Special Publication No. 16-09

Instream Flow Protection in Alaska, 2015

by

Joe Klein

April 2016

Alaska Department of Fish and Game **Divisions of Sport Fish and Commercial Fisheries**

Symbols and Abbreviations

The following symbols and abbreviations, and others approved for the Système International d'Unités (SI), are used without definition in the following reports by the Divisions of Sport Fish and of Commercial Fisheries: Fishery Manuscripts, Fishery Data Series Reports, Fishery Management Reports, and Special Publications. All others, including deviations from definitions listed below, are noted in the text at first mention, as well as in the titles or footnotes of tables, and in figure or figure captions.

Weights and measures (metric)

centimeter	cm
deciliter	dL
gram	g
hectare	ha
kilogram	kg
kilometer	km
liter	L
meter	m
milliliter	mL
millimeter	mm

Weights and measures (English)

cubic feet per second	ft^3/s
foot	ft
gallon	gal
inch	in
mile	mi
nautical mile	nmi
ounce	oz
pound	lb
quart	qt
yard	yd

Time and temperature

day	d
degrees Celsius	°C
degrees Fahrenheit	°F
degrees kelvin	K
hour	h
minute	min
second	s

Physics and chemistry

all atomic symbols	
alternating current	AC
ampere	A
calorie	cal
direct current	DC
hertz	Hz
horsepower	hp
hydrogen ion activity (negative log of)	pH
parts per million	ppm
parts per thousand	ppt, ‰
volts	V
watts	W

General

Alaska Administrative Code	AAC
all commonly accepted abbreviations	e.g., Mr., Mrs., AM, PM, etc.
all commonly accepted professional titles	e.g., Dr., Ph.D., R.N., etc.
at	@
compass directions:	
east	E
north	N
south	S
west	W
copyright	©
corporate suffixes:	
Company	Co.
Corporation	Corp.
Incorporated	Inc.
Limited	Ltd.
District of Columbia	D.C.
et alii (and others)	et al.
et cetera (and so forth)	etc.
exempli gratia (for example)	e.g.
Federal Information Code	FIC
id est (that is)	i.e.
latitude or longitude	lat or long
monetary symbols (U.S.)	$, ¢
months (tables and figures): first three letters	Jan,...,Dec
registered trademark	®
trademark	™
United States (adjective)	U.S.
United States of America (noun)	USA
U.S.C.	United States Code
U.S. state	use two-letter abbreviations (e.g., AK, WA)

Mathematics, statistics

all standard mathematical signs, symbols and abbreviations	
alternate hypothesis	H_A
base of natural logarithm	*e*
catch per unit effort	CPUE
coefficient of variation	CV
common test statistics	(F, t, χ^2, etc.)
confidence interval	CI
correlation coefficient (multiple)	R
correlation coefficient (simple)	r
covariance	cov
degree (angular)	°
degrees of freedom	df
expected value	*E*
greater than	>
greater than or equal to	≥
harvest per unit effort	HPUE
less than	<
less than or equal to	≤
logarithm (natural)	ln
logarithm (base 10)	log
logarithm (specify base)	$\log_2$, etc.
minute (angular)	'
not significant	NS
null hypothesis	H_O
percent	%
probability	P
probability of a type I error (rejection of the null hypothesis when true)	α
probability of a type II error (acceptance of the null hypothesis when false)	β
second (angular)	"
standard deviation	SD
standard error	SE
variance	
population	Var
sample	var

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by
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ABSTRACT

This report summarizes instream flow protection and related activities of the Alaska Department of Fish and Game (ADF&G) in 2015. The status of reservation of water applications by other agencies and the public is also presented. ADF&G created the Statewide Aquatic Resources Coordination Unit (SARCU) within the Division of Sport Fish to address instream flow related activities.

In 2015, ADF&G filed 29 applications for river reaches and was granted certificates for 13 river reaches, providing approximately 22 miles of fish habitat protection. ADF&G has continued to exceed the program goal of filing 10 reservations annually. Overall, ADF&G filed reservation of water applications on 265 river reaches and 4 lakes. Certificates of reservation have been granted to ADF&G for 120 river reaches and one lake.

ADF&G filed an average of 26 applications over the past 5 years. During that same time, ADF&G has received, on average, 17 certificates of reservations per year. Factors contributing to this success include the following: ADF&G and Alaska Department of Natural Resources (DNR) leadership making reservations a priority; a 2002 Memorandum of Understanding between ADF&G and DNR, which created the vision and framework for reducing the backlog; and efficiencies gained through a better understanding of the adjudication process.

SARCU staff performed hydrologic investigations on 6 projects in 2015. Investigations were performed primarily to obtain the necessary data to support reservation of water applications. SARCU staff monitored 52 Federal Energy Regulatory Commission hydroelectric and hydrokinetic projects and served as ADF&G's representative for the Alaska Clean Waters Actions program, which funded 13 projects in state fiscal year 2015 (July 1, 2014, through June 30, 2015).

Key words: instream flow, reservation of water, Alaska Water Use Act, Peterson Creek, Eagle Lake, Orchard Lake, Turner Lake, Thorne River, Windfall Creek, Federal Energy Regulatory Commission, hydroelectric, hydrokinetic, Alaska Clean Water Actions

INTRODUCTION

The State of Alaska has abundant and diverse sport fisheries that are of considerable recreational importance to anglers and others. To date, 18,686 water bodies in Alaska have been identified as supporting anadromous fish species (J. Johnson, Habitat Biologist, Alaska Department of Fish and Game, April 12, 2016, personal communication).

In 2014, an estimated 470,470 anglers fished 2,309,853 days and harvested approximately 2,484,880 of the estimated 5,886,146 fish caught in Alaska[1]. The continued production of these fishery resources depends, in part, upon sufficient amounts of good quality water to maintain seasonal fish habitat in rivers and lakes. Fish and other aquatic and terrestrial organisms have adapted to natural streamflows that provide essential seasonal habitats utilized by the various life stages of each species. Varying seasonal quantities of flowing waters and lake elevations are needed by fish using freshwater and estuarine habitats for migration, spawning, incubation, and rearing (Hynes 1970; Estes 1984; Hill et al. 1991; Poff et al. 1997; Bovee et al. 1998; Annear et al. 2004).

The Fish and Game Act requires the Alaska Department of Fish and Game (ADF&G) to "manage, protect, maintain, improve, and extend the fish, game and aquatic plant resources of the state in the interest of the economy and general well-being of the state" (AS 16.05.020). The act also enables ADF&G to use a variety of legal, regulatory, and administrative options to

[1] Alaska Sport Fishing Survey database [Internet]. 1996– . Anchorage, Alaska: Alaska Department of Fish and Game, Division of Sport Fish, cited February 5, 2016. Available from: http://www.adfg.alaska.gov/sf/sportfishingsurvey/.

quantify and acquire water rights within lotic[2] and lentic[3] water bodies to sustain fish and wildlife resources (AS 16.05.050). Fish habitat permits (AS 16.05.841 and .871) issued by the department are one of the tools that can be used to maintain sufficient amounts of water to protect fish habitat in lotic and lentic fish-bearing systems. For decisions that have the potential to affect a fish-bearing water body, ADF&G and the Alaska Department of Natural Resources (DNR) have agreed to coordinate water right and fish habitat permits to ensure permit conditions are consistent.[4]

In 1980, Alaska's water law was amended to allow protection of instream flows in rivers and water levels in lakes, commonly referred to as Alaska's instream flow law. Alaska's water law treats the term *instream flow* more broadly than most states' jurisdictions because the term may be used to refer to 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 for identified resources and values. Water rights to retain water in lentic and lotic habitats can be acquired from DNR by a private individual, group, or government agency for one or a combination of four purposes:

1. protection of fish and wildlife habitat, migration, and propagation;
2. recreation and park use;
3. navigation and transportation; and
4. sanitation and water quality.

Alaska's water law follows the prior appropriation doctrine, which assigns seniority of water rights in the order they are filed (Alaska Constitution, Article VIII, Section 13). Under Alaska water law, an appropriation to retain water within a water body for any of these purposes may also be defined as a *reservation of water* (AS 46.15.145). The term *reservation of water* is often used to differentiate between retaining water within lotic or lentic water bodies versus out-of-stream withdrawals.[5] It is important to note that passage of the instream flow law expanded the meaning of *appropriation* in Alaska to represent all water right uses, including retention of water in lotic and lentic water bodies. However, an *appropriation* is still more commonly associated with out-of-stream and diversionary uses/water rights, whereas the term *reservation* typically refers to retention of water within a lotic and lentic water body. Further information related to Alaska's instream flow law can be found in Curran and Dwight (1979), White (1982), Anderson (1991), Harle and Estes (1993), Spence (1995), and Burkardt (2000).

In 1986, ADF&G created the Statewide Aquatic Resources Coordination Unit (SARCU) within the Division of Sport Fish (SF) to acquire reservations of water in priority fish-bearing water bodies. Over time, duties were expanded to address other instream flow related issues such as hydroelectric licensing under the Federal Energy Regulatory Commission (FERC) and representation in the Alaska Clean Waters Action (ACWA) program. SARCU staff also developed the capacity to collect hydrologic data for filing reservation of water applications. This report summarizes instream flow protection activities by ADF&G in 2015 and the status of reservation of water activities conducted by other agencies and the private sector.

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[2] Lotic refers to flowing waters such as rivers and streams.

[3] Lentic refers to still waters such as lakes and ponds.

[4] Memorandum from F. Rue, ADF&G Director of Habitat Division to G. Gustafon, DNR Director of Division of Land and Water Management, August 10, 1989, reaffirmed by ADF&G and DNR on December 16, 2009.

[5] Withdrawals can be from surface or subsurface water sources.

