

ADF&G INSTREAM FLOW AND LAKE LEVEL (RESERVATION OF WATER) PROTECTION REPORT

by

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for

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The Nature Conservancy

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Executive Summary

This report was commissioned by the Nature Conservancy (TNC) to summarize the history and elements of the Alaska Water Use Act (AS 46.15) and related legal, regulatory and administrative mechanisms relevant to retaining sufficient amounts of water in rivers and lakes for sustaining fish and wildlife production and habitat. It covers the period from statehood (1959) to June 2007 and provides short and long-term recommendations for improvement.

TNC contracted a similar, but independent project with other consultants, to compliment this analysis performed by the Alaska Department of Fish and Game (ADF&G). The companion product included a review of many of these recommendations and Alaska case laws and legal opinions relevant to these topics, challenges and recommendations. That report is in the possession of TNC.

Self-sustaining fish and wildlife populations require sufficient amounts of good quality habitat. Fish, and in some instances, wildlife habitat conditions are partially dependent on the retention of sufficient amounts of good quality water in river (lotic) and lentic (lake) environments on a year-round basis. Wise management of these and other natural resources contribute to the socioeconomic well being of Alaskans.

Alaska has one of the most progressive water allocation statutes in the United States (AS 46.15) for managing allocation of surface (lentic and lotic) and subsurface (wells) water volumes for withdrawals, diversions, impoundments, and reservations of water (the latter permitting retention of water within lotic and lentic environments/ in situ uses). All water allocation uses are subject to the doctrine of prior appropriation and public interest considerations established by the Alaska Constitution (Article VIII, Sections 3, 13, and 16) and Alaska Statute (AS) 46.15.080. Other state and federal laws can also impact water allocation but are not the main focus of this review.

Alaska became a state in 1959 and remains in its infancy in terms of human population growth and development of natural resources. It will celebrate its 50th anniversary in 2009. With 20% of the nation's land area, approximately 50% of the nation's coastline and 40% of the nation's flowing surface waters, less than 1% of its freshwater resources have been altered. The status of water resources and usages differ significantly from the majority of other locations in the United States and other countries. That is because most water bodies in Alaska are unregulated and currently have sufficient volumes of good quality water to sustain fish and wildlife production, other ecological purposes, and satisfy the majority of present water demands for various human needs.

The population of Alaskans has increased from 224,000 in 1959 to approximately 700,000 in 2009. Some equate Alaska's youth as a state and its early stages of water development as being similar to that experienced by the western United States approximately 170 years ago. Unfortunately past water management actions and policies implemented in the lower 48 states resulted in over appropriation (over allocation) of water from most water bodies

(Reisner 1986, Brajer et al 1989). That means more water was allocated for diversions, withdrawals, and impoundments versus amounts of water needed within rivers and lakes to sustain self-reproducing native fish and wildlife populations and other ecological processes and services. In some lower 48 locations, rivers, lakes and wells can be completely dewatered (left dry).

Present and projected water management uses in Alaska are typically associated with increasing demands for water uses associated with human population, energy, recreation, industrial growth, and maintenance of fish and wildlife and other natural resource uses. Another growing use of water is based on demands to import water of good quality from Alaska by other parts of the country and planet.

The steady growth of water uses should encourage Alaskans to closely evaluate the adequacy and implementation of existing state water allocation laws and information used for effectively balancing competing water demands.

By doing so, one will observe there are insufficient hydrologic data required to document baseline water availability in most locations throughout Alaska. Not knowing how much water naturally exists within a given water source at any given time of the year (or how water availability changes over multiple years during wet and dry periods) can result in inadvertent errors in determining and predicting how much water can or should be removed and left within rivers, lakes and wells in the best public interest. This was one of the lessons learned by lower 48 states that resulted in poor water allocation decisions and dewatering discussed above.

Better water allocation decisions are also hampered by incomplete fish distribution information for Alaska water bodies. Fish habitat protection laws and public interest decisions for water allocation relating to consideration of impacts to fish are partially dependent on knowing whether fish are present in the water body source subject to development and modification.

In spite of these challenges, Alaska's wealth and dependency on wise management of its natural resources, current conditions, and youth provide unique opportunities to use the lessons learned by the lower 48 states to enable Alaskans to take actions to avoid and minimize resource management mistakes made in other parts of the world.

This report addresses these and other relevant issues and presents a series of recommended actions for enhancing the use of various mechanisms and tools to increase protection of sufficient amounts of water in rivers and lakes required for fish production..

When reading this report, it should be emphasized Alaskans, in many instances, have limited experiences testing the adequacy of various laws and regulations or whether there are other and perhaps better options and interpretations for their application. This is due to the relatively short period of statehood, early stages of population and industrial growth and limited amounts of judicial and administrative challenges and experiences specific to Alaska.

Goal

This report is intended to provide cost effective recommendations and strategies to provide short and long-term solutions that will result in better protection of water volumes within fish bearing waters required to sustain fish production in Alaska.

Objectives

1. Describe the existing statutory and regulatory requirements for obtaining reservations of water and similar mechanisms to sustain fish and wildlife production and habitat in rivers and lakes.
2. Describe past, existing, and potential problem(s) that are, or may, stifle full implementation of intended protections for fish and wildlife.
3. Recommend legal or institutional mechanisms and other options to correct the problem(s) identified in #2 including but not limited to:
 - Specific recommendations regarding a broad system of automatic water reservations for fish and wildlife as described in the project goal statement;
 - Specific recommendations on how to ensure that the State's decisions on water reservations and water allocations, under the current system, are made in the best interest of the public; with the best possible information; and, in an objective and balanced manner. This report element is complimented by a separate project and contractor commissioned by The Nature Conservancy (TNC);
 - Specific examples of strategies for application of the existing system as interim and partial solutions at the same time the other strategies are pursued : e.g.: research to develop and test application of remote methods of determining water quantities in rivers and lake levels for sustaining fish and wildlife; a rigorous, statewide baseline water data gathering program focused on the most significant waters for fish and wildlife; and, a strategy for public outreach and education, etc.

Introduction and Setting

Alaska is the largest state in the nation. Its 586,000 square miles are equivalent in area to approximately 20 percent of the lower 48 contiguous states (Figure 1). It is bordered by almost half the nation's coastline. Surface water bodies in Alaska are estimated to represent 40 percent of the Nation's total surface waters (Figure 2). Three of Alaska's many thousands of rivers are among the ten largest in the United States (Moody 1986). Alaska has more than 3 million lakes ranging from pond size to 1,000 square miles (Bue 1963). Water quality, for the most part, is excellent throughout the state (Harle and Estes 1993). Wisely managing the allocation of Alaska's abundant waters are and will continue to be integral to the current and future economic and social well-being of Alaskans.

Unlike water allocation patterns in other states, less than 1 percent of Alaska's free flowing rivers and natural lakes have diversions, withdrawals, and impoundments. Among the primary economic, social, and cultural benefits resulting from Alaska's healthy free flowing waterways is the production of North America's remaining, and in some instances, the most viable fish and wildlife populations. Following the oil industry and government sector, water dependent commercial and sport fishing, and related tourism are the next largest sources of income to the state. Mineral extraction is growing and represents another significant source of annual revenue. Alaskan Natives depend upon subsistence uses of fish and wildlife for their livelihood and preservation of their culture Colt 2006, ISER.

The socioeconomic contributions associated with and importance of sustaining fish production in Alaska waters are recognized by state laws. Fish habitat protection is required in fish bearing lakes and rivers that have been documented in accordance with state law and regulations. As of 2007, approximately 17,000 of Alaska's water bodies (15,341 rivers and 1,506 lakes) have been identified and legally recognized as supporting anadromous fish production and subject to fish habitat protection measures (ADF&G 2008). The process to inventory all water bodies for presence of anadromous and resident fish species is incomplete and continues. Several thousand waterways are estimated to primarily produce resident fish species. Seasonal distribution and documentation of habitats used by various species and life phases of fish are relevant to identifying where laws can be applied to protect fish habitat conditions required to sustain fish productivity.

Tourism is based in part on water related recreational opportunities such as fishing and hunting, canoeing, kayaking, rafting, hiking, camping, sightseeing, including experience quality.

Free flowing waterways and lakes provide other services such as important transportation corridors for boats and barges to move commodities and people in Alaska. Small fixed wing aircraft access remote areas using lakes and rivers to land and take off during the open water season. Similarly, hard surfaces of frozen rivers and lakes serve as important seasonal corridors for transportation by snow machines, sled dogs, cross country skis, snow shoes, automobiles, and small airplanes. Many Alaskan locations are only accessible during ice covered seasons by these forms of transportation.

Alaska's surface and subsurface water sources are withdrawn, diverted and impounded to support human population growth and uses such as industrial, energy, recreational, petroleum, mineral, fish processing, agricultural, and other water dependent developments. Human uses compete with water dependent uses within rivers and lakes such as fish and wildlife production and other ecological services and functions. Surface and subsurface waters that have a hydrologic connection between the two are treated as one water source for purposes of Alaska water allocation laws.

Good water allocation management decisions by natural resource managers will balance existing and potential competing human and ecological water uses in the best public interest.

Alaska's current human population is approaching 700,000 (Figure 3) and is relatively small compared to the size of the state. The state will celebrate 50 years of statehood in 2009 and remains in its early stages of development. Vast quantities of undeveloped land, water, petroleum, mineral and other natural resources remain subject to future human development in Alaska. Similar to experiences of other states during their initial phases of statehood, increased human demands for extraction and development of these resources will be accompanied by more population growth and require construction of additional infrastructure. Demands for water withdrawals, diversions, and impoundment will also increase.

Competition for uses of river, lake, and well water sources has been mostly confined to human population centers and areas with larger concentrations of unique industrial activities such as those associated with oil and mining development, fish processing, fish hatcheries, snow making, and hydropower generation and other energy developments. Municipal water supply developments capture and store large quantities of water to serve as general shared water sources for human consumption and supporting various commercial and industrial uses such as pulp mill operations, fish processing plant operations, etc. Water extraction from lakes, rivers and wells also supports recreational water uses such as irrigation for golf courses and water needed for artificial snowmaking. In the early 1990s, a water export related industry (with potential to extract and transport large quantities of water to other parts of the country and world) was initiated (Estes 1992-1998 and 2001, Harle and Estes 1993, Hayes 1977, Global Water 1999, Swagel 1998).

Federal and state financial and legislative incentives have added to the pace of growth and competition for water uses in Alaska previously described. Examples of these have been U.S. Department of Energy grants distributed to qualified recipients to conduct preliminary hydropower assessments and subsequent hydropower project construction for smaller scale projects in Alaska (Estes 1998). More recently, the state appropriated funding to assess the feasibility of constructing one of North America's largest hydroelectric dams on the Susitna River.

Other specific examples of existing and planned large scale uses of water in Alaska include construction and maintenance of ice roads on the North Slope to support

petroleum developments and water supplies needed to support large scale mining projects, such as the proposed Pebble Mine.

Secondary and subsequent developments associated with or made possible by pioneer developments in remote areas and their accumulative impacts can significantly increase human uses, demands and competition for water in Alaska. These added demands for water are accelerated and made possible by improved and less expensive access to isolated and remote locations that previously had limited access and minimal local infrastructure to support human populations and developments. Individually and collectively, these and other human use pattern changes are rapidly increasing demands for more water to be withdrawn, diverted and impounded. They have the potential to compete with each other and with existing uses of water sources currently supporting a variety of fish and wildlife and other ecological services.

Climate changes may pose another challenge. If projected trends result in reduced precipitation and increased temperatures, one must be mindful that Alaska has vast amounts of untapped water stored in the form of glaciers. Glaciers may serve as alternative water sources and water temperature buffers to mitigate some of these potential climatic changes. Increased demands to import water from Alaska by other global locations may also result.

How Much Water is Available to Meet Various Water Use Demands?

Effective water allocation management is based on quantifying water supply availability required for competing human and ecological uses. Water uses that typically alter the volume of water and hydraulic characteristics in the water source include withdrawals, diversions, and impoundments. Ecological water uses typically depend on retention of water within the water source to support fish and wildlife production, water quality, navigation and recreation and other ecological services. In a perfect world, water managers will have sufficient and reliable water availability and water demand information for making informed water allocation decisions in the best interest of the public.

Unfortunately, there is a dearth of basic hydrologic data (surface and subsurface water volume and lake stage/depth, etc.) defining short and long-term water volume and flow availability patterns for most rivers and lakes in Alaska. Limited hydrologic information in some locations and no data in others, also make it difficult to account for and accurately predict long-term differences in water availability during dry and wet year periods.

As noted above, Information identifying the seasonal distribution of fish species by life phase in all river segments (reaches) and lakes in Alaska is incomplete. Absent certainty of fish presence, it may be assumed fish aren't present in a water body source. This may eliminate the need for consideration of potential fish habitat and related ecological impacts that can result from human water withdrawals, impoundments and diversions.

Historians argue water allocation decision mistakes made in the lower 48 states, such as those for the Colorado River, were based on insufficient hydrologic data records. Water allocation mistakes in other states and portions of the world have also been attributed to

past failures of water resource managers to underestimate future demands and competition for water and the socioeconomic values associated with retaining portions of water in rivers and lakes for fish production and other ecological services. Historically, lower 48 water allocation decisions were primarily based on the false assumption that failure to extract, impound, and divert maximum amounts of water to support human uses and related purposes would be wasteful. Failing to understand and account take into consideration values of ecological services of water associated with retention of water within lakes and rivers combined with underestimating future water uses and needs contributed to inaccurate water use demand projections. These information gaps, past values and practices contributed to decimation of once abundant natural fish runs and ecological functions throughout the western and other lower 48 states.

Alaska cannot afford to repeat these mistakes based on its socioeconomic dependence on fish and wildlife and other uses of its waterway highways. More importantly, despite modern day recognition of past water allocation decisions, most state water laws and processes in the lower 48 states restrict and prevent implementation of corrective actions. It should also be cautioned that in locations and jurisdictions where remedial actions are allowed, they may only be partially implemented because of expense.

The Instream Flow Council (www.instreamflowcouncil.org) and more recently the National Fish Habitat Action Plan (www.fishhabitat.org) were established to help states address these concerns and improve protection of reservation of water opportunities and actions (Annear et al.2004)

Fortunately, Alaska is currently at a stage in its early history and period of development equivalent to that of the lower 48 states approximately 170 years ago, a time when most water supplies were still abundant and unallocated from rivers and lakes. Present and future questions remain as to whether the current Alaska legal and administrative systems (and other tools related to water allocation planning and determinations) in combination with existing limited hydrologic and biologic baseline information are adequate to avoid past lower 48 water allocation mistakes and poor water management decisions? And are they adequate to prevent outcomes that resulted in insufficient water being retained within rivers and lakes for ecological services.

This report contributes to an assessment of current conditions and experiences to identify whether and how the state and other stakeholders might improve Alaska's uses of water allocation and related laws and mechanisms and acquire information needed to better protect the public interest with an emphasis on sustaining fish production. The assessment is limited by the relatively short period of statehood, early stages of human population and natural resource development and limited experiences applying and testing laws and regulations specific to Alaska.

Summary of Water Allocation Related Portions of the Alaska's Constitution, Alaska Statutes, Amendments, and Regulations

This next section summarizes the evolution and actions associated with passage of the original Alaska Water Use act, a series of amendments to the act and accompanying regulations. It also describes the history of failed legislation for automatically retaining and protecting a portion of water within all fish bearing waters as an interim level of fish habitat protection, absent collection and analysis of new data in the majority of fish bearing waters in Alaska lacking basic hydrologic availability and projected use information.

Alaska Constitution

Prior to statehood on January 3, 1959, water allocation was governed by a combination of two systems, the riparian doctrine and doctrine of prior appropriation (Hutchins 1977, Meacham 1997). Alaska's Constitution was crafted and approved by Alaskans in 1956. It became effective with statehood and contains provisions requiring that all waters in the state be administered under the doctrine of prior appropriation. The Constitution extinguished riparian claims for water uses. The doctrine of prior appropriation is based on the concept of "*first in time, first in right*". The doctrine uses a chronological order of priority for water uses based on the date and time a water rights application is filed (or claimed) when multiple competing water uses are claimed for use of the same water source. The Constitution requires the state to balance natural resources development and conservation, including water (Article VIII, Sections 3, 13, and 16) and provides that these resources be managed as a Public Trust (Harrison 1982, Cook 1993).

Alaska Constitution, Article VIII

Section 3. Common Use

" Wherever occurring in their natural state, fish, wildlife, and waters are reserved to the people for common use."

Section 13. Water Rights

" All surface and subsurface waters reserved to the people for common use, except mineral and medicinal waters, are subject to appropriation. Priority of appropriation shall give prior right. Except for public water supply, an appropriation of water shall be limited to stated purposes and subject to preferences among beneficial uses, concurrent or otherwise, as prescribed by law, and to the general reservation of fish and wildlife."

Section 16. Protection of Rights

" No person shall be involuntarily divested of his right to the use of waters, his interests in lands, or improvements affecting either, except for a superior beneficial use or public purpose and then only with just compensation and by operation of law."

Debate has occurred over the meaning and scope of the above Article VIII, Section 13 language relating to the general reservation of fish and wildlife (Curran and Dwight 1979, Anderson 1991, Cook 1993, Harle and Estes 1993). Some interpret the language to establish a constitutional mandate to reserve water for fish. Others believe the language does not prohibit water uses that harm fish and wildlife production and habitat. The most common interpretations for the language are to permit the Alaska legislature to mandate

consideration of impacts of water uses within rivers and lakes for fish and wildlife for public interest consideration (AS 46.15.080); and, to empower the legislature to establish laws to reserve (allocate) water in rivers and lakes for fish and wildlife (AS 46.15.145, AS 45.15.035 and .040).

Opposing parties participating in Alaska Supreme Court (1995) litigation argued over these interpretations; but, the court never ruled on the meaning of this language and intent. The plaintiff argued the DNR violated Article VIII, Section 13 by granting permits for mining without reserving adequate water for fish and wildlife; and, the defendant argued the Constitutional language was intended to prevent water users from obtaining ownership of fish wildlife and not limit water uses. Thus, the interpretation of the Constitutional phrase referencing the general reservation of fish and wildlife continues to remain subject to continued debate.

Alaska Water Use Act - HB 140 (AS 46.15) 1962 to 1979

Alaska's Governor William Egan recognized the importance of water management provisions within the Constitution and contracted Professor Dr. Frank Trelease, Professor at Law at the University of Wyoming, to craft a comprehensive water code for Alaska in 1961. Professor Trelease stated his code did not arise from an emergency, but instead was intended to serve as the basis for a wise law to: "...prevent emergencies from happening and to protect the people from even the beginnings of harm ..." Professor Trelease referred to his draft water code as a "... forward looking law..." to "...give legal protection of existing and future water uses..." and "...set up procedures for utilizing, developing and conserving the water for the maximum benefit of people..." Trelease's resulting water code was converted into bill language for the Alaska Legislature and initially introduced for passage in 1962 and failed to pass. A revised version of Trelease's water code [House Bill (HB) 140] was eventually approved in 1966 after three failed prior attempts: 1962, 1963, and 1964 (Trelease 1967, 1977). The resulting law is referred to as the Alaska Water Use Act (AS 46.15). Many of the original core elements of the 1966 law serve Alaskans today.

The enabling legislation established procedures to maintain existing (prior to July 1966) water rights/uses and obtain new (post July 1966) water rights [AS 46.15.040 (c), .060, .065 (a)] to appropriate (divert, impound, or withdraw a substantial quantity of water from surface and ground waters for beneficial uses. Beneficial uses are defined in AS 46.15.260(3).

Sec. 46.15.040. Right to appropriate

(a) A right to appropriate water can be acquired only as provided in this chapter. A right to the use of water either appropriated or unappropriated may not be acquired by adverse use or possession.

(b) A right to appropriate water shall be obtained by first making application to the commissioner for a permit to appropriate. The commissioner shall by regulation prescribe the form and contents of the application and the procedure for filing the application. If a permit is granted and the means of appropriation is constructed, a certificate of appropriation may be obtained.

(c) All applications to the commissioner for a permit to appropriate water, filed subsequent to July 1, 1966, shall be considered as having been simultaneously filed with the Department of Fish and Game under AS 16 and the Department of Environmental Conservation under AS 46.03.

(d) The commissioner's issuance of a permit under AS 46.15.080 or of a certificate under AS 46.15.065 or 46.15.120 does not represent a guarantee by the state to the permittee or certificate holder that water will be available for appropriation at a certain volume, quality, artesian pressure, or cost. This subsection does not, however, alter the right a permittee or certificate holder may have against a later appropriator, including a government agency.

