INSTREAM FLOW PROTECTION IN THE WEST

Revised Edition - 1993

from the Natural Resources Law Center
University of Colorado School of Law

Edited by
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An Assessment of Instream Flow Protection in Alaska

Mary Lu Harle
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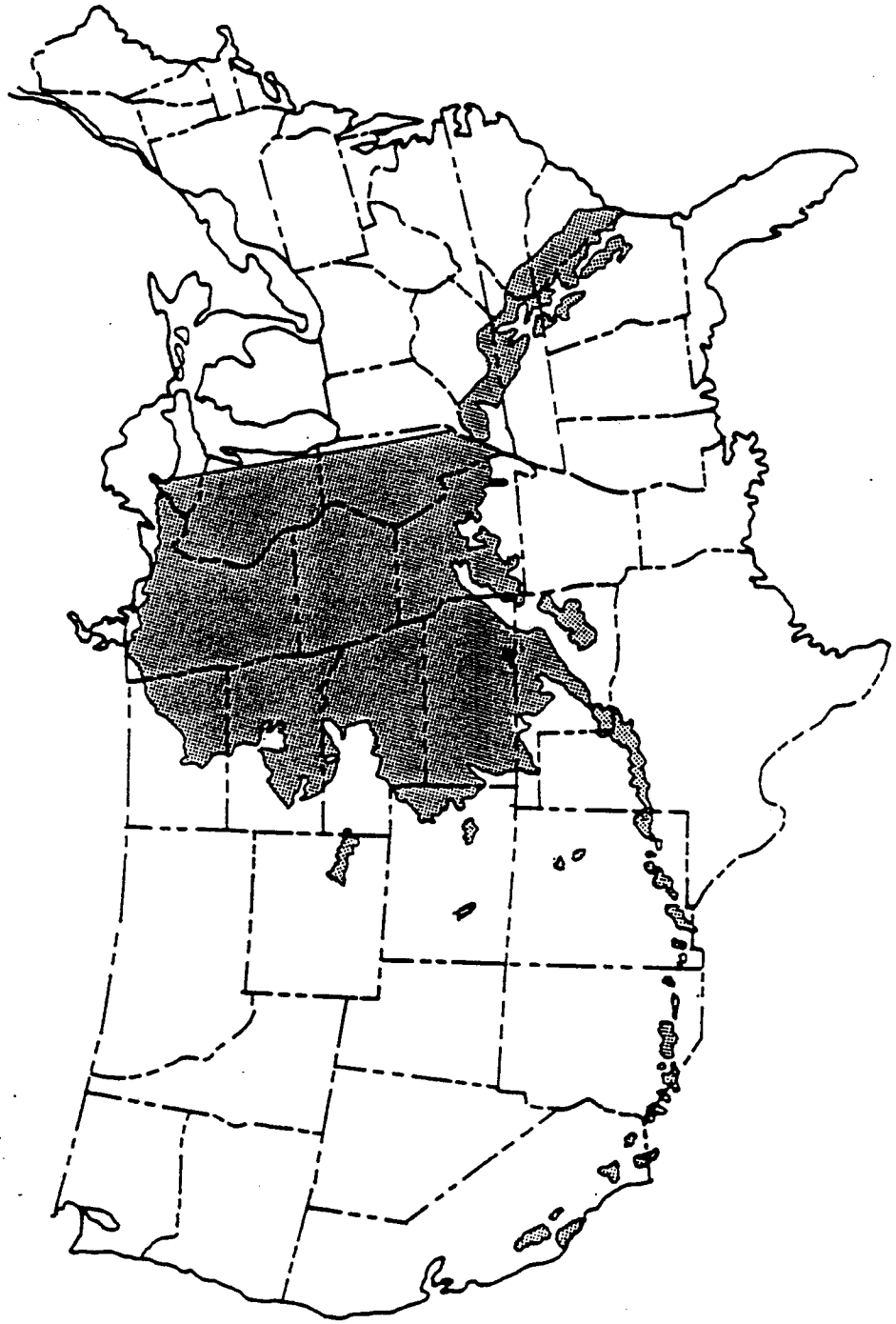
Introduction

Alaska is the largest state in the nation. Its 586,000 square miles are equivalent in area to 20 percent of the 48 contiguous states (Figure 1). Alaska's abundance of rivers, lakes, wetlands, snowfields, and glaciers contribute an estimated 40 percent of the Nation's surface waters.[1] Three rivers, the Yukon, the Kuskokwim, and the Copper, are among the ten largest rivers in the United States. Alaska has more than 3 million lakes ranging from pond size to 1,000 square miles. Water quality, for the most part, is excellent throughout the state.

