The Status of Alaska Water Export Laws and Water Transfers

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INTRODUCTION

Alaska is the largest state in the nation. Its 586,000 square miles are equivalent in area to approximately 20 percent of the 48 contiguous states. Surface water bodies in Alaska are estimated to represent 40 percent of the Nation's total surface waters. Three of Alaska's many thousands of rivers are among the ten largest in the United States. Alaska has more than 3 million lakes ranging from pond size to 1,000 square miles. Water quality, for the most part, is excellent throughout the state (Harle and Estes 1993, Estes 1998). Wisely managing Alaska's waters is and will continue to be integral to the state's current and future economic and social well-being.

Unlike historical 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 are the next largest sources of income to the state. Alaskan Natives depend upon subsistence uses of fish and wildlife for their livelihood and preservation of their culture.

As an example of the productivity of Alaska's waterways, approximately 15,000 water bodies in Alaska have been formally identified as supporting anadromous fish species

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(ADF&G 1994). Many other anadromous fish producing waterways have yet to be investigated and identified. Similarly, there are several thousand waterways yet to be identified that primarily produce resident fish species.

Tourism is the fourth largest industry in Alaska; and, it too is based in part on water related recreational and aesthetic opportunities such as fishing, hunting, canoeing, kayaking, rafting, hiking, camping, and sightseeing.

Many Alaskans are dependent on water based transportation to move commodities and people to and from many locations with and without other means of year-round access. Lakes and rivers provide boat and fixed wing aircraft (with pontoons) access during the open water season. Ice covered rivers and lakes provide important corridors for travel using snow machines, all terrain vehicles, cross country skis, snow shoes, dogsleds, automobiles, and airplanes (with ski-like landing gear).

Alaskan water and related developments that modify amounts of water that remain in lakes and rivers can be categorized as withdrawals of surface and subsurface waters, diversions of surface waters, and impoundment of surface waters for storage and flow release/regulation.

Competition for water in Alaska has been mostly confined to population centers and areas with larger concentrations or unique industrial activities such as those associated with oil and mining development, fish processing, fish hatcheries, snow making, and hydropower development. Large quantities of water consumption are also associated with developments of municipal water supplies that serve as a catchall water source for human consumption, including various commercial and industrial uses such as pulp mill operations, fish processing plant operations, hydropower generation, etc. Agricultural uses of water are less prevalent than those in other states. More recently, a new industry has begun to develop based on water export and bottling (Estes 1992-1998, Harle and Estes 1993, Global Water 1999). Chalecki (2000) has performed a review of environmental, economic, and ecosystem considerations associated with water exports and marketing, including North American Fair Trade Agreement (NAFTA) and World Trade Organization (WTO), and opposing opinions.

As experienced by other states, Alaska's accelerating population growth will likely be accompanied by additional urbanization and associated resource developments that result in increased competition for water supplies. Adding to the pace of growth and competition for water, 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). In the latter part of 2000, Congress and former President Clinton approved legislation authorizing $384 million to construct an electrical intertie system in Southeast Alaska (S. 2439). Several water export projects have been initiated or are in the planning stages (Haugland 2001, Estes 1998; Prokosch 2001b, Dunker 2001). These and other human use pattern changes are likely to add to the challenge of water resources management in Alaska. In summary, many of the Alaskan water developments that are in progress,

under consideration, and most likely to impact water availability in the short-term, are associated with water exports, hydropower generation, public water supplies, and petroleum development.

ALASKA'S CONSTITUTION, WATER USE ACT, AND REGULATIONS

Constitution

Alaska's Constitution was established at the time of statehood in 1959 and requires that waters in the state be administered under the Doctrine of Prior Appropriation (Article VIII, Section 13). Articles VIII, Sections 1, 2, 3, 13, and 16 provide the basic framework for the state to manage its waters in the public interest. Framers of the Constitution recognized that the overall socioeconomic well-being of Alaskans was and will be dependent on the state properly balancing the management of its water and other natural resources as a Public Trust (Harrison 1982).