Sec. 46.15.060. Existing rights

A water right acquired by law before July 1, 1966 or a beneficial use of water on July 1, 1966, or made within five years before July 1, 1966, or made in conjunction with works under construction on July 1, 1966, under a lawful common law or customary appropriation or use, is a lawful appropriation under this chapter. The appropriation is subject to applicable provisions of this chapter and regulations adopted under this chapter.

Sec. 46.15.065. Determination of existing rights

(a) A claimant of an existing right under AS 46.15.060 shall file a declaration of appropriation with the commissioner as set out in this section. The declaration shall be considered correct until a certificate of appropriation is issued or denied. Priority of the right dates from the day work was begun on the appropriation if due diligence was used in completing the work; otherwise, from the day water was applied for the beneficial use.

(b) The commissioner shall, as soon as practicable, determine the rights of persons owning existing appropriations. To accomplish this, the commissioner shall

(1) by order set a definite period for filing a declaration of appropriation within a specified area or from a specified source;

(2) publish notice of the order once a week for three weeks before the beginning of the period in a newspaper of general circulation in the affected area;

(3) give notice of the order by certified mail to any appropriator within the specified area or from the specified source who has requested mailed notice or of whom the commissioner can readily obtain knowledge including each owner of a recorded mining claim.

(c) The commissioner shall make investigations as necessary of rights asserted by declarations filed under this section and shall determine each existing appropriation and mail a summary of the determination to each person who has filed a declaration with respect to the specified area or source. Any person adversely affected by a determination may file with the commissioner a request for a hearing within 20 days of the date the notice is mailed. If a hearing is requested, the commissioner shall, after consulting with the office of administrative hearings (AS 44.64.010), send a notice of the time and place of the hearing to each person who has filed a declaration.

(d) If a hearing is not requested with respect to a determination, or if, after the hearing, the commissioner finds the determination to have been correctly made, the commissioner shall immediately issue a certificate of appropriation. If the commissioner finds the determination to be incorrect, the commissioner shall correct it and either issue a certificate of appropriation or refuse the certificate according to the commissioner's findings.

(e) A person aggrieved by the action of the commissioner may appeal to the superior court within 30 days of the date on which that action is final.

(f) The adjudication process for a declaration filed under (a) of this section that is pending before the commissioner on June 10, 1986, continues under the procedures set out in this section until the commissioner finally determines whether the declarant is entitled to a certificate. If a certificate is issued under this section, the certificate holder may be included as a participant in an adjudication under AS 46.15.165 or 46.15.166.

A beneficial use of water means:

Sec. 46.15.260(3). Definitions

“a use of water for the benefit of the appropriator, other persons or the public, that is reasonable and consistent with the public interest, including, but not limited to, domestic, agricultural, irrigation, industrial, manufacturing, fish and shellfish processing, navigation and transportation, mining, power, public, sanitary, fish and wildlife, recreational uses, and maintenance of water quality” [AS 46.15.260(3)]

The Alaska Department of Natural Resources (DNR) is assigned the authority to administer the water appropriation (allocation) law (AS 46.15.010). This duty is currently performed by the DNR Water Section in the Division of Mining, Land, and Water.

Application forms for water rights must be filed and approved by DNR to use significant amounts of water to make beneficial use of the water (AS 46.15.040). Personal domestic uses of water for 500 gallons per day and non consumptive water uses are typically exempted by DNR from a requirement to acquire a water right unless DNR determines these are significant water uses or there are negative impacts from multiple uses from the same water sources (AS 46.15.010, 020, and .080). Exempted water users retain the option to file for a water right. However, if an exempted user selects not to file for and acquire a water right, their uses of water will have no protection from competing uses of water obtained by others who apply for and obtain water rights whenever there are insufficient amounts of water available to support multiple uses and claims for water from the same source of water. It is therefore in the best interest of an individual to secure a formal water right and acquire long-term protection of water uses.

Provisions to allow an applicant to appropriate and acquire water rights to retain water within a river or lake were suggested by Trelease (1962) in the initial draft of the water code recommendations, but not transferred into and included in the original enabling legislation. Instead, public interest measures were included in the 1966 law (AS 46.15.080) to execute relevant provisions of the Constitution and to represent an alternative solution for addressing suggestions relating to reservations of water from the ADF&G and other agencies (Trelease 1962). Relevant public interest criteria specify DNR must consider whether there is a need to consider whether portions of water subject to appropriation for withdrawal impoundment and diversion uses from rivers, lakes and wells should be retained within the water source for supporting: fish and wildlife, recreation, water quality and navigation, etc. These and other public interest criteria are summarized below:

Sec. 46.15.080. Criteria for issuance of permit (mandatory public interest considerations)

(a) The commissioner shall issue a permit if the commissioner finds that

- (1) 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 water.*

Public interest provisions provided (and continue to provide) an alternative indirect mechanism for temporarily retaining portions of water within a water body as a water right condition for water withdrawals, diversions and impoundments (Harle and Estes 1993).

The public interest tool represents one of the most important elements of the Water Use Act in terms of providing guidance for water allocation decisions by DNR. It provides opportunities for public participation and input in the water allocation decision processes and establishes guidance to DNR for consideration of the public input relating to the public interest criteria. More importantly, the language specifies the criteria must still be considered even if there is no public input. More simply, this section of the statutes requires DNR to consider and use these criteria (and public comments received) to make its final determinations whether to grant all, a portion, or none of the water being requested by a water rights applicant and whether to add conditions associated with the use of the water being requested (AS 46.15.100): Complimenting the public interest finding process and determination is DNR's ability to use these criteria to condition water uses in the best public interest under AS 46.15.100.

Sec. 46.15.100. Terms of permit

“ The commissioner may issue a permit for less than the amount of water requested, but in no case for more water than can be beneficially used for the purposes stated in the application. The commissioner may require modification of plans and specifications for the appropriation. The commissioner may issue a permit subject to terms, conditions, restrictions, and limitations necessary to protect the rights of others, and the public interest. However, the permit shall be subject to termination only as provided in this chapter.”

These criteria and terms also emphasize a property right granted by the state for uses of water, as a common resource, remains subject to state supervision. Another term for this type of property right is *usufructuary*.

The uses for and full potential for and application of this public interest tool and permit terms have historically been given insufficient attention. Its application and uses by DNR, other agencies, and the public have varied since passage of the Alaska Water Use Act and deserve further research and review. A weakness under current practices is that under most circumstances current procedures and practices allow water (retained within a water body as an outcome from a public interest determination) to continue to remain available for and subject to additional appropriations by future water rights applicants. Accordingly previous public interest determinations may be subsequently ignored or overlooked by the same or a future DNR representative when adjudicating the future water rights applications despite the initial or an earlier decision to (for example) condition a water right to retain a portion in the water body for fish production purposes. This limitation may be further exaggerated for water rights determinations completed during the initial 15 to 20 years following passage of the enabling legislation because a variety of procedures were used for adjudicating, documenting and archiving water rights application records.

The term "*adjudication*" represents DNR's administrative determination of the validity and amount of a water right and includes the settlement of conflicting claims among competing appropriators of record [11 AAC 93.970 (1)].

Multiple applications for water rights claims for water uses for water from the same water body are assigned priority dates (AS 46.15.050) by DNR based on Constitutional provisions and the doctrine of prior appropriation. The first application filed and granted a priority date is considered the *senior* application to the next application filed. Each subsequent water rights application filed for water uses from the same water body is considered *junior* to the previous senior application filed at an earlier date and so on. As indicated above, the date and time a water right application is filed and formally accepted by the DNR establishes its priority of use date and seniority standing among multiple competing water rights applications for the same water source. Senior users have priority over all subsequent junior users

Sec. 46.15.050. Priority

(a) Priority of appropriation gives prior right. Priority of appropriation does not include the right to prevent changes in the condition of water occurrence, such as the increase or decrease of stream flow, or the lowering of a water table, artesian pressure, or water level, by later appropriators, if the prior appropriator can reasonably acquire the appropriator's water under the changed conditions.

(b) Priority of appropriation made under this chapter dates from the filing of an application with the commissioner.

(c) Priority of appropriation perfected before July 1, 1966, shall be determined as provided in AS 46.15.065. (Perfected means developed and put into use for a stated beneficial use)

The term, "*perfected*" means constructed.

Public notices, objections and appeal processes (administrative and judicial) and related requirements and options regarding DNR water allocation and related decisions are addressed by AS 46.15.133.

Sec. 46.15.133. Notices; objections

(a) If the commissioner proposes a sale of water or receives an application for appropriation or removal, the commissioner shall prepare a notice containing the location and extent of the proposed sale, appropriation, or removal, the name and address of the applicant, if applicable, and other information the commissioner considers pertinent. The notice shall state that within 15 days of publication or service of notice, persons may file with the director written objections, stating the name and address of the objector, and any facts tending to show that rights of the objector or the public interest would be adversely affected by the proposed sale, appropriation, or removal.

(b) The commissioner shall publish the notice in one issue of a newspaper of general distribution in the area of the state in which the water is to be appropriated, removed, or sold. The commissioner shall also have notice served personally or by certified mail upon an appropriator of water or applicant for or holder of a permit who, according to the records of the division of lands, may be affected by the proposed sale, appropriation, or removal and may serve notice upon any governmental agency, political subdivision, or person; notice shall also be served upon the Department of Fish and Game and the Department of Environmental Conservation. An applicant for an appropriation or removal shall pay the commissioner's costs in providing publication and notice under this subsection. The commissioner may require as a condition of a sale of water under AS 46.15.037, that a purchaser of water reimburse the department for the costs associated with providing notice of the proposed sale.

(c) Within 15 days of publication or service of notice, an interested person may file an objection. The commissioner may hold hearings upon giving due notice and shall grant, deny, or condition the proposed sale or application for appropriation or removal in whole or in part within 30 days of receipt of the last objection or, if the commissioner elects to hold hearings, within 180 days of receipt of the last objection. Notice of the order or decision shall be served personally or mailed to any person who has filed an objection.

(d) If no objection is filed, the commissioner may proceed to make a determination upon the application for appropriation or removal or the proposal for sale.

(e) A person aggrieved by the action of the commissioner or by the failure of the commissioner to grant, deny, or condition a proposed sale or an application for appropriation or removal in accordance with (c) of this section may appeal to the superior court.

(f) The commissioner may, by regulation, designate types of appropriations that are exempt from this section and provide simplified procedures for ruling on the applications. The commissioner may not exempt under this subsection appropriations for removal under AS 46.15.035, appropriations by the state for sale or sales by the state under AS 46.15.037, or removals of water under AS 46.15.035 and 46.15.037.

DNR has the option to determine whether water rights have been abandoned and whether to revoke a water use under AS 46.15.140.

Sec. 46.15.140. Abandonment, forfeiture, and reversion of appropriations

(a) The commissioner may declare an appropriation to be wholly or partially abandoned and revoke or amend the certificate of appropriation as to the unused quantity of water if an appropriator, with intention to abandon, does not make beneficial use of all or a part of the appropriated water.

(b) The commissioner may declare that an appropriator has wholly or partially forfeited an appropriation, and shall revoke the certificate of appropriation in whole or in part if the appropriator voluntarily fails or neglects, without sufficient cause, to make use of all or a part of the appropriated water for a period of five successive years. A person who has a permit to develop a use of water including but not limited to residential, agricultural, industrial, or mining use, but has not developed that property to the point of water use before permit expiration, may file a request for permit extension with the commissioner.

(c) Failure to use beneficially for five successive years all or part of the water granted in a certificate of appropriation raises a rebuttable presumption that the appropriator has abandoned or forfeited the right to use the unused quantity of water and shifts to the appropriator the burden to prove otherwise to the satisfaction of the commissioner.

(d) If the commissioner revokes a certificate in whole or in part, the portion of the certificate covered by the revocation reverts to the state and the water becomes unappropriated water.

Applicants for public water supply uses can request and claim a *preferred use* for a water source in accordance with provisions of the Constitution and state law when there is insufficient water available from a water source because it was previously appropriated for other purposes. To achieve preference for a public water supply an applicant must be able to demonstrate the preferred use is prevented by existing senior uses. A successful applicant for a preferred water use must compensate existing senior users for any damages sustained by their loss of senior water preference (AS 46.15.150).

Sec. 46.15.150. Preferred use

(a) An applicant who asserts and proves a preferred use shall be granted a permit and shall be granted preference over other appropriators. A preferred use of water is for a public water supply.

(b) To be entitled to a preference an applicant must show that the applicant's use will be prevented or substantially interfered with by a prior appropriation; the use is a preferred use; the applicant agrees to compensate a permit or certificate holder for the prior appropriation for any damages sustained by the preferred use; and other information that the commissioner requires by regulation.

A water right owner can request permission from DNR to change the uses, conditions and locations governing the original water rights [AS 46.15.050 (a)]. Water rights are automatically considered appurtenant (linked to the land) identified in the original water rights application. However, the owner of water rights can request permission from DNR to sell, transfer or lease their rights including sever and transfer the water rights to link the rights to other land (AS 46.15.160).

Sec. 46.15.160. Transfer and change of appropriations

(a) The right to use water under an appropriation or permit shall be appurtenant to the land or place where it has been or is to be beneficially used, provided, that water supplied by one person to another person's property is not appurtenant to the property unless the parties so intend. An appurtenant water right shall pass with a conveyance of the land, or transfer, or by operation of law unless specifically exempted from the conveyance.

(b) With the permission of the commissioner, all or any part of an appropriation may be severed from the land to which it is appurtenant, may be sold, leased or transferred for other purposes or to other land and be made appurtenant to other land. A permit or certificate or a deed, lease, contract, assignment of permit or other instrument transferring an appropriation must be filed in the office of

the commissioner and a certified copy of the instrument must be recorded in the recorder's office of the recording district in which the appropriation is located.

Disagreements between DNR and ADF&G in 1976 relating to industrial uses and perceived over allocation of water on the North Slope resulted in Commissioner James Brooks of the ADF&G to assert AS 16.05.870 habitat permitting authority and temporarily stop all water withdrawals for a 24-hour period. The decision was based on perceptions the DNR was negligent in exercising its authority to manage water in the public interest (Fairbanks Daily News Miner (1976). Hayes (1977) completed an analysis of this action and issues as a Master of Science thesis.

Although she questioned whether sufficient documentation supported the decision, Hayes (1977) concluded changes and improvements in water management and coordination were warranted. For example, the ADF&G action highlighted optional uses of its authority (White 1981) and a need for better interagency coordination of issues pertaining to overlapping natural resources agency authorities relating to water allocation, water quality, and fish habitat. It also demonstrated the consequences of poor water use planning, limitations of water allocation decisions based on scarce hydrologic information and poor fish distribution information, and illustrated problems associated with the inability to acquire water rights to reserve water in rivers and lakes for fish under the existing Water Use Act. These circumstances ultimately led to better interagency cooperation between the DNR, ADF&G and Department of Environmental Conservation and intergovernmental planning for water uses and availability on the North Slope.

This experience also supported the need to enter into another state contract with Professor Trelease (1977) to review and evaluate the initial 10 years of implementation of the Alaska Water Use Act he initially helped author. The resulting 76 page assessment identified various limitations, and provided eight recommendations and other solutions and included 3 proposals for draft legislation, including: State Water Planning, Reservation of Stream Flows, and Protection of Stream Channels (Trelease 1977). His report contributed to a reorganization of the state's water allocation program and state efforts to pass a reservation of water legislation amendment.

1980 Reservation of Water Uses Amendment House Bill 118 (AS 46.15.03, 46.15.145)

Increased competition for water uses and demands in Alaska, combined with an assessment of the limitations of the original 1966 Water Use Act (Trelease 1977, Hayes 1977), highlighted and emphasized the need for an amendment to allow reservation of water appropriations. This water rights legislation was required to augment AS 46.15.080 requirements and allow applicants to legally apply for and acquire water rights (on equal footing with other existing permitted water uses) to retain flowing waters in rivers and water levels (water volumes and water stage) in lakes. This amendment was considered especially important for fish bearing water bodies where little or no competition for water existed. As mentioned previously, Trelease (1962, 1967) had proposed a similar provision in 1962; but, it was deleted from the original 1966 enabling legislation before being introduced.

The addition of this new legal tool to retain water within rivers and lakes was eventually achieved through passage of an amendment to the Water Use Act (HB 118) in 1980 by the legislature and Governor (AS 46.15.03 and AS 46.15.145). Alaskans had gained sufficient experiences to recognize the economic and social benefits that would be derived from this supplemental water use. They also understood these provisions would be needed to help adjudicate and settle federal reserved water rights claims under state law and within the jurisdiction of a state judicial system. There was also recognition for potential benefits to mining interests for the certainty of water that could be achieved by acquiring water rights to protect water volumes to help miners comply with dilution requirements for permitted effluent discharges in receiving waters.

The resulting statutory amendments to the Water Use Act (AS 46.15.03 and AS 46.15.145) are periodically referred to as the “*instream flow law*”. However, it is more accurate to refer to these amendments as “*the reservation of water law*” because the statutory changes are not restricted to water rights for flowing waters and also allow acquisition of water rights to maintain lake levels and volumes.

Sec. 46.15.030. Water reserved to the people

Wherever occurring in a natural state, the water is reserved to the people for common use and is subject to appropriation and beneficial use and to reservation of instream flows and levels of water, as provided in this chapter.

Sec. 46.15.145. Reservation of water

(a) The state, an agency or a political subdivision of the state, an agency of the United States or a person may apply to the commissioner to reserve sufficient water to maintain a specified instream flow or level of water at a specified point on a stream or body of water, or in a specified part of a stream, throughout a year or for specified times, for

- (1) protection of fish and wildlife habitat, migration, and propagation;*
- (2) recreation and park purposes;*
- (3) navigation and transportation purposes; and*
- (4) sanitary and water quality purposes.*

(b) Upon receiving an application for a reservation under this section, the commissioner shall proceed in accordance with AS 46.15.133.

(c) The commissioner shall issue a certificate reserving the water applied for under this section if the commissioner finds that

- (1) the rights of prior appropriators will not be affected by the reservation;*
- (2) the applicant has demonstrated that a need exists for the reservation;*
- (3) there is unappropriated water in the stream or body of water sufficient for the reservation;*

and

- (4) the proposed reservation is in the public interest.*

(d) After the issuance of a certificate reserving water, the water specified in the certificate shall be withdrawn from appropriation and the commissioner shall reject an application for a permit to appropriate the reserved water.

(e) A reservation under this section does not affect rights in existence on the date the certificate reserving water is issued.

(f) At least once each 10 years the commissioner shall review each reservation under this section to determine whether the purpose described in (a) of this section for which the certificate reserving water was issued and the findings described in (c) of this section still apply to the reservation. If the commissioner determines that the purpose, or part or all of the findings, no longer apply to the reservation, the commissioner may revoke or modify the certificate reserving the water after notice, hearing when appropriate, and a written determination that the revocation or modification is in the best interests of the state.

AS 46.15.145 and regulations adopted in 1983 (AS 46.15.03 and .145 and 11 AAC 93.970) required modification of the definition of “*water appropriation*” a term synonymous with “*water rights*” by adding “*reservations of water uses*”: to the original definition of “*appropriation*”. The 1966 to 1979 version of this Water Use Act definition restricted water uses to water diversions, withdrawals, and impoundments.

Passage of the 1980 law also established Alaska as one of the few states that provides the opportunity for private individuals; in addition to state, federal, tribal, and local government

agencies, to legally acquire water rights to maintain a specific flow rate in rivers (or level of water in rivers and lakes) for one or a combination of four types of uses:

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

Reservations of water (or appropriations of water for these purposes) can be described as the rate or volume of flow (or related physical attribute such as water depth to be retained a specific point or part of water body (rivers and lakes) throughout the year or for specified times. A “*reservation of water*” to protect flow related characteristics can also be called an “*instream flow reservation*”. However, it is recommended the term “*reservation of water*” be used to describe and highlight the law’s applications in Alaska for both rivers and lakes. Use of this terminology is helpful during discussions with others representing different parts of the country since water laws of most other state laws do not provide a similar mechanism to retain water within lake environments.

As previously noted, surface and subsurface waters are treated as one source of water under the Alaska Water Use Act when a hydrologic connection between the surface and subsurface water bodies can be documented. Accordingly, this statute also applies to uses of subsurface water sources connected with surface waters that are reserved and vice versa.