Despite Alaska's apparent wealth of water, its water resources are not distributed uniformly either geographically or seasonally. Precipitation ranges from an average of five inches on the Arctic Slope to an average of 300 inches per year in the maritime rain forests of Southeast Alaska. Glaciers and icefields cover about five percent of Alaska and affect the timing and quantity of runoff.[2] Many of Alaska's rivers are laden with glacial flour during the open water season. Others are affected by ice-jam flooding during spring breakup; and, many are ice covered much of the year. Permafrost limits the occurrence and availability of groundwater in some areas of northern and interior Alaska. Alaska's size, geology, climate, limited surface transportation network, and the variability of water availability throughout the state all serve as challenges to water users and managers.

Instream uses of Alaska's water are important to support the state's people and economy. Instream flows in Alaska sustain many of North America's most productive fish and wildlife populations. Alaskan Natives depend upon subsistence use of fish and wildlife for their livelihood and preservation of their culture. Following the oil industry and government sector, commercial and sport fishing are the next largest sources of income to the state. Tourism is the fourth largest industry in Alaska and is based in part on water related recreational opportunities such as fishing and hunting, canoeing, kayaking, rafting, hiking, camping, and sightseeing.[3] Larger rivers function as important transportation corridors for boats and barges to move goods and people. Small planes access remote areas by using lakes and rivers to land and take off. Frozen rivers and lakes also serve as important winter transportation corridors.

Figure 1. Comparison of Alaska with the "48" contiguous states.



With the majority of Alaska's water resources currently unappropriated, the stage of water resources development in Alaska is similar to that of the western United States 150 years ago. As with other states, however, population growth accompanied by increased urbanization and resource development is beginning to cause water use conflicts. Water required for mining processes and resulting changes to water quality can compete and conflict with recreational boating, fishing, and community water supply systems. Hydroelectric development is sometimes incompatible with fishery needs. At times, water availability can be insufficient to both rear fish in hatcheries and to sustain instream flows needed by indigenous fish. Public water supply needs can also conflict with instream uses of water. Offstream recreational based water uses, such as artificial snow making for ski areas, occasionally compete with instream flow dependent recreation uses.

In addition to these use conflicts caused by population growth, a new program recently initiated by the State of Alaska to promote the sale and export of Alaska's water to other states and countries may further expedite the development and allocation of Alaska's water resources. The continued viability of the State's commercial, sport and subsistence fisheries; petroleum, mining, recreation and tourism industries; and public and domestic water supplies are all dependent on wise water quantity and quality resource management.

Alaska Water Law

Alaska's Constitution

When Alaska was admitted to the Union in 1959, the framers of the constitution recognized the importance of Alaska's water resources in both its constitution and statutory law. Alaska's Constitution provides that the state's resources are to be managed as a public trust, and that water will be allocated under the doctrine of prior appropriation.[4] The Alaska Constitution, Article VIII, Section 3 states that "Wherever occurring in their natural state, fish, wildlife, and waters are reserved to the people for common use." Section 13 expands the concept by reserving all surface and subsurface waters to the people for common use, makes them subject to appropriation, and provides that prior appropriation gives prior right. Public water supply is the only constitutionally recognized preferred use. The constitution also states that appropriations are subject to preferences established by law and to the general reservation of fish and wildlife. The general reservation clause, at a minimum, enables the Alaska Legislature to enact laws to reserve water to protect fish and wildlife habitat. Read most broadly, it is a mandate to reserve waters for fish and wildlife habitat. At present, there has been no court determination as to whether the constitution enables or requires the Alaska Legislature to authorize such reservations.

The Alaska Water Use Act

The Alaska Water Use Act was enacted in 1966.[5] The statute established procedures to maintain existing rights and obtain new rights to divert, impound, or withdraw surface and ground waters in the state. Under this act, the Alaska Department of Natural Resources (DNR), through its Division of Water, is assigned the authority to administer the act. The statutory procedure to obtain water rights requires filing an application for water rights with DNR. After public notice, a permit to appropriate may be issued to the applicant, granting the right to develop a water source and establish beneficial water use. Once the water is beneficially used and the permit conditions have been met, a certificate of appropriation is issued. Water rights may be sold, leased, or transferred with the permission of DNR.

Although specific provisions for reserving instream flows were not included in the original act, several aspects relating to instream protection were included. The act included sanitary, fish and wildlife, and recreational uses of water among the beneficial uses. The act also allowed for limited protection of instream uses by requiring the DNR commissioner to evaluate public interest criteria when adjudicating water rights. This includes consideration of the potential effect of water uses on fish and game resources, recreation, and public health. These criteria, as set forth in Alaska Statute 46.15.080, follow below:

(a) The commissioner shall issue a permit if he/she finds that:

(1) the rights of a prior appropriator will not be unduly affected;
(2) the proposed means of diversion or construction are adequate;
(3) the proposed use of water is beneficial; and
(4) the proposed appropriation is in the public interest.

(b) In determining the public interest, the commissioner shall consider:

(1) the benefit to the applicant resulting from the proposed appropriation;
(2) the effect of the economic activity resulting from the proposed appropriation;
(3) the effect on fish and game resources and on public recreational opportunities;
(4) the effect on public health;
(5) the effect of loss of alternate uses of water that might be made within a reasonable time if not precluded or hindered by the proposed appropriation;
(6) harm to other persons resulting from the proposed appropriation;
(7) the intent and ability of the applicant to complete the appropriation; and

(8) the effect upon access to navigable or public waters.