Water Use Act

The Alaska Water Use Act was enacted in 1966 and established the Alaska Department of Natural Resources (ADNR) as the state manager of water resources for purposes of water allocation of surface and subsurface waters. Public interest measures were included in the 1966 legislation (AS 46.15.080) to adhere to those established by the Constitution (Harle and Estes 1993).

Instream Flow Amendment

The Alaska legislature amended the Alaska Water Use Act (AS 46.15) in 1980 in recognition of the economic and social benefits that would be derived by adding another class of water rights (appropriations of water) to enable applicants to retain sufficient water within 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.

These amendments (AS 46.15.03 and AS 46.15.145) to the Alaska Water Use Act are referred to as the "instream flow law" and allow for appropriations of water to maintain a specific flow rate in rivers (or level of water in rivers and lakes).

Under Alaskan law (AS 46.15.145) and regulations (11 AAC 93.970), an appropriation of water for these purposes is also defined as a "reservation of water". Reservations of water can be described as the rate or volume of flow in a river, the volume of water in a lake, or a related physical attribute such as water depth. A reservation of water to protect flow related characteristics can also be called an "instream flow reservation".

Passage of the 1980 instream flow law also established Alaska as one of the few states that provides the opportunity for private individuals, in addition to state, federal, and local government agencies, to legally acquire reservations of water in rivers and lakes.

Instream Flow Regulations

Regulations to implement the 1980 instream flow law were adopted by the ADNR in September 1983. Additional regulations were promulgated in 1990 (Estes 1992), 1993 (Alaska Administrative Code 1993 a, b, c) and 1996 (Alaska Administrative Code 1996a, b) relating to the instream flow and other water rights application processes, application fees for water rights, conservation fees for water exports (see discussion below), and administrative fees associated with processing new and existing water rights.

To reserve water under AS 46.15.145, an application containing supporting data and analyses that substantiate the need for the amount of water being requested must be submitted to the ADNR for adjudication (the administrative determination of the validity and amount of a water right, including the settlement of conflicting claims among competing appropriators). Forms required to apply for reservations of water were first made available by the ADNR in November 1983. Further information related to Alaska's instream flow water laws can be found in Curran and Dwight (1979), White (1981), Estes (1984), Estes and Harle (1987), Harle (1988), Estes (1987-1998), and Harle and Estes (1993).

Basin Wide Adjudication Amendment

Additional amendments (AS 46.15.165 to .169) to the Alaska Water Use Act were enacted in 1982 to retain state jurisdiction of Federal Reserved Water Rights adjudications. The 1982 legislation established administrative and judicial procedures for basin wide and other geographic based water rights adjudications of surface and subsurface waters (out-of-stream and reservation of water uses). These adjudications are discussed in White (1981) and Welker (1997).

Water Export Amendment (HB 596) and Evolution of the Amendment

Water export related amendments (AS 46.15.035 and .037) to the Water Use Act were approved in 1992. These amendments were enacted to add special adjudication safeguards and fee requirements for water rights applications filed to appropriate water for export and sale from large hydrologic units (Estes 1990, 1991, 1992, 1993, 1998, Harle 1993). The water export related amendments were included in an omnibus bill House Bill, HB (596). The instream flow portions of HB 596 were intentionally designed to apply to bulk exports of water and water bottled in state prior to export, two means of shipping water. Automatic instream flow protection and water conservation fees were among several mandatory conditions established by this legislation for water exported exported from hydrologic units (see below).

Five failed legislative attempts (Estes 1989-1993, Harle and Estes 1993) influenced the final version of water export legislation enacted in 1992 (HB 596). These five pieces of legislation included HB 210, introduced in 1989 (Estes 1989-1991, HB 353, 354, and 355 introduced in the spring of 1991 (Estes 1991, 1992, 1993, 1996, 1998, Anderson 1991,

Harle and Estes 1993), and Senate Bill (SB) 442, introduced in 1992. HB 210, 353, 354, and 355 were introduced by Representative Cliff Davidson of Kodiak (Davidson 1991a, b, c). SB 442 was introduced by the administration of Governor Walter J. Hickel. The purposes of the failed legislation varied and included automatic instream flow protection, improved water data collection and management, and water export and sales.