RESERVATIONS OF WATER

To file for a reservation of water, an application must be completed, signed, and submitted to DNR with the appropriate application fee. Applications are prepared to comply with requirements established by state law (AS 46.15.145), state regulations (11 AAC 93.141-147), reservation of water application form instructions, and the *State of Alaska Instream Flow Handbook* (DNR 1985) when applicable. An applicant can apply for a reservation to secure their interest and obtain a priority date, and they will then have 3 years to collect any additional data; a 2-year extension can be obtained with approval from DNR (11 AAC 93.142 (4)). The following is an overview of the reservation of water process followed by ADF&G.

Nominations

ADF&G developed nomination work plans for SF Regions 1, 2, and 3 (Figure 1; Klein 2011). These work plans served as the basis for coordinating with regional management and research staff to nominate water bodies for instream flow protection. Nomination reviews were coordinated by SF regional research coordinators and included input from other staff or agencies that had information on fish resources and/or future water uses in the region.

Final selection of water bodies to be reserved was made by the SARCU supervisor in consultation with SF regional supervisors or their designees. In general, final selections were based on the importance of a water body to fishery resources, the likelihood for competing out-of-stream uses, the amount of existing hydrologic data, and the availability of other mechanisms[6] to provide instream flow protection.

Data Compilation, Collection, and Analysis

A reservation of water application needs to include information that substantiates the amount of streamflow or level of water being requested for the selected purpose(s). Applications prepared by ADF&G included biological and hydrologic data to support reservations of water for the protection of fish habitat, migration, and propagation. ADF&G strives to collect and analyze all data according to accepted scientific methods and procedures that would meet evidentiary standards and any challenges[7] that may be filed.

Biological Data

A variety of sources were used to obtain information needed to document fish use in the selected water body. This information typically included fish distribution and life history periodicity[8] data that were summarized from ADF&G biologists, scientific literature, and the ADF&G Anadromous Waters Catalog for the appropriate region.[9]

Hydrologic Data

DNR recommends a minimum of 5 years of continuous streamflow or lake level data to support water rights decisions, including reservation of water applications (Gary Prokosch, Chief Water

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[6] Other mechanisms may include fish habitat permits, water right permits, Clean Water Act permits (Section 401 Water Quality Certification, Section 402 National Pollution Discharge Elimination System, and Section 404 Dredge and Fill permits), permits from land management agencies, and the Federal Power Act.

[7] Challenges may be filed by an aggrieved party to contest the validity of the data set, analyses, and rationale for the requested amount of water the department considers necessary.

[8] Seasonal use of habitat by species and life stage for passage, spawning, incubation, and rearing.

[9] See https://www.adfg.alaska.gov/sf/SARR/AWC/index.cfm?ADFG=main.home.

Resources Section, DNR, April 26, 2005; personal communication). This 5-year recommendation is intended to reduce potential bias that may be associated with intra- and interannual hydrologic variability.

When available, streamflow data describing seasonal and long-term hydrologic characteristics and quantifying instream flow needs were obtained from the U.S. Geological Survey (USGS) National Water Information System (NWIS) website.[10] When hydrologic data were limited or not available, SARCU collected streamflow data in accordance with USGS standards (Rantz et al. 1982; Klein 2013). Streamflow records were computed using the Water Information System Kisters Incorporated (WISKI) hydrologic data management software after they were proofed for errors and transformed into a WISKI-compliant format. WISKI is a Windows-based professional time series hydrologic management system that meets USGS standards for data computation. Streamflow records obtained from USGS or collected by SARCU were analyzed using the most current version of the SAS statistical software package with support from SF biometricians.

Where less than 5 years of data were available, simple linear regression was used to extend the streamflow record if a suitable, long-term streamgage was available (Klein 2013).

Instream Flow Analysis

Under Alaska law, applicants are not required to use a specific method for quantifying instream flow needs (11 AAC 93.142; DNR 1985). The burden is on the applicant to choose and defend the approach used.

ADF&G used hydrologic-based approaches combined with fish use information to quantify instream flow needs for fish. These included analyses based on historic streamflow data (Annear et al. 2004) and a variation of the Tennant Method (Estes 1998; Tennant 1976) to account for local hydrologic and biological conditions. ADF&G recommended streamflow regimes similar to the magnitude and timing of the natural streamflows to maintain seasonal use of fish habitat.

Hydrologic characteristics of a river were used as the primary basis to delineate reaches. This information came from various sources, including USGS topographic maps, ADF&G Anadromous Waters Catalog for the appropriate region, ADF&G Freshwater Fish Inventory[11], and USGS National Hydrography Database[12]. Reach boundaries were based on documented fish presence and then further refined to minimize differences in streamflow. Major tributaries upstream and downstream of the chosen reach were generally selected as reach boundaries.

Adjudication

Adjudication is the legal process of determining 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)). DNR provides a public notice of the proposed reservation, typically with 15 days to comment. If no further administrative actions are needed after all public comments are reviewed, DNR prepares a "Findings of Facts, Conclusions of Law and Decision" document that describes the information and rationale used for the decision and will issue a Certificate of Reservation. The certificate is recorded in the State Recorder's Office and includes a description of the water right, any conditions placed on it, and the priority date that establishes the seniority of the water

[10] See http://waterdata.usgs.gov/ak/nwis/sw.
[11] See http://www.sf.adfg.state.ak.us/SARR/Surveys/index.cfm
[12] See http://nhd.usgs.gov/data.html

right. An appeal may be filed by a commenter to the DNR Commissioner, with an option to seek further remedy through Alaska's court system.

In 2002, a Memorandum of Understanding (MOU) was signed between DNR and ADF&G to address the increasing backlog of reservation of water applications needing adjudication and to improve the overall process. As part of the agreement, ADF&G partially funds a position at DNR to adjudicate applications. This position also provides assistance with preparing applications and other instream flow related needs. DNR and ADF&G also meet annually to prepare a work plan that prioritizes applications to adjudicate in the coming year and discuss any instream flow related issues.

ACTIVITIES

RESERVATIONS OF WATER

ADF&G has filed reservation of water applications on 265[13] river systems and 4 lakes. Certificates of reservation were granted to ADF&G for 120 river reaches and one lake, and for one river reach and lake under the water export provision[14] (Table 1). The remaining 145 applications are waiting for adjudication. Requested flow amounts in the pending applications are subject to modification during the adjudication process.

In 2015, ADF&G filed 29 applications (Table 2; Figures 2 and 3) and received 13 certificates of reservation providing protection for approximately 22 miles of fish habitat (Table 3; Figure 4).

HYDROLOGIC INVESTIGATIONS

Hydrologic investigations were performed primarily to obtain data to support a reservation of water application. Investigations were performed on six projects in 2015 and are summarized below (Figure 7).

Peterson Creek near Amalga Harbor

Peterson Creek is located 19 miles northwest of Juneau (Figure 7). The creek has approximately two miles of anadromous waters and supports populations of coho (*Oncorhynchus kisutch*), pink (*O. gorbuscha*), and chum salmon (*O. keta*); steelhead (*O. mykiss*) and cutthroat trout (*O. clarki*); and Dolly Varden char (*Salvelinus malma*).

Peterson Creek drains out of Peterson Lake and flows downstream five miles to Salt Lake before eventually entering Amalga Harbor. A barrier falls is located 2.5 miles upstream from Salt Lake and prevents anadromous fish from accessing the upper creek and lake. The watershed has a drainage area of approximately 10 square miles. The majority of the Peterson Creek watershed is within the Tongass National Forest. The lower portion of watershed near the Glacier Highway is City and Borough of Juneau land.

Peterson Creek is a popular, road-accessible steelhead fishery for Juneau area anglers. It also serves as a steelhead index stream for the ADF&G Division of Sport Fish snorkel survey project. An ADF&G Division of Sport Fish weir on the creek monitored steelhead immigration from 1989 to 1991. During this study, an average of 205 steelhead immigrated into the creek (Harding and Jones 1992).

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[13] Reservation numbers have been revised based on a recent review and supersede previous report summaries.

[14] Water exported out of one of the six defined hydrologic units requires a mandatory reservation to protect fish resources (AS 46.15.035).

ADF&G installed streamgage 13601 at Peterson Creek on September 27, 2012. This streamgage will continue to operate until October 1, 2017. Site visits were made to the gage 13 times during 2015 to download transducer data, take discharge measurements, and perform routine streamgage maintenance. A reservation of water application, using two years of streamflow data, was filed with and accepted by DNR on September 2, 2015

Turner, Eagle, and Orchard lakes

ADF&G received funding provided by the Western Native Trout Initiative (WNTI) to collect hydrologic data for reservation of water applications on three trophy cutthroat trout lakes in Southeast Alaska. Turner, Eagle, and Orchard lakes were chosen for this project (Figure 7). Turner Lake is located adjacent to Taku Inlet, 16 miles east of Juneau; Eagle Lake is located on the mainland 48 miles southeast of Wrangell; and Orchard Lake is located 35 miles north of Ketchikan on Revillagigedo Island.

ADF&G has operated lake-level gages on these lakes since the fall of 2010. In 2015, each lake was visited twice, once in May and once in October. These site visits included downloading transducer data, measuring current lake levels relative to an established reference mark, taking pictures of site conditions, and performing routine gage site maintenance. The October 2015 site visit marked the end of data collection. Five years of lake-level data have now been collected at each lake. During the October 2015 site visit, after all data collection and measurements were complete, the gages were decommissioned. The transducer, gage housing, and all associated mounting hardware have now been removed from the site.

Using one year of hydrologic data, reservation of water (ROW) applications reserving lake levels were filed and accepted by DNR in 2012. New ROW applications, using data from the entire period of gage record, will be completed and submitted to DNR in 2016.

Thorne River

Thorne River is located in Southeast Alaska on Prince of Wales Island (Figure 7). With approximately 113 anadromous river miles, Thorne River is the largest stream system on Prince of Wales Island and supports populations of coho, chum, sockeye (*O. nerka*), and pink salmon; cutthroat and steelhead trout; and Dolly Varden char. Thorne River provides a popular sport fishery as well as an important subsistence fishery for Prince of Wales Island residents.