Based upon the evaluation of these criteria, a permit may be issued, subject to conditions necessary to protect the rights of others and the public interest; or, the permit may be denied.

Prior to passage of instream flow legislation in 1980, DNR used this authority as its primary tool for instream flow protection by conditioning permits to maintain streamflows for fish and wildlife. The procedure is of limited value as a management tool because permit conditions do not protect unallocated water from future appropriation. In addition, instream flow conditions on early water use permits were not always taken into account when junior permits were granted on a stream. A clearer procedure therefore was needed to legally establish and maintain instream flows, especially in water bodies where little or no competition for water presently existed.

In 1976, DNR contracted with Professor Frank J. Trelease to evaluate Alaska's water resources planning and administration of water rights. Among his recommendations was one to amend the Water Use Act to authorize state agencies to apply to DNR for reservations of flows for fish and wildlife, recreation, and water quality purposes.[6] His report also contained a proposed bill to accomplish this recommendation. This bill was introduced in the Alaska Legislature in 1977 but failed to pass.

Alaska's 1980 Instream Flow Law

Instream flow amendments to the Water Use Act were eventually enacted in 1980 following several years of debate. The 1980 instream flow law amended the Water Use Act in three important ways. First, a reservation of water for instream use was defined as an appropriation. Second, navigation, transportation, and maintenance of water quality were added as beneficial uses. Third, a new section, AS 46.15.145, was added detailing the process of reserving water for instream uses.[7]

The instream flow statute allows any local, state, or federal government agency or any private person or organization to apply for a reservation of water for one of the recognized instream uses. A reservation of water is a water right to maintain a specified instream flow or level of water at a specific point or part of a stream or water body throughout the year or for specified times. The Alaska instream flow statute is among the few state instream flow statutes that allow private citizens and organizations to apply for an instream or lake level reservation. Alaska's law therefore allows direct private sector participation to select, apply for, and maintain instream flows.

Four instream uses are recognized for protection under Alaskan law:

- protection of fish and wildlife habitat, migration, and propagation;

- recreation and park purposes, which by regulation include contact and secondary recreation and park purposes including scenic, natural, historic, or cultural values;
- navigation and transportation purposes, which by regulation include boats or float planes and tracked or wheeled vehicles during the winter; and
- sanitary and water quality purposes.

The statute also provides for quantification of water required to sustain instream water uses, establishment of a priority date, and issuance of a certificate of reservation under the state's existing water rights system.

Procedure For Establishing An Instream Flow

Regulations implementing the instream flow statute were adopted in 1983 and were amended in 1990. Regulation 11 AAC 93.142 specifies the information that must be included in an application. Applications must include the purpose of the proposed reservation, the location of the proposed reservation, the need for the reservation, the quantity proposed to be reserved, the method used to quantify the requested flow or lake level, data substantiating the request, and an application fee. The regulations do not require that any one method be selected to quantify an instream flow reservation request. However, applications must identify and include a description of the method used. The fee for instream flow applications is presently $500 per application.[8] State agencies are the only entities that are exempt from the application fee.

A new $50 annual administrative service fee was adopted by regulation in April, 1993. Domestic water use of less than 1500 gallons of water per day, state agencies, and reservations of water for a public benefit are exempt from this fee.[9] The term "reservation of water for a public benefit" has been described as a reservation that is granted to an individual, group, or agency when the reservation of water is for the public good and does not generate revenues for profit. Reservations for the protection of fish and wildlife and non-commercial recreation would therefore be exempt from paying the annual administrative fee.[10]

The date and time that an application is judged complete and is accepted by DNR establishes the priority date for the application. Regulations effective in 1990 allow applicants the opportunity to file instream flow applications and receive priority dates by filing estimated quantities. The regulations allow applicants up to three years, with an additional two year possible extension, to complete data collection and analysis and to fully quantify the proposed reservation. This is a significant new change that allows instream flow applicants to receive priority dates in advance of complete quantification of instream flows. After the final instream quantity is determined, an applicant may amend the original application to a different flow if the analysis does not support the quanitity of water originally requested. The application can then be adjudicated.

Notice of the proposed reservation must be given by DNR, but is paid for by the applicant. Public notice is required once in a newspaper of general distribution in the vicinity of the proposed reservation of water. In addition, individual notice must be served on prior appropriators who might be affected, the Alaska Departments of Fish and Game (ADF&G) and Environmental Conservation, any federal, state, or local government in whose jurisdiction the proposed reservation would occur, and any others who may have requested notice.

Hearings on a proposed reservation of water may be held if DNR determines they are necessary. Finally, the commissioner must issue a certificate of reservation if four criteria are met. These criteria are:

- the rights of prior appropriators will not be affected by the reservation;
- the applicant demonstrates a need for the reservation of water;
- there is unappropriated water in the stream or water body sufficient for the reservation; and
- the proposed reservation is in the public interest.

