Special Publication No. 15-16

Instream Flow Protection in Alaska, 2014

by

Joe Klein

April 2015

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

SPECIAL PUBLICATION NO. 15-16

INSTREAM FLOW PROTECTION IN ALASKA, 2014

By

Joe Klein
Alaska Department of Fish and Game, Division of Sport Fish, Anchorage

Alaska Department of Fish and Game
Division of Sport Fish, Research and Technical Services
333 Raspberry Road, Anchorage, Alaska, 99518-1565

April 2015

This investigation was partially financed by the Federal Aid in Sport Fish Restoration Act (16 U.S.C. 777-777K) under Project F-10-31, Job H-1.

The Special Publication series was established by the Division of Sport Fish in 1991 for the publication of techniques and procedures manuals, informational pamphlets, special subject reports to decision-making bodies, symposia and workshop proceedings, application software documentation, in-house lectures, and became a joint divisional series in 2004 with the Division of Commercial Fisheries. Special Publications are intended for fishery and other technical professionals. Special Publications are available through the Alaska State Library, Alaska Resources Library and Information Services (ARLIS) and on the Internet: http://www.adfg.alaska.gov/sf/publications/. This publication has undergone editorial and peer review.

Joe Klein,
Alaska Department of Fish and Game,
Division of Sport Fish, Research and Technical Services
333 Raspberry Road, Anchorage, Alaska, USA

This document should be cited as:
Klein, J. 2015. Instream flow protection in Alaska, 2014. Alaska Department of Fish and Game, Special Publication No. 15-16, Anchorage.

TABLE OF CONTENTS

Page

LIST OF FIGURES ii

LIST OF TABLES ii

LIST OF APPENDICES ii

ABSTRACT 1

INTRODUCTION 1

Reservations of Water 3

- Nominations 3
- Data Compilation, Collection, and Analysis 3
  - Biological Data 3
  - Hydrologic Data 3
  - Instream Flow Analysis 4
- Adjudication 4

ACTIVITIES 5

Reservations of Water 5

Hydrologic Investigations 5

- Peterson Creek near Amalga Harbor 5
- Turner, Eagle, and Orchard Lakes 6
- Thorne River 6
- Windfall Creek near Juneau 7

Hydroelectric Project Licensing 7

Alaska Clean Water Actions Program 8

DISCUSSION 9

Issues and Activities 9

Hydrologic Data Needs 9

RECOMMENDATIONS 10

ACKNOWLEDGMENTS 11

REFERENCES CITED 12

FIGURES AND TABLES 15

APPENDIX A. ALASKA CLEAN WATER ACTIONS GRANTS – FY14 PROJECT DESCRIPTIONS 31

LIST OF FIGURES

Figure **Page**

1. Map of ADF&G, Division of Sport Fish regions in Alaska. 16
2. Location of ADF&G reservation of water applications filed in 2014 in Alaska, except Southeast. 17
3. Location of ADF&G reservation of water applications filed in 2014 in Southeast Alaska. 18
4. Location of ADF&G certificates of reservation granted in 2014 in Alaska, except Southeast. 19
5. Location of ADF&G certificates of reservation granted in 2014 in Southeast Alaska. 20
6. Summary of ADF&G reservations filed and granted from 1980 to 2014 in Alaska. 21
7. Location of hydrologic investigations performed by ADF&G, Statewide Aquatic Resources Coordination Unit staff in 2014 in Alaska 22

LIST OF TABLES

Table **Page**

1. Summary of all reservation of water applications filed and granted in Alaska as of December, 2014. 23
2. Summary of ADF&G reservation of water applications filed in 2014 in Alaska. 24
3. Summary of ADF&G reservation of water applications granted in 2014 in Alaska. 26
4. Summary of FERC hydroelectric and hydrokinetic projects in Alaska monitored by ADF&G staff in 2014. 27
5. Summary of USGS streamgage sites in Alaska as of September 30, 2014. 29

LIST OF APPENDICES

Appendix **Page**

A1. Alaska Clean Water Actions Grants, FY14. 32

ABSTRACT

This report summarizes instream flow protection and related activities of the Alaska Department of Fish and Game (ADF&G) in 2014. 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.

ADF&G filed reservation of water applications on 250 river reaches and 4 lakes. Certificates of reservation have been granted to ADF&G for 79 river reaches and one lake. In 2014, ADF&G filed 44 applications for river reaches and was granted certificates for 26 river reaches.

ADF&G has continued to exceed the program goal of filing 10 reservations annually. From 2010 to 2014, on average, 26 applications were filed per year and 16 were granted. This is up from the 1999–2009 average of 4 and 2 applications filed and granted, respectively. Factors contributing to this improvement include ADF&G and DNR leadership making reservations a priority; an agreement with DNR (Department of Natural Resources), 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 six projects in 2014. Investigations were performed primarily to obtain the necessary data to support reservation of water applications. SARCU staff monitored 63 hydroelectric and hydrokinetic projects and served as ADF&G's representative for the Alaska Clean Waters Actions (ACWA) program. ACWA funded 14 projects in state fiscal year 2014 (July 1, 2013, through June 30, 2014).

Key words: instream flow, reservation of water, Alaska Water Use Act, Peterson Creek, Eagle Lake, Orchard Lake, Turner Lake, Thorne River, Windfall Creek, Meadow Creek, Fish 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, 18,120 water bodies in Alaska have been identified as supporting anadromous fish species (J. Johnson, Habitat Biologist, Alaska Department of Fish and Game, January 22, 2014; personal communication).

In 2013, an estimated 465,936 anglers fished 2,202,957 days and harvested approximately 2,941,908 of the estimated 6,5481,603 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 quantify and acquire water rights within lotic[2] and lentic[3] water bodies to sustain fish and

[1] Alaska Sport Fishing Survey database [Internet]. 1996– . Anchorage, Alaska: Alaska Department of Fish and Game, Division of Sport Fish, cited February 11, 2015. Available from: http://www.adfg.alaska.gov/sf/sportfishingsurvey/.

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

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

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 impact 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 2014 and the status of reservation of water activities conducted by other agencies and the private sector.