ADF&G has operated streamgage 13501 on the mainstem of the Thorne River since August 2012. Site visits were made to the gage 5 times during 2015 to download data, take discharge measurements, and perform routine gage-site maintenance.

ADF&G installed three discharge measurement stations on tributaries to the Thorne River in 2012, which included the North Thorne River, Goose Creek, and Rio Beaver. In 2015, four discharge measurements were also collected at each of these stations.

Streamgage 13501 and all three discharge stations will remain in operation until October 2017. Reservation applications requesting to reserve streamflows within 5 miles of the mainstem of the Thorne River and 13 miles of the tributaries have been completed and will be submitted to DNR in 2016.

Windfall Creek near Juneau

Windfall Creek is located 18 miles northwest of Juneau (Figure 7). The creek, downstream of Windfall Lake, has approximately 0.5 miles of anadromous waters and supports populations of coho, pink, chum, and sockeye salmon; steelhead and cutthroat trout; and Dolly Varden char.

Windfall Creek drains out of Windfall Lake and flows 0.5 miles into a side channel of the Herbert River. The entire watershed is located within the Tongass National Forest.

The creek is a popular fishery for Juneau-area anglers because it is the only Juneau-area stream where anglers can catch and harvest sockeye. There is also a United States Forest Service public use cabin located on the northeast shore of the lake that can be accessed by a 3.2-mile–long trail.

An ADF&G fish weir operated in the spring of 1997 counted 616 cutthroat trout, 34,074 Dolly Varden, and nine outmigrating steelhead trout from Windfall Creek (Jones and Harding 1998). Immigrating sockeye salmon were counted at ADF&G fish weirs in 1989 and 1997, and the total return was estimated to be 4,667 in 1989 and 4,228 in 1997 (Bethers and Glynn 1990, Yanusz 1998). ADF&G has also conducted foot surveys of spawning sockeye salmon in Slate Creek, a tributary to Windfall Creek above Windfall Lake, since 1990.

ADF&G installed streamgage 13801 at Windfall Lake on June 17, 2013. Site visits were made to the streamgage 7the times during 2015 to download transducer data, take discharge measurements, and perform routine streamgage maintenance. This streamgage will continue to operate until October 2018. A reservation of water application, using two years of streamflow data, was filed with and accepted by DNR on September 2, 2015.

FERC HYDROELECTRIC PROJECT LICENSING

FERC administers the Federal Power Act (FPA), which governs the regulation of hydroelectric projects in the United States, among other duties. FERC issues licenses[15] that specify how projects will be constructed and operated, including any protection, mitigation, and enhancement requirements. FERC licenses specify how streamflows will be allocated between energy generation and other beneficial uses recognized by the FPA and other applicable laws (Roos-Collins and Gantenbein 2005). The FPA affords considerable weight and due deference to ADF&G as the state's fish and wildlife agency. If FERC does not accept all of ADF&G's recommendations, they must attempt to resolve any such inconsistency, giving due weight to the department's authority and expertise. Each project is unique, requiring reviews and analyses specific to affected resources.

Prior to 1998, ADF&G's review of FERC hydroelectric projects was handled on a regional basis. To provide better consistency and interdepartmental coordination, a position was created in SARCU to oversee statewide coordination efforts for all FERC jurisdictional projects and to ensure all legal and administrative requirements are met. Non-FERC hydroelectric projects are reviewed by the Division of Habitat staff within ADF&G.

Under the FERC process, applicants obtain a preliminary permit that gives them the exclusive right to study the project's feasibility. ADF&G plays an important role in assisting the applicant to obtain fish and wildlife information needed for project review. If an applicant is interested in

[15] A FERC license has a term of 30 to 50 years, subject to renewal.

pursuing the project, a license application is submitted before the end of the Preliminary Permit term.

In 2015, SARCU monitored 52 FERC hydroelectric and hydrokinetic projects (Table 4). Activities in Southeast Alaska included the following:

- The Gartina Creek Hydroelectric Project was completed and placed in service in the fall of 2015.
- The Southeast Alaska Power Authority received approval of a non-capacity amendment to the FERC license to raise the height of the Swan Lake Hydroelectric Project dam.
- A final license application has been filed with FERC for the proposed Sweetheart Lake Hydroelectric Project located near Juneau.

Activities in South Central included the following:

- At Cooper Creek, the Stetson Creek Diversion Project was completed in the fall of 2015. The project diverts Stetson Creek to Cooper Lake/reservoir and releases warmer lake water to Cooper Creek. Studies indicated that cold water temperatures were limiting production of anadromous salmon in the creek.
- A FERC non-capacity amendment was reviewed for the Battle Creek Diversion at the Bradley Lake Hydroelectric Project.
- FERC non-capacity amendments were proposed for the Hidden Basin diversion project at the Terror Lake project.
- Construction of the Allison Creek project is ongoing with anticipated completion in the fall of 2016.
- A license application was filed with FERC for the Old Harbor Hydroelectric project.
- An instream flow study of the Power Creek bypass reach was started in 2015.
- The village of Igiugig has applied for a pilot hydrokinetic license for the Kvichak River. They requested a 10-year term license.
- The Whitestone Hydrokinetic Project surrendered its FERC license.
- The East Forelands Hydrokinetic Project surrendered its FERC PP.
- FERC cancelled the PP for a proposed project on Fourth of July/Godwin Creeks.
- FERC cancelled the PP for a proposed project on the Talkeetna River.
- Proposed projects at Chenega and Knutson Creek received determination of FERC non-jurisdiction.

ALASKA CLEAN WATER ACTIONS PROGRAM

The ACWA program was created through Alaska Administrative Order 200 and brings together the three state resource agencies—Alaska Department of Environmental Conservation (DEC), ADF&G, and DNR—to characterize Alaska's waters in a holistic manner that included the sharing of relevant data and expertise. ACWA's database of priority waters and identified stewardship actions is a product of this collaboration[16].

The three state resource agencies also conduct an annual joint matched solicitation for water quality projects using funds that are passed through from federal monies. Projects to restore,

[16] Although the entire database is not available to the public, a list of all high-priority waters and other information regarding these waters is available on DEC's website: http://dec.alaska.gov/water/acwa/acwa_index.htm

protect, or conserve water quality, quantity, and aquatic habitat on identified waters are considered. Local governments, citizen groups, tribes, and education facilities are often the recipients of these awards.

Each agency is responsible for collecting and assessing water body information related to its expertise. ADF&G assesses aquatic habitat, DEC assesses water quality, and DNR assesses water quantity. Water body assessments start when a water body is nominated into the ACWA database for specified concerns. Water bodies can be nominated by agency personnel or by concerned members of the public. Each agency evaluates the sufficient and credible information available and assigns a priority ranking based on specific criteria for each type of water body issue. A decision tree is used to identify a needed action for each nominated water body in one of four categories:

1. Data collection
2. Recovery
3. Protection and maintenance of at-risk water bodies
4. Adequately protected water bodies

ACWA staff rank each water body as high, medium, or lower priority based on criteria that evaluate threats, current condition, and resource value. High-priority water bodies may go on to be eligible for project funding through the annual ACWA grant solicitation process. ACWA tracks information on all nominated water bodies through an interagency database. To date, 392 waters have been nominated into the ACWA program, 143 of which include water bodies ranked "high priority" by one or more agencies.

In state fiscal year 2015 (July 1, 2014, through June 30, 2015), ACWA awarded a little over $424,000 in grants for 13 projects (Appendix A1). Funding for the grants came from EPA (Clean Water Act, Section 319 funds) and DEC Beach Grant (for specific actions on identified beaches). In addition, a comprehensive list of unfunded high-priority actions was produced to address needs for restoration, protection, or monitoring for which funding was not available or that were solicited for proposals but did not receive an application. For more information on ACWA, including current and past funded projects and the list of unfunded high-priority actions, go to www.state.ak.us/dec/water/acwa/acwa_index.htm.

DISCUSSION

RESERVATIONS

During the past year, ADF&G continued to file reservations and protect fish habitat. In 2015, 29 applications were filed and accepted by DNR, and 13 applications were adjudicated and issued certificates. The number of applications adjudicated in 2015 decreased approximately half from last year. This is largely a result of the time expended by DNR to adjudicate the complex Middle Creek/Stream 2003 casefile and because 8 applications adjudicated for the Mulchatna and Stuyahok rivers in 2015 have been appealed to the DNR Commissioner and have not been granted. Overall, 123 certificates have been granted to ADF&G, resulting in protection of 1,408 miles of stream and 1,481 surface acres of lakes.

ADF&G has filed an average of 26 applications over the past 5 years. During that same time, ADF&G has received, on average, 17 certificates of reservations per year. ADF&G continued to exceed their annual goal of filing 10 reservations annually (Figure 6). However, it is not

expected that ADF&G staff can continue to file at this same pace. The number of fish-bearing water bodies with 5 or more years of streamflow data is decreasing quickly. ADF&G anticipates allocating a greater portion of their time operating gaging stations in order to continue to obtain the necessary hydrologic data to file reservations. Operating a gaging station is typically a 5-year commitment, unless there is a suitable, concurrently operating USGS gage nearby that can be used to extend the record. ADF&G relies on grants and cooperators to assist with undertaking these projects, primarily due to the large financial commitment but also to assist with logistical issues, combine resources, and reach mutually shared strategic priorities.

The 2002 MOU between DNR and ADF&G was instrumental toward improving the reservation process and increasing fish habitat protection. Factors that contributed to this improvement included ADF&G and DNR leadership making reservations a priority, the vision and framework provided by the MOU, and efficiencies gained by both agencies through a better understanding of the adjudication process.