The public interest criteria for out-of-stream water uses is applied to evaluate instream uses of water. DNR's decision and rationale for granting, conditionally granting, or denying an application for an instream reservation of water must be in writing.

Certificates of reservation are, by regulation, issued to the applicant by DNR and may be subject to conditions. The applicant is responsible for compliance with the conditions. Once a reservation of water for instream use is granted, the instream quantity reserved is withdrawn from out-of-stream appropriation unless the reservation is formally reduced at a later date as part of a mandatory instream flow reservation review process.

Review of Instream Flow Reservations

Reservations of water for instream uses must be reviewed at least once every 10 years, and can be reviewed any time within the 10 year period if it is deemed necessary. The review determines if the purpose and need for the reservation still apply, if the reservation affects prior appropriators or the public interest, if new information about the reservation is available, if the quantity or level of water reserved is adequate for the purposes of the reservation, and if additional data collection or analysis is needed to review the reservation.

Public and agency notice of the review is given to gather information that may assist in the review. At the conclusion of the review by DNR, findings are written and the certificate of reservation can be continued, amended, or revoked. A similar review is not required for out-of-stream appropriations.

Recent Instream Flow Legislative Proposals

Overview of General Concerns

Since 1989, a number of bills have been introduced in the Alaska Legislature to amend the instream flow provisions of the Water Use Act. Some legislators, agency personnel, and members of the public questioned whether the 1980 instream flow provisions in the Water Use Act were adequate. They questioned whether the existing law complies with the intent of the general reservation of fish and wildlife language in Article VIII, Section 13 of the Alaska Constitution. They also questioned whether the public interest criteria in the law require that effects of proposed water appropriations on fish and wildlife simply be considered, or whether these provisions guarantee instream flow protection for fish and wildlife. A third area of concern was the level of protection provided by certificates of reservation granted by DNR, given that they must be reviewed every 10 years and can be periodically modified or revoked. A fourth area of concern was based on the experience that only eleven instream flow reservations have been granted since the state's instream flow law was enacted in 1980.

Advocates for strengthening instream flow protection increased their efforts to influence legislation in 1991 in response to actions initiated by Governor Walter J. Hickel's administration to investigate opportunities to market and export Alaskan water to drought-stricken western states and other countries. As a follow up to their investigation, the Administration introduced legislation in 1992 to enable the state to better manage the sale of Alaska's water and also gain financial benefit. These instream flow and water marketing legislative proposals are described below.

House Bill 210

In 1989, House Bill 210 was introduced in the Alaska Legislature by Representative Cliff Davidson, Chairman of the House Resources Committee, to guarantee a reservation of instream flows for fish in all fish-bearing waters in the state.[11] The bill required that, upon receipt of an application to appropriate water from a river or lake that is important for the spawning, incubation, rearing, or migration of fish, DNR must first reserve an instream flow to maintain existing fish habitat. The amount of water to be reserved was set at 60 percent of the mean annual flow for April through October and 30 percent of the mean annual flow for November through March. The percentages were based on the Tennant Method of estimating instream flow needs.[12] This method was chosen because only mean annual flows are required; and, mean annual flows can be estimated for the many areas of Alaska with only sparse hydrologic data. If there were an insufficient quantity of unappropriated water in a stream or river to satisfy the full amount of the instream flow reservation requirement, the remaining unappropriated water available would have been reserved to the State. The priority date

for these instream flow reservations was to be the date of the act's passage and therefore existing appropriators would not be affected. A junior applicant who wished to appropriate water that had been reserved under this proposal could do so by showing that additional water withdrawals would not harm fish habitat.

House Bill 210 proved to be very controversial. Supporters believed that existing instream flow protection was inadequate to protect instream flow uses for future generations of Alaskans when competition for water increased. In addition, they felt the authority to condition permits was arbitrary and could be misused. Opponents argued that fisheries habitat is not threatened by out-of-stream appropriations in Alaska. They also believed that the 1980 instream flow law and the authority of DNR to condition permits and certificates to protect instream flows provide ample protection for fish habitat.

A second area of contention was that the Tennant Method of determining instream flows could not be uniformly applied state wide, due to the variety of climatic zones and stream characteristics across the state. In addition, all parties agreed the small number of stream gaging stations throughout the state limited the accuracy of estimating streamflows. Amendments to the bill attempted to address these technical issues by requiring DNR to adopt regulations within 18 months to specify the proportion of mean annual or mean monthly flow that would be reserved within each of the six major U.S. Geological Survey (USGS) hydrologic subregions in Alaska (Figure 2). During the 18 month interim period, Tennant's 60 and 30 percent flow regime would be reserved.