[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

---

[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[11], ADF&G Freshwater Fish Inventory[12], and USGS National Hydrography Database[13]. 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)). Once DNR makes a determination on the amount of water to reserve, the public is provided 15 days to comment. If no further administrative actions are needed after all public comments are reviewed, DNR prepares a "Finding of Fact, Conclusion of Law and Decision" document that describes the information and rationale used for the decision and issues a Certificate of Reservation of Water. The certificate is recorded in the State Recorder's Office and

[10] See http://waterdata.usgs.gov/ak/nwis/sw.
[11] See https://www.adfg.alaska.gov/sf/SARR/AWC/index.cfm?ADFG=main.home.
[12] See http://www.sf.adfg.state.ak.us/SARR/Surveys/index.cfm
[13] See http://nhd.usgs.gov/data.html

includes a description of the water right, any conditions placed on it, and the priority date that establishes the seniority of the water right. If DNR's decision is challenged, there is an administrative appeal process with the 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 assist with 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

From 1980 to 2014, ADF&G filed reservation of water applications on 250 river systems and 4 lakes from a total of 515 applications received by DNR (Table 1). Certificates of reservation were granted to ADF&G for 105 river reaches and one lake, and for one river reach and lake under the water export provision[14] (Table 1). The remaining 148 applications remain in queue waiting to be adjudicated. Requested flow amounts in the pending applications are subject to modification during the adjudication process.

In 2014, ADF&G filed 44 applications (Table 2; Figures 2 and 3) and received 26 certificates of reservation providing protection for approximately 134 miles of fish habitat (Table 3; Figures 4 and 5). ADF&G continues to exceed the annual program goal of filing 10 reservations annually (Figure 6). From 2010 to 2014, on average, 26 applications were filed annually and 16 reservations were granted. This is significantly more than the 1999–2009 average of 4 and 2 applications filed and granted, respectively. Factors contributing to this improvement include ADF&G and DNR leadership making reservations a priority, the 2002 MOU that created the vision and framework for reducing the backlog, and efficiencies gained by both agencies through a better understanding of the adjudication process.

HYDROLOGIC INVESTIGATIONS

Hydrologic investigations were performed primarily to obtain data to support a reservation of water application. Investigations were performed on six projects in 2014 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*).

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

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).

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 11 times during 2014 to download transducer data, take discharge measurements, and perform routine streamgage maintenance. A reservation of water application will be filed in 2015, after the available streamgage data has been analyzed.

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 2014, each lake was visited twice. Turner Lake was visited in June and October, and Eagle and Orchard lakes were visited in May and October. These site visits included downloading transducer data, measuring current lake levels relative to an established benchmark, taking pictures of site conditions, and performing routine gage site maintenance. The October site visits also included collecting a true elevation above sea level for the established benchmark at each site.

The lake level gages will remain in operation until October 2015. Using one year of hydrologic data, reservation of water applications reserving lake levels were filed and accepted by DNR. After hydrologic data collection is complete and analyzed, amendments to the reservation using data from the entire period of record will be submitted, if necessary.

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 and 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 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 2014 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 2014, discharge measurements were also collected at each station as follows: four measurements at the North Thorne River, five measurements at Goose Creek, and four measurements at Rio Beaver.

Streamgage 13501 and all three discharge stations will remain in operation until October 2017. In 2015, reservation applications will be filed requesting to reserve streamflows within 5 miles of the mainstem of the Thorne River and 13 miles of the tributaries.

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 also is 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 steelhead outmigrating 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 seven times during 2014 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 will be filed in 2015 after one complete water year of streamgage data has been collected and analyzed.

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.

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

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

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 is expected to ease the burden on applicants and resource agencies and should result in more collaborative and informed license applications.

In 2014, SARCU monitored 58 FERC hydroelectric and hydrokinetic projects (Table 4). 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[16] aging power-generation infrastructure.

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[17].

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, 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:

---

[16] 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).

[17] 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

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, 391 waters have been nominated into the ACWA program, 143 of which include water bodies ranked "high priority" by one or more agency.

In state fiscal year 2014 (July 1, 2013, through June 30, 2014), 12 projects were funded by ACWA (Appendix A1). 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

ISSUES AND ACTIVITIES

ADF&G continued to successfully protect fish habitat through the use of reservations during the past year. In 2014, 44 applications were filed and accepted by DNR. In addition, 26 applications were successfully adjudicated and issued certificates. Overall, 106 water bodies have been granted certificates protecting 1,363 miles of stream and 1,481 surface acres of lakes. The 2002 DNR-ADF&G MOU has provided guidance and support needed to address the backlog of pending applications. Although the backlog remains at over 380 applications, current efforts by DNR and ADF&G are making a difference and providing protection for fish habitat, migration, and propagation.

During the past year, DNR completed adjudication of a USFWS application for the Uganik River near Kodiak and initiated adjudication of U.S. Bureau of Land Management applications for the Gulkana River near Sourdough and one private application with the Chickaloon Native Village for Moose Creek near Palmer.

House Bill 77, introduced by Governor Parnell last year, included many provisions in an attempt to address permitting and other issues by DNR. It included a provision to address how reservations could be filed and to whom they could be granted. DNR stated that granting a public resource, such as a reservation of water, to a nongovernmental organization or a private individual could conflict with the State of Alaska's public trust responsibilities. The issue was debated in the Senate Natural Resource committee and due to strong public opposition against the bill, it was tabled and expired at the end of the session.

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 521 USGS streamgages have been established in Alaska (J. Conaway, USGS Hydrologist, Anchorage, December 15, 2014, personal communication; Table 5). This equates to flow measurements for less than 1 percent of Alaska's water bodies. Less than half of these could meet the USGS's 10-year minimum historical record standard for supporting a statistically reliable regional flow analysis.

In Water Year 2014 (October 1, 2013, through September 30, 2014), USGS operated 107 streamgages in Alaska. This represents approximately one streamgage 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 2014, 22 were in Southeast, 39 were in Southcentral, and 46 were located throughout the remainder of the state (J. Conaway, USGS Hydrologist, Anchorage, December 15, 2014, personal communication; Tables 5 and 6). This is a decrease of 16 streamgages (approximately 13 percent) from Water Year 2013.