In 2015, DNR adjudicated and issued a decision on the Chuitna Citizens Coalition Inc.'s (CCC) three reservation applications for Middle Creek/Stream 2003, a tributary to the Chuitna River. Prior to DNR's decision, a public hearing was held in addition to a Public Notice. The decision supported CCC's reservation on the lower reach but denied applications for the main and middle reaches. Appeals were filed with the DNR Commissioner and a final decision is pending.[17]

Similarly, DNR issued a decision for applications filed by ADF&G and the Southwest Salmon Habitat Partnership for the Mulchatna (5 applications) and Stuyahok (3 applications) rivers in 2015. All reaches were supported for reservations; however, appeals were filed with the DNR Commissioner and a final decision is pending.

HYDROLOGIC DATA NEEDS

The paucity of hydrologic data throughout most of Alaska limits ADF&G's ability to acquire reservations of water (Estes 1998; Brabets 1996). Although Alaska has approximately 40 percent of the nation's surface water outflow[18], only 477 USGS gaging stations have been established in Alaska (J. Conaway, USGS Hydrologist, Anchorage, February 9, 2010, personal communication). Of these, only 323 provide 5 or more years of record (Table 5)[19].

In Water Year 2015 (October 1, 2014, through September 30, 2015), USGS operated 107 gaging stations in Alaska. This represents approximately one gage site per 5,000 square miles, which contrasts significantly with the western United States, where there is approximately one gage site per 400 square miles. Of the streamgages operating in Water Year 2015, 22 were in Southeast, 37 were in Southcentral, and 47 were located throughout the remainder of the state (J. Conaway, USGS Hydrologist, Anchorage, February 9, 2016, personal communication; Table 5).

Baseline hydrologic data are needed by water resource agencies and water users for planning and management. Accurate estimates of available streamflows and lake elevations are needed for project designs and for the management and enforcement of water rights. Obtaining these data

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[17] For further information, see http://dnr.alaska.gov/mlw/water/reservations/chuitna.cfm.

[18] Alaska Department of Natural Resources: Water Resources Program. 2012. Alaska Hydrologic Survey: surface water. http://dnr.alaska.gov/mlw/water/hydro/components/surface-water.cfm (Accessed May 2012).

[19] USGS performed a significant review and revision to their databases, which resulted in revisions to the number of streamgages previously reported. This affects comparisons to previous report summaries. A revised summary for Water Years 2012 – 2015 is provided in Table 5.

can be difficult and expensive because of challenges that include Alaska's limited road systems, extreme weather conditions, and the loss of equipment to bears and other wildlife.

Without baseline hydrologic data, models must be used to estimate seasonal and long-term streamflow characteristics. On streams with limited or no streamflow data, using hydrologic models to predict long-term or seasonal flow characteristics is difficult and often produces estimates with high uncertainty. Furthermore, it is more time-consuming to estimate streamflow characteristics for streams with limited or no data than it is to summarize data for a stream with an adequate hydrologic record.

To address the need for streamflow data, ADF&G Sport Fish Division has provided annual funding for streamgaging efforts. These funds have been leveraged with USGS and other partners when possible to maximize the collection of streamflow data[20]. USGS is also expected to release a version of Streamstats in 2016 for the Cook Inlet region. Streamstats is a web-based application that that allows users to obtain streamflow statistics and drainage-basin information for USGS gaging stations and user selected stream sites. This will provide a good platform to build from as geospatial data is updated in other regions of the state.

FERC HYDROELECTRIC LICENSING ACTIVITIES

The Hydropower Regulatory Efficiency Act was passed by the U.S. Congress in 2013. The act, among other things, redefines "small hydroelectric power projects" as having an installed capacity that does not exceed 10,000 kilowatts and authorizes the Commission to extend the term of preliminary permits once, for not more than two additional years beyond the three years previously allowed. The ability to extend preliminary permits in Alaska has eased the burden on applicants and resource agencies, and should result in more collaborative and informed license applications.

Interest in hydroelectric power has increased recently and is expected to continue for the foreseeable future as energy prices remain high and the state seeks solutions for the railbelt's[21] aging power-generation infrastructure. Across the state many utilities are seeking options to increase stability and efficiency, and to reduce variabilities within existing hydroelectric systems.

RECOMMENDATIONS

- More streamgages are needed in Alaska to increase hydrologic baseline data across the state, especially in the southwest, northwest, and Arctic regions.
- The relationship between instream flows and fish productivity needs to be more intensively researched. Ideally, investigations should be conducted over multiple life cycles and in areas not significantly influenced by human activities. Naturally occurring fish populations and the amount of available versus utilized habitat should be monitored to better understand fish habitat preferences. Research is needed on key environmental parameters (e.g., ground water, water temperatures, and turbidity) and how variations in these parameters influence fish productivity.

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[20] Water bodies gaged include Indian River, Situk River, Chatanika River, Mulchatna River, Stuyahok River, Ophir Creek, Wasilla Creek, Montana Creek, Stariski Creek, Goldstream Creek, and Little Willow Creek.

[21] Alaska's railbelt region stretches from the Kenai Peninsula north more than 500 miles to Fairbanks. This region is named for areas reached by the railroad and is home to approximately 70 percent of Alaska's population (source: http://arctec.coop/, accessed April 4, 2014).

- The adequacy of ADF&G certificates of reservation should be reassessed using the latest state-of-the-art method. If results indicate additional water should be reserved, a supplemental reservation of water application should be completed and filed.
- Out-of-stream appropriations should be automatically reviewed by DNR once every 10 years, similar to reservations of water. This would allow DNR to better manage Alaska's water resources and minimize or avoid water use conflicts.
- Instream flow education, training, and outreach should be strengthened within the department and interested stakeholders. A fundamental goal commonly identified by instream flow practitioners is to achieve public recognition of the importance of maintaining instream flows and lake levels to sustain healthy fish populations. A key step toward achieving this goal is comprehensive outreach and incorporation of instream flow concepts and activities into education programs and school systems.
- Dedicated funding to the ACWA grant pool is needed to continue to meet ACWA's goal to address stewardship of Alaska's water bodies. Information about aquatic habitat issues is also needed to improve the ACWA database. This information can range from fish habitat concerns to documented habitat degradation and can include field data, reports, or photographs.

The experience of other states shows that it is prudent to protect instream flows as early as possible; otherwise, water may become scarcer and opportunities for protection more costly and contentious.

ACKNOWLEDGMENTS

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FIGURES AND TABLES

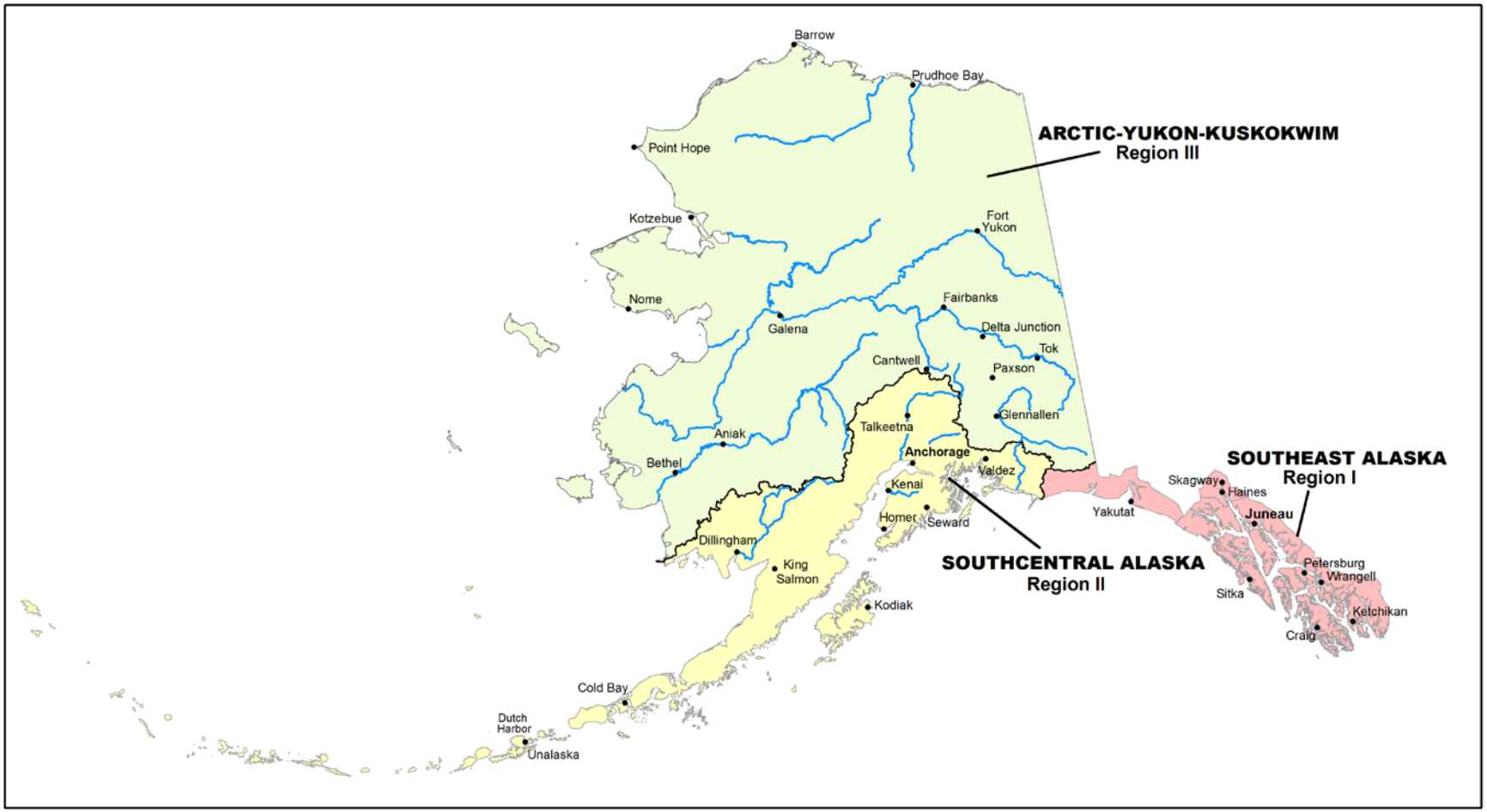

Figure 1.–Map of ADF&G, Division of Sport Fish regions in Alaska.