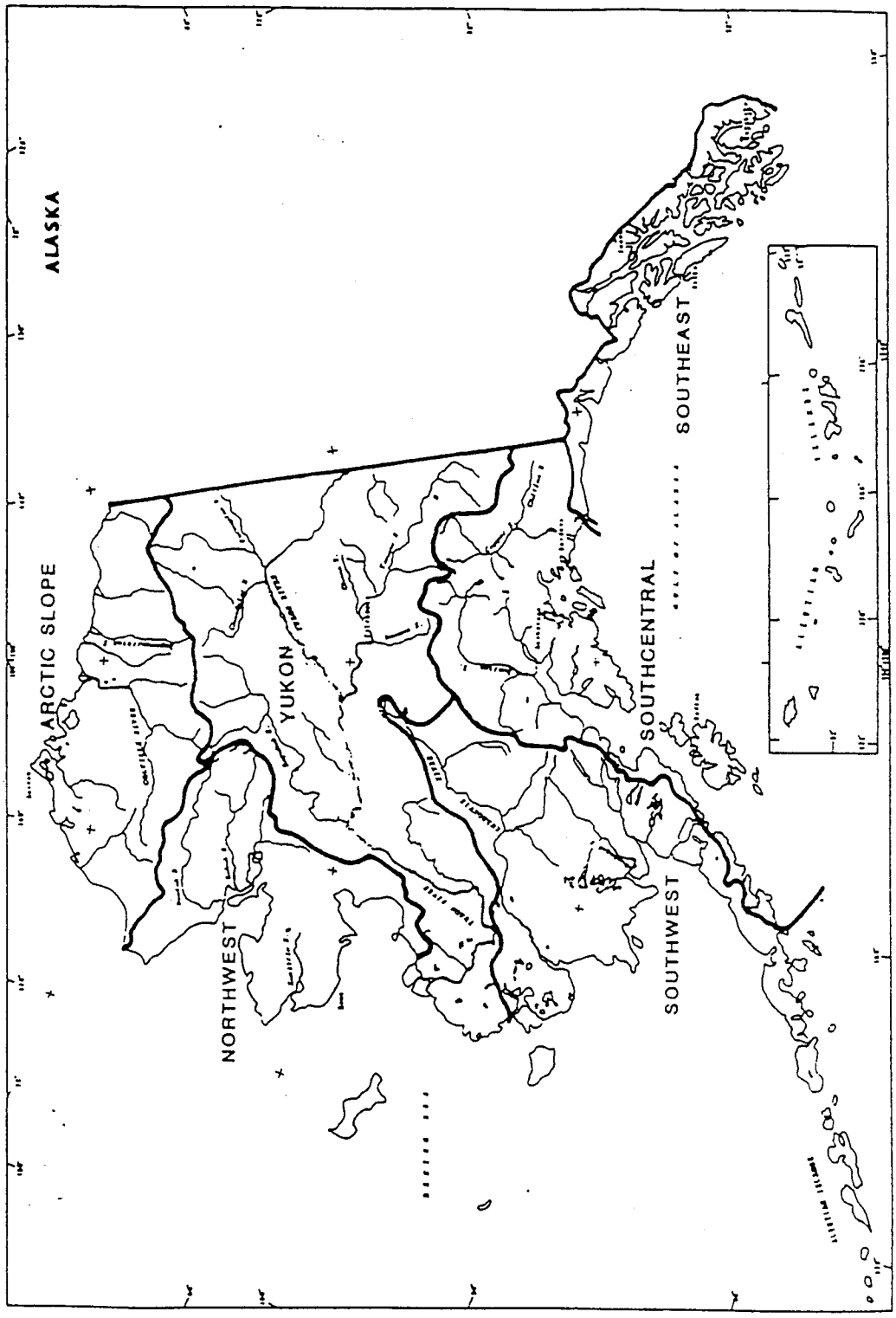
A third area of debate focused on whether House Bill 210 was unconstitutional because it would place instream flow protection ahead of public water supply. Concerns were also raised that domestic uses in rural areas would be harmed. To ensure that the legislation would not adversely affect either domestic water uses or public water supplies, both uses were exempted from the bill.

As a result of the debate and controversy, the bill failed to pass on a floor vote in the House of Representatives, and was not considered in the Senate.[13]

The 1991-1992 Legislature

Based upon experiences gained with House Bill 210, House Bills 353, 354, and 355, were introduced in the 1991 Legislature by Representative Cliff Davidson, Chair of the House Resources Committee, to improve instream flow protection and water management in Alaska.[14] In addition, Senate Bill 442 was introduced by Governor Walter J. Hickel in 1992 to enable the state to market and sell water.[15] All four bills failed to pass. However, in a special session immediately following the adjournment of

Figure 2. United States Geological Survey hydrologic subregions (units) for Alaska.



the 1992 regular session, House Bill 596, an omnibus license and user fee bill that also contained water related provisions, was introduced and passed by the Legislature and signed by the Governor.[16] It became law in July, 1992.

House Bill 353 was a bill to fund the completion of DNR's automated water rights data base to enable storage and retrieval of stream reach data for instream flow reservations. It would also have improved management of other water rights. House Bill 354 would have provided funding to evaluate Alaska's network of surface water stream gaging sites. It would have also funded several new stream gage sites. Both of these bills failed to pass.