To reserve water under AS 46.15.145 and its companion regulations (11 AAC 93.141-.147), an application containing supporting data and analyses that substantiate the need for the amount of water being requested must be submitted to the DNR for adjudication.

Forms required to apply for reservations of water were first made available by the DNR in November 1983. A \$1500 application fee is required to accompany each application and was originally \$500. Additional details regarding these processes and opportunities for improvement follow this section.

Basin Wide Adjudication Amendment (SB 150)

Additional amendments to the Alaska Water Use Act were approved by the legislature and Governor in 1986 relating to federal reserved water rights claims on federal reservations of land and to facilitate basin wide water rights adjudications for adjudication of Federal Reserved Water Rights and other Basin Wide Adjudications (Senate Bill, SB 150). The 1986 amendments established formal mechanisms for adjudicating Federal Reserved Water Rights (for withdrawals impoundment and reservations of surface and subsurface waters) under administrative jurisdiction of state law (AS 46.15.165) and the Alaska judicial system (AS 46.15.166). These processes enhance the roles and opportunities for the state to maintain more control and minimize costs when using these tools to eliminate uncertainty related to competing water rights claims that may be associated with future claims for reserved rights. The importance of basin wide adjudications is also discussed in White (1981), Anderson (1991), Welker (1997) and Estes (1998, 2007). Welker (1997)

provides a series of recommendations associated with basin wide adjudications for state action as part of an audit requested by the Alaska Legislature.

Sec. 46.15.165. Administrative adjudications

(a) The commissioner may, by order, initiate an administrative adjudication to quantify and determine the priority of all water rights and claims in a drainage basin, river system, ground water aquifer system, or other identifiable and distinct hydrologic regime, including any hydrologically interrelated surface and ground water systems.

(b) In the order initiating an administrative adjudication, the commissioner shall describe the appropriate geographic and hydrologic boundaries of the adjudication area. During the adjudication, the commissioner may adjust the boundaries to ensure the efficient administration of water appropriations among users.

(c) Upon initiation of the adjudication, the commissioner shall

(1) serve the order on each applicant, certificate holder, or permittee listed in the department's records within the adjudication area;

(2) serve the order on any agency of the federal, state, or a local government with management authority over land or water within the adjudication area;

(3) serve the order on any person who owns or claims land within the adjudication area if the land is held in trust by the United States for the person or if the patent, deed, or certificate to the land from the United States was issued under 25 U.S.C. 334 (Indian General Allotment Act of February 8, 1887, 24 Stat. 389, as amended and supplemented), 25 U.S.C. 372 (the Allotment Act of June 25, 1910, 36 Stat. 855), 43 U.S.C. 270-1, 270-2 (the Allotment Act of May 17, 1906, 34 Stat. 197), any other allotment act, or the Alaska Native Townsite Act of May 25, 1926, 44 Stat. 629, and serve the order on the United States on behalf of the person;

(4) serve the order on the United States and the appropriate governing body of the Annette Island Reserve established by 25 U.S.C. 495 (the Act of March 3, 1891, 26 Stat. 1101) if the land or water, including hydrologically interconnected water, of the Annette Island Reserve is within the adjudication area;

(5) serve the order on any other person claiming a federal reserved water right within the adjudication area;

(6) serve the regional corporation and village corporation established under 43 U.S.C. 1601 et seq. (Alaska Native Claims Settlement Act) that has a pending land selection or has acquired ownership to land under that act that is located within the adjudication area; and

(7) serve the order on each mining claimant of record with the United States and the state within the adjudication area as of the date of the order initiating the administrative adjudication.

(d) Service of an order under (c) of this section does not constitute an admission by the state that the person served with the order has a water right.

(e) Service of the order under (c)(1) of this section is sufficient if mailed by certified mail, return receipt requested, to the last known address that the applicant, certificate holder, permittee, or claimant has given to the division of the department responsible for administration of water rights. A person served under (c)(1) -- (7) of this section who fails to appear in a timely manner and assert a claim as prescribed by the commissioner is estopped from subsequently asserting an objection to the adjudication of that person's water rights within the adjudication area, unless the person is entitled to a federal reserved water right and has failed to consent under (k) of this section.

(f) In an adjudication under this section, the commissioner may appoint an impartial qualified person as a master to preside over the adjudication, to hold hearings, to take testimony, to collect

evidence, to propose to the commissioner an order adjudicating the validity of, quantifying, and determining the priority of all water rights, and to take other action the commissioner decides is necessary.

(g) A state agency may assert a water right on behalf of the state in the adjudication.

(h) A division of the department or another state agency may provide documentary and testimonial evidence, research, and scientific analysis during the adjudication. The commissioner may provide evidence, research, or analysis from sources outside government.

(i) In conducting an adjudication, the commissioner may take action necessary for the efficient and fair administration and use of the state's water including

(1) determining indispensable, necessary, and convenient parties to the adjudication;

(2) classifying applicants, certificate holders, permittees, and claimants in groups that share similar interest, such as by the amount of water used or the type of use, and restricting their active participation in the adjudication by appointing group representatives for the purposes of receiving notices, examining witnesses, and other adjudicatory functions;

(3) entering interlocutory orders appropriate to a disposal of all or part of the issues in the adjudication, and designating the orders as final for the purposes of an appeal to the superior court under (l) of this section; and

(4) allocating to a participant the extra costs that the state has incurred in conducting the adjudication because the participant has in bad faith asserted a claim to water wholly without merit or has unreasonably delayed the proceeding.

(j) For the purpose of asserting a water right in an adjudication, a certificate issued under this chapter is prima facie evidence of the water right and its priority date.

(k) If the commissioner has initiated the adjudication and the federal government or a private person who has been served under (c)(2) -- (4) of this section asserts a federal reserved water right but fails to consent in writing to the adjudication, then the commissioner may exclude the federal government or the person, respectively, as participants in the adjudication. The commissioner may negotiate the terms of the written consent.

(l) A person adversely affected by a final order of the commissioner adjudicating water rights under this section may appeal to the superior court within 30 days after the decision is mailed or delivered to the person.

(m) The commissioner may adopt regulations setting out procedures for administrative adjudications under this section.

A 2005 legislative house keeping amendment to the Water Use Act was approved to correct language in the basin wide adjudication provisions (AS 46.15.165) by updating a federal reference in paragraph (c) (6) for administrative basin wide adjudications (included in version above).

Sec. 46.15.166. Judicial adjudications

(a) Instead of initiating an adjudication under AS 46.15.165, the commissioner may, with the concurrence of the attorney general, if a federal reserved water right has been or might be asserted by an agency of the United States on its own behalf or on behalf of a person described in AS 46.15.165(c)(3) -- (6), file on behalf of the state a complaint in superior court to initiate a judicial adjudication consistent with 43 U.S.C. 666 to quantify and determine the priority of all water rights

in a drainage basin, river system, ground water aquifer system, or other identifiable and distinct hydrologic regime, including any hydrologically interrelated surface and ground water systems.

(b) The venue for an action filed under (a) of this section shall be established by rule of the supreme court under AS 22.10.030.

(c) In a complaint brought under (a) of this section, the court may appoint an impartial, qualified person as a master to hold hearings, take testimony, collect evidence, and make recommendations to the court regarding the scope and content of a proposed judicial decree that would finally adjudicate the validity of water rights, quantify them, and determine priorities among the water right appropriations in the adjudication area. Employment by a federal, state, or local government agency does not disqualify an individual from appointment as master under this subsection if the court determines that the individual is otherwise impartial and qualified to act as master. The master may, with the court's permission, take action that the commissioner would be authorized to take in an administrative adjudication under AS 46.15.165.

(d) In an adjudication under this section, the court may incorporate in an order or judgment final orders of the commissioner previously issued under AS 46.15.165.

(e) Proceedings under this section shall be conducted without a jury.

Water Export Amendment (HB 596) and Evolution of this Automatic Water Reservation Amendment (failed legislation: HB 210, 353, 354, 355, SB 442)

HB 596 Water Export Legislation Amendment (1992)

Between passage of the initial 1980 reservation of water amendment, a passage of regulations in 1983 and 1989, limited progress had been made filing for and adjudicating reservations of water under AS 46.15.145 for fish bearing waters. DNR was struggling to address an increasing backlog of water rights applications pending adjudication for all types of water uses and interest to export water for out of state uses and commercial sales was increasing. Several attempts were made to amend the Water Use Act to address these issues. Several bills (HB 210, 353, 354, and 355 and SB 442) were introduced to establish automatic reservation of water protection, establish procedures for water exports and revenues, fund collection of hydrologic data information, and fund improved management of water rights information. These five amendments failed, but ultimately contributed passage of the 1992 water export and sales amendment (HB 596) to the Water Use Act which included automatic reservation of water provisions. The failed amendments and their contributions to HB 596 are discussed below.

The 1992 water export amendment to the Water Use Act was successfully included in omnibus legislation (HB 596) and approved by the legislature and Governor Hickel. The water export and related elements within the package of legislation addressed impacts of water exports, automatic reservations of water for fish, and established fee requirements for water rights applications filed to appropriate water for export. The water export amendments within the legislation were intentionally designed to apply to bulk exports and bottled water exports, two means of shipping water. Passage of these amendments resulted in modifications to AS 46.15.020 and the additions of AS 46.15.035 and AS 46.15.037. Additional details are summarized following the resulting amendments to the Water Use Act.

Sec. 46.15.020. Authority and duties of the commissioner

(4) prescribe fees or service charges for any public service rendered consistent with AS 37.10.050 -- 37.10.058, except that the department may charge under regulations adopted by the department an annual \$50 administrative service fee to maintain the water management program and a water conservation fee under AS 46.15.035;

(5) before February 1 of each year, prepare a report describing the activities of the commissioner under AS 46.15.035 and 46.15.037; the commissioner shall notify the legislature that the report is available; the report must include

(A) information on the number of applications and appropriations for the removal of water from one hydrological unit to another that were requested and that were granted and on the amounts of water involved;

(B) information on the number and location of sales of water conducted by the commissioner and on the volume of water sold;

Sec. 46.15.035. Appropriation or removal of water out of hydrologic units to other hydrologic units; water conservation fee; reservation of water for fish

(a) Water may not be removed from the hydrologic unit from which it was appropriated to another hydrologic unit, inside or outside the state, without being returned to the hydrologic unit from which it was appropriated nor may water be appropriated for removal from the hydrologic unit from which the appropriation is sought to another hydrologic unit, inside or outside the state, without the water being returned to the hydrologic unit from which it is to be appropriated, unless the commissioner

(1) finds that the water to be removed or appropriated for removal is surplus to needs within the hydrologic unit from which the water is to be removed or appropriated for removal, including fishing, mining, timber, oil and gas, agriculture, domestic water supply, and other needs as determined by the commissioner;

(2) finds that the application for removal or appropriation for removal meets the requirements of AS 46.15.080; and

(3) assesses a water conservation fee under (b) of this section.

(b) The commissioner shall establish, by regulation, a water conservation fee for a use of water in which the water is removed from the hydrologic unit from which it was appropriated to another hydrologic unit inside or outside the state, without the water being returned to the hydrologic unit from which it was appropriated. The fee established under this subsection shall be graduated to encourage the conservation of water.

(c) Except as provided in AS 46.15.090, and in addition to the requirements of (a) of this section, the commissioner may approve an application for removal or permit an appropriation for removal under (a) of this section of water from a lake, river, or stream that is used by fish for spawning, incubation, rearing, or migration, or ground water that significantly influences the volume of water in a lake, river, or stream that is used by fish for spawning, incubation, rearing, or migration, only if the commissioner reserves a volume of water in the lake or an instream flow in the river or stream for the use of fish and to maintain habitat for fish. The commissioner may adjust the volume of water reserved under this subsection if the commissioner, after public notice and opportunity to comment and with the concurrence of the commissioner of fish and game, finds that the best interests of the state are served by the adjustment. A reservation under this subsection

(1) of a volume of water or an instream flow for the use of fish and to maintain habitat for fish that is reserved under this section is withdrawn from appropriation;

(2) for fish from a lake, river, or stream, identified under AS 16.05.870 or identified in a Department of Fish and Game regional guide as being used by fish for spawning, incubation, rearing, or migration on or before July 1, 1992, has a priority date as of July 1, 1992;

(3) of water does not apply to an application for removal or appropriation for removal under AS 46.15.040 for nonconsumptive uses of water or for single family domestic use;

(4) is not subject to AS 46.15.145;

(5) of water does not apply to appropriations of ground water of 5,000 gallons or less a day unless the commissioner, in consultation with the Department of Fish and Game, determines that the appropriation may adversely affect fish habitat in a lake, river, or stream; the commissioner shall consider multiple appropriations of water for a single related use as a single appropriation for the purposes of this subsection.

(d) With respect to rivers and streams described in (c) of this section, the instream flow reservation shall be limited to the portion of the stream, including tributaries to the stream, at and downstream of the point of diversion or withdrawal. With respect to lakes described in (c) of this section, the reservation shall be limited to the lake from which the diversion or withdrawal is made, and the outlet and tributaries to the outlet flowing downstream.

(e) In this section,

(1) "fish" means a species of anadromous or freshwater fish that may be taken under regulations of the Board of Fisheries;

(2) "hydrologic unit" means a hydrologic subregion established by the United States Department of the Interior, Geological Survey, on the "Hydrologic Unit Map-1987, State of Alaska"; "hydrologic unit" includes the water of an ocean that is adjacent to a hydrologic subregion of the state.

Sec. 46.15.037. Sale of water by the state

(a) The commissioner may provide for the sale of water by the state if

(1) the water has first been appropriated to the state in accordance with the requirements of this chapter; and

(2) the commissioner determines that

(A) the water is surplus to needs within the hydrologic unit from which it was appropriated, including fishing, mining, timber, oil and gas, agriculture, domestic water supply, and other needs as determined by the commissioner;

(B) the proposed sale of the water meets the requirements of AS 46.15.080; and

(C) the sale price of the water is based upon the fair market value of the water.

(b) A purchaser of water from the state under this section shall acquire only those contractual rights to the water set out in sale documents prepared by the commissioner except that a sale of water by the state does not constitute an appropriation of water under this chapter to the purchaser.

(c) If water to be sold by the state under (a) of this section, is to be removed from the hydrologic unit from which it was appropriated to another hydrologic unit, inside or outside the state, without being returned to the hydrologic unit from which it was appropriated, the commissioner may not sell the water unless the sale meets the requirements of (a)(2) of this section, a water conservation fee is assessed under AS 46.15.035, and, if the water to be sold is from a lake, river, or stream that is used by fish for spawning, incubation, rearing, or migration, or ground water that significantly influences the volume of water in a lake, river, or stream that is used by fish for spawning, incubation, rearing, or migration, the commissioner reserves a volume of water in the lake or an instream flow in the river or stream for the use of fish and to maintain habitat for fish. The commissioner may adjust the volume of water reserved under this subsection if the commissioner, after public notice and opportunity to comment and with the concurrence of the commissioner of fish and game, finds that the best interests of the state are served by the adjustment. A reservation under this subsection

(1) of a volume of water or an instream flow for the use of fish and to maintain habitat for fish that is reserved under this section is withdrawn from appropriation;

(2) for fish from a lake, river, or stream, identified under AS 16.05.870 or identified in a Department of Fish and Game regional guide as being used by fish for spawning, incubation, rearing, or migration on or before July 1, 1992, has a priority date as of July 1, 1992;

(3) is not subject to AS 46.15.145;

(4) of water does not apply to appropriations under this section of ground water of 5,000 gallons or less a day unless the commissioner, in consultation with the Department of Fish and Game, determines that the appropriation may adversely affect fish habitat in a lake, river, or stream; the commissioner shall consider multiple appropriations of water for a single related use as a single appropriation for the purposes of this subsection.

(d) With respect to rivers and streams described in (c) of this section, the instream flow reservation shall be limited to the portion of the stream, including tributaries to the stream, at and downstream of the point of diversion or withdrawal. With respect to lakes described in (c) of this section, the reservation shall be limited to the lake from which the diversion or withdrawal is made, and the outlet and tributaries to the outlet flowing downstream.

(e) In this section,

(1) "fish" means a species of anadromous or freshwater fish that may be taken under regulations of the Board of Fisheries;

(2) "hydrologic unit" has the meaning given in AS 46.15.035(e).

(f) The commissioner may not provide for the sale of salt water under this section.

Unlike the 1980 reservation of water application processes required by AS 46.15.145, the 1992 Water Export amendments established automatic reservation of water protection for rivers and lakes and is based on unique procedures. The water export language in HB 596 was based on elements of prior failed legislation, HB 210, 353, 354, 355 and Senate Bill 442 (House Finance Committee 1992). The water export related provisions of HB 596 only apply to water export uses of water removal from six subregion hydrologic unit boundaries (large polygons) defined by the US Geological Survey, USGS: Arctic Slope, Northwest, Southwest, Yukon, Southcentral, and Southeast (Figure 4).

Three sections of HB 596 amended the Alaska Water Use Act (AS 46.15). They are referred to as Water Export provisions (Sections 30, 31, and 32). The water export provisions establish automatic reservation of water protection for fish bearing water body water export sources (rivers and lakes). It must be emphasized the provisions only apply when a water export will result in removal of the water from one of six USGS Hydrologic Units and the water is not returned to that same Hydrologic Unit (Figure 4). HB 596 highlights the importance of fish distribution knowledge and documentation and formerly references the ADF&G fish information data bases (the ADF&G anadromous fish catalog, ADF&G 2008, and ADF&G Regional Guides, ADF&G 199~~) to identify fish bearing waters subject to the legislation.

A provision was included in the amendment allowing the automatic reservation of water safeguards to be modified and potentially negated by other mechanisms, but only after consultation with public and concurrence by the ADF&G. This ADF&G mandatory consultation language represents a significant added safeguard against harm to fish.

The large size of each of the six hydrologic subregions established by the water export law restricts the reservation of water provisions from impacting the majority of existing water allocation processes within the state. Examples of exceptions might be for an instate water bottling operation that distributed water statewide, as would a cruise ship taking on potable water in an Alaskan port in the Southeast Alaska Hydrologic Unit and traveling out of state or to Southcentral Alaska Hydrologic Unit or the reverse. Some stakeholders questioned whether the fees for water export established by DNR regulations associated with this legislation were too low (11 AAC .05.010) based on estimated costs current exporters have indicated they plan to charge their clientele. That issue continues to be subject to debate.

Another future potential use of in state water export may be to transfer water from other Alaska locations to the Arctic National Refuge Area where supplemental water supplies may be needed for ice roads. The imported water could help avoid local environmental negative impacts to fish and wildlife.

It was initially anticipated that this legislation and future regulations would primarily guide the Hickel administration's efforts to market Alaska's water to other states and countries (Estes 1998, 2001). To date there has been limited application and financial gain to the state from the water export amendments; however it is assumed that water export from Alaska to other locations will eventually occur to meet water demands in portions of the world with water shortages.

Contributions of Failed Legislation to Passage of HB 596 Water Export Provisions (HB 210, 353, 354, 355 and SB 442)

Earlier failed legislative actions contributed to the passage of the water export provisions of HB 596 during a special session in 1992. The more detailed description and review of five legislative proposals below is important for those evaluating whether other future actions should be considered for improving Alaska's Water Use Act.

House Bill (HB) 210 was introduced in 1989 by Representative Davidson as a means to improved reservation of water protection by automatically reserving water in all fish bearing waters. HB 210 failed to pass and prompted introduction of an additional three pieces of water related legislation (House Bills 353, 354, and 355). All three were introduced in the spring of 1991 by Representative Cliff Davidson of the Alaska Legislature (Davidson 1991a, b, c) to improve instream protection and water management processes. Legislation (Senate Bill 442) was introduced by Governor Walter J. Hickel in 1992 to enable the state to both market and sell water to increase state revenues for sale of natural resources (Hickel 1992). HB 353, 354, 354, and SB 442 failed to pass. Each is described below.

HB 210

The reservation of water elements in the water export legislation (HB 596) were based on prior attempts during 1989 and 1990 to pass legislation (HB 210) introduced by Representative Cliff Davidson intended to provide automatic blanket reservation of water protection for all fish bearing waters in Alaska. Had HB 210 passed, the bill would have

automatically established an interim baseline reservation of water in fish bearing waters based on seasonal percentages of the mean annual flow (the one hydrologic statistic that can be predicted for all flowing water locations in Alaska that are ungaged or gaged. This statistic is used to establish reservations of water based on a method referred to as the Tennant analysis (or modifications of) and would have provided an interim process to reserve a portion of water in all fish bearing waters for all water bodies with limited or no hydrologic data. Provisions were included to modify the reservations based on the availability of additional information, analyses or added procedures so long as fish habitat wasn't harmed.