Water Export Amendment (HB 596) Elements

Three sections of HB 596 related to the Water Use Act (AS 46.15): Sections 30, 31, and 32. These provisions were designed to only apply when water is removed from a Hydrologic Unit and not returned to that same Hydrologic Unit. Hydrologic Units were defined in the bill as the Subregion category established by the USGS. Alaska is subdivided into six subregions (large polygons): Arctic Slope, Northwest, Southwest, Yukon, Southcentral, and Southeast (Estes 1992, Harle and Estes 1993).

HB 596 included conservation stipulations that were intended to prevent harm to water users within hydrologic units. The law makes water exports contingent upon ADNR establishing instream flow protection for fish bearing waters and determining that the export of water from a hydrologic unit is surplus to existing and future water needs. Another provision, which some may interpret to be contradictory, enables the Commissioner of the ADNR to modify these automatic safeguards, but only after acquiring input from the public and the Commissioner of the Department of Fish and Game.

The large size of each of the six hydrologic subregions restricts these water export provisions from having additional instream flow and other impacts on most uses of water within the state, or the majority of water appropriations for in state uses. 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. A reverse scenario, in which the law would apply, would be a cruise ship obtaining potable water from a Southcentral Alaska Hydrologic Unit source and then travel out of state or to Southeast Alaska Hydrologic Unit. However, the costs assessed by the state by regulation (11 AAC .05.010) seem negligible, if not too low, especially when compared to what current exporters expect to charge their clientele.

Companion regulations for water export conservation and fair market value fees (11AAC .05.010) were not promulgated until early 1996 (Alaska Administrative Code 1996a, b). Other regulations defining how to execute specific provisions of the bill were never completed by the ADNR.

Although HB 596 established automatic instream flow protection for a subset of fish bearing waters subject to water export, it did not provide mandatory protection for other uses of fish-bearing waters. Such universal protection for fish bearing waters remains an elusive goal for those who consider it critical to future wise water management in the state.

IMPLEMENTATION OF THE WATER EXPORT AMENDMENTS TO THE WATER USE ACT

The First Water Export Under HB 596

As indicated above, the ADNR selected not to promulgate all of the anticipated regulations for establishing and refining processes and requirements outlined by HB 596 for water export (AS 46.15.035 and .037). This created uncertainty and confusion during the adjudication of the first water export application under this 1992 water export legislation. The initial application was filed by the City and Borough of Sitka to acquire a water right to annually withdraw 14 thousand acre-feet of water from Blue Lake for export and sale. This water source was acquired by the City and Borough of Sitka through the transfer and change of use of an existing water right previously used for industrial purposes by a former pulp mill.

Global Water, Inc., a Canadian firm, entered into a contractual arrangement with the City and Borough of Sitka to purchase and ship the water by tanker to China and the Far East. It was projected the City and Borough of Sitka may earn between $30 million to $80 million per year if the full amount of water appropriated is eventually exported annually. The State of Alaska however remains limited to earning a maximum of $80 thousand per year based on water export conservation fee regulations promulgated in 1996.

Automatic Reservations Granted

Two mandatory reservations of water were granted by the ADNR as part of the adjudication of water right applications to export water from the Blue Lake watershed. Each was granted a 1992 priority date as mandated by this amendment to the Water Use Act. Reservations of water were granted establishing protection for fish in Blue Lake, and to protect instream flow needs of fish in Sawmill Creek. However a reservation of water filed by the ADF&G under the 1980 provisions of the Alaska Water Use Act (AS 46.15.145) for Sawmill Creek downstream of Blue Lake continues to be pending adjudication.

There was a tremendous push by the City and Borough of Sitka to adjudicate this initial Blue Lake water export appropriation in a timely manner. Ironically, more than four years have passed since the approval of this water export appropriation by the ADNR, the infrastructure is still incomplete, and schedule for initiating water exports remains unknown.