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 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[19].

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.

[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] 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.

- 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. 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

The author would like to thank Monte Miller, Shawn Johnson, Jarrod Sowa, Tom Cappiello, Jason Mouw, and Jason Hass from ADF&G for their contributions and/or review; Jeff Conaway from USGS and Kim Sager from DNR for their contributions; the Division of Sport Fish biologist who responded to requests for information; and Ian Gill and Kyra Sherwood for their editorial and technical support.

REFERENCES CITED

Anderson, R. T. 1991. Alaska legislature considers innovative instream flow law. Rivers 2(3):255-261.

Annear, T., I. Chisholm, H. Beecher, A. Locke, P. Aarrestad, C. Coomer, C. Estes, J. Hunt, R. Jacobson, G. Jobsis, J. Kauffman, J. Marshall, K. Mayes, G. Smith, R. Wentworth, and C. Stalnaker. 2004. Instream flows for riverine resource stewardship. Revised edition. Instream Flow Council, Cheyenne, Wyoming.

Bethers, M. R., and B. Glynn. 1990. A study of sockeye salmon in Windfall Lake, 1989. Alaska Department of Fish and Game, Fishery Data Series No. 90-29, Anchorage.

Bovee, K. D., B. L. Lamb, J. M. Bartholow, C. B. Stalnaker, J. Taylor, and J. Henriksen. 1998. Stream habitat analysis using the instream flow incremental methodology. U.S. Geological Survey, Biological Resources Division Information and Technology Report USGS/BRD-1998-0004, Fort Collins, Colorado.

Brabets, T. P. 1996. Evaluation of the streamflow-gaging network of Alaska in providing regional streamflow information. U.S. Dept. of the Interior, U.S. Geological Survey; prepared in cooperation with the Alaska Department of Natural Resources and U.S. Forest Service. Water-resources investigations report 96-4001, Anchorage.

Burkardt, N. 2000. Paradise confounded: the status of Alaska's instream flow program. Rivers 7(4):361-363.

Curran, H. J., and L. P. Dwight. 1979. Analysis of Alaska's Water Use Act and its interaction with federal reserved water rights. Institute of Water Resources, University of Alaska, Fairbanks.

DNR (Alaska Department of Natural Resources). 1985. State of Alaska instream flow handbook: a guide to reserving water for instream use. Alaska Department of Natural Resources, Division of Land and Water Management, Water Management Section, Anchorage.

Estes, C. C. 1984. Evaluation of methods for recommending instream flows to support spawning by salmon. Master's thesis, Washington State University, Pullman.

Estes, C. C. 1998. Annual summary of instream flow reservations and protection in Alaska. Alaska Department of Fish and Game, Fishery Data Series No. 98-40, Anchorage.

Harding, R., and Jones, D. 1992. Peterson Creek and Lake System Steelhead Evaluation 1991. Alaska Department of Fish and Game, Fishery Data Series No. 92-46, Anchorage.

Harle, M. L., and C. C. Estes. 1993. An assessment of instream flow protection in Alaska. Pages 9-1-9-19 [*In*] MacDonnell, L.J. and T.A. Rice, editors. 1993. Instream flow protection in the West. Revised Edition. University of Colorado School of Law, Natural Resources Law Center, Boulder.

Hass, J. 2013. Thorne River streamgage. Alaska Department of Fish and Game, Division of Sport Fish, Regional Operational Plan ROP.SF.4A.2013.10, Anchorage.

Hill, M. T., W. S. Platts, and R. L. Beschta. 1991. Ecological and geomorphological concepts for instream and out-of-channel flow requirements. Rivers 2(3):198-210.

Hynes, H. B. N. 1970. The ecology of running waters. University of Toronto Press, Toronto.

Johnson, J., and P. Blanche. 2011. Catalog of waters important for spawning, rearing, or migration of anadromous fishes - Arctic region, effective June 1, 2011. Alaska Department of Fish and Game, Special Publication No. 11-04, Anchorage.

Jones, J. D., and R. D. Harding. 1998. Juneau roadside cutthroat trout studies: Windfall Creek Weir and Windfall Lake, 1997. Alaska Department of Fish and Game, Fishery Data Series No. 98-44, Anchorage.

Klein, J. 2011. Instream flow protection in Alaska, 1999-2009. Alaska Department of Fish and Game, Special Publication No. 11-01, Anchorage.

Klein, J. 2013. Surface-water data manual for the statewide aquatic resources coordination unit. Alaska Department of Fish and Game, Special Publication No. 13-05, Anchorage.

REFERENCES CITED (Continued)

Poff, N. L., J. D. Allan, M. B. Bain, J. R. Karr, K. L. Prestergaard, B. D. Richter, R. Sparks, and J. Stromberg. 1997. The natural flow regime: a paradigm for river conservation and restoration. BioScience 47(11):769-784.

Rantz, S. E., and others. 1982. Measurement and computation of streamflow: Volume 1 and 2. Geological Survey Water-Supply Paper 2175, Reston, VA.

Romberg, W. J., G. B. Jennings, K. Sundet, and A. E. Bingham. *In prep*. Estimates of participation, catch, and harvest in Alaska sport fisheries during 2012. Alaska Department of Fish and Game, Fishery Data Series, Anchorage.

Roos-Collins, R., and J. Gantenbein. 2005. Citizen toolkit for effective participation in hydropower licensing. Hydropower Reform Coalition. http://www.hydroreform.org/hydroguide/hydropower-licensing/citizen-toolkit-for-effective-participation (accessed June 29, 2010).

Sowa, J. 2013a. Peterson Creek Streamgage, 2012–2018. Alaska Department of Fish and Game, Division of Sport Fish, Regional Operational Plan SF.4A.2013.04, Douglas.

Sowa, J. 2013b. Windfall Creek Streamgage, 2012–2018. Alaska Department of Fish and Game, Division of Sport Fish, Regional Operational Plan SF.4A.2013.04, Douglas.

Spence, L. E. 1995. The natural flow regime: a paradigm for river conservation and restoration. Rivers 5(3):222-226.