Despite strong opposition resulting from limited understanding of Alaska Water Law, confusion related to varying hydrologic conditions and relationships to fish productivity, and concerns raised by those that believed the bill might negatively and permanently impede future resource extraction and related developments, the bill was successfully passed by the House Resources and Finance Committee and forwarded to the Rules Committee for a vote by all House members. Opponents successfully used floor procedures to amend the bill and convert the legislation into an unacceptable version that would have harmed water quality protection. As a result of the negative floor action, the sponsors killed the bill.

The introduction and debate over HB 210 and associated attention to the issues and problems highlighted water management issues and educated legislators and the public. Those outcomes resulted in other subsequent improvements to water allocation laws, regulations, and procedures for all water uses. Water use requirements for reservations were improved and treated on a more equal footing to requirements for diversions, impoundments and withdrawals.. Detailed analyses of this legislation are provided in (Estes 1990-1998, Harle and Estes 1993, Anderson 1991, 1996). HB 210 continues to be considered one the best potential vehicles for providing interim reservation of water protection for all fish bearing waters in Alaska based on the limited biologic and hydrologic information in Alaska and to avoid inadvertent over appropriation of water. The legislation is discussed further in the recommendations section. Copies of historical and other background information related to this failed legislation were collected and provided to TNC.

HB 353

House Bill (HB) 353 failed in 1991 and would have provided \$239,400 to the DNR for automation of its water rights data base. It did contribute to later legislative actions in 2001 (HB 185) that supported development of an improved automated system for tracking water rights. That system is still in the process of development and refinement and is important for tracking all water uses and enforcement of water rights conditions.

HB354

HB 354 failed to pass in 1991. It would have provided-pass through matching funding (\$242,000) to the USGS through the DNR to perform a surface water data network evaluation of the Alaska stream gaging program and database. The evaluation would have addressed the adequacy of the existing stream gage network, databases, and existing models used to estimate streamflows at ungaged sites. Recommendations and priorities

for locating and maintaining existing and future gage sites would have been reported as one of the products of this legislation. Several gage sites would also have been funded by this legislation. It ultimately provided sufficient attention to the issue to enable DNR to include \$200,000 in their capitol improvement budget for 1993 to fund a stream gaging network assessment in cooperation with the USGS, ADF&G and other agencies (Brabets and Hawkins 1995). This is an issue demanding additional attention and is discussed in greater detail in other sections of the report below.

HB 355

HB 355 failed to pass in 1991. This legislation had many similarities to legislation submitted by Representative Davidson two years earlier (HB 210), which failed to pass (Estes 1990, Anderson 1990). HB 355 would not have applied to public water supplies, single family domestic uses of water, non-consumptive uses of water, and, in many instances, uses of groundwater of 5000 gallons per day or less. Unlike HB 210, HB 355 did not specify a formula and procedures for quantifying the amount of water that would be reserved for fish and wildlife. Before it was amended and died, HB 355 included a provision which would have also guaranteed reservation of water protection to fish and wildlife.

Passage of Temporary Water Use Act Amendment 2001 (HB 185)

HB 185 was passed in 2001 to improve public interest requirements and guidelines for temporary water use provisions of the Alaska Water Use Act and water use fees. Interestingly, it also addresses issues previously identified and raised by Hayes (1977) and Trelease (1976).

Temporary water uses do not establish a permanent water right and the associated benefits. The purpose for this water use provision is intended to authorize temporary uses of water of limited quantities and short duration. Temporary water uses establish no guarantee or priority for uses of the water.

HB 185 provides for more coordination and public notice and coordination with fish habitat permitting authorities for consideration of impacts to fish bearing waters and their protection (AS 46.15.155). Prior to passage of this amendment, temporary water uses have typically not been subject to all the checks and balances associated with formal water rights applications related to consideration of public interest impacts such as impacts to fish habitat. The following statutory language includes the revised (existing and new) provisions of the law relevant to temporary water uses. It also adds emphasis on identification fish distribution information. Further discussion of the merits and supplemental background of issues related to this amendment are discussed in other sections below relating to case law.

Sec. 46.15.155. Authorization for temporary use of water

(a) Notwithstanding any contrary provision of this chapter, the commissioner may authorize the temporary use of a significant amount of water, as determined by the department by regulation, for a period of time not to exceed five consecutive years, if the water applied for has not been appropriated in accordance with this chapter.

(b) Notwithstanding any contrary provision of this chapter, an authorization for a temporary use of less than a significant amount of water is not required under this section unless the commissioner has determined by regulation that the use may have an adverse effect on other water uses and that an authorization must be obtained from the department.

(c) The issuance of an authorization for temporary use of water under this section does not establish a right to appropriate water. The temporary use of water under an authorization remains subject to appropriation under this chapter.

(d) Notwithstanding any contrary provision of this chapter, the commissioner is not required to provide public notice under AS 46.15.133 of a proposed authorization for temporary use of water; however, the commissioner shall request comment on an application for temporary use of water from the Department of Fish and Game and the Department of Environmental Conservation.

(e) The provisions of AS 46.15.080 do not apply to the issuance under this section of an authorization for temporary use of water.

(f) The commissioner may impose reasonable conditions or limitations on an authorization for temporary use of water to protect the water rights of other persons or to protect fish and wildlife habitat, human health, or other public interests.

(g) Upon approval by the department, an authorization under this section may be transferred to another person under the same conditions and limitations under which the authorization was issued.

(h) A person to whom an authorization for temporary use of water was issued under this section may allow another person to use the authorization, consistent with the conditions and limitations of the authorization.

(i) The commissioner may modify, suspend, or revoke an authorization issued under this section if the commissioner determines it necessary to protect the water rights of other persons or the public interest.

1967 Alaska Water Use Act Water Regulations (11AAC Register 23 11 AAC 72, 93) and Subsequent Amendments.

Alaska's initial water rights regulations were promulgated in 1967 (11AAC, 72 and 93) Register 23 and have been amended periodically to comply with statutory amendments and improve administration of the act based on experiences gained from its application. Some of the amendments to the regulations were added to address simple clerical house keeping amendments for clarifications. Others are significant. It is important to keep in mind that integrated statutory and regulatory reviews should be thorough and are essential to fully comprehend and interpret requirements, processes, and definitions associated with all water rights determinations and processes. Regulations are organized as follows:

Title 11 Chapter 93 Water Management and Dam Safety

- Appropriation of Water-Article 2, .040-.147
- Dam Safety-Article 3, .190-.201
- Temporary Water Use-Article 4, .220-.220
- Preferred Use-Article 5, .240-.260
- Enforcement-Article 6, .270-.290
- Appeals-Article 7, .300-

- Administrative & Judicial Basin Wide Adjudications-Article 8, .400-.440
- Critical Water Management Areas-Article 9, .500-.540
- General Provisions including Definitions-Article 10, .910-.970

1983 Reservation of Water Regulations (11AAC 93.141-147)

Regulations (11AAC 93) were adopted by the Alaska Department of Natural Resources (DNR) in September 1983 after DNR concerns related to their implementation were satisfied (Estes 1982). The regulations were modified in 1990 (Estes 1992), 1993 (Alaska Administrative Code 1993 a, b, c) and 1996 (Alaska Administrative Code 1996a, b) Regulation amendments pertaining to fees assessed for water exports and water rights application processes (11 AAC 05.010) were also updated.

Collectively these regulation and amendments significantly expand legislative requirements for reservations of water processes and provide expanded definitions of terms.

11 AAC 93.141. Application for a reservation of water

As provided in AS 46.15.145(a), the state, an agency or political subdivision of the state, an agency of the United States, or a person may apply for a reservation of water for

(1) "protection of fish and wildlife habitat, migration and propagation," which means the quantity or level of water necessary to maintain suitable habitat conditions for the various life stages of fish, other aquatic organisms, and wildlife, including waterfowl and mammals, and their habitat, including water quality, depth, velocity and temperature, substrate, or streamside vegetation;

(2) "recreation and park purposes," which means the quantity or level of water necessary to maintain suitable conditions for contact and secondary recreation, including wading, swimming, fishing, boating, or hunting, or for park purposes, including scenic, natural, historic, or cultural values;

(3) "navigation and transportation purposes," which means the quantity or level of water necessary to maintain sufficient width and depth to allow vehicles, including boats or float planes, or tracked or wheeled vehicles during the winter, to travel on or through a stream or water body; and

(4) "sanitary and water quality purposes," which means the quantity or level of water necessary to attain and maintain water quality standards under 18 AAC 70 or, if applicable, drinking water standards under 18 AAC 80, or to maintain the naturally occurring water quality conditions.

11 AAC 93.142. Content of application

(a) An application for a reservation of water must be made to the department on a form provided by the department. The form must be completed in accordance with the instructions furnished by the department to the applicant.

(b) Each application must

(1) identify the purposes of the proposed reservation;

(2) identify the name of the stream or water body in which water is proposed to be reserved, and locate the proposed reservation on the most detailed United States Geological Survey map for the area, identified by section, township, range, meridian, and river mile index if available, showing

either the point on a water body at which, or two points on a stream between which, the proposed reservation is being requested;

(3) explain what need exists for the proposed reservation, including reasons why the reservation is being requested;

(4) specify the time period required to fully quantify the proposed reservation, which may be no longer than three years after the date the application is accepted by the department for filing;

(5) specify the times of the year and purposes for which the reservation is proposed;

(6) identify and explain the methodology to be used to quantify the proposed reservation, including

(A) existing data to be used, if available;

(B) the method of any new data collection;

(C) the type of new data to be collected; and

(D) a description of how the data will be analyzed;

(7) state the estimated quantity of water, stage, or elevation proposed to be reserved, measured in cubic feet per second for an instream flow rate or measured in cubic feet, acre feet, or an elevation relative to a permanent bench mark for a surface elevation, with documentation and calculations justifying the request;

(8) identify physical, biological, water chemistry, and socio-economic data substantiating the need for and the quantity of water requested for the proposed reservation;

(9) be accompanied by the application fee prescribed by 11 AAC 05.010.

(c) At the applicant's request, the department will provide assistance in filling out the application.

(d) At the applicant's written request, submitted at least 30 days before the end of the time period specified under (b)(4) of this section, the commissioner will, in his or her discretion, grant an extension of the time period of up to two years for good cause shown.

(e) When the applicant completes the quantification of the proposed reservation of water, the applicant shall notify the commissioner in writing and shall submit any information that changes, adds, or deletes information presented in the original application.

11 AAC 93.143. Incomplete applications

(a) An application that does not substantially comply with the requirements of 11 AAC 93.142 will not be accepted by the department for filing.

(b) The commissioner will, in his or her discretion, require an applicant whose application complies with the requirements of 11 AAC 93.142 and has been accepted for filing to provide additional information if, during the adjudication process under 11 AAC 93.145, the commissioner determines that the application fails to clearly present and document all aspects of the proposed reservation. The commissioner will identify the areas of deficiency, and the applicant will be given 60 days in which to submit supplemental information, unless a longer period of time is agreed upon by the applicant and the commissioner. An applicant's failure to submit the additional information within the time required is grounds for rejecting the application without further notice; a request for additional information will contain a warning to that effect.

11 AAC 93.144. Departmental investigations

(a) Upon receipt of an application for a reservation of water, the commissioner will, in his or her discretion, investigate any aspect of the application, including the source of the water and other uses

or demands for water within the area, to determine whether there is a possibility that the rights of prior appropriators or the public interest will be adversely affected by the proposed reservation.

(b) Failure of the applicant to cooperate in the investigation will result in the rejection of the application.

11 AAC 93.145. Adjudication of applications

(a) Notice of an application for a reservation of water will be provided in accordance with AS 46.15.133 and 11 AAC 93.080. In addition, the commissioner will provide notice to the Alaska Departments of Fish and Game and Environmental Conservation, to any federal or state agency responsible for managing land in the vicinity, and to any local government in whose jurisdiction the proposed reservation of water would occur, as well as to any other interested party who has filed a request with the department to receive notice.

(b) Timely objections received following notice of an application for a reservation of water will be considered in accordance with 11 AAC 93.090.

(c) Hearings regarding an application for a reservation of water will be held in accordance with AS 46.15.133 and 11 AAC 93.110.

*(d) The commissioner's decision to grant, conditionally grant, or deny an application for a reservation of water will be summarized by **written findings of fact and conclusions of law**, including justification of any special conditions to which the reservation is subject. In determining whether the proposed appropriation is in the public interest, the commissioner will consider the criteria set out in AS 46.15.080(b).*

11 AAC 93.146. Issuance of a certificate of reservation of water

(a) The commissioner will issue a certificate of reservation of water if the commissioner finds that the reservation meets the requirements of AS 46.15.145.

(b) The certificate of reservation will be issued to the applicant. The applicant is responsible for compliance with the conditions of the certificate of reservation.

(c) A certificate of reservation will contain the following conditions:

(1) the certificate of reservation may not be voluntarily abandoned, conveyed, transferred, assigned, or converted to another use, in whole or in part, unless required as a result of review under 11 AAC 93.147; and

(2) the certificate of reservation does not authorize the certificate holder or any other person to prevent access to, on, or through the water reserved by the certificate, or to prohibit the use of the reserved water for other compatible purposes set out in AS 46.15.145(a).

(d) The certificate of reservation will state any additional terms or conditions the commissioner considers necessary to protect the prior valid rights of other appropriators and the public interest. The conditions will, in the commissioner's discretion, include the following:

(1) measuring devices of a type and at a location approved by the commissioner must be installed and maintained to monitor and report on the reserved instream flow or level of water; and

(2) the reservation will be reviewed by the commissioner within a specified period of time, if sooner than the 10-year review under 11 AAC 93.147.

(e) The priority of a reservation of water is the date the application was accepted by the department for filing.

(f) Nothing in this section constitutes a waiver of the responsibility of the applicant to secure any appropriate state, federal, or local regulatory permits or licenses with regard to the stream or water body affected.

11 AAC 93.147. Review of reservation of water

(a) The commissioner will review a reservation of water at least once each 10 years after the date of issuance of the certificate of reservation. The commissioner will, in his or her discretion, review a reservation of water in fewer than 10 years if circumstances warrant a review. These circumstances might include

(1) a condition on the certificate of reservation requiring an earlier review, under 11 AAC 93.146(d)(2);

(2) a significant change affecting the water resource;

(3) a subsequent applicant's protest of the justification for the reservation of water if water might be unavailable to both maintain the reservation of water and to grant the applicant's request; or

(4) a written request by the certificate holder to the department, seeking authority to abandon, convey, transfer, assign, or convert the certificate of reservation to another use; the fee required under 11 AAC 05.010 must accompany the request.

(b) Upon review of a reservation of water, the commissioner will determine

(1) if the purpose for the reservation still applies;

(2) if the need for the reservation still exists;

(3) the effects of the reservation on prior appropriators;

(4) the effects of the reservation on the public interest;

(5) repealed 11/7/90;

(6) if additional physical, biological, water chemistry, and socio-economic data or reports concerning the reservation are available;

(7) if the quantity or level of water reserved is adequate for the purposes of the reservation;

(8) if the daily duration and months of the year of the reservation still apply; and

(9) if additional research, data collection, and analysis should be conducted, or different methodologies employed for reviewing the reservation.

(c) The commissioner will, in his or her discretion, require that additional research, data collection, and analysis be conducted or different methods used for reviewing the reservation of water. Costs of conducting additional research, data collection, and analysis, and of using a different methodology will be borne by the protestant if a protest regarding the reservation has been filed with the department. In other cases, these costs will be borne by the state. If the certificate holder desires expedited review, the commissioner will, in his or her discretion, require the certificate holder to bear the costs.

(d) The commissioner will provide written notice, as provided in 11 AAC 93.145(a), of a review of a reservation of water in order to solicit information that might be pertinent to the review. The commissioner will, in his or her discretion, hold a hearing on the review of a reservation of water.

(e) In accordance with the procedural requirements of 11 AAC 93.940, the commissioner will determine whether the purpose for the reservation of water, and his or her original findings of fact in granting the reservation, have been significantly altered by subsequent events. If the purpose of the reservation or all or part of the findings in granting the reservation no longer apply to the reservation, the commissioner will, in his or her discretion, amend the certificate of reservation or

revoke all or part of it in accordance with AS 46.15.145(f) and 11 AAC 93.940. The commissioner's final decision to amend or revoke all or part of a certificate of reservation will be summarized by written findings of fact and conclusions of law. The commissioner will record any amended certificate of reservation in the appropriate recorder's office.

Note the original 1983 regulations placed the burden for defending the reservation of water on the certificate holder (owner of the water rights for the reservation of water). These provisions have since been modified to instead place the burden on the protestant (see above).

Critical Water Management Procedures

This regulation represents one of the nation's most potentially powerful and unique water allocation tools within the Alaska Water Use Act tool box. It provides DNR the discretion and ability to revise existing water uses resulting from unforeseen hydrologic changes such as droughts per AS 46.15.010 and AS 46.15.020.

11 AAC 93.500. Initiating critical water management designation proceedings

The commissioner will, in his or her discretion, initiate proceedings to designate a particular geographic or hydrologic area, including surface and ground water, as a critical water management area if

(1) the commissioner determines that there is or might be an imminent water shortage in the area, for all or part of the year, affecting a substantial number of permittees or certificate holders of record so that their ability to reasonably acquire water has been or will be affected by existing or potential overappropriation, drought, saltwater intrusion, or a chemical or toxic contamination rendering the water source unusable;

(2) an agency or political subdivision of the state, or an agency of the United States, petitions for the designation of the area as a critical water management area and demonstrates that a condition in (1) of this section exists; or

(3) 25 percent or more of the permittees and certificate holders of record in a geographic or hydrologic area petition for the designation of a critical water management area and demonstrate that at least one condition in (1) of this section exists.

11 AAC 93.510. Public notice and hearing

Before the commissioner designates a geographic or hydrologic area as a critical water management area, or revokes or amends a designation, the department will

(1) publish a notice of the proposed designation, revocation, or amendment in a newspaper of general circulation in the area affected once a week for four consecutive weeks, soliciting public comment and announcing the date, time, and place of a public hearing;

(2) solicit comments on the proposed designation, revocation, or amendment by certified mail, return receipt requested, from appropriators and property owners of record within the area; affected federal, state, and local agencies, including the Departments of Fish and Game and Environmental Conservation; and any affected regional or village corporation; and

(3) hold a public hearing in the affected area to take written and oral comments on the proposed designation, revocation, or amendment; the department will accept additional written comments submitted up to 30 days after the hearing date.

11 AAC 93.520. Department order

The decision to designate a geographic or hydrologic area as a critical water management area, or revoke or amend a designation, will be in writing, and will, as appropriate,

- (1) state the reasons for the designation, revocation, or amendment;*
- (2) define the boundaries of the area or amendment;*
- (3) predict the likelihood of an imminent or continued water shortage or contamination problem;*
- (4) state how additional appropriations would affect the rights of permittees or certificate holders of record, or the public interest under AS 46.15.080; and*
- (5) state whether, after a specific date, applications for water rights will be accepted or adjudicated.*

11 AAC 93.530. Effect of the order

(a) Within 30 days after signing a department order to designate a geographic or hydrologic area as a critical water management area, or revoke or amend a designation, the commissioner will announce the decision by publishing the order in a newspaper of general circulation in the affected area once a week for four consecutive weeks. The order will also be mailed to permittees or certificate holders of record and property owners of record in the area; affected federal, state, and local agencies, and affected regional and village corporations.

(b) After the commissioner takes action under (a) of this section, the department may take the following actions:

- (1) restrict or deny the acceptance of applications for new water appropriations or applications for additional quantities for existing appropriators of record, until the order is amended or revoked;*
- (2) seek voluntary agreement among permittees and certificate holders to limit the quantity of their water use on an equitably apportioned basis during all or part of the year;*
- (3) fix a time limit for accepting new applications for water rights for existing water uses;*
- (4) designate all water uses as significant;*
- (5) require notice of all applications;*
- (6) require conservation measures;*
- (7) take any other actions necessary to fully inform the public of the order; or*
- (8) enforce actions under 11 AAC 93.280, 11 AAC 93.290, AS 46.15.255, and AS 46.15.256.*

11 AAC 93.540. Appeals

An eligible person affected by a decision under 11 AAC 93.520 -- 11 AAC 93.530 may appeal that decision as provided in 11 AAC 02.

To date, the critical water management tool has primarily been used as a means to address water quality related water quantity concerns to prohibit water withdrawals from contaminated water sources and to help mitigate saltwater intrusion related to water withdrawals.