House Bill 355 was another proposal to guarantee instream flow reservations for fish, and had many similarities to the 1989 instream flow bill. However, unlike HB 210, HB 355 did not specify a formula or procedure for quantifying the amount of water that would be reserved. It exempted public water supplies, single family domestic uses of water, non-consumptive uses of water and, in most instances, ground water appropriations of 5000 gallons per day or less. Before it was amended and died, HB 355 also included a provision to guarantee instream flow protection for wildlife.

In 1992, House Bill 596 was enacted and included amendments to the Alaska Water Use Act pertaining to water exports and sales.[17] The potential to earn state revenues through large-scale exports of Alaskan freshwater to drought-plagued "Lower 48" states and to Mexico served as an incentive to pass the water related components of this law. DNR, through its Division of Water, is actively investigating the economic feasibility of transporting water, identifying water sources, and conducting discussions with potential buyers of Alaska's water.[18]

House Bill 596 prohibits the removal of water from its hydrologic unit of origin to any other place, either inside or outside the state, unless DNR first determines that the water is surplus to instream needs for fish and to the water needs of industry and the public within the hydrologic unit. This instream flow requirement was included to secure passage of the water export provisions. Hydrologic units are defined in the law as the six major hydrologic subregions delineated by USGS (Figure 2). The law also grants DNR the authority to assess a conservation fee for all water exports from these units and further stipulates that sales of water appropriated to the state must be based on fair market value. The protection of instream flows is weakened somewhat by other provisions that allow DNR to adjust instream flow reservations after public notice and consultation with the Alaska Department of Fish and Game.

The requirement to protect instream flows prior to diversion or export from a hydrologic unit is a partial implementation of the general reservation of water for fish and wildlife contained in the Alaska Constitution. However, the new law does not include instream flow protection for wildlife. The large size of the hydrologic units likely means the new law will have little or no impact on diversions of water within the state, or

on the majority of water rights. It will, however, be important in protecting instream flows in streams and lakes that may become sources for water export. Regulations presently being drafted will help define the effectiveness of this law.[19]

Alaska's Experience Protecting Instream Flows

State Agency Instream Flow Applications

The ADF&G is the only state agency that has submitted applications for instream flow reservations. It began an instream flow program in 1986 and has filed 53 applications to protect fisheries habitat (Figure 3). Of these applications, ten have been granted and six are currently being adjudicated. Two reservations have been granted based on the Instream Flow Incremental Methodology, while the remaining ADF&G applications are based on the Tennant Method. One application to reserve a flushing flow to maintain channel characteristics in a reach of the Chena River has been filed but has not yet been acted upon. Another application to reserve a lake level for Buskin Lake has also been submitted, but not yet adjudicated. No ADF&G applications have been acted upon by DNR since 1991.[20]

In May of 1988, the Alaska Legislature enacted a law establishing six recreational rivers in Southcentral Alaska. The law requires that instream flows be reserved on these rivers for recreational purposes.[21] A cooperative effort between the DNR, ADF&G, and the National Park Service (NPS) was begun to file for instream flow protection for the six river systems. A recreational user survey was completed by the NPS and a draft report prepared on flows needed to protect recreational boating. Some hydrology data collection and analysis has also been completed. However, the majority of analyses required to file for instream flows for ungaged stream segments have not yet been completed due to shortage of funds. To date, recreational instream flows required by the 1988 law have not been reserved.

Federal Agency Instream Flow Applications

The Bureau of Land Management (BLM) is the only federal agency that has filed an application for a state water right for instream flows in Alaska. Instream flows were granted by the DNR in 1989 for Beaver Creek National Wild River (Figure 3) to protect flows for fish and wildlife habitat and for public recreation. The BLM reservation is significant because it is the first instream flow application submitted by a federal agency under state law, and it is also the first federal instream flow application to be granted by the State. BLM is collecting data and plans to file applications for instream flows for the Gulkana River, the Forty Mile River, Birch Creek, Unalakleet River and the Delta River, all of which are designated as National Wild and Scenic Rivers.[22]

The U.S. Fish and Wildlife Service (FWS) has adopted a water rights policy that states that the Service will obtain sufficient quantities of water and the legal rights to use that water to manage the refuges, protect endangered species, and to maintain instream flows on FWS refuges. Whenever possible, water rights necessary for FWS facilities and programs will be secured under state law, unless it is determined that state law would provide inadequate protection. However, federal reserved water rights will also be asserted when necessary to protect federal interests in water.[23]

Region 7 of the Fish and Wildlife Service, which encompasses the State of Alaska, established a formal water rights program in Fiscal Year 1993. One of the primary goals of the new program is to secure instream water rights to protect habitat for fish and wildlife identified by the Alaska National Interest Lands Act on refuges in Alaska. During Fiscal Year 1994 applications will be prepared for selected rivers and lakes in the 1002 area of the Arctic National Wildlife Refuge.[24] Hydrologic data collection began in the summer of 1993 on the Yukon Flats National Wildlife Refuge to support future instream flow applications there. An analysis is also being conducted to identify threats to refuge water resources and to prioritize watersheds and refuges for subsequent hydrologic data collection and preparation of instream flow applications.