Tennant, D. L. 1976. Instream flow regimes for fish, wildlife, recreation, and related environmental resources. Pages 359-373 [*In*] J. F. Orsborn and Allman, C. H. Editors. , Volume II. Instream flow needs. American Fisheries Society, Bethesda, Maryland.

White, M. R. 1982. Opportunities to protect instream flows in Alaska. U.S. Department of the Interior, Fish and Wildlife Service Office of Biological Services, Western Energy and Land Use Team, FWS/OBS-82/33, Washington, D. C.

Yanusz, R. J. 1998. Sockeye salmon escapement to Windfall Lake during 1997. Alaska Department of Fish and Game, Fishery Data Series No. 98-32 , Anchorage.

FIGURES AND TABLES

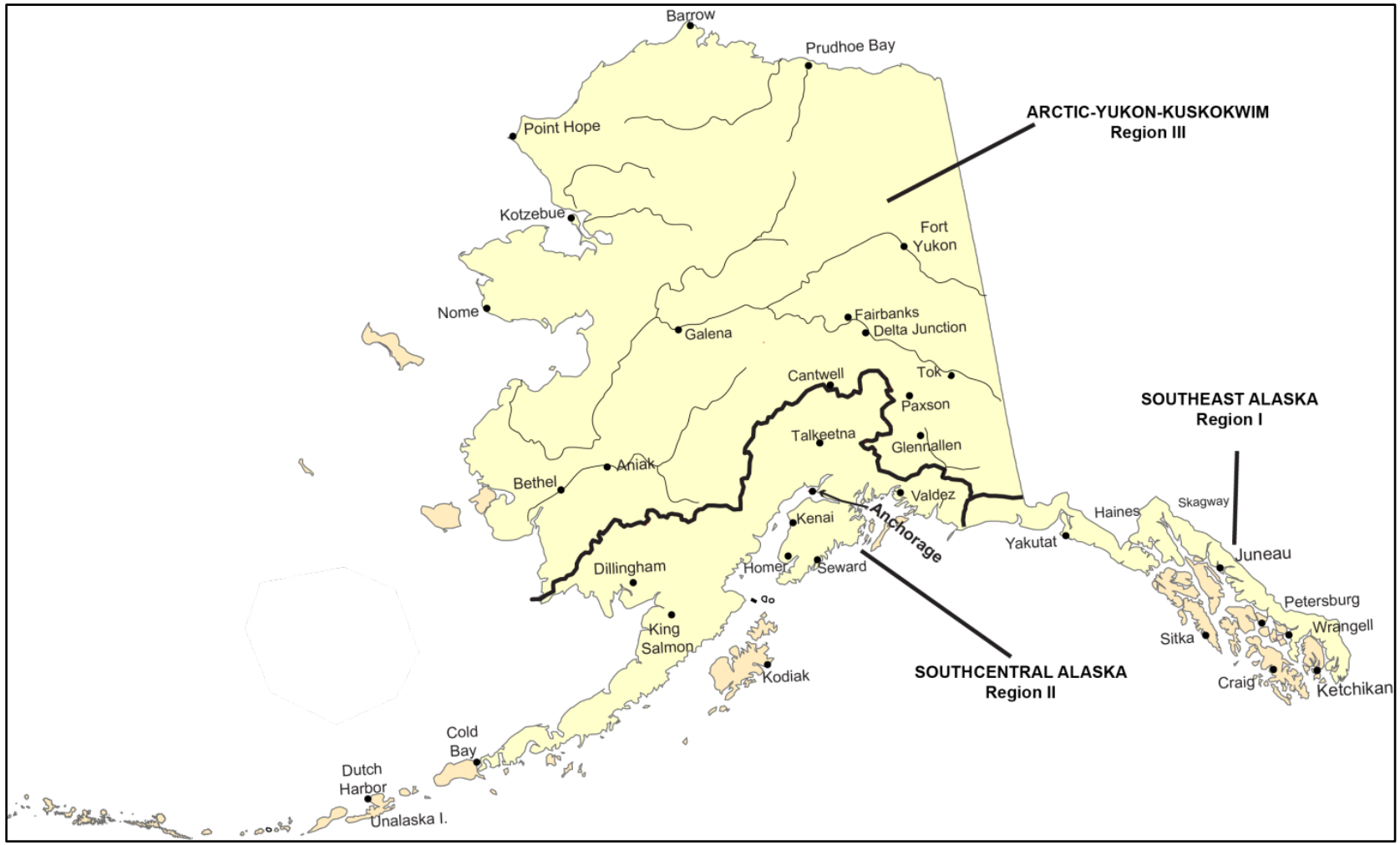

Figure 1.–Map of ADF&G, Division of Sport Fish regions in Alaska.