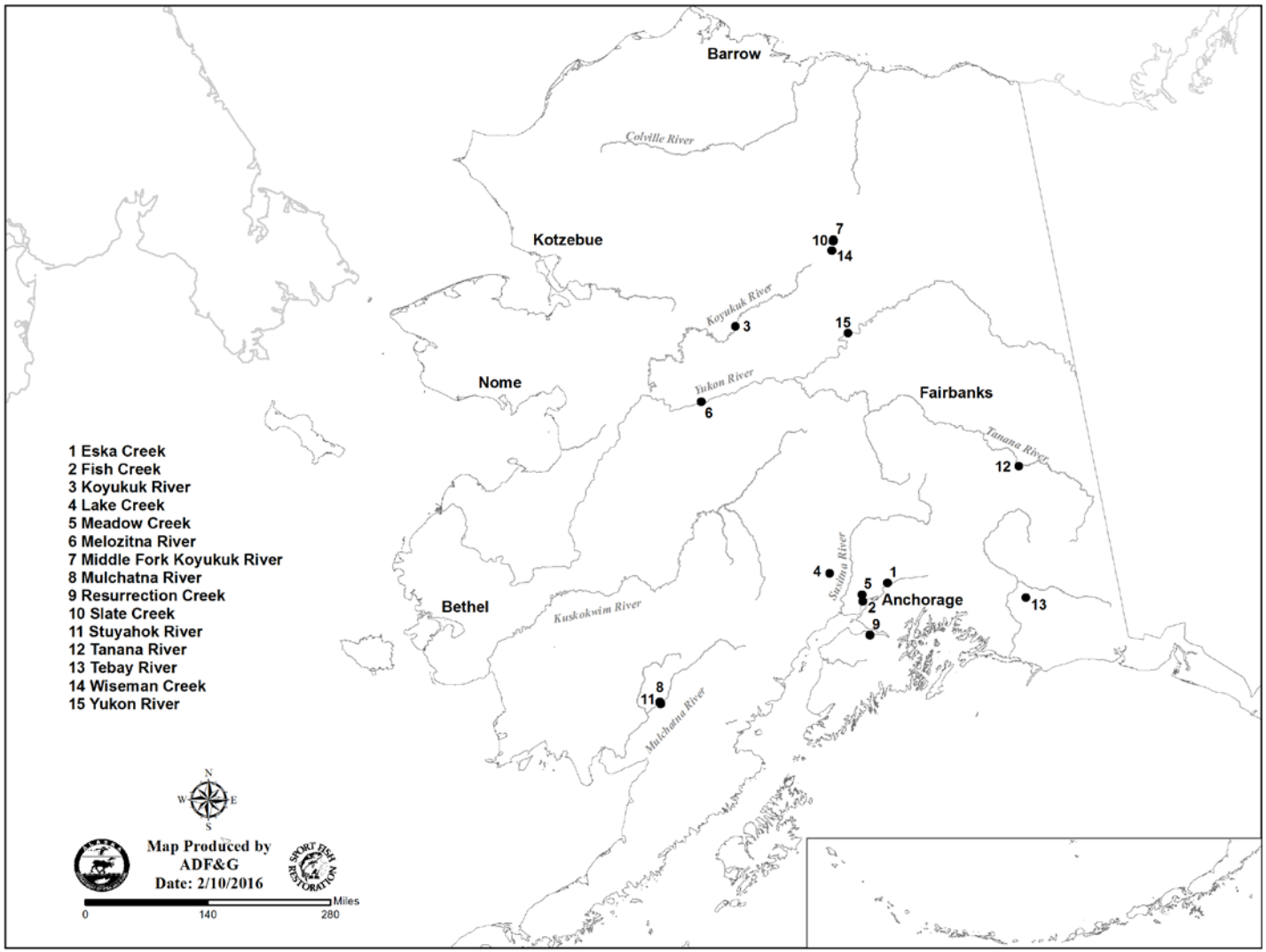

Figure 2.–Location of ADF&G reservation of water applications filed in 2015 in Alaska, except Southeast.

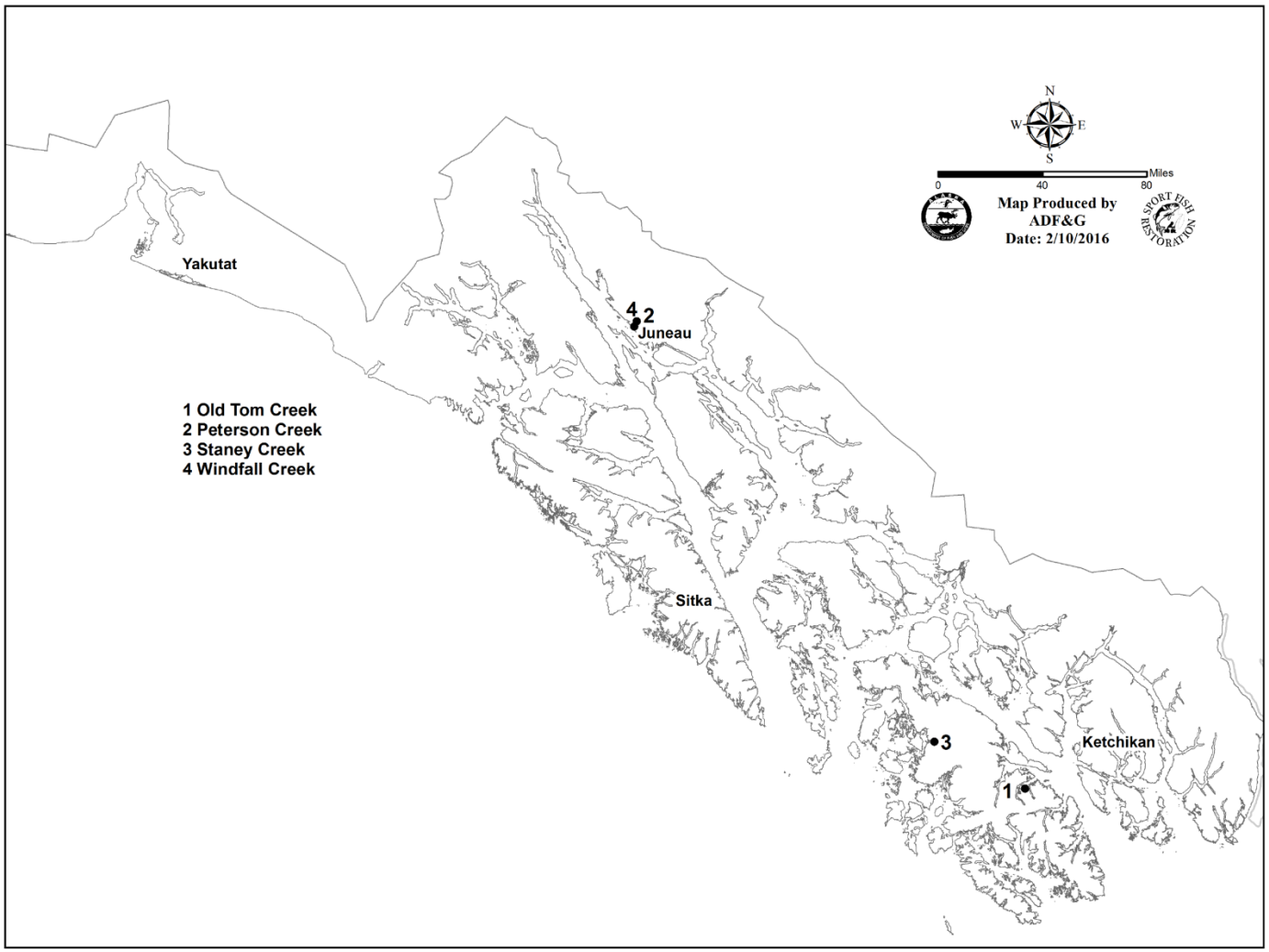

Figure 3.–Location of ADF&G reservation of water applications filed in 2015 in Southeast Alaska.