Private Sector Instream Flow Applications

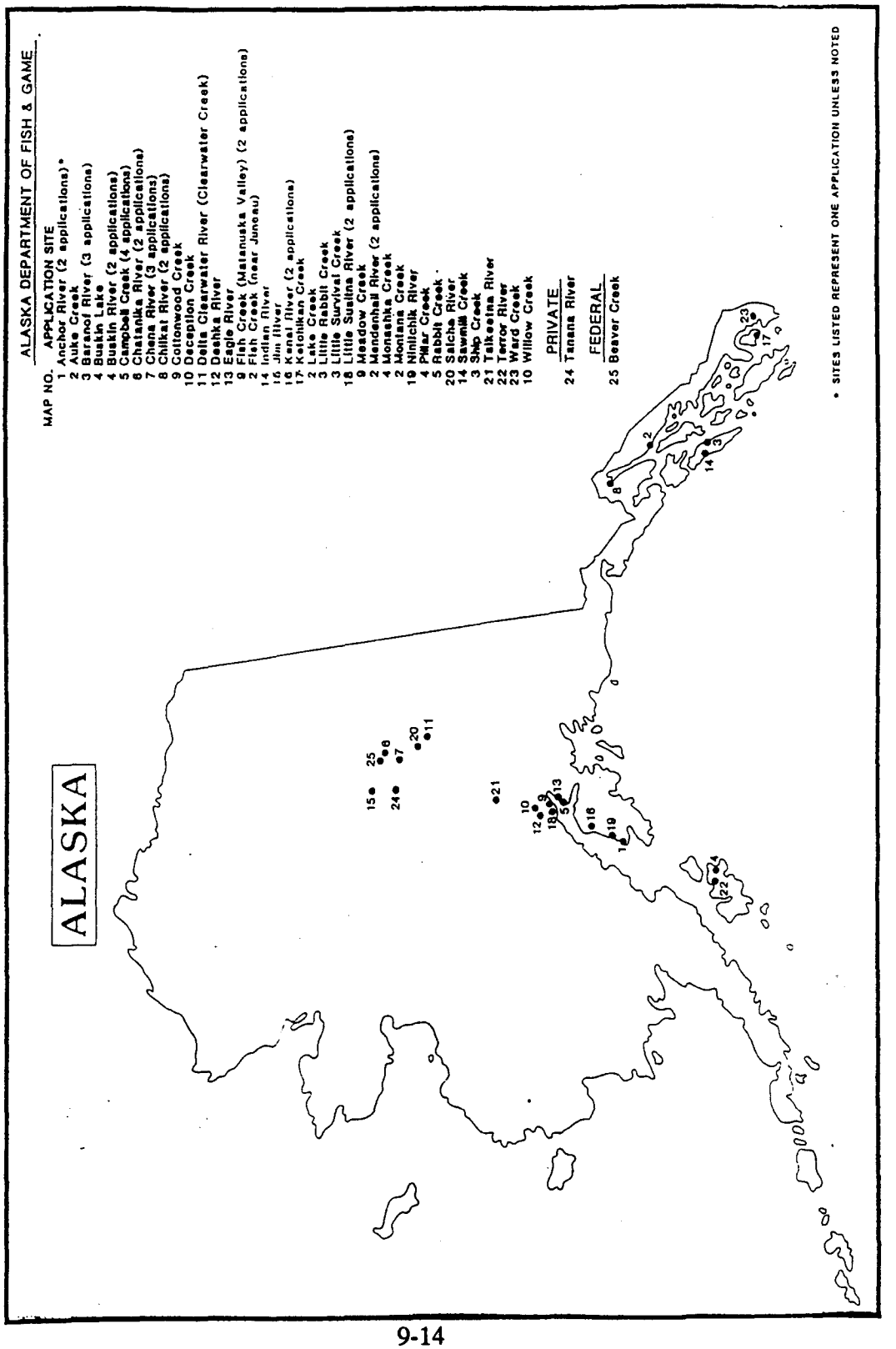
Seven applications have been filed by the private sector since passage of the instream flow law in 1980. Four applications were submitted to DNR in 1983 by the Anchorage Audubon Society to protect fish habitat. Two additional applications were filed in 1983 by private individuals, one for water quality and one to establish a lake level. All of these applications were rejected by DNR. Two of the applications were submitted before the adoption of regulations to implement the 1980 instream flow law, while the others had insufficient information to process the applications.[25]

In 1992, students at the University of Alaska Fairbanks belonging to the Arctic Unit of the Alaska Chapter of the American Fisheries Society submitted an instream flow application to DNR to protect fisheries habitat in the Tanana River (Figure 3). This application has been accepted by DNR and it is the first instream flow application prepared by a private organization to be accepted. It has not yet been acted upon.