Other Water Export Activity

Interest for exporting water from Alaska to other states and countries appears to be increasing (Swagel 1996, 1998). Two water use applications to export water from Alaska were filed by Sun Belt, a California based company, prior to the passage of HB 596. The applications were closed due to incomplete information (see discussion above). If these water rights had been granted by the ADNR, Sun Belt would have withdrawn water from Orchard Lake in Ketchikan and the tailrace of the Snettisham Hydroelectric Project in

Juneau. It was never determined whether AS 46.15.035 would have applied to the Sun Belt applications. Interestingly, a new application was recently filed to export water from the Snettisham project by a different applicant in 2000 (see below).

Alaska Glacier Fresh purchased water from the Municipality of Anchorage water supply for export to Seattle, and eventually Saudi Arabia. The company had hopes to eventually export 14 million gallons of water per tanker load using a Saudi Arabian ocean vessel (Estes 1995).

The Municipality of Anchorage sold 1.7 million gallons of water to an unspecified industrial plant in Japan during 1994 (Blumberg 1994). The water was sold for $3.14 per 1,000 gallons, for a total sale of $5,338. The water was transported to Japan by an industrial ocean tanker.

A Washington state based firm is exploring water export sites on Prince of Wales Island and other development plans for water export operations in Alaska are increasing (Estes 1996, 1997).

A special interagency task force was formed related to labeling and packaging of bottled water slated for intra state and out of state water exports (Estes 1998).

Matanuska Maid, an Alaskan dairy firm, projects the majority of its profits will come from sales of bottled water in the next 10 years (Ragsdale 1997).

The *Anchorage Daily News* reported that Young Do Kim, owner of Newstar Trading Company, was granted a $100,000 loan from the State of Alaska to expand his bottled-water and seafood exporting businesses. The newspaper stated that Mr. Kim's water-bottling operation is called Alaska Polar Glacier Water. Alaska Polar Glacier Water obtains its water from the Municipality of Anchorage Eklutna Lake water supply system prior to being treated by the Municipality. Mr. Kim's company filters and purifies the water for bottling. It is unknown whether this bottled-water is exported.

A new and second water export application was recently filed in early 2001 by the City and Borough of Sitka to appropriate additional water from Blue Lake for water export although the initial appropriation has not been perfected from 1996. The name of the company that will export the city's water is Sitka Beverage Corporation (Haugland 2001). The amount of the latest requested appropriation ranges from 1,100,000 gallons of water per day to approximately 12, 500,000 gallons per day (or 1,232 acre feet OF water per year) of water to be exported annually and would require the City and Borough of Sitka to pay $7,392 per year to the state (ADNR) and the remaining 12,500,000 gpd (14,001 acre feet per year) if exported under current law (regardless of being bottled or not) would translate to $86,006 per year to ADNR based on an annual export fees per AS 46.15.035 and associated existing regulations (11 AAC.05.010). The ADNR will be required to establish an automatic instream flow reservation with a 1992 priority date because the water source produces fish. It won't impact the existing appropriation to the City and Borough since that priority date is from the 1950's and is for municipal use. The

range of conservation fees Sitka would have to pay DNR annually varies because the amount assessed will depend on how much water will actually be exported in any given year.

Interestingly, at a public meeting of the Alaska Southcentral Section of the American Water Resources (AWRA), the ADNR Chief of the Water Section of the Division of Mining, Land, and Water announced that his agency had intended on possibly seeking legislation to exempt value added water from the current water export provisions. Value added was defined by Mr. Prokosch as bottling water in state before being exported out of the hydrologic unit (Prokosch 2001a).

Additional water export proposals under consideration, or in various stages of adjudication, are: one for 6,600 gallons per day of Starrigavin water in the Sitka area, of which 1,600 gpd is for water export.

Another was filed by Alaska Aquaculture Inc. for exporting water from Burnett Lake via a hatchery and hydropower penstock, 75,000,000 gallons per month. The applicant had indicated that the application may be amended and the application has since been closed.

Aqua of Alaska has a pending application to export Crystal Lake water that would be acquired via a hydropower tailrace and the Blind Slough Hatchery, at a rate of 200,000 gallons per day, and is pending adjudication.

Don and Sam Ramey filed an application to export water from Wolf Creek, via Wolf Creek Boat Works hydropower tailrace, at 12 cubic feet per second. This application was suspended, pending adjudication of a senior water rights application from Alaska Power and Telephone, whose application is for a hydroelectric power generation.