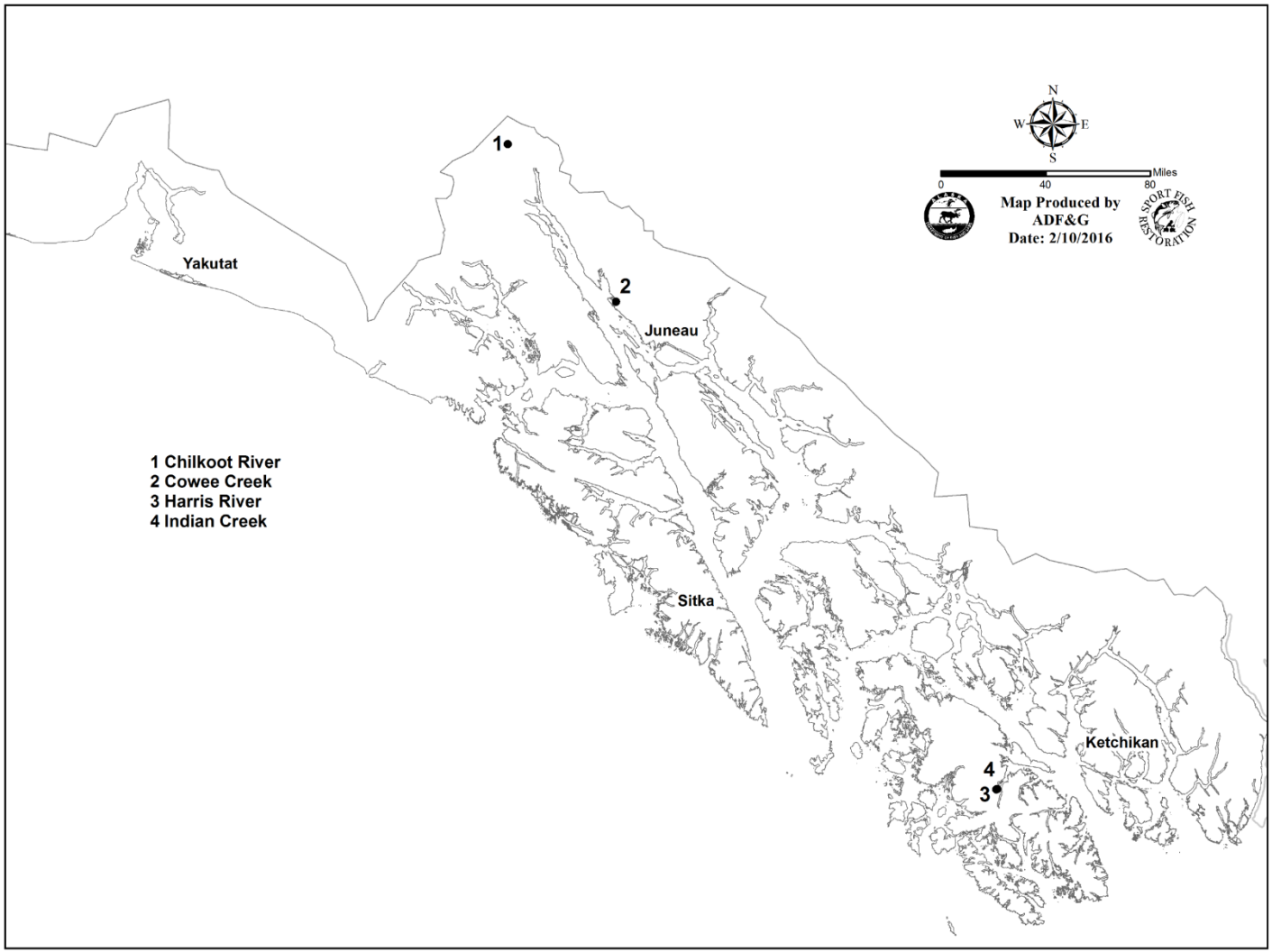

Figure 4.–Location of ADF&G certificates of reservation granted in 2015 in Southeast Alaska.

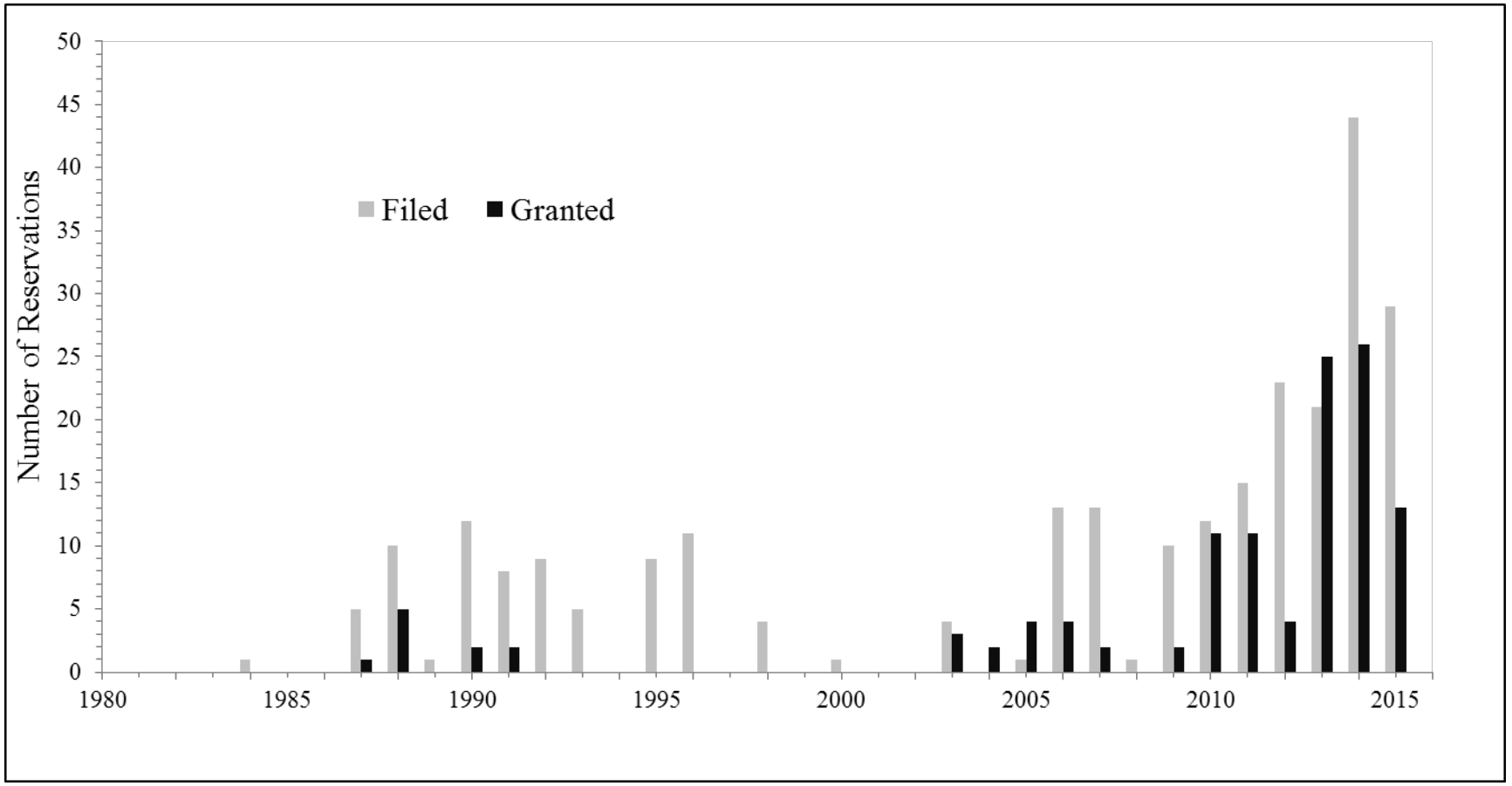

Figure 5.–Summary of ADF&G reservations filed and granted from 1980 to 2015 in Alaska.

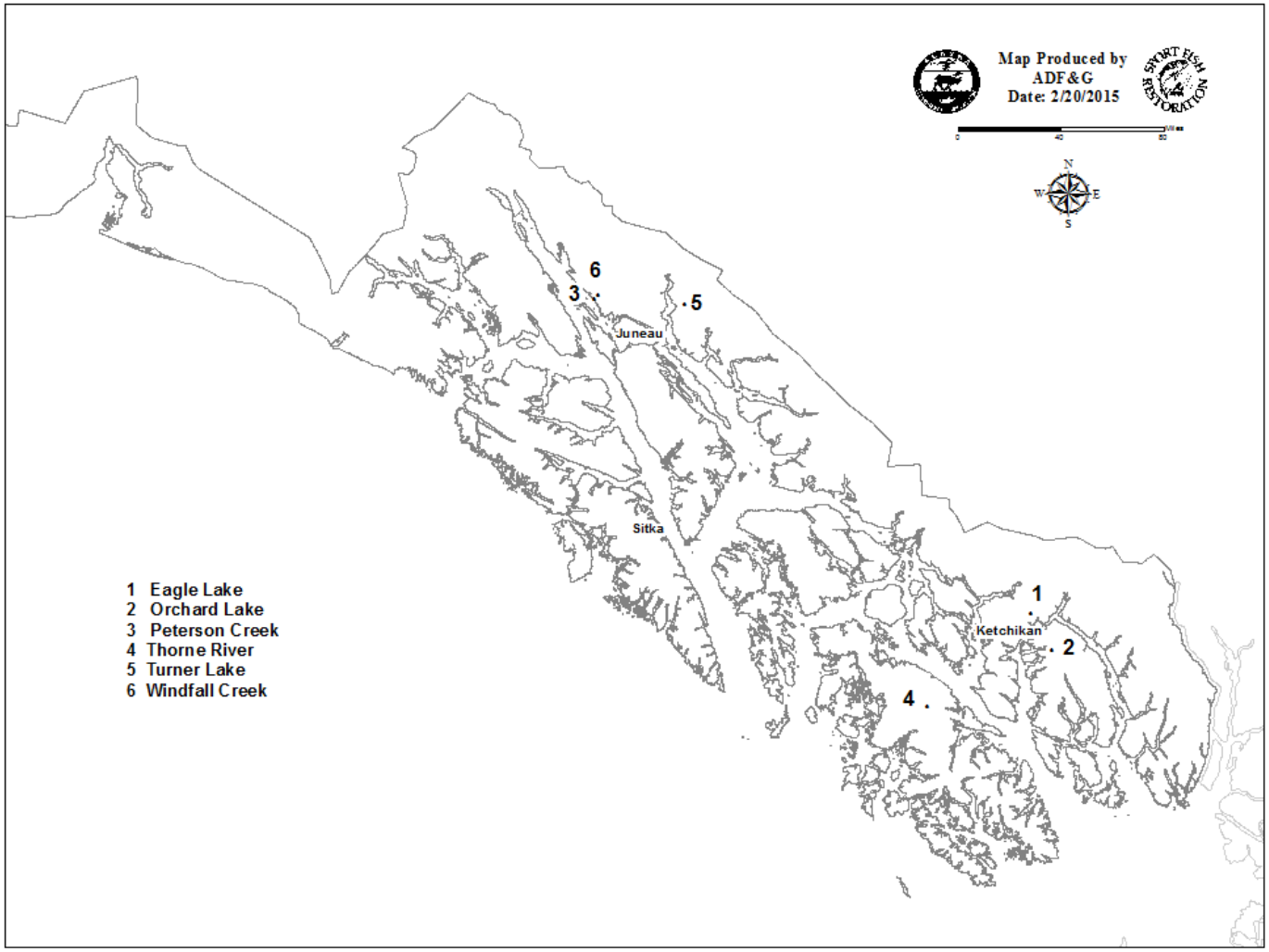

Figure 6.–Location of hydrologic investigations performed in 2015 by ADF&G, Statewide Aquatic Resources Coordination Unit staff.