Evaluation of Instream Flow Protection In Alaska

How effective is instream flow protection in Alaska? In the 13 years since Alaska's instream flow law was enacted, portions of only 11 rivers and streams have been granted legal protection by certificates of reservation. A total of 55 applications have been filed by only three organizations. While Alaska's instream flow law is a progressive

Figure 3. Locations of instream flow applications sites (•) in Alaska.



law among the western states, it has fallen short of protecting instream flows on a wide scale basis.

A number of factors limit instream flow protection in Alaska. These include insufficient hydrologic data, costly and lengthy studies and administrative processes, and expensive application fees. Additional discussion of these limitations is provided in the 1992 "Annual Summary of Alaska Department of Fish and Game Instream Flow Reservation Applications".[26]

The lack of hydrologic data in Alaska is perhaps the most limiting factor in applying for instream flow reservations. Over 99 percent of the rivers and streams in Alaska are ungaged. Altogether, less than 400 USGS stream gaging sites have been established in Alaska since 1908. On the average, no more than 25 percent of these gages are active in any one year due to funding restrictions. This equates to an average of one stream gage per 7,000 square miles in Alaska as compared to the "Lower 48" average of one gage site per 400 square miles. Although the USGS recommends a 10-year record as the minimum data base required to support a statistically reliable regional flow analysis, less than half of the Alaskan gage sites can meet this standard.[27]

The DNR Division of Water, along with other state and federal agencies such as the FWS and BLM, also collect hydrologic data; however, such data collection is very expensive in most regions of Alaska. Road systems are limited. Travel and field logistics in remote areas, extremes in weather and field conditions, and difficulties such as loss of equipment to bears and other wildlife, make data collection difficult and expensive. In the Arctic and other remote regions of the state, stream gages can only be maintained during the ice-free months without large expenditures of resources. In addition to being difficult and expensive to obtain, data are also spread throughout the various agencies that collect them. Consequently, locating existing data can be a challenge.

Quantifying instream flow requirements for ungaged stream reaches in Alaska requires the use of regional hydrologic models to estimate flow characteristics. Flow and precipitation data collected at a network of index sites throughout the state are among the variables used to develop these models. The limited number and uneven geographic distribution of index sites in Alaska affects the types, precision, and accuracy of model outputs. Whereas mean annual and monthly flows can be estimated for many of the watersheds in Southeast and Southcentral Alaska, insufficient data limits estimates for most basins in the remainder of the state to mean annual flows.

In addition to sparse hydrologic data, accompanying data to support both the need for instream reservations and the quantity of water requested for instream flow reservations is also sparse. These data include biologic data on the location of species during their life stages, recreation user data, and water quality data. These data are also time-consuming and expensive to collect.

The administrative process also serves as a deterrent to potential instream flow applicants. Collecting, analyzing, and completing an application is a significant project. In addition, the mandatory 10-year review of certificates of reservation requires that records be maintained and that more data collection, analysis, and a defense of the reservation may be required in future years. At present, the State does not have a fixed schedule to process instream flow applications. No instream flow reservations have been granted since 1991, and the backlog of applications is developing.

Finally, the $500 application fee may serve as a deterrent to some applicants. State agencies are exempt from this fee; however, this is a substantial fee for other agencies and private organizations or individuals, especially if more than one application is filed.

Conclusion

Alaska's law to protect instream uses of water is a forward looking law. It allows private persons and organizations, as well as local, state, and federal agencies, to participate in the process of reserving instream flows and lake levels. To date, there is little competition for water and most water bodies remain available for appropriation. This provides a sense of security that the current system is working. However, experience shows that private applications are difficult to bring to fruition and the 10-year mandatory review places instream flow reservations at a comparative disadvantage to out-of-stream appropriations. Accordingly, the debate continues as to whether existing laws and regulations are adequate to prevent over-appropriation and subsequent litigation that other western states are experiencing.

There are several recommendations for ensuring that instream flows will be protected for future generations. First, a statewide network evaluation of stream gage and precipitation monitoring sites is needed, followed by establishment of necessary stream and precipitation index stations, so that estimates of discharge for ungaged streams can be determined for all regions of the state with a reasonable level of accuracy and minimal expenditure of resources.

Second, methods used to determine instream flow requests, such as the Tennant method for water bodies with little or no data, need to be systematically evaluated and refined to calibrate them for use in regions such as the Arctic, where they have not yet been applied. Whenever these methods prove unusable for instream flow determinations in systems facing high levels of competition for water sources, other Alaska-specific methods need to be developed that provide more definitive quantitative instream flow determinations.

Third, the statute requiring 10-year mandatory review of instream flow reservations should be eliminated. This provision places holders of instream flow reservations on uneven footing with out-of-stream appropriations.

Finally, a broad baseline approach, similar to the approaches outlined in House Bills 210 and 355, is required to protect instream values on a statewide or regional basis. In addition, analysis and reservation of instream flows for specific water bodies is needed for high priority rivers, lakes, and wetlands.

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