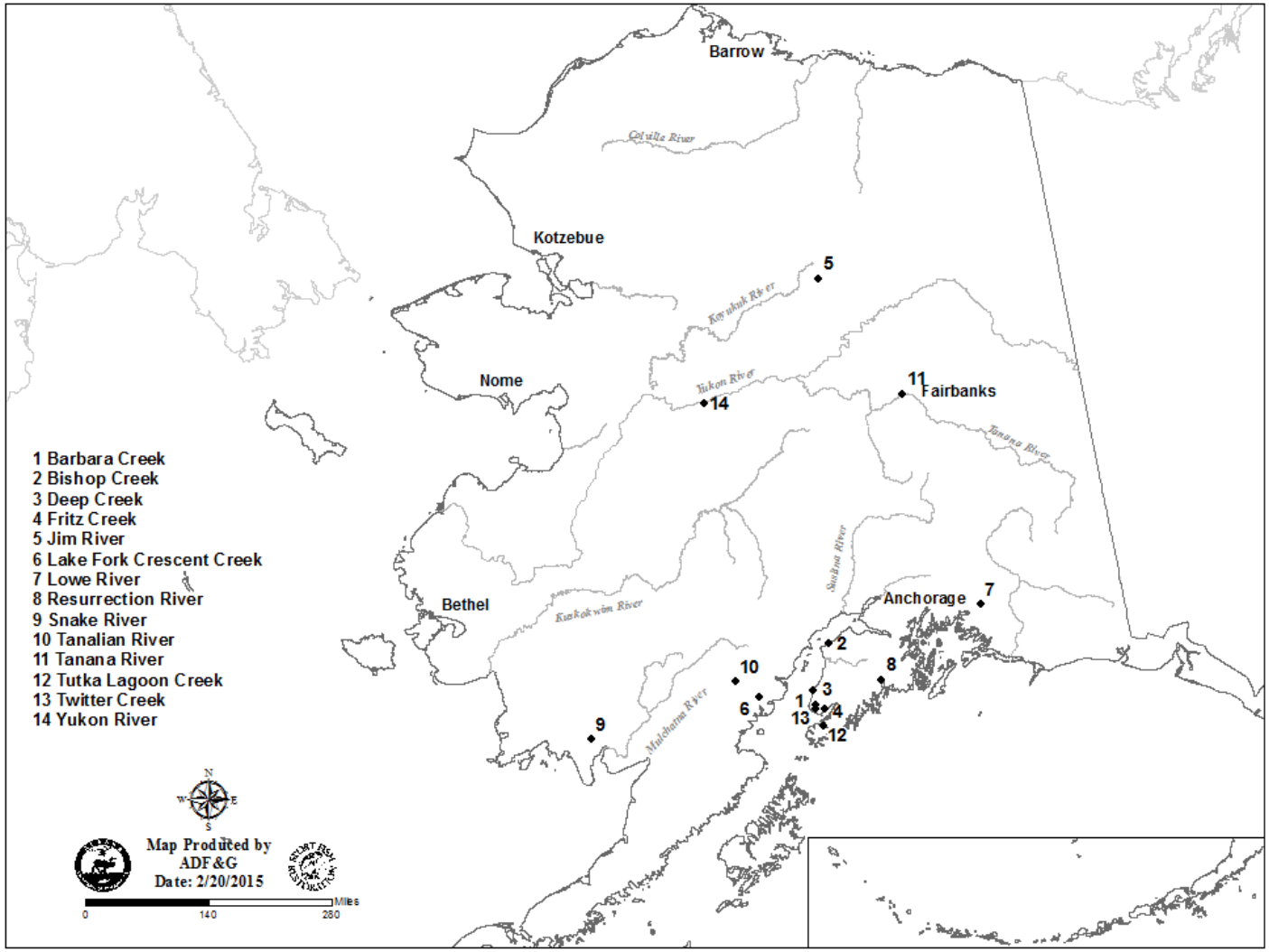

Figure 2.–Location of ADF&G reservation of water applications filed in 2014 in Alaska, except Southeast.

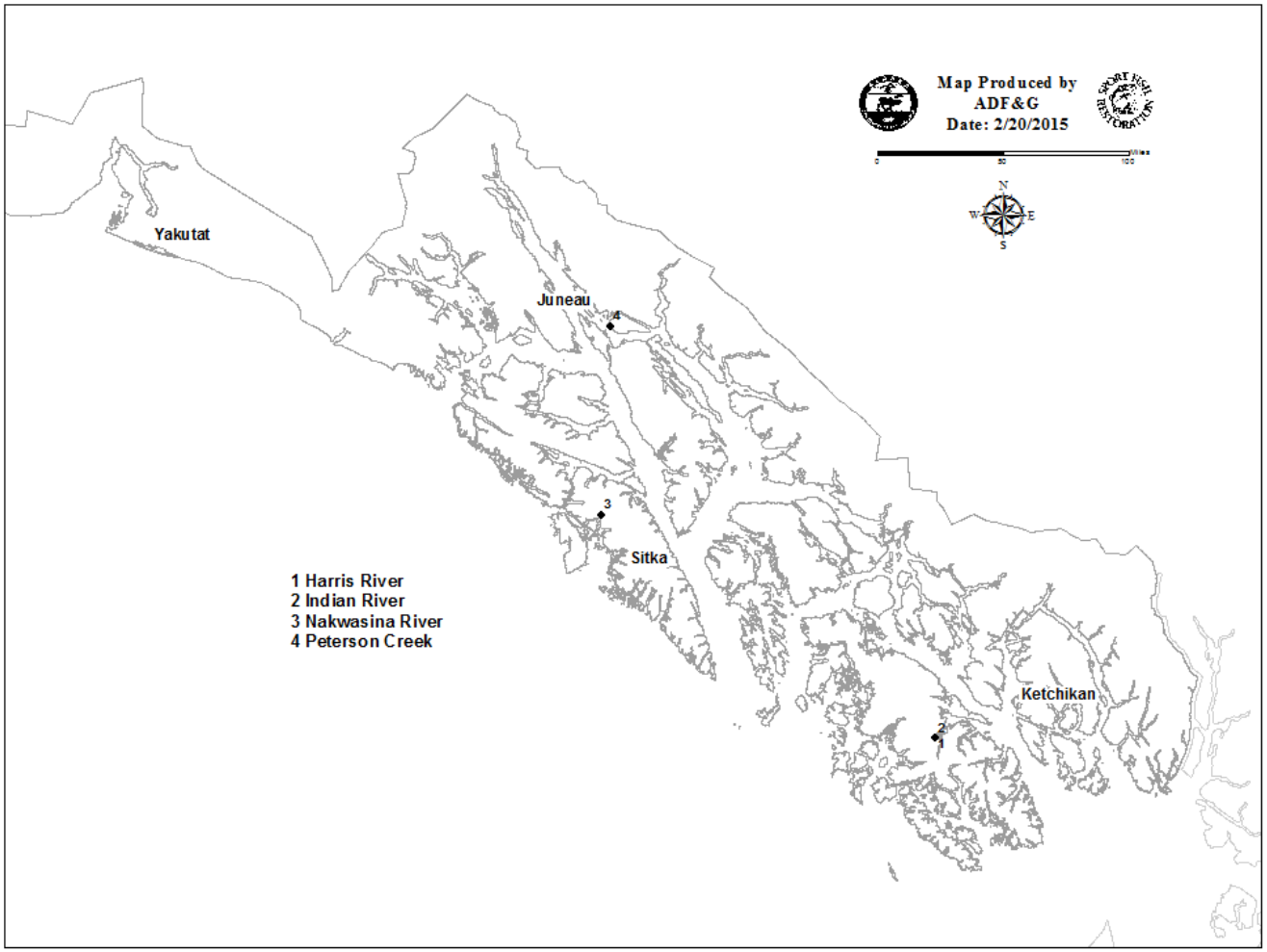

Figure 3.–Location of ADF&G reservation of water applications filed in 2014 in Southeast Alaska.