Status of Reservation of Water Protection in Alaska Using the Preceding Laws and Regulations

Reservation of Water Statute Actions (AS 46.15.145)

Six initial ADF&G reservation of water applications were accepted by the DNR in the mid 1980s testing a variety of methods and data requirements. The methods used by the ADF&G to quantify water volume requirements and file for reservations of water under AS

46.15.145 ranged from use of the Tennant Method, modified Tennant Method and Physical Habitat Simulation System and variations of each (Estes 1984, 1987-1998, Estes and Orsborn 1986). Method selection was based on the level of competition for water uses, availability and quality of existing hydrologic and biologic information, time limitations, and availability of staff and other resources to collect and analyze data. Alaska laws and regulations enable each applicant for a reservation to determine and justify which method to use for substantiating reservation of water analyses and other application requirements. The best available data at the time of filing the application must be used for the resulting analyses and be accompanied by supporting documentation. All ADF&G reservation methods and analyses are integrated with and influenced by the amount and quality of hydrologic and biologic information. The initial six reservations and selection of supporting reservation analysis methods were chosen to represent and test the costs, other resource requirements, validity and overall merits for choosing and applying different methods for acquiring reservations of water under varying hydrologic and biologic conditions, and under differing levels of water competition. Some of the initial reservation of water requirements in applications were based in part on estimates of flow solely using hydrologic estimation models, others were calculated using historical and new measurements of flow; and others were based on a combination of information and correlations between sites with limited and longer-term historical flow records, including synthetic flows. Channel maintenance, ecological services flows and other methods were also considered and summarized in Estes 1984, 1987-1998, Estes and Orsborn 1986, Reiser, Ramey and Lambert 1985).

All six original applications were successfully adjudicated (processed) by DNR and reservations of water were granted to the ADF&G by DNR. This established the validity of the variety of methods and information used by the ADF&G under varying conditions. Each of the six ADF&G applications were also granted a priority date based on the original date and time of day each application was initially submitted by ADF&G and accepted by DNR. The adjudication and granting of these initial six ADF&G applications contributed to a 1995 Alaska Supreme Court ruling relating to application of acceptable methods for establishing flow requirements and information needs and the DNR documentation requirements and processes for water adjudications (Estes 1998, Supreme Court of Alaska 1995). Review of this Alaska Supreme Court litigation is recommended, especially in light of the limited Alaska specific case law relevant to water allocation processes in Alaska.

As of June 2007, ADF&G filed 105 reservation of water applications (includes the six reservations discussed previously). 104 applications were submitted to DNR to reserve flowing waters for fish and one application was to reserve stage and water volumes for fish in a lake (Figure 5). Twenty-four of these ADF&G reservation applications have been adjudicated and granted (includes 17 reservations for flowing waters and the ADF&G's and state's first and only adjudication of a lake reservation of water application to date). Approximately half of the adjudications were completed during the past 5 years largely due to an agreement established in 2002 between the ADF&G and DNR to partially fund a water rights adjudicator position at the DNR in Anchorage and more recently a DNR hydrologist position in Southeast Alaska (ADF&G/DNR 2002). This agreement is subject to annual renewal.

Under this agreement, a schedule mutually acceptable to the ADF&G and DNR is established annually to process applications for reservations of water on file at DNR pending adjudication and address related actions and issues of interest to both agencies such as the status of the adjudication backlog of all water rights applications of concern to ADF&G, adjudication processes, mutual priorities for new reservation of water applications and other activities that will mutually benefit both agencies. In most instances, the DNR adjudicates pending water rights applications in the order of priority filed by the ADF&G unless both parties agree to a variation. A process for modifying the order of adjudication by DNR (previously established and agreed to by the ADF&G and DNR during the Hickel administration) remains in force. That process allows DNR to place a higher priority on the adjudication of a reservation of water application (as an exception to the normal order of priority for processing pending reservation of water applications) when a competing pending application for a water withdrawal, impoundment or diversionary water use for the same water source requires both to be adjudicated at the same time to more effectively settle the competing claims for both the reservation of water and the other competing water uses.

Future ADF&G application filings are projected to continue to add to the existing DNR backlog of reservation of water and other classes of water rights applications pending adjudication. These will be discussed in greater detail below. .

Status of Other Reservation of Water Applications (AS 46.15.145)

The DNR has received 327 applications for reservations of water under AS 46.15.145 since passage of the 1980 reservation of water amendment to the Water Use Act. This total represents a combination of applications filed by ADF&G, federal agencies, and the private sector ADF&G (Figure 5, Estes 1987-1997, Davis 2007).

In addition to the 105 ADF&G applications (104 for rivers and 1 reservation of water for a lake), 7 have been filed by the US Bureau of Land Management (BLM) for rivers, 200 by the US Fish and Wildlife Service (USFWS) for lakes and rivers, and 15 for rivers by the non governmental (private) sector. The private applications consist of four filed by the Anchorage Audubon Society, two by private individuals, one by the Arctic Unit of the Alaska Chapter of the American Fisheries Society (AFS), one by the Juneau Chapter of Trout Unlimited (TU), one by The Nature Conservancy (TNC), and 6 by tribal interests (Estes 1987-1998, Davis 2007). Some of the private applications represent cooperative efforts with the ADF&G.

Six of the above private applications (four Audobon and two applications completed by other private individuals) in the early 1980s were rejected by DNR for a variety of reasons and are therefore not represented in (Figure 5, Estes 1993, Harle and Estes 1993).

Of the 222 non ADF&G reservation of water applications filed under AS 46.15.145, one of the BLM applications has been adjudicated and granted to BLM by the DNR (Estes 1998, Davis 2007). All of the non ADF&G applications were accompanied by a mandatory application fee and generated over \$100,000 revenue for DNR.

Status of Reservations of Water Established by the Water Export Amendments to the Alaska Water Use Act (AS 46.15.035 and .037)

Following passage of the 1992 water export legislation, the City and Borough of Sitka filed Alaska's initial application for water export uses and requested the right to annually withdraw 14 thousand acre-feet of water from Blue Lake for export and sale (ADL 43826) with a 1959 priority date. The early priority date was acquired because existing water rights formerly used by Alaska Pulp Mill to support pulp mill operations were transferred to the city following DNR protocols and procedure for water rights transfers and changes of water uses in combination with the new water export requirements.

Two automatic reservations of water were eventually granted for this system, one for Blue Lake and Sawmill Creek, respectively. Each automatic reservation of water was granted a 1992 priority date for reserving water as mandated by the 1992 water export legislation. Reservations of water were granted establishing water volume and stage protection for fish in Blue Lake, and to protect flow related water volume requirements for fish in Sawmill Creek. An earlier ADF&G reservation of water application filed in 1988 under regular provisions of the Alaska Water Use Act (AS 46.15.145) for Sawmill Creek (located downstream of Blue Lake) continues to be pending adjudication and retain its 1988 senior priority date (LAS 11995) to the water export water rights granted (LAS 20526). How the pending adjudication of the earlier ADF&G applications will be treated by DNR and related to the water export appropriations previously granted remains to be discussed and determined.

Successful application of the water export law indicates that the concept of an automatic reservation has merit. Perhaps, simply reducing the size of the polygons that are subject to this current law may be one of the first steps that can be achieved for further improvement. As discussed in earlier ADF&G publications and correspondence with DNR, the ADF&G believes development of regulations to provide more guidance for water export related application and adjudication processes will further improve this reservation of water process.

Federal Reserved Water Rights (AS 46.15.165 and .166)

Several attempts to assert Federal Reserved Water Rights have not been successfully completed in Alaska. However, this and related basin wide adjudication provisions of the Water Use Act may eventually be used as one of the supplemental mechanisms (AS 46.15.165 and .166) for reserving water for specific purposes for water uses associated with federal land reservations.

Unlike other water rights actions, adjudications of Federal Reserved Water Rights require settlement of all other outstanding water allocation use claims in a basin and are limited to the minimum amounts of water needed to support purposes of a federal reservation of land established by Congress (Welker 1997).

The state has limited experiences applying AS 46.15.165 and .166 in Alaska. Challenges associated with application of these administrative and judicial adjudication tools and

processes in Alaska can be gleaned by reviewing historical summaries of failed attempts to adjudicate reserved rights claims asserted by the National Park Service and others in the Indian River Basin in Sitka in the 1980s (Estes 1998, 2007).

Traditional uses of the tool and its significance are highlighted in (Estes 1998, 2007, Welker 1997, Anderson 1991, 1996). Unique uses and applications of these tools in Alaska were and are still being debated as part of the Katie John litigation decision (Anderson 1996). The Western States Water Council published a summary of Federal Reserved Water Rights issues and experiences for western states (WSWC~ 2001).

Indirect and Other Tools for Protection of Reservation Water Uses

Abandonment, forfeiture, and reversion of appropriations Sec. 46.15.140

Application of this process was successfully applied by DNR after citizens petitioned the DNR to apply this provision (AS 46.15.140) to settle competing claims in the Baranof River system regarding priority of and legitimacy of beneficial water uses claimed (Dunker 2002, and DNR Office of the Commissioner 2002). Denial of the pending senior claims (ADL 40815 and ADL 43281) also protected the priority standing of existing reservation of water claims filed by the ADF&G (LAS 13803, 13804, 13805). Despite challenges, the DNR decision was finalized based on the inability of the applicant to demonstrate continued beneficial use of their claim for water (Dunker 2002, DNR Office of the Commissioner 2002). The state justified part of its actions used under 11 AAC .02.260 based on the fundamental test for fairness articulated by the U.S. Supreme Court (1976) DNR argued that procedural fairness requires a balancing of 1) importance of individual interest at stake) 2) value of additional procedural safeguards, and 3) the government's interest in fiscal and administrative efficiency (DNR Office of the Commissioner 2002).

The outcome demonstrates the value of the tool. The use and effectiveness of these procedures remain subject to the discretion of DNR unless, as demonstrated, water users or other stakeholders take the initiative to petition or use other options to request and convince DNR to take affirmative and proactive action.

Recreation Rivers Act. 1988. AS 41.23.400-510.

The Recreation Rivers Act was passed in 1988 and contained elements encouraging reservation of water uses and protection for fish and recreation in six river management units within the Susitna River basin [(AS 41.23.400, 41.23.420(b), 41.23.440(c)): Little Susitna River, Deshka River (Kroto Creek/Moose Creek), Talkeetna River, Lake Creek, Talachulitna River, and Alexander Creek. The Act required the DNR to establish management plan guidelines consistent with the enabling legislation. The Act and plan (DNR 1991) emphasize the need to maintain and enhance the land and water for a variety of recreational uses including fish and wildlife recreation economic use the enjoyment of the public, multiple uses of the uplands, and the accommodation of access. The plan recommends protection and acquisition of reservations of water for recreation, and fish and wildlife habitat for each river system throughout the year (including waterway access).

ADF&G filed for reservations of water for fish in the Little Susitna River, Deshka River, and Talkeetna River. It is in the process of collecting and analyzing data to file reservations for reserving water in Moose Creek. Funding to collect stream gaging information will be needed quantify to reservation of water needs for Lake Creek, Talachulitna River, and Alexander Creek. This information will also be required to complete reservation of water analyses and applications for those three systems.

Reservation of water applications have not been filed for protection of recreation for the series of Recreational Rivers. However, data have been collected for the Little Susitna River and Lake Creek that can be used for this purpose by National Park Service staff, contractors, state agencies and others and may eventually be used for this purpose.

Other State and Federal Reservation of Water Protection Tool Practices and Options **Fish Habitat Permits**

Prior to 2003 the ADF&G used two processes to address water allocation impacts to fish habitat. It used its independent fish habitat permitting statutory authority under AS 16.05.840 and .870 to specify the amounts of water that should be retained in all fish bearing water bodies for fish passage (.840) and documented anadromous fish bearing waters (.870). The department also provided public interest recommendations to the DNR Division of Water (responsible for managing water allocation under DNR AS 46.15 authorities) per AS 46.15.080, public interest criteria. The ADF&G and DNR Division of Mining Land and Water coordinated their independent fish habitat (AS 16.05.840 and .870) and water use permitting AS 46.15) authorities and actions relating to water volume under a 1989 interagency agreement (Rue 1989). The 1989 interagency permitting coordination agreement resulted from a series of experiences and misunderstandings between the two agencies including the interagency dispute on the north slope in 1976 (Hayes 1977). Uses of these two parallel authorities are addressed in White (1981) and Trelease (1976). .

In 2003 Governor Murkowski issued Executive Order 107 (EO 107) to transfer the ADF&G fish habitat permitting authorities under AS 16.05.840 and .870 to the DNR Office of Habitat and Management Permitting under AS 41. A memorandum of agreement between the ADF&G and DNR (DNR/ADF&G 2007) was crafted and amended four times to establish the mechanics and guidelines for administering this change of authorities. Evaluations of EO 107, including its effectiveness, costs, and other impacts, were initiated by the legislature and Governor Palin's administration in 2007 after the Murkowski administration ended in 2006. Based on those analyses, Governor Palin initiated a process to return all of the fish habitat permitting functions from DNR to the ADF&G in early 2008, and established a target date for completing the transfer by July 2008.

Prior to implementation of EO 107, ADF&G and DNR operated under a 1989 agreement to coordinate the ADF&G fish habitat and DNR Water Use Act permitting authorities and actions relating to developments in fish bearing waters that impacted fish and wildlife (Rue 1989). Assessment of the transfer of the fish habitat permitting authority to DNR under EO 107 and preparation of this report highlighted and brought attention to another existing regulatory tool under the Water Use Act [AS 46.15, 11 AAC 93.080 (5)] that could be initiated and used by ADF&G as an alternative means to request DNR to continue to notify

ADF&G of opportunities to provide public interest input to DNR for water use cases, decisions and actions governed by the Water Use Act (AS 46.15) that impacted fish and wildlife and other water actions of interest to ADF&G.

“the department will provide written notice to any person known to the department to own land where the water is to be withdrawn or used, or over which the water is to be transported, or whose request to receive notice is on file with the department”

By the time ADF&G became aware of this option, the process to return habitat permitting functions to ADF&G was in progress. Therefore no action had been initiated by ADF&G to request statewide notification from DNR under this regulation. However, doing so may still have merit even though fish habitat permitting authorities will return to ADF&G. This is because this request for formal notification from DNR would provide another tool and another means of checks and balances for insuring ADF&G is apprised of all water rights actions that might impact fish and wildlife and waterway access to those resources and hence enhance coordination between both agencies. Private citizens and others can also exercise this option to request automatic notification from DNR and are not limited to water uses related to fish and wildlife. Anyone has the option to make the request and define the geographic scope and types of water uses targeted for the request.

ADF&G Hatchery Permits to Protect Reservations of Water

ADF&G can and has used its fish hatchery permit authorities [AS 16.10.400 (g), 5 AAC 40.220(5) and (7)] to insure water rights for hatchery purposes are adequate for hatchery operations and uses and will not be harmful to reservation of water needs required for indigenous fish (Estes 1991a, 1998).

Other State and Federal Permitting Options to Protect Reservations of Water

ADF&G can also work towards achieving protection of reservations of water by providing its technical recommendations to other federal, state, and local permitting authorities regarding reservation of water needs for fish and wildlife under other state and federal laws such as 401 certification under the Clean Water Act, Safe Water Drinking Act, Federal Energy Regulatory Commission Hydropower licensing, Coastal Zone Management Act, Fish and Wildlife Coordination Act, National Environmental Protection Act processes, etc.

The licensing of the Reynolds Creek Hydroelectric Project by the Federal Energy Commission in Southeast Alaska on Prince of Wales Island (Project #11480) represents a good example of the interactions between uses of state laws and regulations and their relationships to the Federal Power Act for protecting reservations of water and other ecological services. This example demonstrates a use of the Coastal Zone Management Act under state law to resolve administrative and litigation challenges to habitat protection requirements achieved through these combination of permitting tools. It also represents an important example for exercising state laws to influence federal permitting decisions and outcomes related to federal licensing of hydropower projects.

Case Law Applications to Reservation of Water Protection

In addition to brief references and summaries of significant Alaska case law decisions above such as the Supreme Court Ruling in 2005, the TNC contracted a legal assessment

of case law such as the 2005 Supreme Court ruling and other Alaska legal decisions and opinions to augment this report. That assessment was reported directly to the TNC by its contractor.

Greenpeace (2000) represents another example of case law and related actions and outcomes that merit attention in this report and is discussed in more detail below. This case law related to an existing reservation of water application filed by the ADF&G that was still pending adjudication. The collective actions associated with this case nearly resulted in the introduction of state legislation to weaken reservation of water provisions. Specifically, the circumstances relating to this dispute triggered consideration of legislative revisions that (if introduced and implemented) would have eliminated existing opportunities provided to non state governmental entities under AS 46.15.145 to apply for and acquire reservations of water. Ironically, the combination of this litigation and associated challenges to weaken existing reservation of water related protection and opportunities instead resulted in passage of HB 185 in 2001. Ultimately, HB 185 strengthened temporary water use and associated public interest consideration processes and requirements (AS 46.15.150).

The plaintiff, Greenpeace, sued the state and British Petroleum (Greenpeace 2000) based on their belief the state was permitting water withdrawals on the North Slope by petroleum interests without adequately addressing a pending reservation of water application filed by the ADF&G in the Kuparuk River. Greenpeace argued the state was inadequately applying AS 46.15.080 considerations when granting temporary and other uses of water from the Kuparuk River and within its vicinity. As part its strategy to achieve better legal standing under AS 46.15, Greenpeace replicated a copy of the reservation of water application (LAS 20646) filed by the ADF&G in 1995 (and still pending adjudication by DNR) and filed for its own water rights. The Greenpeace application was junior in standing to the senior ADF&G application and did not request more water than initially sought by the ADF&G. Some industrial and other public sectors interpreted the Greenpeace filing and other actions as examples how extreme conservation interests will exploit AS 46.145 and be able to lock up all of the remaining water in Alaska that will be needed for water extraction and required to support future economic developments and other withdrawal, diversionary, and impoundment water uses. As a result, developmental interests and state governmental representatives cited these potential economic threats to promote introduction of new legislation to eliminate provisions within AS 46.15.145 that allow anyone to file an application to acquire reservations of water in the best public interest. Eventually, internal governmental and public discussions and debates ultimately shed light on all the facts surrounding the Greenpeace water rights application, administrative challenges, and litigation. The factual information negated the efforts to modify and weaken the reservation of water law and instead resulted in passage of amendments to the Alaska Water Use Act requiring stronger temporary water use and related public interest provisions (HB 185) including better consideration of potential impacts to fish bearing waters. The Greenpeace application for a reservation of water was eventually closed (terminated) by DNR because it was a duplicate of the more senior water rights application filed by the ADF&G. This experience represents an important example how the complexity of the Alaska water allocation system, its intent, and mechanisms can be

misinterpreted and misrepresented by public officials, industry, the general public, and others.

CHALLENGES AND OBSTACLES TO CURRENT AND FUTURE RESERVATION OF WATER PROTECTION (Direct and Indirect)

This discussion section is followed by a Recommendations Section based on the issues discussed.

Magnitude of the Issue, Tools and Challenges – Fish Bearing Waters Subject to Water Allocation

At least 17,000 known fish bearing waters (~15,000 rivers and ~1,500 lakes) are estimated to be potentially subject to water extraction and flow modification in Alaska. To qualify for water rights protection under AS 46.15.145 and AS 46.15.035 and .037, the majority of fish bearing rivers must be subdivided into five or more individual stream reaches. Each lake must also be individually protected. That means each reach and lake will require a separate reservation of water application unless there is prior agreement with DNR to bundle them on a multiple reach or basin wide basis. Therefore, if one multiplies the 15,000+ anadromous rivers by a conservative estimate of only four reaches that will equal 60,000. This calculation represents the potential estimated number of reservation of water river reaches (segments of rivers) potentially requiring protection under AS 46.15.145, not including protection of lakes and other fish bearing waters that have yet to be found and documented.

The ADF&G continues to question why less than 400 rivers reaches and 142 lakes (out of an estimated 60,000 or more fish bearing river reaches and 1,500+ lakes) have been targeted for formal reservations of water applications and related protection mechanisms (Estes 1987-1998, Davis 2007, Figure 5) during the past 28 years. It also questions why only 15 of the 327 applications for reservation of water filed have been adjudicated and granted under AS 46.15.145 and the consequences of the remainder being subject to future completion of the adjudication processes.