Three applications were filed by Aleut Enterprise Corporation (Lake Betty, Lake Bonnie Rose, and Lake DeMarie), each for 46,000,000 gal/month, for these three ADAK area water bodies.

Joe Gil filed a request to export water from Zarembo Springs, Wrangell area and requested 720 gallons per day for bottling and export.

Alaska Pure Mountain Spring Water, Juneau Alaska, and the Division of Mining and Water Management are working on amending the owner's existing permit to appropriate water to include water export for 30,250 gpd.

Finally, Alaska Water Exports, plans to export water from the Snettisham Tailrace and Lake Outlet. Pending applications on file are for 100,000AF/yr respectively (Dunker 200, Prokosch 2001b). This water source was one of those of initial interest to Sun Belt, as mentioned above.

The effects of water exports and sales will undoubtedly increase as time passes, placing a greater emphasis on the laws passed to manage these activities. Accordingly, the impact of this law cannot be fully assessed at this time.

DISCUSSION

Challenges and Concerns

Despite Alaska's apparent wealth of water, the extreme variability of runoff and temperature patterns throughout the state, combined with the large and varied geographic area and hydrology combined with other limitations below have periodically resulted in every major population center occasionally experiencing water shortages. This is because in reality, it must be clarified that Alaska's water resources are not distributed uniformly, both spatially and temporally. 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 also impact the quantity and timing of runoff patterns. Therefore, much of the water in Alaska can be in a frozen state for seven or more months of each year. Topography and a limited road infrastructure in many areas limit the ability of local governments and the state to cost effectively develop storage systems to augment water supplies during occasional periods with reductions in or no precipitation. The limited road network, weather, and other environmental conditions make it difficult to develop access to water sources in many locations.

Combined with the varying hydrologic conditions throughout the state is the dearth of hydrologic data that is being and had been collected in Alaska. This dearth of data is perhaps the most limiting factor governing the ability of government resource managers and the private sector to define specific water availability for water uses in Alaska. Less than 500 USGS continuous flow stream gaging sites have been established in Alaska since 1908. This equates to flow measurements for less than 1 percent of Alaska's water bodies. Typically, no more than 20 percent of Alaskan gages are active in any one year due to funding restrictions. For the past several years there has been an annual average of approximately 85 gages that were operational (Estes 1991-1998, Brabets and Hawkins 1995, Brabets 1996, Meyer 1997). Subsurface water and precipitation data are also lacking.

Complicating ungaged flow predictions, is that daily stage and water surface elevation data are non-existent for the majority of Alaskan lakes. Similarly, subsurface water availability data are also limited. This dearth of real-time and historical hydrologic data for Alaska has resulted in the majority of requests for withdrawing and impounding water or acquiring instream flows being based on estimates of water availability. To estimate flows, one must use regional hydrologic models and/or extend limited data bases through correlation with a limited number of longer-term sites. In the absence of long-term data, 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.

And, it should be recognized it is more time consuming to estimate flow characteristics for streams having a limited or non-existent database as opposed to summarizing data for a stream having an adequate historical record. Precipitation information, also required for these ungaged flow models is also limited, further complicating the process for estimating flow availability. Similar data limitations hamper efforts to quantify water volumes and stage in lakes.

Nonetheless, basic hydrologic data are required by all potential water users (out-of-stream and instream), and water management agencies 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.

Limited road systems, extremes in weather conditions, and difficulties such as loss of equipment to bears and other wildlife make data collection difficult and expensive in Alaska. It should be obvious that additional gaging stations should be added for a minimum of 10- to 20 years to improve the accuracy of the information used to make decisions pertaining to water availability and allocation in Alaska. However, due to this significant shortage of hydrologic information, Alaskan researchers and water managers are often satisfied, if not euphoric, if they are fortunate to have 5-years of continuous flow data, a significantly lower standard than that of other states.

Unless a commitment is made to close these data gaps in Alaska, we will continue to be limited to making decisions regarding water allocation using the existing models with little or no hope for improving the precision or accuracy of our flow estimates. 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 not to avoid repeating over appropriation mistakes of the other states.