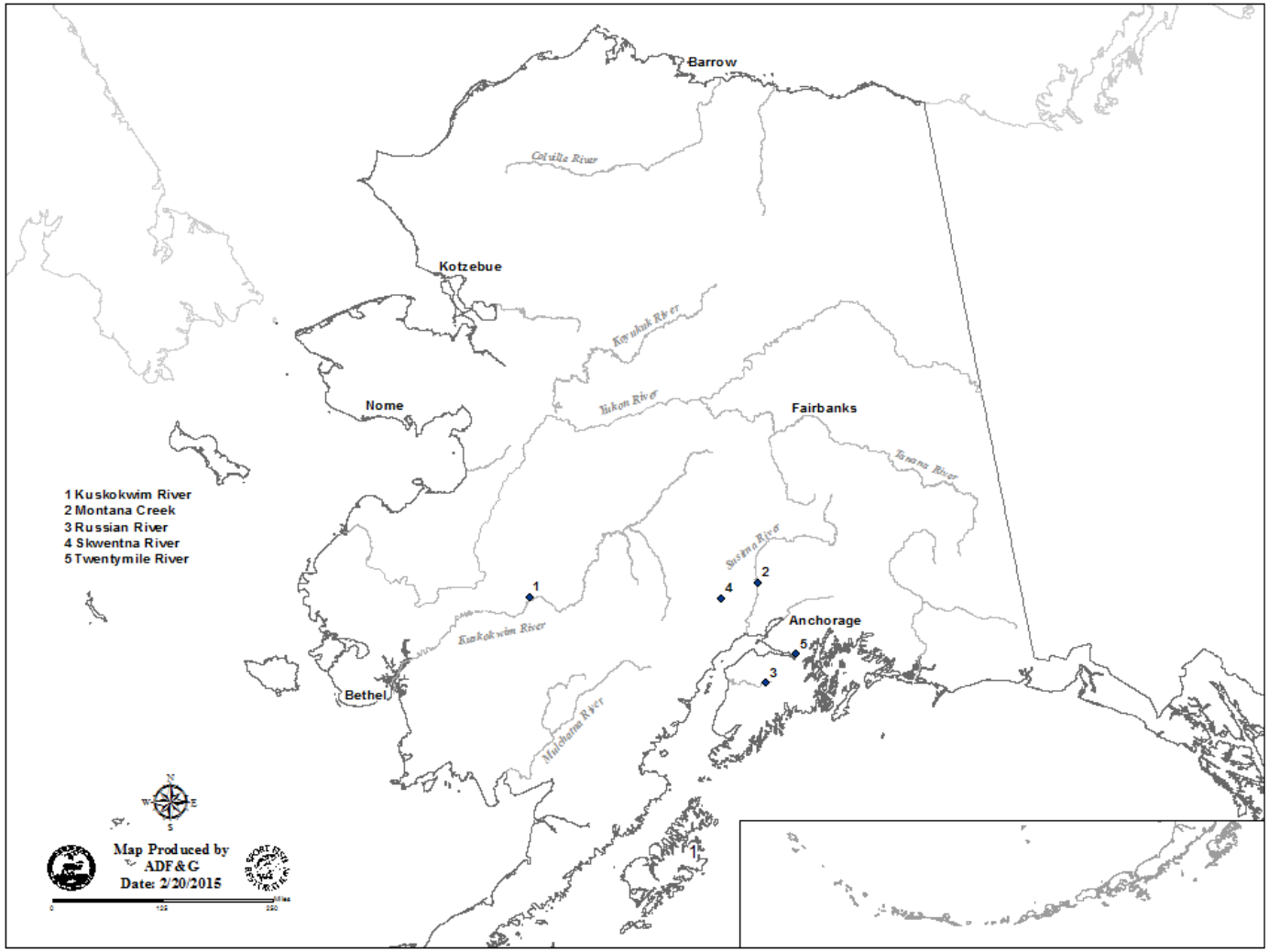

Figure 4.–Location of ADF&G certificates of reservation granted in 2014 in Alaska, except Southeast.