Table 1.–Summary of all reservation of water applications filed and granted in Alaska as of December, 2015[a].

	Filed		Granted	
Organization/Private Individual	Rivers	Lakes	Rivers	Lakes
ADF&G	265	4	120	1
U.S. Fish and Wildlife Service	61	140	1	
Bureau of Land Management	22		1	
Trout Unlimited	11			
Curyung Tribal Council–Trout Unlimited	11			
Chuitna Citizens Coalition	3			
Eklutna Native Village	3	1		
Southwest Alaska Salmon Habitat Partnership–ADF&G	3			
The Nature Conservancy–ADF&G	1			
Arctic Unit of the Alaska Chapter of the American Fisheries Society–ADF&G	1			
Trout Unlimited–ADF&G	1			
Cook Inletkeeper–ADF&G	1			
Cheesh-na Tribal Council	1			
Chickaloon Native Village	1			
Bristol Bay Heritage Land Trust–New Koliganek Village Council	1			
Willie Dixon	1			
Copper River Watershed Council		1		
ADF&G (per Water Export Provision[b])	NA	NA	1	1
DNR (per Water Export Provision)	NA	NA	2	2

Source: K. Sager, DNR Water Resources Section, February 2, 2016.

Note: NA = not applicable

[a] Reservation numbers have been revised based on a recent review and supersede previous report summaries.
[b] The Water Export Provision (AS 46.15.035) refers to water exported out of one of the six defined hydrologic units that require a mandatory reservation to protect fish resources.

Table 2.–Summary of ADF&G reservation of water applications filed in 2015 in Alaska.

Name	DNR LAS No.[a]	Priority Date
Lake Creek	30058	1/16/2015
Eska Creek	30060	1/16/2015
Stuyahok River Reach A2	30073	1/27/2015
Stuyahok River Reach B	30074	1/27/2015
Mulchatna River Reach A2	30075	1/27/2015
Mulchatna River Reach B2	30076	1/27/2015
Mulchatna River Reach C	30077	1/27/2015
Yukon River Reach F	30112	2/17/2015
Yukon River Reach G	30111	2/17/2015
Tanana River Reach E	30109	2/17/2015
Tanana River Lower Reach B (Top File)	30106	2/17/2015
Tanana River Lower Reach A (Top File)	30174	3/26/2015
Tebay River	30177	4/1/2015
Resurrection Creek near Hope	30191	4/3/2015
Meadow Creek Reach A2 (Top File)	30212	4/20/2015
Fish Creek Reach A2 (Top File)	30213	4/20/2015
Fish Creek Reach B2 (Top File)	30214	4/20/2015
Old Tom Creek Reach B[b]	30265	6/1/2007
Old Tom Creek Reach C[b]	30264	6/1/2007
Melozitna River	30448	9/2/2015
Peterson Creek near Amalga Harbor	30449	9/2/2015
Windfall Creek	30450	9/2/2015
Koyukuk River	30451	9/2/2015
Middle Fork Koyukuk River	30712	11/25/2015
Staney Creek Reach A	30713	11/25/2015
Staney Creek Point B	30714	11/25/2015
Staney Creek Point C	30715	11/25/2015
Wiseman Creek	30720	11/25/2015
Slate Creek	30721	11/25/2015

Note: See figures 2 and 3 for site locations.

[a] The Land Administration System (LAS) is managed by Alaska Department of Natural Resources (DNR) to provided case file summaries and abstracts of information depicted on the State Status Plat.

[b] Previously filed but further refinement needed.

Table 3.–Summary of ADF&G reservation of water applications granted in 2015 in Alaska.

Name	DNR LAS No.[a]	Priority Date	Granted Date	Miles of Fish Habitat Protected
Cowee Creek	27485	12/11/2009	4/24/2015	2
Harris River Reach A	26462	6/1/2007	6/3/2015	1.3
Harris River Reach B	29903	6/1/2007	6/3/2015	1.1
Harris River Reach C	29904	6/1/2007	6/3/2015	5.6
Harris River Reach D	29905	6/1/2007	6/3/2015	5.3
Harris River Point E	29906	6/1/2007	6/3/2015	0
Harris River Reach F	29907	6/1/2007	6/3/2015	0.5
Harris River Point G	29908	6/1/2007	6/3/2015	0
Indian Creek Reach A	29909	6/1/2007	6/9/2015	1
Indian Creek Reach B	29910	6/1/2007	6/9/2015	0.8
Indian Creek Reach C	29912	6/1/2007	6/9/2015	1.2
Chilkoot River Reach A	27349	7/14/2009	11/6/2015	1.5
Chilkoot River Reach A2	30417	12/17/2012	11/6/2015	1.5
			Total	21.8

Note: See figure 4 for site locations.

[a] The Land Administration System (LAS) is managed by Alaska Department of Natural Resources (DNR) to provide case file summaries and abstracts of information depicted on the State Status Plat.

Table 4.–Summary of FERC hydroelectric and hydrokinetic projects in Alaska monitored by ADF&G in 2015.

Project	FERC No.	Capacity (kW)[a]	Status
Active Projects			
Southeast			
Annex Creek	2307	3,600	Licensed Hydroelectric
Armstrong – Keta	8875	80	Licensed Hydroelectric
Beaver Falls	1922	7,100	Licensed Hydroelectric
Black Bear	10440	4,500	Licensed Hydroelectric
Blind Slough/Crystal Lake	201	2,000	Licensed Hydroelectric
Blue Lake	2230	16,900	Licensed Hydroelectric
Burnett River Hatchery	10773	80	Licensed Hydroelectric
Crooked Creek/Jim's Lake Elfin Cove	14514	160	Proposed Hydroelectric
Dewey Lakes	1051	943	Licensed Hydroelectric
Falls Creek	11659	800	Licensed Hydroelectric
Gartina Falls	14066	600	Licensed Hydroelectric
Goat Lake	11077	4,000	Licensed Hydroelectric
Green Lake	2818	18,540	Licensed Hydroelectric
Jetty Lake	3017	249	Licensed Hydroelectric
Kasidaya	11588	3,000	Licensed Hydroelectric
Ketchikan Lakes	420	4,200	Licensed Hydroelectric
Lake 3160	14588	4,995	Proposed Hydroelectric
Lake Dorothy	12379	14,300	Licensed Hydroelectric
Mahoney Lake	11393	9,600	Under FERC Stay
Pelican	10198	700	Licensed Hydroelectric
Hiilangaay (Reynolds Creek)	11480	5,000	Licensed Hydroelectric
Salmon Creek	2307	6,700	Licensed Hydroelectric
Soule River	12615	75,000	Proposed Hydroelectric
Swan Lake	2911	22,000	Licensed Hydroelectric
Sweetheart Lake	13563	20,000	Proposed Hydroelectric
Tyee	3015	20,000	Licensed Hydroelectric
West Creek	14603	25,000	Proposed Hydroelectric
Whitman Lake	11841	4,600	Licensed Hydroelectric
Yakutat Wave Energy	14438	750	Proposed Hydrokinetic-Tidal

[a] kilowatts

-continued-

Table 4.–Page 2 of 2.

Project	FERC No.	Capacity (kW) [a]	Status
Active Projects			
Southcentral			
Allison Lake	13124	6,500	Licensed Hydroelectric
Bradley Lake	8221	119,700	Licensed Hydroelectric
Bruskasna Creek	14652	1,700	Proposed Hydroelectric
Carlo Creek	14645	1,600	Proposed Hydroelectric
Chignik	620	60	Licensed Hydroelectric
Cooper Lake	2170	19,380	Licensed Hydroelectric
Dry Spruce	1432	75	Licensed Hydroelectric
Grant Lake Kenai Peninsula	13212	5,000	Proposed Hydroelectric
Humpback Creek	8889	1,250	Licensed Hydroelectric
Jack River	14646	4,200	Proposed Hydroelectric
Kvichak River-Igiugig	13511	4,000	Proposed Hydrokinetic-River
Old Harbor	13272	525	Proposed Hydroelectric
Power Creek	11243	6,000	Licensed hydroelectric
Solomon Gulch	2742	12,000	Licensed hydroelectric
Susitna-Watana	14241	600,000	Proposed Hydroelectric
Terror Lake	2743	33,750	Licensed Hydroelectric
Turnagain Arm #13509	13509	240,000	Proposed Hydrokinetic-Tidal
Projects Surrendered (S) or Cancelled (C)			
Interior			
Whitestone – Tanana River	13305	100	Licensed Hydrokinetic (S)
Southcentral			
East Forelands	13821	100,000	Prop. Hydrokinetic-Tidal (S)
Fourth of July/Godwin Creeks	14630	12,700	Proposed Hydroelectric (C)
Talkeetna River	14636	7,500	Proposed Hydroelectric(C)
Projects Non-Jurisdictional by FERC			
Southeast			
Walker Lake	DI15-2	1,000	Proposed Hydroelectric
Southcentral			
Anderson Creek-Chenega	DI14-3	60	Proposed Hydroelectric
Knutson Creek-Pedro Bay	DI14-6	Not Specified	Proposed Hydroelectric

[a] kilowatts

Table 5.–Summary of USGS gaging stations in Alaska for water years 2012 to 2015[a,b].