Another concern is that the initial series of draft regulations that were intended to refine the water export processes should be revisited by the ADNR, subject to public commentary, and depending on public feedback, promulgated.

Economic and environmental considerations raised by Chalecki (2000) should be carefully addressed as should those of the International Joint Boundary Commission (IJC) that were summarized in their assessment of water export from the Great Lakes. Also Alaska should participate in a planned water export study of all joint Canada and U.S. shared waters (IJC 2000, Baldini 1999).

CONCLUSION

It is likely the water export industry will continue to grow. Alaskans have the opportunity to base the management of their waterways on the long-term experiences gained by other states, including the costly and hard learned lessons associated with and resulting from excessive modifications and reductions to naturally occurring flow characteristics and water volumes that occurred in lower 48 waterways. Hopefully, it has also been learned that attempts in the lower 48 states to later reverse those mistakes have been difficult, impossible to achieve, and extremely costly.

Another lesson that should have been learned by Alaskans is that the ability to harvest fish will be restricted when fish populations become depressed by negative impacts associated with poor water and habitat management (Meacham, Clark, and Estes 1986).

How and whether Alaskan waters laws are strengthened and executed by the state's resource managers, especially laws associated with instream flow protection and water export, will chart the course for future generations of Alaskans. Clearly, success or failure will, in part, be measured on whether sufficient water of good quality is retained in rivers and lakes and subsurface water sources.

Alaska's citizens, legislators, and public servants are fortunate to still have these choices and are uniquely situated to take advantage of their state's infancy and early stages of limited resource and population development to require environmentally sound developments and natural resource conservation. Although it should be evident that the only solution will be to prevent poor and shortsighted natural resources management, only time will tell whether Alaskans chose to use or misuse what likely is their one time opportunity to apply the lessons learned by others.

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Graphics are in separate files (Alaska v Contiguous US Map, Water Use in Alaska and Water Use in Alaska versus Contiguous US Figures, and Hydrologic Unit Map)

Appendix

A Sampling of Instream Flow and Water Rights Related Web Sites Related to Alaska and National/International Sites

Christopher Estes

ALASKA INSTREAM FLOW PUBLICATIONS AND LINKS

www.state.ak.us/local/akpages/FISH.GAME/sportf/geninfo/instflow/isfpubs.htm
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SEE ALASKA STATE STATUTES FOR ADMINISTERING WATER RIGHTS - SEE AS 46.15

http://www.legis.state.ak.us/FOLHOME.HTM

SEE ALASKA STATE REGS FOR ADMINISTERING WATER RIGHTS SEE 11 AAC 93

http://www.legis.state.ak.us/cgi-bin/folioisa.dll/aac?

SEE ALASKA STATE REGS FOR WATER FEES IN 11 AAC 05.010

http://www.legis.state.ak.us/cgi-bin/folioisa.dll/aac?

SEE ALASKA CONSTITUTION RE WATER RIGHTS - ART VIII, PRIMARILY SEC 13

http://www.gov.state.ak.us/ltgov/akcon/table.html

See State Statutes for Alaska Department of Fish and Game (ADF&G) related authority regarding water quality and water allocation - see AS 16.05.840, 16.05.870, Sec. 16.10.010 and 16.10.020.
httP:// www.legis.state.ak.us/FOLHOM.HTM

Other (Alaska Department of Natural Resources, Mining, Land and Water Division, Water Section (DNR) web info
http://www.dnr.state.ak.us/mine_wat/water/wrfact.htm

LEGISLATIVE WATERWAYS ISSUES AUDIT OF DNR, ADF&G, ALASKA DEPARTMENT OF LAW, 1997

http://www.legis.state.ak.us/legaud/web/pages/digests/1997/4540dig.htm

Water quality stats are also in Title 46.
The state also has administrative orders and agreements on file re: coordination between DNR, Alaska Department of Environmental Conservation (DEC) and ADF&G re water quality and quantity coordination of our permitting authorities that overlaps.