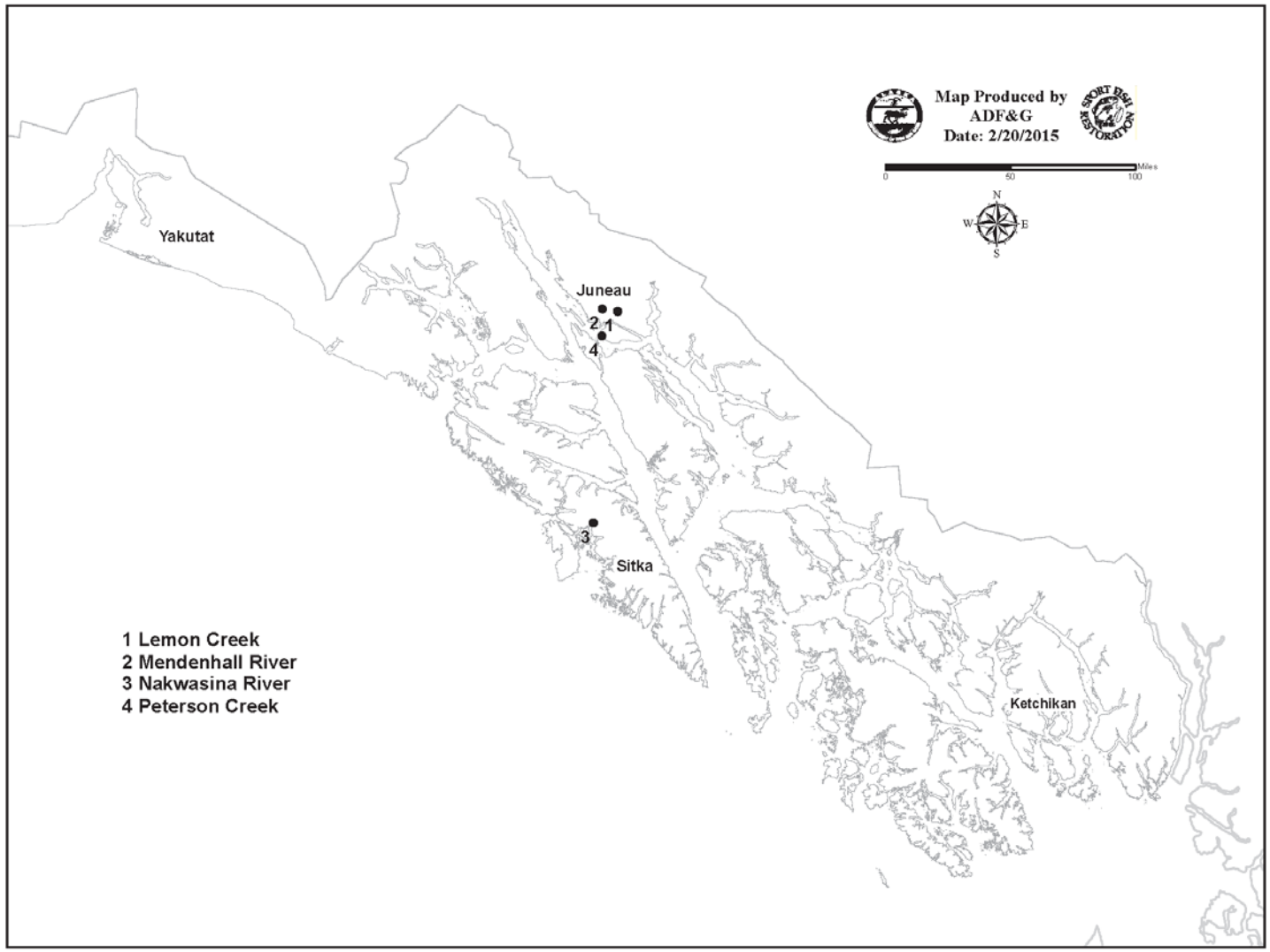

Figure 5.–Location of ADF&G certificates of reservation granted in 2014 in Southeast Alaska.

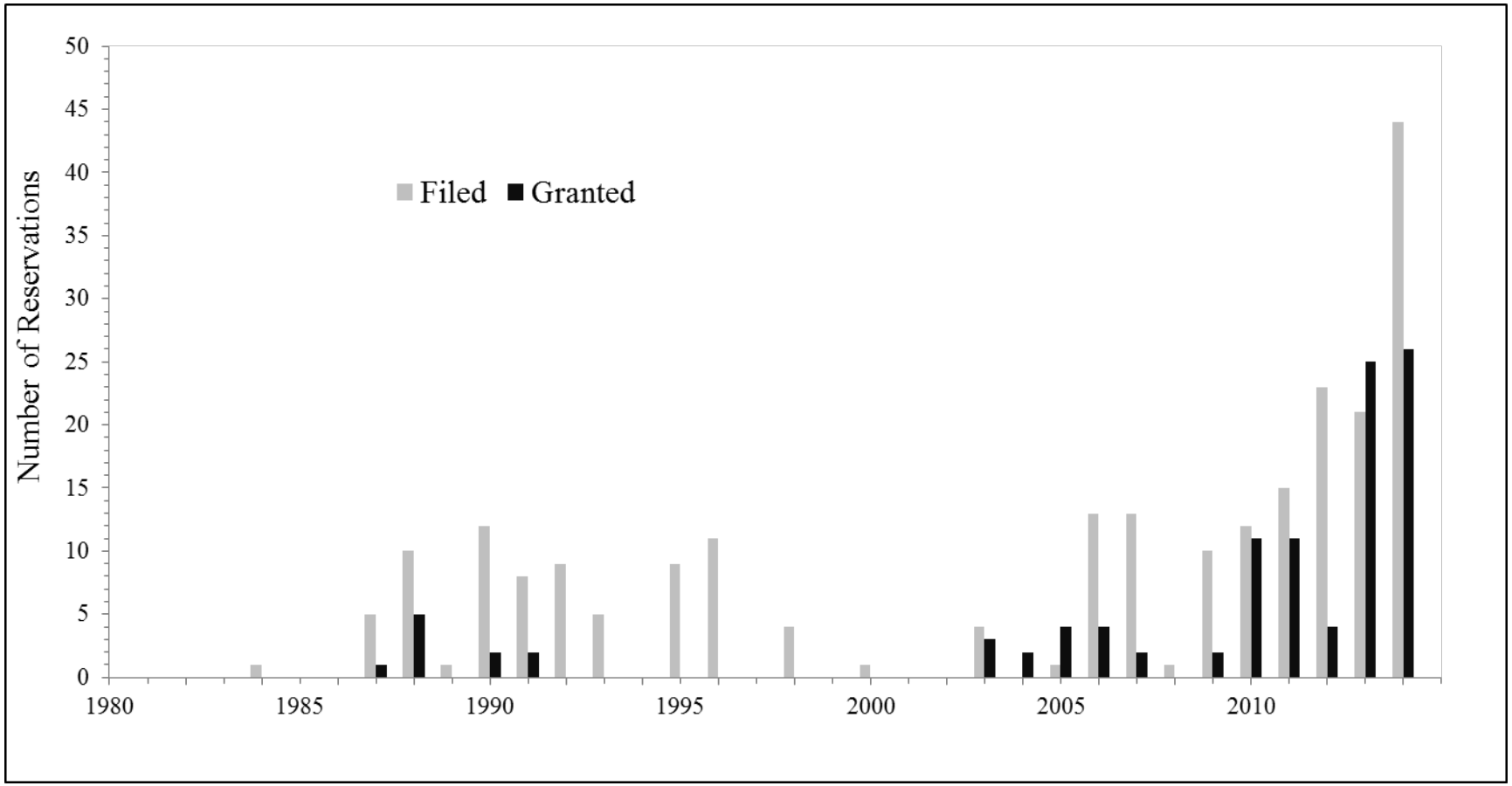

Figure 6.–Summary of ADF&G reservations filed and granted from 1980 to 2014 in Alaska.

