNR, it is unclear who the ADNR will require to fund and provide them.

In addition to instream flow reservations, the ADNR adjudicates applications for out-of-stream appropriations. Due to limited staffing, the ADNR has a backlog of applications for instream flow and out-of-stream water rights and usually cannot adjudicate these immediately upon receipt. To protect the applicant's priority for water rights, the ADNR assigns a priority date to all applications at the time they are received regardless of when adjudication occurs. Despite this protection, the delayed adjudication process can burden applicants if scheduled at an inconvenient time. Currently, 23 ADF&G applications are awaiting adjudication. In the absence of a schedule, initiation of some or all of these adjudications may disrupt ongoing operations.

Another constraint to reserving instream flows is that instream flow applicants must meet more rigorous requirements than those applying for out-of-stream appropriations. Presently, an instream flow applicant must quantify and substantiate the flow regime requested in order to file an application and receive a priority date. On the other hand, an out-of-stream applicant is required to only estimate the amount of water needed to receive a priority date. Another obstacle that may contribute to the limited number of instream flow applications filed is the recently adopted regulation to charge a higher application fee<sup>1</sup> for an instream flow application (\$500) than the \$50 to \$200 range of fees charged for an out-of-stream application (fees vary by the amount of water requested for appropriation).

The problems discussed above can be ameliorated if additional resources are obtained to collect and analyze the biologic and hydrologic data needed to support applications for instream flow reservations. Solutions can also be promoted through regulatory and legislative modifications presently under consideration that are designed to facilitate acquisition and protection of instream flow water rights. One of the proposed regulatory changes undergoing interagency review would allow instream flow applicants to receive a priority date based on their estimate of the quantity of water they want to reserve. Additional time would then be granted to collect and analyze data to substantiate these estimated flow regimes. Another regulatory proposal would eliminate the prerogative of the Commissioner of the ADNR to require an instream flow certificate holder to collect and analyze additional data for the automatic 10 year review.

Other regulatory proposals would increase data and analysis requirements for out-of-stream applicants, making them more equivalent to those of instream flow applicants. Out-of-stream applicants requesting more than a threshold amount of water would be required to describe the naturally occurring seasonal flow or stage characteristics within the affected water body as part of their application (this threshold was not established by the ADNR at time of press). Out-of stream applicants would also be required to substantiate requests exceeding standards established by the ADNR.

Legislation (HB 210), introduced in the Alaska House of Representatives in 1989 by Representative Cliff Davidson, would provide a guaranteed base level of instream flow protection to all streams and river reaches that support fish (Davidson 1989).

In summary, although the existing instream flow reservation process is among the most progressive in the country, lack of parity between requirements for data and analyses supporting instream flow reservations and those for out-of-stream appropriations undermines the entire water rights process. The result is that the level of instream flow protection implied by Article VIII, Section 13 of the Alaska Constitution (Harrison 1982), which grants a general reservation of water to fish and wildlife, is not achieved. As

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<sup>1</sup> State agencies are exempted from water rights application fees.

noted previously, these concerns would be addressed by proposed regulatory and legislative changes.

Based on our experiences and the ADF&G's mandate to protect sport fish and other fish and wildlife species, the following recommendations are considered critical to the overall success of the instream flow program:

- 1) allocate additional staff and financial resources to the instream flow program to allow for a greater number of applications to be processed;
- 2) fund additional USGS gaging stations to improve flow projection estimates and determinations of water availability for out-of-stream and instream uses;
- 3) initiate and fund a program to update and improve the precision and accuracy of hydrologic models used to estimate flow characteristics for ungaged sites in Alaska. Information derived from these models is essential in determining the availability of water for out-of-stream and instream uses for the majority of rivers and streams in the state;
- 4) adopt proposed ADNR Water Use Act regulations if they will improve the instream flow reservation process and provide equal treatment to instream flow and out-of-stream applicants;
- 5) either eliminate the automatic ten year instream flow reservation review or require a comparable automatic review of out-of-stream appropriations; and
- 6) enact HB 210 legislation or similar legislation that will automatically guarantee a base level of instream flow protection for stream reaches that are classified as supporting fish.

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