NATIONAL and INTERNATIONAL INSTREAM FLOW RELATED WEB SITES

NIFPA National Instream Flow Program Assessment SITES (ALSO HAS THE VIDEO INFO)
http://www.state.ak.us/local/akpages/FISH.GAME/sportf/geninfo/instflow/isfnifp2.htm

INSTREAM FLOW COUNCIL

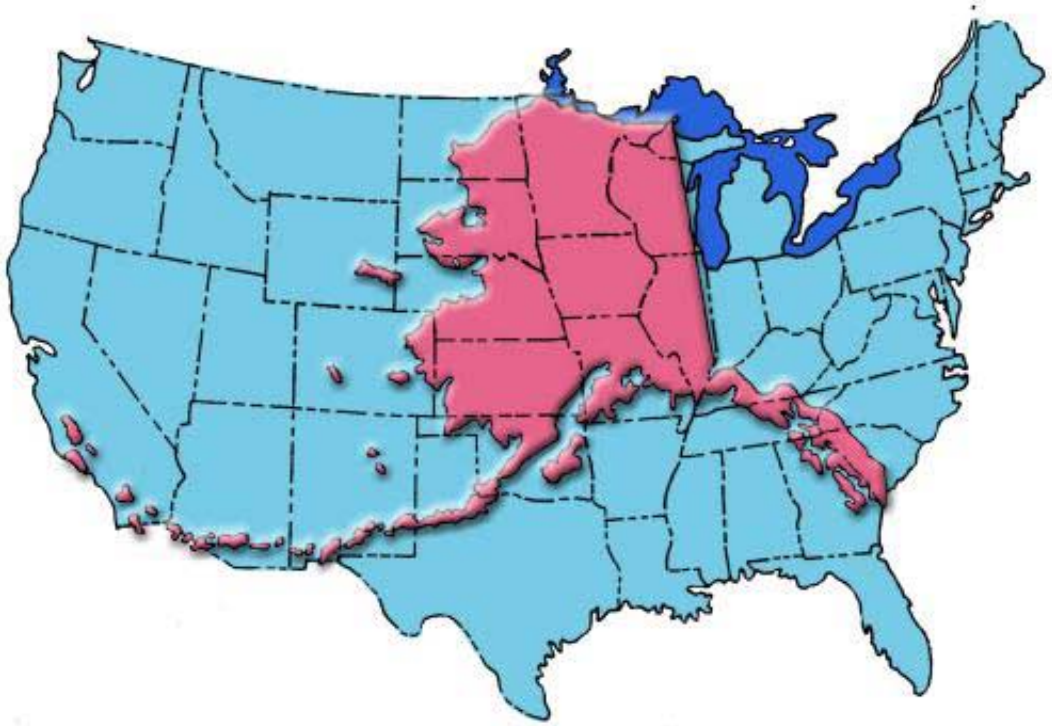
Http://www.instreamflowcouncil.org

INTERNATIONAL JOINT BOUNDARY COMMISSION

Http://www.ijc.org/ijcweb-e.html
(also see links)

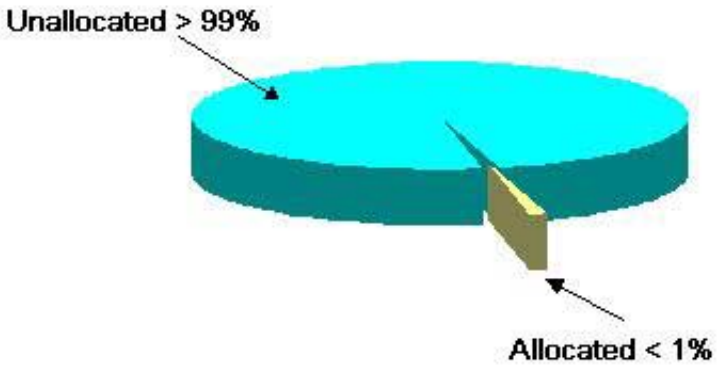
Size Comparison of Alaska Versus 48 Contiguous States

Alaska's 586,000 square miles are equivalent in area to approximately 20% of the contiguous lower 48 states.



Surface Water Resources Comparison Between Alaska and Contiguous Lower 48 States

Alaska Water Allocation



Six United States Geological Survey Hydrologic Unit Subregions for Alaska