Based on ADF&G's experiences and participation in the evolution of Alaska's water allocation and related laws, regulations and their implementation we have identified several potential reasons for the limited number of filings and adjudications. They include the environmental setting, limited infrastructure, insufficient hydrologic data, insufficient knowledge of fish distribution information by species and life phase, insufficient allocations of personnel and financial resources, lengthy administrative processes for preparing and adjudicating applications for water reservations, insufficient water use and demands planning, insufficient public education relating to reservation of water protection opportunities, and except for state agencies, reservation of water application fees (Estes 1993, Harle and Estes 1993, Estes 1996, Estes 1998).

Environmental Setting, Limited Infrastructure, and Experience

Alaska's size, abundant fish and wildlife resources and apparent wealth of water are misleading and contribute to a false sense of security relating to long-term water

availability and adequacy of the existing system used and resources expended to allocate water.

Water resources are not distributed uniformly in Alaska. They vary spatially and temporally. This is due to the extreme variability of runoff and temperature patterns throughout the state, the state's large and varied geographic areas, and other extreme ranges of hydrologic and environmental conditions.

Precipitation can vary from an average of 5 inches on the Arctic Slope to an average of 300 inches per year in the maritime rain forests of Southeast Alaska. Glacial areas and ice fields cover approximately 5 percent of Alaska and impact the quantity and timing of runoff patterns. Water may be frozen seven or more months of each year in many locations. Ocean tides and freshwater inflows interact and mix in estuarine areas along Alaska's vast coastline.

Topographic relief in many communities limits the footprint space available to cost effectively construct water storage reservoir systems to manage and augment water supplies for human uses. A discontinuous series of local road networks, weather, permafrost, tundra, and other environmental factors also limit or restrict seasonal and year round access to water sources in many locations. This typically means the time and cost for meeting increasing water demands and developing new water supplies and delivery systems will take several years and be expensive. Factors that should be considered are resources and time needed to locate new water supplies, acquiring the rights to develop new public water supplies, and the time and cost needed to construct the infrastructure to distribute the water.

Alaskans and others interested in these topics may not be aware these and other factors have resulted in most Alaska population centers experiencing local shortages of water supplies during the past 30 years. Wise use of water allocation laws and sufficient planning will be required to avoid repeats of those situations and to retain sufficient quantities of water in rivers and lakes to sustain fish and wildlife production and other ecological services.

Hydrologic Conditions and Limitations

Perhaps the most limiting factor related to locating, inventorying, developing and allocating water supplies is the dearth of hydrologic data. This hurdle restricts existing and other legal mechanisms to plan for and assure wise and good management of water in the Public Interest under current and any future scenarios.

Less than 500 USGS (482) USGS continuous mean daily flow stream gaging sites have been established in Alaska since 1908 (Meyer 2007, Table 1). This equates to flow measurements for less than 1 percent of Alaska's water bodies. Thirteen of these Alaskan gage sites have less than 1 year of continuous flow data, one hundred-thirty have 1 year to less than 5 years of continuous flow data, eighty have 5 to less than 10 years of continuous flow data, one hundred-seventeen have 10 to less than 20 years of continuous

flow data, one-hundred-fourteen have 20 to less than 50 years of continuous flow data, and twenty-eight sites have 50 or more years of data.

Twenty percent, or 97 of the 482 gages established in Alaska, with one or more years record, were operational during Water Year 2007 (October 1, 2006 to September 30, 2007). Generally, no more than 20 percent of the total number of Alaskan gages are active in any one water year due to funding restrictions (Estes 1991-1998, Brabets and Hawkins 1995, Brabets 1996, Meyer 1998).

The 97 gages, operating during Water Year 2007 represent an average of approximately one stream gage per 6000 square miles in Alaska. In past years the average has been one gage per 7000 square miles. Whether it is 6000 or 7000 square miles, Alaska's density of gages contrasts significantly with the lower 48 states' average of one gage site per 400 square miles (Table 1)

This is a significant problem because insufficient hydrologic information for stream reaches, individual locations, and lakes limits the ability of potential water users and managers to accurately project water availability for water uses and developments. Developmental and natural resource interests are dependent on this information to enable them to project the reliability and amount of water that might be available, even if there were no other competitors for their targeted water source. Continuous flow and stage data are also necessary to manage and enforce existing water rights. Flow and water volume information are also essential for quantifying reservation of water needs for fish, wildlife, water quality, navigation and other ecological services.

Ideally, a minimum of five years of continuous mean daily flow or stage data should be collected or synthesized and analyzed to reduce bias associated with inter-annual hydrologic variability for making water allocation decisions. This is a much lower data standard than established in the Lower 48 states. Although existing water allocation laws and legal precedents have established "best available data" as the minimum requirement, ADF&G believes it is in the best public interest to strive to meet this multi-year data recommendation so long as all classes of water applications will be held to the same standard by DNR and sufficient time and resources are provided for funding and completing the data collection and analyses prior to final adjudication of the water right.

USGS charges an average fee of \$50,000 to gage (measure) continuous daily flows for a single river reach annually in Alaska. This cost translates into \$250,000 for a 5-year period and represents a significant impediment. Access limitations and loss of equipment to bears and other wildlife may contribute to this annual cost for collecting this essential information.

Water use applicants and natural resource management agencies such as DNR and ADF&G attempt to compensate for these hydrologic limitations by estimating basic hydrologic conditions. To estimate flows, one must use regional hydrologic models and/or develop synthetic long-term hydrologic data by extending limited data bases through correlation with other sites having longer-term hydrologic data. In the absence of additional

long-term historical hydrologic data in Alaska, it is obvious the USGS databases, from which these models were developed, limit the ability to evaluate naturally occurring hydrologic patterns at ungaged sites (and sites with limited historical flow data) with confidence. Water allocations for lake water bodies are also hampered by limited or non-existent historical daily stage and water surface elevation data for the majority of Alaskan lakes.

The limited availability of current (real-time) and historical (past) multi-year hydrologic data records for Alaska have resulted in the majority of water rights appropriation and temporary water use requests to be based on hydrologic estimates and historical data records under 5-years in length. Public interest consideration assessments are also often based on hydrologic estimates and short periods of flow records due to these circumstances. When water uses are not gaged, they cannot be monitored for enforcement. These and related data limitations hamper the effectiveness of water management. They will also impact the effectiveness of new mixing zone regulations because the new process is based in part on knowing or predicting water volumes of receiving waters locations and being able to calculate their capacity to dilute effluents at specific locations at different times of the year.

Precipitation information required for flow prediction models is obtained using an outdated TP 47 Precipitation Model for Alaska. This model is over 30 years old. Use of this outdated precipitation information further complicates the process for estimating flow availability and reduces the accuracy and precision of the resulting hydrologic estimate. It should be recognized it is more time consuming to estimate flow characteristics for streams and lakes having a limited or non-existent database as opposed to summarizing data for a stream or lake having an adequate long-term historical record.

It is ironic that it remains so difficult to secure financial resources for this critical information. It represents some of the most useful and essential data required to improve the accuracy and precision of models engineers and natural resource planners rely on to plan and design facilities for industrial and human population growth. Notwithstanding the dependence of fish and wildlife on sufficient water volumes, it should be recognized and emphasized hydrologic information is essential to all facets of human survival, the water we drink, quality of our water, industrial needs, energy production, sewage treatment plants, projections of flood hazards, agriculture, designing roads, bridges, culverts, etc. Climate change prediction models are also dependent on this information. Without sufficient water of good quality humans will not survive.

Biologic Information Limitations (Fish Distribution)

Next to hydrologic information, limited reach specific biologic information describing the seasonal presence of fish species by life phases represents a challenge in many locations in Alaska. When fish presence is unknown, laws cannot be applied to protect fish habitat requirements and developments may be approved that inadvertently harm both fish habitat and production.

Fish species and life phase velocity, depth, substrate and other habitat requirements are unavailable for most stocks of Alaska fish. Funding for research to collect and analyze this type of information has not been available since the mid 1980s. This information is typically used for sophisticated flow quantification models when there is high level of competition for limited water volumes.

In summary, 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. This limitation simply adds to the challenge for water managers to avoid repeating over appropriation mistakes of the other states, especially when it appears there appears to be changing trends in overall climatic conditions.

Limited Financial Resources

Over the years, the ADF&G devised a strategy to enable it to quantify reservations of water requirements in rivers and lakes for fish with hydrologic and biologic data limitations described above. This strategy enables the ADF&G to partially compensate for the limited availability of financial and personnel resources. Special grants have also been acquired to augment the program, primarily in Southeast Alaska.

The ADF&G strategy is based on a cost-effective approach to acquire the majority of its reservation of water protection for fish by using the Tennant Method and variations of this method as a primary technique for analyzing flow requirements. When necessary, this method has been modified and new procedures and variations (requiring minimal resource expenditures) have been developed (Estes 1984, 1989, 1992, 1998, Estes and Orsborn 1986, Reiser, Ramey, and Lambert 1985) to request specialized reservations of water (e.g., flushing flows, and water depth and area in lakes). When available, existing hydrologic and biologic information are integrated to refine these analyses.

As a rule, uses of more sophisticated and expensive methods for reserving water, such as the Instream Flow Incremental Methodology Physical Habitat Simulation System model (Bovee 1982) have been limited to situations where competition between out-of-stream uses and reservation of water related uses were likely to be highly controversial and required an incremental quantitative flow analysis. Negotiations with competing water users have also resulted in agreement to use different applications and a variety or combination of methods and approaches.

Projects under federal jurisdiction (e.g., projects requiring a Federal Energy Regulatory License, FERC) have occasionally mandated a specific data collection and analytical procedure or provided the preferred resources and time to perform more sophisticated analyses. Basin wide adjudications for quantifying Federal Reserved Water Rights may also require uses of more costly data collection and analysis processes than applied for the ADF&G core program.

Supplemental funding has been available in the past for large and high profile projects requiring application of more sophisticated flow analyses such as the Susitna Hydroelectric Project, Pebble Mine, North Slope water withdrawals, municipal water supply needs, etc.

Generally, funding has been unavailable for other types of water allocation decisions and is usually unavailable to collect the desired 5 years of baseline hydrologic data to support reservation of water analyses at the majority of priority ungaged stream reaches. Similarly funding has been unavailable to collect new fish distribution and habitat suitability information, and to systematically evaluate whether reservations of water filed in the past are adequate. Funding is also unavailable to provide real time monitoring of existing reservation of water locations and observe whether sufficient water is being retained in water bodies. Monitoring information is needed for reservation of water locations to enable ADF&G and others to track water uses and availability and notify DNR when enforcement actions are required to halt water withdrawals by junior water appropriators that harm senior water reservation appropriations.

Staffing and its Relationships to Reservation Applications and Adjudications

Staffing at both DNR and the ADF&G has increased over the years. However the added work force has been unable to eliminate the back log for adjudication of all pending water rights classes. Four or less applications for reservations of water are being adjudicated annually. Other staffing for keeping pace with reviews for public interest determinations under AS 46.15.080 and commenting on fish habitat permits and other state and federal permits is discussed in other sections.

Limited Participation by Department of Environmental Conservation (DEC) and other State Agencies

DEC, DNR State Parks, and other agencies have not taken advantage of opportunities to file for reservations of water to sustain water volumes for water quality purposes, waterway access, protection of aesthetic values (to sustain water falls etc.) and other recreational public interests. From a water quality perspective, reservation of water protection will be integral to achieve successful application of the newly implemented DEC mixing zone regulations to assure sufficient water volumes for dilution. Unless mechanisms are in place to insure there is sufficient receiving water reserved under the reservation of water law (AS 46.15.145) to dilute a given effluent discharge that is permitted, it may not be possible to achieve the desired outcomes under the new DEC regulations if too much water can be withdrawn from the receiving water. Similarly, DEC can use reservation of water tools for other water quality related outcomes where applicable, including for protection of water temperatures. With respect to aesthetic and recreational uses, no actions have been taken to follow through on the Susitna Basin Recreational Rivers legislation despite its emphasis on the importance of reservations of water for recreational purposes in addition to reserving water for fish and wildlife. In the long run, it will be important for other agencies besides the ADF&G to exercise their public trust responsibilities if the state hopes to meet all of its duties to the public allowed and envisioned under AS 46.15.145.

Duration of Administrative Processes

Administrative processes can be an added deterrent to potential and existing applicants, for reservations of water, including the ADF&G. There have been 15 completed adjudications of the ADF&G's and other applicants' pending applications for reservations of water (filed under AS 46.15.145) since 2002 and 10 prior to 1998 (Estes 1998, Harle and Estes 1993). Under AS 46.15.035 and .037, the DNR granted two mandatory reservations of water required by the 1992 HB 596 water export amendments to the Water Use Act (Estes 1996, 1998, 2001). And as noted above, adjudications of 18 more of ADF&G's pending reservation of water applications, (17 as part of the former DNR backlog project), have been initiated by the DNR.

Based upon past experiences, an estimated 1- to 3-weeks or longer of an applicant's time may be required to participate in the various phases of the DNR adjudication process for each outstanding reservation of water application (Estes 1994). This has extended to even longer periods when the DNR was unable to initiate a scheduled adjudication due to other unexpected priorities and because of personnel changes.

The absence of a fixed or more certain timetable for the DNR to adjudicate water rights applications, after acceptance by DNR, has frustrated some applicants. This issue can be a significant burden for an applicant who is later requested by DNR to actively participate in the adjudication process and provide additional data and analyses and too much time has lapsed since the application for the water right was initially submitted to DNR. It is also possible a different DNR outcome and decision may result if an adjudication were completed on a more timely basis following submittal of a water rights application.

DNR'S variable schedule for processing all classes of water rights applications is contingent on resources availability and the need to address its overall backlog of water rights actions. Both add another obstacle and level of difficulty for water rights applicants. The unscheduled initiation of the adjudication of several water rights applications (potentially impacting fish and wildlife resources and other ADF&G interests) by DNR during the same time period (requiring timely public interest analyses and input from ADF&G) cannot be accommodated under the existing ADF&G program. Planning for ADF&G participation and joint DNR and ADF&G scheduling for adjudications of reservation of water applications are, on the other hand, are currently addressed by the cooperative agreement with DNR initiated in 2002 (ADF&G/DNR 2002).

Prior to 1998, DNR's water rights application backlog was estimated to have been growing at a ratio of approximately one reservation of water application per ten applications for out-of-stream water rights. Although an analysis of subsequent years is in progress, it is assumed this ratio hasn't varied too much.

Complicating the adjudication of the DNR backlog are water rights for out-of-stream uses that were grandfathered by the DNR in 1966. Many of these water rights were granted without identifying whether the quantity of water claimed by an applicant actually existed, was needed, or used. This may have resulted, or will result, in overappropriations (over allocation of water) from some of the affected water sources (and dewatering) unless

corrective actions are taken to address this class of water rights to insure they are in the best public interest consistent with current practices.

DNR's eventual adjudication of its entire backlog of applications for out-of-stream uses of water (for water extracted from or affecting fish bearing water sources) could provide another type of opportunity for reservation of water and related protection if sufficient resources are available to review each water right application and identify reservation of water needs. This is because under AS 46.15.080 (b)(3), the DNR is required to provide the ADF&G the option to review any proposed water use that may affect fish and wildlife production. The ADF&G can, based upon its review, request the DNR to condition (revise or deny) an applicant's proposed out-of-stream water use for the purpose of protecting fish and wildlife. DNR has the options to accept, modify, or ignore the ADF&G's recommendations under this provision.

Accordingly, there is an immediate benefit for reservation of water protection when DNR concurs with ADF&G requests for adding AS 46.15.080 conditions to a consumptive water use (or a related water use that would otherwise negatively modify flow and water volume characteristics). Unfortunately the unallocated water, resulting from a DNR public interest condition placed on a water right (in consideration of a request from the ADF&G or others), remains subject to future appropriations unless better documentation processes are established by DNR (see finding of fact recommendations discussion) and the conditions and rationale related to the public interest decisions are formally included in or documented and linked to the certificate of appropriation. An assessment whether regulatory modifications can be used by DNR to enhance the impacts and tenure of public consideration decisions and conditions is suggested to further strengthen the results of public interest determinations and to provide cost effective alternatives to filing for reservations of water.

Similarly, a habitat protection permit should be issued consistent with the 1989 agreement between ADF&G and DNR (Rue 1989) to reinforce the public interest determination and provide further safeguards against future water appropriations that are inconsistent. . Both the water right and fish habitat permits should be cross referenced and entered into a common Geographic Information System (GIS) data base. This suggestion for cross referencing and coordinating permit conditions also applies to the following suggestion regarding Factual Findings below.

Factual Findings (also referenced as Findings of Fact Conclusions of Law per regulations- see above regulations)

An absence of standards governing how the DNR documents its rationale for adjudication decisions under AS 46.15.080 further weakens reservation of water related considerations under these provisions. This was also highlighted by court litigation challenging an adjudication determination by DNR (Supreme Court of Alaska 1995). Inadequately documented decisions for denying or reducing the amount of water granted to an applicant for an out-of-stream use (in response to a request from the ADF&G or other stakeholders) may result in future DNR adjudicators inadvertently interpreting that the remaining

unallocated water in a water body remains subject to allocation, when in fact, a public interest decision had been previously made for purposes of reservation of water protection.

This record keeping problem would be solved if the DNR were to adopt findings of fact and conclusions of law procedures for all classes of water rights applications. Presently, this process is only mandatory for reservation of water adjudication decisions (11 AAC 93.145(d)). See discussion above, too.

Date of Priority

The growing backlog of the ADF&G's applications for water reservations pending adjudication has, until recently, not been interpreted to pose an immediate threat to desired reservation of water and related protection. This is because a priority date was assigned to each application for a reservation of water at the time it was accepted by the DNR.

The priority date establishes the order of priority for the allocation of water within and from the source of water. To date, this principle has been applied consistently. Nonetheless, until the adjudication process is completed, the amounts of water requested in applications for water reservations and out-of-stream water uses remain subject to 100 percent acceptance, future modification, or 100% rejection by the DNR.

Absent DNR actions to complete the adjudication of a pending reservation of water right application, it is assumed 100% of the original amount of water requested in the application will be managed by the DNR on behalf of the applicant, assuming the reservation of water application is senior to other pending applications.

The ADF&G has become increasingly concerned as more time passes before an application for a reservation of water is adjudicated. This is because it is more likely that those responsible for the original water reservation analyses and application preparation, and the DNR staff who completed the initial phases of an adjudication will have changed employment or responsibilities. It is also conceivable that out-of-stream competition for water from sites pending adjudication of previously filed applications for reservations of water will increase over time.

Experiences gained by other states indicate that protection of reservation of water uses is often judged to be less important than allocating water to competing out-of-stream water uses when competition for water allocation is keen. Accordingly, there is a danger that lengthy delays in adjudicating applications for reservation of water uses may result in less than desired protection than would otherwise be granted today (while competition from other out-of-stream water uses remains minimal).

DNR Water Diversion Policy

Another past limitation of existing water management practices, is based on a DNR policy of not managing water diversions when water is not used. For example, this applies to a water body that has been diverted without putting the water to use before returning the

water to the original water source at the same or different location from the initial point of diversion.

This DNR policy could result in the dewatering of portions of fish bearing waters, unless the ADF&G were notified of the water diversion and exercised when the habitat permitting authority is returned to the ADF&G. However, the ADF&G permit will not benefit terrestrial species that may be impacted unless DNR can be convinced to exercise its authority under AS 46.15.080.

Water Export Reservations

Two reservations were processed in 1992 for Blue Lake and Sawmill Creek. Alaska legislation enacted in 1992 (AS 46.15.020 -.037), relating to the export and marketing of water (House Bill 596). The water export provisions of the Water Use Act have the potential to affect the protection of water reservations on a large scale (Estes 1992-1997, Harle and Estes 1993).

Regulations for conservation fees, required by the legislation, were promulgated in early 1996 (Alaska Administrative Code 1996a, b). Based on an assessment of existing experiences, detailed procedures defining how to execute the provisions of the law for additional exports in the future should be completed for public review and adoption.

Elimination of the Water Use Act

Perhaps, the most significant and immediate threat to future reservation of water protection in Alaska, other than failed attempts to introduce legislation to limit opportunities to file for reservations of water, were a variety of cost savings options previously considered by the DNR (Estes 1996, 1998). Those options ranged from elimination of the Alaska Water Use Act and the DNR Water Management Section within the Division of Mining and Water to retaining the status quo (Estes 1995, 1996, 1998). Based on public and other stakeholder feedback to a DNR survey regarding those proposals and options, the DNR fortunately selected to maintain the status quo. Correspondence regarding these options and other concerns discussed above are included in Appendix B1 of Estes (1996) should be reviewed for a historical perspective related to the strategies and issues in this report.