Period of Record (Years)	Number of Gaging Stations for Water Year 2012	Number of Gaging Stations for Water Year 2013	Number of Gaging Stations for Water Year 2014	Number of Gaging Stations for Water Year 2015
0 < 1	16	17	16	14
1 to < 5	146	140	142	140
5 to < 10	90	94	95	95
10 to < 20	117	115	115	119
20 to < 50	89	96	94	94
≥ 50	11	12	14	15
Total	469	474	476	477
At least 5 years of record	309	316	318	323
Total active in water year	122	123	107	106
Total active for Southeast	26	24	22	22
Total active for Southcentral	46	48	39	37
Total active for Southwest, Yukon, Northwest, and Arctic	56	51	46	47

Source: J. Conaway, USGS Hydrologist, Anchorage, February 9, 2016; personal communication.

[a] USGS performed a significant review and revision to their databases, which resulted in revisions to the number of streamgages reported. This affects comparisons to previous report summaries.

[b] A water year occurs from October 30 through September 30 (e.g., Water Year 2012 occurs from October 1, 2011 – September 30, 2012).

APPENDIX A.
ALASKA CLEAN WATER ACTIONS GRANTS – FY15
PROJECT DESCRIPTIONS

Reproduced from Alaska Department of Environmental Conservation ACWA *Previously funded projects* website; see http://www.dec.state.ak.us/water/acwa/acwagrantsproject.htm

Below are the summaries of the Alaska Clean Water Actions (AWCA) Grants for projects starting July 2014 and finishing June 2015. The summaries are arranged by region of the state.

SOUTHEAST REGION

Pullen Creek Rain Garden and Outreach

Southeast Alaska Watershed Coalition, $18,400

This project addresses an ACWA Restoration priority. Working with the Taiya Inlet Watershed Council, the coalition will construct a rain garden at the Senior Center in Skagway. The garden will be designed to capture stormwater that normally flows along 11th Avenue, enabling the water to be treated before flowing to Pullen Creek. Diverting untreated stormwater will help to reduce the pollution reaching Pullen Creek. The garden will also serve to educate Skagway residents about the benefits of low impact development. Contact: Rachel Ford, (907) 983-2426.

Snow Removal Plan in the Haines Borough

Southeast Alaska Watershed Coalition, $17,000

This project addresses an ACWA Stewardship priority. This project will develop a snow removal plan to be presented to the Haines Assembly and the Department of Transportation for adoption. Haines receives an average of 97 inches of snow per year and can receive as much as 120 inches of snow in a single month. Piles of snow, which are often laced with sand, grease, antifreeze, oil and heavy metals have, in the past, been pushed into anadromous stream and tide pools. This project will provide Haines with a snow removal plan identifying alternative locations that will better protect sensitive fish and aquatic habitats. Contact: Brad Ryan, (907) 314-0477.

Wrangell Beach Monitoring

Southeast Alaska Watershed Coalition, $24,589

This project addresses an ACWA Stewardship priority. This project will initiate recreational beach monitoring at City Park and Petroglyph Beach in Wrangell, Alaska. These beaches were identified by DEC as a high priority, because they are commonly used for swimming and wading recreation activities. DEC will work with local agencies to notify the public if monitoring results confirm bacterial levels that exceed public health criteria. The project will also increase public awareness of potential sources of bacterial contamination and associated health risks. Contact: Brad Ryan, (907) 314-0477.

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SOUTHCENTRAL REGION

Big Lake Management Plan Revision

Agnew Beck Consulting, LLC, $28,616

This project addresses an ACWA Restoration priority. In 2006, Big Lake was identified as impaired (polluted) from petroleum hydrocarbons. This project is focused on amending the 1998 Lake Management Plan. With support from the community council, the project will start by educating the public on how revising the 1998 Lake Management Plan could help to reduce the petroleum hydrocarbons in the lake. Once authorization to amend the plan is received from the community, the grant recipients will produce an amended plan, and subsequently work with the community and Matanuska-Susitna Borough officials to seek adoption of the amended plan. Contact: Shelly Wade, (907) 242-5326.

Clean Boating in the Susitna Valley

Cook Inletkeeper, $55,000

This project addresses both ACWA Restoration and Protection priorities and expands on an ongoing program. Since 2010, DEC, in conjunction with Cook Inletkeeper and local partners has been educating boat owners at Big Lake and the Little Susitna River on the importance of clean boating practices. This project continues the education activities at these sites and adds the Deshka River boat landing. All locations are popular for sport fishing and other recreational opportunities in the Matanuska-Susitna Borough and are important economically and socially. The waters are impaired (Big Lake) or at risk of impacts to water quality from petroleum hydrocarbons. Excess turbidity is also a concern. Older 2-stroke carbureted motors are a significant contributor of petroleum hydrocarbons, and boat wakes can cause re-suspension of fine sediment which increases turbidity. Contact: Rachel Lord, (907) 235-4068 ext. 29.

Cottonwood Creek Septic Smart: Homeowner Outreach

Mat-Su Resource Conservation Development Council, $23,450

This project addresses an ACWA Restoration priority and expands on-going efforts. Cottonwood Creek is polluted from fecal coliform bacteria. This project will work with homeowners, local engineers, and septic system pumping services to expand pumping co-operatives that share costs where one street with several home septic systems can be inspected and serviced at the same time at reduced costs. To date, several local septic pumping companies are willing to offer a discounted rate for the co-op. Outreach to the local neighborhoods adjacent to Cottonwood Creek has been conducted and at least one co-op is anticipated to be formed shortly. The project now seeks to expand the number of participants in co-ops. The project will also include an education component to raise awareness of how septic systems can impact water quality in the creek and ways homeowners can reduce this risk. Contact: Marty Metiva, (907) 373-1016

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Kenai and Kasilof River Bacteria Monitoring

Kenai Watershed Forum, $96,616

This project addresses an ACWA Stewardship priority and continues previous work. Elevated levels of enterococci and fecal coliform bacteria have been measured in samples collected at the mouth of the Kenai River. Using past data to focus the 2014 sampling efforts, this project continues monitoring on the Kenai River (at the mouth of the Kenai River, North Beach and South Beach) and at an upriver location near the Warren Ames Bridge (River Mile 5). The project will also monitor at the mouth of the Kasilof River (both north and south beaches) and at one location near the Sterling Highway Bridge. If bacteria levels of concern are found, microbial source tracking will be used to determine the source. Contact: Rebecca Zulueta, (907) 260-5449 x1210.

Kenai River Watershed Baseline Assessment

Kenai Watershed Forum, $30,000

This project addresses an ACWA Protection priority. The project will conduct a comprehensive evaluation of the Kenai River baseline data collected from April 2007 to July 2014. Since 2000, the Kenai Watershed Forum has led a broad partnership among 14 organizations to conduct twice-annual watershed-wide monitoring. Monitoring has evaluated 22 sites for over 18 parameters including metals, petroleum hydrocarbons, turbidity, water temperature, and pH. The results are evaluated annually, but a comprehensive evaluation of trends has not been completed since 2007. This project will provide a comprehensive report including trend analysis of all data collected to date. Contact: Rebecca Zulueta, (907) 260-5449 x1210.

Matanuska River Assessment

Palmer Soil and Water Conservation District, $16,800

This project addresses an ACWA Restoration priority. A portion of the Matanuska River is impaired because of an unpermitted disposal area. Items in the disposal area include automobiles, appliances, abandoned drums, railroad cars, and other recently disposed household items. The grant recipients will work with DEC and the landowner to develop a debris removal and disposal alternative plan including needed permits. The plan will include a cost estimate of options. Contact: Dr. Jeff Smeenk, (907) 745-1441.

Willow Water Quality Habitat Assessment

Aquatic Restoration and Research Institute, $47,000

This project addresses an ACWA Protection priority to evaluate water quality and aquatic habitat of Willow Creek, an important salmon and rainbow trout stream in the Matanuska Susitna Borough. Riparian development in combination with recent flooding may be increasing bank erosion. Increased development in the watershed may also be impacting water quality. This project will evaluate Willow Creek for physical characteristics, physical habitat, biotic communities, and riparian development. A final report will detail the current ecological condition of Willow Creek. Contact: Jeffrey C. Davis, (907) 315-4631.

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INTERIOR REGION

Chena River – Awareness Campaign

Tanana Valley Watershed Association, $12,000

This project addresses an ACWA Restoration priority. This project supports on- going efforts to raise local awareness about the Chena River. The Chena River is Alaska's second largest producer of juvenile Chinook salmon that migrate to the Yukon River. This project will organize a Chena River Summit highlighting the benefits of green infrastructure (GI) applications to improve water quality in the Chena River watershed. Contact: Jewelz Barker, (907) 374-8890.

Fairbanks Complete Streets Best Management Practices

Tanana Valley Watershed Association, $11,392

This project addresses an ACWA Restoration priority for the Chena River. This project seeks to implement green infrastructure projects in conjunction with the Cushman and Barnette Complete Streets improvement projects. Green infrastructure applications are a logical fit to the Complete Streets movement, which has nationally seen high success rates in making streets safer and more user-friendly and at the same time reducing environmental impacts. Through public outreach, the project will work with local partners including the City of Fairbanks and private land owners to see how they can incorporate green infrastructure applications to complement the street redesign. Contact: Jewelz Barker, (907) 374-8890.

STATEWIDE

Decreasing Sewage Discharges from Alaska Boaters

Cook Inlet Keeper, $43,223

This project addresses an ACWA Protection priority. This project will partner with the Alaska Clean Harbors project to educate boaters and harbormasters on the importance of proper sewage management to protect public health. It will also obtain feedback on the barriers to proper sewage pump-out use, and increase the number of harbor facilities in Alaska with working sewage pump- out units. With over 68,000 recreational motor boat users in Alaska, it is clear that many Alaskans enjoy boating around the coast, bays and other inlets. Human sewage from boats can contain harmful bacteria contaminating local waters and shellfish beds. A final report describing accomplishments and avenues for increasing pump out use will be provided. Contact: Rachel Lord, (907) 235-4068 ext. 29.