Summary of Other Demands for Reservation of Water Protection

Despite the limited availability of resources to acquire reservations of water for fish, the ADF&G's reservation of water program has become increasingly burdened with annual increases in requests for technical support by other staff, agencies, and the private sector. Among the support needs identified include participation on the Interagency Navigability Team to address recommendations from a waterways issues audit conducted in 1997 (Welker 1997).

The limitations above, combined with the growth in demands for assistance to others, without additional staffing, will increasingly hamper the ability of the ADF&G to maintain its

average production rate of seven or more applications per year. It is apparent regulatory, legislative and other options deserve consideration.

The above factors, the complexity of water law and regulations, and Alaska's infancy, all contribute to the low number of applications filed for reservations of water to date.

Activities Designed to Improve the Reservation of Water and other Related Protection Mechanisms and Processes

2002 ADF&G MOU ADF&G and DNR Memorandum of Understanding for Reservations of Water

The ADF&G and DNR entered into a formal agreement in 2002 for improving interagency coordination and processes for adjudicating reservations of water and to provide additional resources for DNR adjudications. The agreement resulted from interagency discussions initiated following communications initiated by the ADF&G relating to concerns pertaining to the adequacy of reservation of water processes and protection (Rue 2001). The agreement is subject to annual renewal and remains in force. It is used to guide the activities of both agencies. Two positions, an adjudicator and a hydrologist are partially funded at DNR by the ADF&G under this agreement. This is the basis for the successful adjudication of an additional 15 pending reservation of water reservations and much closer coordination and cooperation between both agencies. A more in depth analysis of this agreement will be included in a future ADF&G progress report. Limitations to date have been based on personnel turnover and the time needed to train specialists.

As noted in other sections of this report, progress has been made as of 2002 as a result of the joint DNR/ADF&G memorandum which is renewed annually. Since its implementation 15 more applications have been adjudicated since 1998.

Alaska Water Management Council (AWMC)

The AWMC was established in 1992 to improve water management through better interagency state and federal coordination and cooperation.

Former Alaskan Governor, Wally Hickel signed an Administrative Order formalizing the activities of the AWMC in 1993 (Hickel 1993). Federal agencies challenged the language and requested modifications. The order was voided and the revisions requested by federal agencies were never formalized.

The AWMC has not met since the Fall of 1993 and was replaced by the Alaska Clean Waters Action (ACWA) program discussed below.

The AWMC members produced an important document summarizing water data issues for Alaska (Munter 1992). It is a good reference for identifying challenges and options for improving the ability of state and federal agencies to manage water data.

Alaska Clean Waters Action (ACWA)

The ACWA program was initially established by Executive Order 200 in 2002 by former Governor Knowles in 2002. The order continues to remain in effect. Its purposes are to coordinate funding for fish habitat, water quality and water quantity (including reservation of water) activities of ADF&G, DNR, Department of Environmental Coordination, and Division of Governmental Coordination and other stakeholders for high priority waters and to maintain a database. ADF&G contributed to its formation and organization. It continues to evolve and mature as more experience is gained by participating agencies, the public and other stakeholders.

The ACWA processes provide a mechanism for Alaskans to nominate waterbodies they consider to be in the most need of water protection and recovery and helps the state to acquire, distribute, and target financial resources for projects to monitor and execute those actions. Some agency and watershed groups take advantage of these nomination opportunities and resulting prioritized list to pursue funding for local projects, but there are many agencies, resource managers and stakeholders who are still unfamiliar with this evolving program and its potential opportunities and benefits.

A full-time ADF&G ACWA representative was established in April 2006 and is partially funded through a cooperative agreement with DEC. During the past six years, ADF&G has supported the ACWA program. ADF&G contributed to and compiled habitat information on ACWA waterbodies and cooperated with other ACWA partners to populate the ACWA database with scores and rankings on the majority of waterbodies nominated for ACWA consideration. Improvements have been made in the ACWA processes and rationale and information used for assigning habitat actions to high priority streams by working with ADF&G area managers, local watershed groups and stakeholders, and by conducting site visits.

The role of ACWA involvement with habitat planning permitting, and enforcement has yet to be defined and warrants further assessment. The ACWA program will also benefit with improved and more formal participation roles for federal and public stakeholders.

Many outreach activities have been conducted in the past year to help publicize ACWA and to collect additional localized information on waterbodies.

ADF&G anticipates bigger and better habitat projects will be funded through ACWA as more experience is gained defining and executing these types of projects and opportunities to link ACWA with the National Fish Habitat Action Plan and other related programs are explored.

Interagency Hydrology Committee for Alaska

The IHCA was formed in the early 1970s to coordinate technical concerns relating to the collection, analysis, and reporting of Alaskan hydrologic and climatologic data by state, federal and local agencies. The chair and vice chair leadership positions are filled by state and federal representatives respectively and alternates each annual cycle. During the year

the chair is a state agency representative, the vice chair will be a federal agency representative and vice versa.

In 1993, the IHCA accepted a request from the AWMC to serve as their technical advisor. The IHCA continues to meet twice a year despite the demise of the AWMC and provides an excellent vehicle for networking and coordination by private, state, federal, academic practitioners focusing on collection and analysis of hydrologic information.

The IHCA has played a major role in supporting acquisition of resources to develop Alaska's current statewide electronic topographic data bases, the Alaska hydrologic unit code system, and continues to contribute to efforts to improve stream gaging, precipitation and other hydrologic data collection, analyses, and protocols.

Alaska Public Waters Coalition

The Alaska Public Waters Coalition was formed in 2001 to represent a variety of stakeholders who have an interest in water allocation laws. Its members comprise sport fishing groups, conservation organizations, former members of the Alaska Water Resources Board and other individuals. Its mission is to ensure that Alaska's rivers and other fresh waters are well managed for the long-term benefit of all Alaskans as well as the animal and plant communities that rely on this keystone public trust resource. This organization has been working to support and improve the state's water management and allocation laws in the best public interest. It has been proactive and supportive of and beneficial to efforts by DNR and ADF&G for developing improved reservation of water processes and acquiring more resources dedicated to the state's water management related programs and activities.

National Fish Habitat Action Plan

The ADF&G has been an active participant in the formation and implementation of the National Fish Habitat Action Plan, Action Plan (www.fishhabitat.org). The Action Plan goals are to protect, restore and enhance freshwater, estuarine and marine aquatic habitats in our nation. The Action Plan is administered by 22 board members (see attached). Alaska is an active participant and has one of the first four fish habitat partnerships nationally recognized by the National Fish Habitat Board. It is located in the Mat Su Valley. Another three candidate partnerships located in Alaska are in the progress of seeking recognition from the board. Other partnerships cover most portions of the nation including one forming in Hawaii. The ADF&G is represented on the Board. Among the initial top 4 objectives is to protect and restore reservations of water. The Plan was modeled to mimic the highly successful NAWCA initiative but focuses on fish. http://www.fishhabitat.org/images/documents/science/Final_Interim_Strategies_Targets.pdf

Recommendations for Future Action

Based upon the background information and discussions above coupled with experiences of the ADF&G, the following recommendations are presented as potential short, interim and long-term solutions to improving and enhancing the ability of the State of Alaska and

others to quantify and protect sufficient amounts of water in rivers and lakes using state laws and other protection mechanisms. Many of the following recommendations were originally proposed in the ADF&G reservation of water status report series in past years (Estes 1989-1998). Others have been presented in other forums (Estes 1984, Estes and Harle 1987, Harle and Estes 1993, Estes 2002).

- 1) **Financial Resources** Continue retention of additional ADF&G staff (fishery biologists and hydrologists) and financial resources increases initiated in 1999. This will allow for improved reservation of water protection on gaged and ungaged water bodies, including completion of adjudications without impeding the completion of new applications by the ADF&G. It will also help compensate for increased demands for public interest determinations and recommendations associated with increased population growth, resource development and resulting increases in competition for water. Staff should record resource expenditures invested providing public interest analyses and comments for water rights applications filed by others and to provide reservation of water protection related recommendations and input to other state and federal permitting authorities including input provided to those responsible for fish habitat permits. This will help identify if other resources are required and justified.
- 2) **Hydropower Licensing** A prior request for adding additional staff to assist hydropower coordination is pending the passage of the new 5 mw hydropower licensing provisions and should be funded if the regulations are enacted.
- 3) **Hydrologic Data Gaps** Legislation should be enacted annually to continue funding additional stream gage recommendations identified in the USGS network evaluation and updates (Brabets 1995). The stations are required to improve flow projection models and of water for out-of-stream and reservation of water and related uses in rivers and lakes. They are also required to predict and monitor floods. Although legislation has not been enacted for a large scale program, multi year funding was secured to establish four gage sites under a cooperative effort between the ADF&G and USGS in FY 99. The USGS should also provide a higher proportion of the match for the total cost of gages and their operations to help both the state and USGS fund more index stations in more locations. Index sites should be operated a minimum of 10-years and preferably 20. The resulting new information should be used to improve existing predictive flow models for ungaged locations in Alaska. It is imperative that an extensive stream gaging and updated precipitation measurement program to add and operate strategically located index gaging stations is required. The sites added should be operated a minimum of 10- to 20 years to improve the accuracy of the information where gages are located to improving the reliability of models for ungaged site predictions used to make decisions pertaining to water availability and allocation in Alaska. These hydrologic data limitations continue to be perhaps the most limiting factor governing our ability to establish more confidence that water volumes requested to sustain fish and wildlife productivity will be sufficient and to make our applications for reservations of water more easily defensible (Estes 1998). The validity of any calculation and recommendation to reserve or withdraw water depends on the adequacy and quality of the data and how well the assumptions are met under varying conditions. Therefore, for performing future hydrologic analyses to support water allocation analyses, DNR and our department have voluntarily agreed, that when

possible, a minimum of 5 years of continuous mean daily flow data should be collected or synthesized to reduce bias associated with inter-annual hydrologic variability. We believe it is in the best public interest to strive to meet this multi-year recommendation so long as all classes of water will held to the same standard. However, when necessary to achieve the department's best interests and obtain a priority date before potential competing water allocation interests potentially harm a fish bearing stream, a shorter historical record or estimate of flow may be utilized to quantify reservation of water needs when a 5-year hydrologic period of record is not available and will be pursued when in the best interest of protecting the fish and wildlife resources. It should be noted that when limited data are available, and it is not possible to acquire the desired 5-year record, the Alaska Water Use Act regulations (see above) allow interim estimates to be used as a starting point to quantify reservation of water needs and file for a reservation to obtain a priority date. This regulation also allows for the additional collection of three to five more years to further refine the initial analyses and reservation of water request and include consultation with DNR and USGS (11 AAC 93.141 and .142).

- 4) **10-Year Review of All Classes of Appropriations of Water** Similar to reservations of water all new appropriations for out-of-stream (withdrawals, diversions and impoundment) appropriations of water should be automatically conditioned to be subject to review by the DNR at least once every 10 years, as are reservations of water. This is probably one of our strongest past recommended actions for making out of stream diversionary, withdrawal and impoundment uses on more equal footing with those for reservations based on current reservation of water provisions. This tool is excellent in light of the regulatory improvements made in the 90s for reservations of water and should be expanded to all appropriations of water.
- 5) **Automated Water Rights Data Base Improvement** The DNR water rights database should continue with its progress for fully automating water appropriations on a GIS system accessible to other agencies and the public. This data base should be integrated if possible with the fish habitat permit data base so both are GIS based and can be more easily cross referenced. This will benefit developers and others to remain in compliance with both water rights and fish habitat permitting requirements. It will also help identify if there are gaps in the anadromous fish habitat catalog and permits for fish habitat and water uses.
- 6) **Audit of 1966 Grandfather Water Rights** All water rights acquired under grandfather provisions in 1966 should be evaluated to determine their accuracy based on hydrologic analyses of water availability. If analyses of flow data indicate water in a water body is overappropriated and public interest criteria were not addressed adequately in 1966, corrective adjustments should be made to the affected certificate of appropriation. This issue will avoid significant and costly conflicts that may occur in the future in Alaska as population and industrial growth along with water requirements expand throughout the state.
- 7) **Audit of ADF&G Pending Water Rights Applications and Existing Water Rights** ADF&G should review the status and adequacy of all its pending and existing water rights held by the department. The department should also evaluate whether all water uses comply with state statutory and regulatory requirements including water rights

being managed on behalf of the department through lease agreements or other arrangements, including with private non profit hatcheries. This process could be integrated into hatchery and other existing permitting processes administered by the department. Without this audit, the department will have no basis to determine the long-term adequacy of existing methods and actions and to insure all water uses are being met in the manner best suited to the department in accordance with statutory mandates.

- 8) **Evaluate Adequacy of Past Appropriations for Reservations of Water** The ADF&G should fund or contract a project to apply the Physical Habitat Simulation System model or other equivalent or better sophisticated forms of the Instream Flow Incremental Methodology to reanalyze the adequacy of reservations obtained using the Tennant Method and modifications to the Tennant Method for important sport fisheries and other important locations where relevant. If results indicate additional water should be reserved by the department, a supplemental reservation of water application should be completed and filed. This may also include monitoring of fish population dynamics new fish habitat suitability information. Funding has not been made available for this task to date.
- 9) **Fish Habitat Suitability Research** Research is needed to collect and establish fish habitat utilization, preference and suitability criteria for Alaska fish species, life phases and stocks. This information is required for use with sophisticated reservation of water methods.
- 10) **Water Export.** Successful application of the water export law provisions passed in 1992 indicates that the concept of an automatic reservation has merit. Simply reducing the size of the polygons that are subject to this current law (Figure 4) may be one of the first steps that can be achieved for further improvement of this law relative to water transfers in the state.
- 11) **Water Export Regulations Fees (11 AAC.05.010)** Regulations for processes to assess conservation and fair market value fees by DNR (11AAC .05.010) were promulgated in early 1996 (Alaska Administrative Code 1996a, b) as a requirement of HB 596. Regulations defining processes for executing specific provisions of the bill, especially those associated with quantifying reservations of water, the roles of the ADF&G and who owns the resulting reservation water right should be drafted and subject to public review and feedback prior to finalization and adoption.
- 12) **Finding of Facts and Conclusion of Law – All Appropriations** All DNR water rights decisions would be more effective if all significant outcomes and rationale for public interest determinations that are developed during adjudication processes were documented in writing. This requirement is mandatory for reservations of water, under Findings of Fact and Conclusions of Law regulations for reservations of water but only optional for out-of-stream water rights. Findings of fact and conclusion of law should be documented equivalent in content to those generated for reservations of water decisions. The resulting determinations should be included or appended to each certificate of appropriation (water right authorization certificate) explaining the rationale for granting, conditionally granting, or denying diversionary, withdrawal, and

impoundment water rights. The decisions to condition a water right for fish and wildlife purposes should be incorporated into final certificates of appropriation to insure the record is clear why a water allocation has been conditioned in the best public interest. DNR has improved its documentation as a result of the 1996 Supreme Court ruling (Supreme Court of Alaska 1995). We believe the public will benefit if this documentation effort is expanded further.

- 13) **Public Interest Criteria** AS 46.15.080 should be analyzed to determine how it can be used more effectively and how to better document DNR's decisions for approving, denying or conditioning a water use application. An explanation how DNR evaluates and addresses each criteria element, for example socioeconomics, will benefit the public and others, by having a better understanding for of the intent and data requirements if there are any for a water rights applicant (see also finding of facts recommendation above).
- 14) **Automatic Interim Protection of Reservations of Water for Fish Bearing Waters-** Legislation should be enacted or regulations established that will guarantee a base level of reservation of water protection for all fish bearing waters similar to that attempted for HB 210 in 1990 and subsequent similar efforts. It is unknown whether the legislature intends to consider this recommendation in the near future, but resource materials have been gathered in the event the department is requested to provide technical assistance. Additionally education of all stakeholders should be completed to review the lessons learned from initially failing to pass this important legislation. This, or similar legislation, is the only tool, identified to date, that can provide an interim level of blanket protection to avoid repeating mistakes made in the lower 48 states. It is needed especially, in light of the dearth of hydrologic data available in the majority of fish bearing waters in Alaska and to establish a cost effective solution for helping keep pace with increasing demands and competition for water.
- 15) **Reservation of Water Education and Outreach** A formal departmental reservation of water, water needs and uses, and associated water management educational program should be funded to encourage public participation in the reservation of water and other departmental water rights related processes. The rationale for reservation and other departmental uses of water should be included. Additionally, all legal and regulatory and other actions that can be used to retain sufficient amounts of water in rivers and lakes/reservoirs for fish and wildlife should be included. This also includes training on water use planning to determine how to plan for short and long term individual, community and industrial water requirements, and how to plan for the infrastructure to achieve those goals while still reserving sufficient water fish wildlife and other uses. Part of the program should focus on water conservation to avoid water waste.
- 16) **Reservation of Water Handbook** A Reservation of Water, and other reservation of water related protection methods and applications handbooks should be prepared to provide sufficient guidance for the public and other interested parties to file for and defend reservations of water applications.

- 17) **Fee Reduction for Public Interest Reservations of Water** Applicants for private sector reservations of water should be exempt from optional administrative fees that can presently be assessed by DNR to pay for DNR staff adjudication time and resources.
- 18) **Reservation application filing** It is recommended that applicants filing a reservation of water application obtain a certified return receipt verification when submitting applications by mail or when hand carrying and submitting an application in person request and obtain a receipt from the state identifying the date and time the application was accepted.
- 19) **Assessment of Whether State Reserved Rights Exist** State statutory provisions, that may be interpreted to automatically grant reservation of water rights for water bodies within Alaska State Parks, should be evaluated and a determination made whether an automatic reservation of water has been established.
- 20) **Recreational Rivers Legislation Follow Through.** Efforts to implement the Recreational Rivers legislation should be resurrected regarding recreational reservations of water. ADF&G should request funds for gaging for Lake Creek, Alexander Creek, and the Talchulitna River. The information collected should be used to file for reservations of water for fish for these three systems.
- 21) **Water Diversion Oversight by DNR** The DNR should continue its efforts to reevaluate the validity of earlier policies preventing management of water that is diverted from a water body and not used and how to coordinate its permitting process with ADF&G when these diversions impact fish bearing waters.
- 22) **Channel Maintenance and Ecological Flows** Estes (1980-1998), 1984, Tennant and other researchers ([Leopold et al. 1963](#), [Reiser et al. 1985](#), [Estes and Orsborn 1986](#), [Schmidt and Potyondy 2004](#)) have identified the need for ecological flows in exceedance of average conditions on a periodic basis for habitat and channel maintenance. Originally, [Tennant \(1975\)](#) designated a flow of 200% of QAA, as a "flushing flow" or a flow that flushes fine bed sediments. Estes indicated that at least a flow equivalent of 800% of the QAA or higher, and preferably a flow equaling a percentage of the one in two year peak flood is required for these purposes. The need for formally reserving flushing and ecological service flows is currently noted within each reservation of water application because these reservation of water reaches continue to remain subject to future development and water diversions and withdrawals of water. At a minimum, efforts to develop approaches to formally reserve these flows under existing law, especially in systems with control structures, should continue to be pursued under the cooperative agreement with DNR and any other interested stakeholders.
- 23) **EO 107** After the fish habitat permit functions are returned to ADF&G, an evaluation should be completed to determine whether the 1989 agreement for coordination of the ADF&G fish habitat permits and DNR water use act permits is still valid and whether a new agreement is required.

- 24)**Regulations versus Water Use Act Statutes** Stakeholders and others assessing options for evaluating and improving water allocation laws and processes in Alaska should read both the water use act statutes and regulations, not just the statutes, in order to have a full understanding how those and other elements of the Alaska Water Use Act can be interpreted.
- 25)**Prioritization of Reservation of Water Locations** The ADF&G should periodically update prioritization lists for reservation of water protection for all parts of the state using a process similar to process recently used to update reservation of water priorities in Southeast Alaska. The prioritization effort should be integrated with other similar prioritization efforts performed by other divisions that are also relevant. It should also be determined whether a strategic plan specific to reservation of water program efforts is needed.
- 26)**Interagency Cooperation** Outreach efforts should be formalized to periodically communicate, meet and coordinate with other state, federal, local and private entities that are potentially impacted by reservations of waters on an annual or some other periodic basis. This effort should be integrated with processes for updating reservation of water priorities. If need, cooperative agreements should be developed to better coordinate resources and mutual priorities.
- 27)**Public Notice** The department should request formal public notice from the DNR regarding all water rights applications and actions that relate to departmental water uses, concerns, and mandates as identified in the discussion section above.
- 28)**Units of Measure** It should be noted the ADF&G encourages DNR to require inclusion of cubic feet per second (cfs) units, feet per second (fps) of measure water volume conversions for all water rights transactions and documentation. Fish survival and habitat requirements are measured and impacted based on water velocities, water depths and total volumes of water. These units of measure are impacting availability and use of habitat by fish species and life stage for passage, rearing, incubation and spawning at any given second in time. Acre feet per day, year, or gallons per day etc., without fps and/or cfs conversions are unacceptable units of measure for consideration of fish habitat impacts.
- 29)**Lay Summary of Issues in this Report** A lay abbreviated version of this report should be prepared focusing on the most critical short and interim actions that can be accomplished by the conservation interests. The process to prepare that document is in progress.
- 30)**Trelease, Welker and Other Recommendations** Recommendations by Trelease (1976), Welker (1998), Sheehan (1999), White (1981), Dewsnup et al (1977), and Annear et al (2004) should be considered for implementation.

Conclusion Statement

It is recommended all of the above are considered to improve reservation of water protection in Alaska.

- Alaska Administrative Code. 1993a. 11 AAC 93.141 - 144.
- Alaska Administrative Code. 1993b. 11 AAC 05.010(a)(8)(viii)(B).
- Alaska Administrative Code. 1993c. 11 AAC 05.010(a)(8)(O).
- Alaska Administrative Code. 1996a. 11 AAC 05.010(a)(8)(P). Effective February 16, 1996.
- Alaska Administrative Code. 1996b. 11 AAC 05.010(a)(8)(Q). Effective February 16, 1996.
- ADF&G (Alaska Department of Fish and Game). 1984. Instream flow work plan. Alaska Department of Fish and Game, Anchorage.
- ADF&G (Alaska Department of Fish and Game). 1998. Pacific salmon. Alaska's story. Alaska Department of Fish and Game. Juneau. 1984. 32 pages.
- ADF&G (Alaska Department of Fish and Game). 2001. Division of Sport Fish strategic plan. Alaska Department of Fish and Game, Juneau, Alaska. 24 pages.
- ADF&G (Alaska Department of Fish and Game). 2008. See J. Johnson and M. Daigneault. (a-f) 2008. An atlas to the catalog of waters important for spawning, rearing or migration of anadromous fishes. Alaska Department of Fish and Game, Division of Habitat, Anchorage.
- ADF&G/DNR. 2002. Alaska Department of Fish and Game (ADF&G) and Alaska Department of Natural Resources (DNR). 2002. MOU regarding reservation of water coordination and cooperation. Anchorage.
- Anderson, B. 2006. Native American rights and instream flows: the Katie John case. National Instream Flow Program Assessment Proceedings. March 5-6, 1996. Denver, Colorado. Public Trust Doctrine Video Tape Series:103b. Alaska Department of Fish and Game. Division of Sport Fish. Research and Technical Services. Statewide Aquatic Resources Coordination Unit. Anchorage.
- Annear, T, I. Chisholm, H. Beecher, A. Locke, P Aarrestad, C. Coomer, C. Estes, J. Hunt, R. Jacobson, G. Jobsis, J. Kauffman, J. Marshall, K. Mayes, G. Smith, R. Wentworth, and C. Stalnaker. 2004. Instream flows for riverine resource stewardship, revised 2004 edition. Instream Flow Council, Cheyenne, WY 268 pages
- . Blumberg, P. 1994. Japan buys water. Anchorage Daily News. August 23, 1994. Pages B1-2. Anchorage.
- Bovee, K. D. 1982. A guide to stream habitat analysis using the Instream Flow Incremental Flow methodology. Instream Flow Information Paper No. 122. FWS/OBS/82/26. U.S. Fish and Wildlife Service, Ft. Collins, Colorado.
- Brabets, T. 1996. Unpublished data provided to Christopher Estes, Alaska Department of Fish and Game, in response to a data inquiry regarding U.S. Geological stream gaging historical database. U.S. Geological Survey, Water Resources Division, Anchorage.
- Brabets. T. P. and D. B. Hawkins. 1995. Evaluation of the streamflow-gaging network in Alaska. Water Resources Investigation Report 95. U. S. Geological Survey. Anchorage.
- Brajer~, . 1989. The strengths and weaknesses of water markets

- Bue, C.D. 1963 Principal lakes of the United States. Geological Survey Circular 476. U.S. Geological Survey, Washington D.C. 22 p.
- Colt, S. 2006. AFN leadership forum. UAA. ISER. Anchorage. 36 pages.
- Cook, G. 1993. the public trust doctrine in Alaska. Journal of Environmental Law and Litigation. Volume 8. University of Oregon. School of Law. 49 pages.
- Curran, H. and L. Dwight. 1979. Analysis of Alaska Water Use Act and its interaction with Federal Reserved Water Rights. Institute of Water Resources, University of Alaska, Fairbanks.
- Davis, L. 2007. Summary of DNR water rights. DNR. Anchorage.
- Dewsnap, R. L., D.W. Jensen, E. Hoban, G Horak, M. Lewis, and W. Nelson. 1977. Promising strategies for reserving instream flows. Western Energy and Land Use Team. Office of Biological Services. U.S. Fish and Wildlife Service. Ft. Collins, CO. 80 pages.
- DNR (Alaska Department of Natural Resources). 1985. State of Alaska instream flow handbook. Alaska Department of Natural Resources, Anchorage.
- DNR. (Alaska Department of Natural Resources). 1991 Susitna Basin recreation rivers management plan. DNR Division of Land and Water. Land and Resources Section. January 1991 Anchorage. 42 pages..Anchorage
- DNR (Alaska Department of Natural Resources) Office of the Commissioner. 2002. Re: removing stay of decision revoking ADL 40815 and ADL 43281 June 2002. Department of Natural Resources. Juneau, AK
- DNR/ADF&G. (Alaska Department of Natural Resources/Alaska Department of Fish and Game). 2007. MOU and amendments for EO 107 implementation. DNR/ADF&G.~
- Dunker, J. 2002. Decision in the matter of the revocation of ADL 40815 and ADL 43281. Department of Natural Resources. Division of Mining Land and Water. Juneau, AK.
- Estes, C. 1982. Estes to Logan December 8, 1982 regarding approval of reservation of water regulations. Alaska Department of Fish and Game, Anchorage.
- Estes, C. C. 1984. Evaluation of methods for recommending instream flows to support spawning by salmon. Master's thesis, Washington State University, Pullman.
- Estes, C. C. 1985. Organization of departmental instream flow program. Memorandum to Richard Logan, September 12, 1985. Alaska Department of Fish and Game, Anchorage.
- Estes, C. C. 1987. Instream flow. Alaska Department of Fish and Game, Fishery Data Series No.23, Juneau.
- Estes, C. C. 1988. Annual summary of statewide instream flow reservation applications. Alaska Department of Fish and Game, Fishery Data Series No.55, Juneau.
- Estes, C. C. 1989. Annual summary of statewide instream flow reservation applications. Alaska Department of Fish and Game, Fishery Data Series No. 121, Juneau.

- Estes, C. C. 1990. Annual summary of statewide instream flow reservation applications. Alaska Department of Fish and Game, Fishery Data Series No. 90-43, Anchorage.
- Estes, C. 1991. Estes to Trasky May 5, 1991 regarding hatchery statutes and regulations relating to reservations of water needs and processes Alaska Department of Fish and Game, Anchorage.
- Estes, C. C. 1991. Annual summary of Alaska Department of Fish and Game instream flow reservation applications. Alaska Department of Fish and Game, Fishery Data Series No. 91-65, Anchorage.
- Estes, C. C. 1992. Annual summary of Alaska Department of Fish and Game instream flow reservation applications. Alaska Department of Fish and Game, Fishery Data Series No. 92-45, Anchorage.
- Estes, C. C. 1993. Annual summary of Alaska Department of Fish and Game instream flow reservation applications. Alaska Department of Fish and Game, Fishery Data Series No. 93-43, Anchorage.
- Estes, C. C. 1994. Annual summary of Alaska Department of Fish and Game instream flow reservation applications. Alaska Department of Fish and Game, Fishery Data Series No. 94-37, Anchorage.
- Estes, C. C. 1995. Annual summary of Alaska Department of Fish and Game instream flow reservation applications. Alaska Department of Fish and Game, Fishery Data Series No. 95-39, Anchorage.
- Estes, C. C. 1996. Annual summary of instream flow reservations and protection in Alaska. Alaska Department of Fish and Game, Fishery Data Series No. 96-45, Anchorage.
- Estes, C. C. 1997. Annual summary of instream flow reservations and protection in Alaska. Alaska Department of Fish and Game, Fishery Data Series No. 97-39, Anchorage.
- Estes, C. C. 1998. [Annual summary of instream flow reservations and protection in Alaska.](#) Alaska Department of Fish and Game, Fishery Data Series No. 98-40, Anchorage.
- Estes, C. C. 2001. [The Status of Alaska Water Export Laws and Water Transfers.](#) Presented at the American Society of Civil Engineers World Water and Environmental Resources Congress, Orlando, FL.
- Estes, C. C. 2007. Summary of Indian River (Sitka) water rights actions. ADF&G.o Chronicle. Colorado State University. Ft. Collins. IV(1):1-2. ~
- Fairbanks Daily News Miner. 1976. Brooks halts Water Use. April 2, 1976. Fairbanks, AK.
- Fraser, J. C. 1972. Regulated discharge for fish and other aquatic resources- an annotated bibliography. Food and Agricultural Organization (FAO) Fisheries Technical Paper. No. 112. FIRI/T112. United Nations. Rome. Italy
- Fraser, J. C. 1972. Water levels, fluctuation and minimum pools in reservoirs for fish and other aquatic resources: an annotated bibliography. Food and Agricultural Organization (FAO) Fisheries Technical Paper. No. 113. FIRI/T113. United Nations. Rome. Italy

- Fraser, J. C. 1975. Determining discharges for fluvial resources. Food and Agricultural Organization (FAO) Fisheries Technical Paper. No. 143 FIRS/TI143. United Nations. Rome. Italy.
- Greenpeace. 2000. Greenpeace, Inc. v. State of Alaska and BP Exploration, Inc., Sup. Ct. No. 3AN-99-03415 (Oct. 9, 2000)
- Harle, M. L. 1988. Appropriations of instream flows in Alaska. Pages 157-171 *in*: Instream Flow Protection in the Western United States: A Practical Symposium. Natural Resources Law Center. March 31 - April 1, 1988. Edited by L. J. MacDonnell and T. A. Rice. First Edition. University of Colorado School of Law. Boulder.
- Harle, M. L. and C. C. Estes. 1993. An assessment of instream flow protection in Alaska. Pages 9-1 to 9-19 *in*: Instream Flow Protection in the Western United States. Edited by L. J. MacDonnell and T. A. Rice. Natural Resources Law Center. Revised Edition. University of Colorado School of Law. Boulder.
- Hickel, W. J. 1993. Administrative order number 133. State of Alaska, Office of the Governor, Juneau.
- Howe, A. L., G. Fidler, C. Olnes, A. E. Bingham, and M. J. Mills. 1997. Harvest, catch, and participation in Alaska sport fisheries during 1996. Alaska Department of Fish and Game, Fishery Data Series No. 97-29, Anchorage.
- Howe, A. L., G. Fidler, C. Olnes, A. E. Bingham, and M. J. Mills. 1998. Harvest, catch, and participation in Alaska sport fisheries during 1998. Alaska Department of Fish and Game, Fishery Data Series No. 98-25, Anchorage.
- Hutchins, W. 1977. Water rights laws in the nineteen western states. Volume III. U.S. Department of Agriculture. Misc. Publication No. 1206. 793 pages.
- Hynes, H. B. 1970. The ecology of flowing waters. University of Toronto Press.
- Instream Flow Committee. 1986. Memorandum to directors, October 1, 1986. Alaska Department of Fish and Game, Anchorage.
- Interstate Council on Water Policy and Western States Water Council. 1996. Water policy roundtable. March 20-22, 1996. Washington DC. 43 pages.
- Johnson, J., and M. Daigneault. 2008. Catalog of waters important for spawning, rearing, or migration of anadromous fishes – Arctic Region, Effective June 2, 2008. Alaska Department of Fish and Game, Special Publication No. 08-03, Anchorage.
- Johnson, J., and M. Daigneault. 2008. Catalog of waters important for spawning, rearing, or migration of anadromous fishes – Interior Region, Effective June 2, 2008. Alaska Department of Fish and Game, Special Publication No. 08-04, Anchorage.
- Johnson, J., and M. Daigneault. 2008. Catalog of waters important for spawning, rearing, or migration of anadromous fishes – Southcentral Region, Effective June 2, 2008. Alaska Department of Fish and Game, Special Publication No. 08-05, Anchorage.

- Johnson, J., and M. Daigneault. 2008. Catalog of waters important for spawning, rearing, or migration of anadromous fishes – Southeastern Region, Effective June 2, 2008. Alaska Department of Fish and Game, Special Publication No. 08-06, Anchorage.
- Johnson, J., and M. Daigneault. 2008. Catalog of waters important for spawning, rearing, or migration of anadromous fishes – Southwestern Region, Effective June 2, 2008. Alaska Department of Fish and Game, Special Publication No. 08-07, Anchorage.
- Johnson, J., and M. Daigneault. 2008. Catalog of waters important for spawning, rearing, or migration of anadromous fishes – Western Region, Effective June 2, 2008. Alaska Department of Fish and Game, Special Publication No. 08-08, Anchorage.
- Johnson, N. and C. DuMars. 1989. A survey of the evolution of Western water law in response to changing economic and public interest demands. *Natural Resources Journal*. Volume 29, No. 2. University of New Mexico Law School. Albuquerque, New Mexico. 42 pages
- Kammerer, J.C. 1987. Largest rivers in the world: Water fact sheet.
- Open-File Report 87-242. U.S. Geological Survey, Washington, D.C. 2 p.
- MacDonnell, L. J. and T. A. Rice, Editors. 1988. *Instream Flow Protection in the Western United States: A Practical Symposium*. Natural Resources Law Center. March 31 - April 1, 1988. Edited by L. J. MacDonnell and T. A. Rice. First Edition. University of Colorado School of Law. Boulder.
- MacDonnell, L. J. and T. A. Rice, Editors. 1993. *Instream Flow Protection in the Western United States*. University of Colorado. Natural Resources Law Center. Revised Edition. University of Colorado School of Law. Boulder.
- Meyer, D. 1998. Unpublished data provided to Christopher Estes, Alaska Department of Fish and Game, in response to a data inquiry regarding U.S. Geological stream gaging historical database. U.S. Geological Survey, Water Resources Division, Anchorage.
- Moody, D.W., E.B. Chase, and D.A. Aronson, compilers. 1986. National water summary 1985: Hydrologic events and surface-water resources. Water-Supply Paper 2300. U.S. Geological Survey, Washington, D.C. 506 p.
- Munter, J. A. 1992. Interagency water data issues group: work session report. Public Data File 92-10. Alaska Department of Natural Resources, Fairbanks.
- Orsborn, J. F. and C. H. Allman, editors. 1976. *Proceedings of the symposium and specialty conference on instream flow needs*. Two volumes. American Fisheries Society. Bethesda, Maryland
- Orsborn, J. F. and F. J. Watts. 1980. *Hydraulics and hydrology for fisheries biologists*. U.S. Fish and Wildlife Service, Fisheries Academy, Kearneysville, Virginia.
- Ragsdale, R. 1997. Matanuska's cash cow. *Alaska Journal of Commerce*. Volume 6 No 6. Pages 5-7.
- Reiser, D. W., M. P. Ramey, and T. R. Lambert. 1985. Review of flushing flow requirements in regulated streams. Pacific Gas and Electric Company, San Ramon, California.

- Reisner, M. 1986. Cadillac desert. The American west and its disappearing water. Penguin Press. 582 pages.
- Rue, F. 1989. Memorandum to Gary Gustafson, Alaska Department of Natural Resources, regarding coordination of ADF&G fish habitat and DNR water allocation permitting processes and conditions. August 10, 1989. Habitat Division. Alaska Department of Fish and Game (ADF&G). Juneau.
- Rue, F. 1997. Letter to Robert S. Grimm. July 16, 1997. South Fork Hydro Project. Alaska Department of Fish and Game (ADF&G). Office of the Commissioner. Juneau.
- Rue, F. 2001. Memorandum to Pat Pourchot, Alaska Department of Natural Resources, regarding instream flow protection. June 20, 2001. Alaska Department of Fish and Game (ADF&G). Office of the Commissioner. Juneau.
- SAS (SAS Institute Incorporated). 1990. SAS procedures guide, version 6, third edition. SAS Institute Incorporated, Cary, North Carolina.
- Shaw, E. M., editor. 1988. Hydrology in practice. Van Nostrand Reinhold Co. Ltd., London.
- Sheehan Dugan, K. 1999. A comparative analysis of Alaska water law with Montana, Oregon, Washing and Wyoming with recommendations for improving the Alaska Water Use Act. Mater of Science Thesis. Alaska Pacific University. Anchorage.
- Spence, L. 1995. Alaska's instream flow program. Rivers. Volume 5, No. 3. July 1995. Pages 222-226.
- Supreme Court of Alaska. 1995. Opinion No. 4232- July 28, 1995. Supreme Court No. S-5711. Superior Court No. 2AN-91-8627 Cl. Appeal from the Superior Court of the State of Alaska, Third Judicial District, Anchorage, Dana Fabe, Judge. Tulkisarmute Native Community Council; People of the Village of Tuluksak, Appellants v. Harold Heinze, Commissioner, Department of Natural Resources; Ric Davidge, Director, Division of Water, Appellees, Calista Corporation; Tuluksak Dredging, Intervenors-Appellees. Anchorage.
- Supreme Court of United States. 1976. Mathews v. Eldridge, 424 US 319 (1976)
- Swagel, W. 1996. Drops of revenue. Alaska Magazine. Page 9. February 1996.
- Swagel, W. 1998. Exporting Alaska's water. Alaska Business Monthly. November. Pages 78-80.
- Tennant, D. L. 1972. A method for determining instream flow requirements for fish, wildlife and aquatic environment. Pages 3-11 *in* Pacific Northwest River Basin Commission Transcript of Proceedings of Instream Flow Requirements Workshop, March 15-16, 1972. Pacific Northwest River Basin Commission, Portland, Oregon.
- Tennant, D. L. 1976. Instream flow regimes for fish, wildlife, recreation, and related environmental resources. Pages 359-373 in J. F. Orsborn and C. H. Allman, editors. Instream Flow Needs, Volume II, American Fisheries Society, Bethesda, Maryland.
- Trelease, F. 1961. A water code for Alaska. Supplementary report. Summary of hearings October 1961: Ketchikan, Juneau, Anchorage, Fairbanks. Suggestions of consultants, state officials, and others, with comments. Laramie, WY. 82 pages.

- Trelease, F. 1962. A water code for Alaska – A report to the State of Alaska. Laramie, WY. 140 pages.
- Trelease, F. 1967. Alaska's new water use act. *In: Land and Water Review*. University of Wyoming. Laramie, Wyoming 49 pages.
- Trelease, F. 1977. Recommendations for water resources planning and administration. Laramie, WY. 60 pages.
- Trelease, F. III. 1990. In-stream water rights. Water rights of the fifty states and territories. American Water Works Association. Denver, CO. 13 pages.
- Welker, R. S. 1997. Audit report. Department of Natural Resources, Department of Fish and Game, and Department of Law Waterway Management Issues. Audit Control Number. 10-4540-97. Alaska State Legislature. Division of Legislative Audit. Juneau.
- Western States Water Council (WSWC~). 2001. Federal reserved water rights in the western United States. Midvale, Utah.
- White, M. R. 1981. Opportunities to protect instream flows in Alaska. U.S. Fish and Wildlife Service, Office of Biological Surveys, Washington, D.C

Appendix 1. Historical data summary for U.S.G.S. continuous streamflow gage sites in Alaska, 1908 to the present (November 2007) (from USGS website and Dave Meyer)

Number of Gaging Stations	Period of Record (Years)
13	0 < 1
130	1 to < 5
339	At least 5
80	5 to < 10
117	10 to < 20
114	20 to < 50
28	≥ 50
482	Total number of existing gages
167	Total existing for Southeast
191	Total existing for Southcentral
124	Total existing for Interior
97	Total number of active gages
18	Total active for Southeast
42	Total active for Southcentral
37	Total active for the Interior