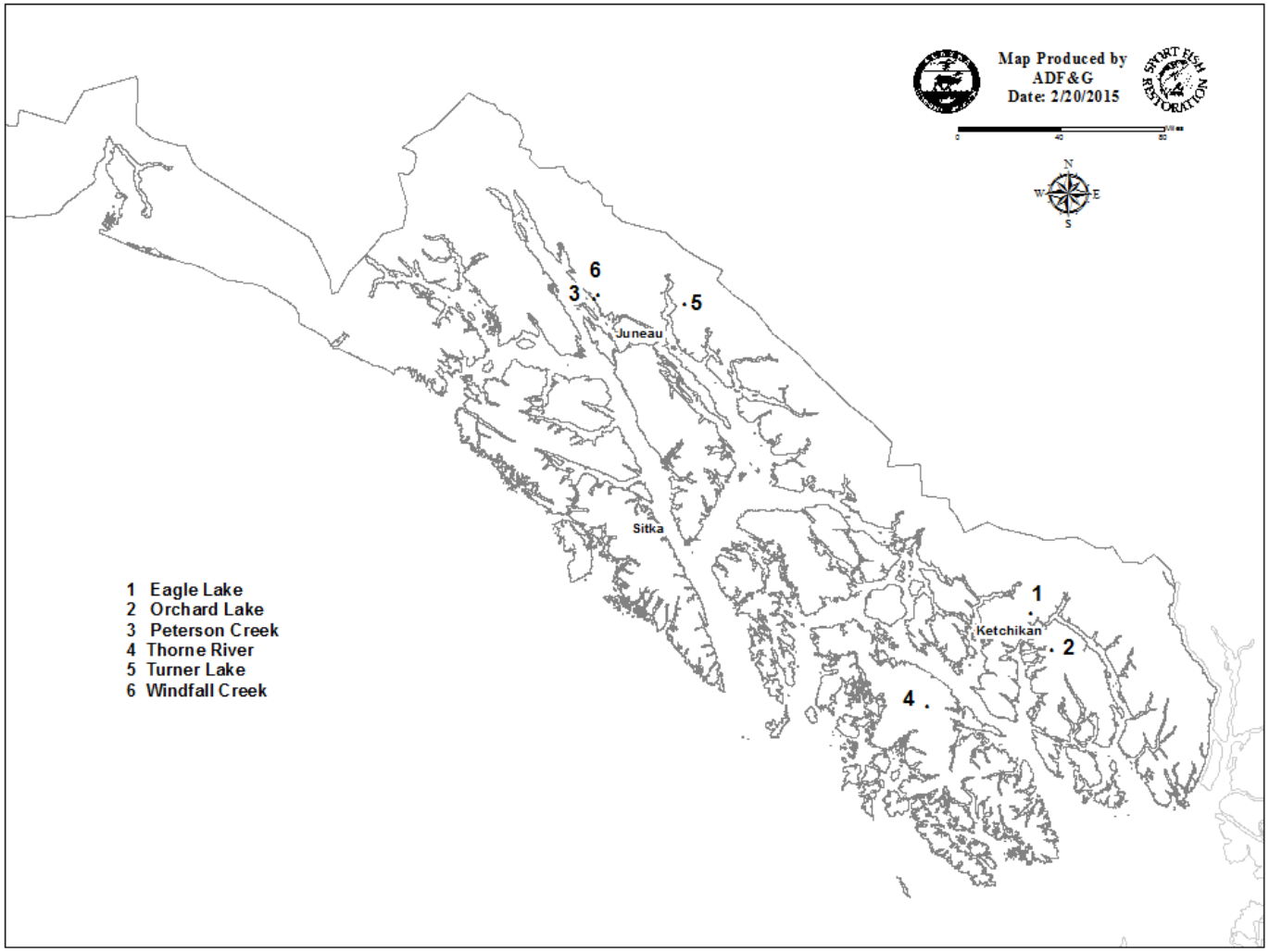

Figure 7.–Location of hydrologic investigations performed in 2014 by ADF&G, Statewide Aquatic Resources Coordination Unit staff.

Table 1.–Summary of all reservation of water applications filed and granted in Alaska as of December, 2014.

	Filed		Granted	
Organization/Private Individual	Rivers	Lakes	Rivers	Lakes
ADF&G	250	4	105	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			
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			
Copper River Watershed Council		1		
Willie Dixon	1			
ADF&G (per Water Export Provision)	NA	NA	1	1
DNR (per Water Export Provision)	NA	NA	2	2

Source: K. Sager, Alaska Department of Natural Resources, January 2, 2015.

Note: NA = not applicable

[a] 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 2014 in Alaska.

Name	DNR LAS No.	Priority Date
Barabara Creek	29427	1/13/2014
Bishop Creek	29682	6/3/2014
Deep Creek	29683	6/3/2014
Fritz Creek	29428	1/13/2014
Harris River – Reach B	29903	6/1/2007
Harris River – Reach C	29904	6/1/2007
Harris River – Reach D	29905	6/1/2007
Harris River – Point E	29906	6/1/2007
Harris River – Reach F	29907	6/1/2007
Harris River – Point G	29908	6/1/2007
Indian River in Harris Watershed – Reach H	29909	6/1/2007
Indian River in Harris Watershed – Reach I	29910	6/1/2007
Indian River in Harris Watershed – Reach J	29912	6/1/2007
Jim River – Lower Reach (top filed)	29933	9/15/2014
Lake Fork Crescent Creek	29681	6/3/2014
Lowe River	29784	7/1/2014
Nakwasina River Reach B	29418	3/29/2007
Nakwasina River Reach C	29419	3/29/2007
Nakwasina River Reach D	29420	3/29/2007
Nakwasina River Reach E	29421	3/29/2007
Nakwasina River Point F	29422	3/29/2007
Nakwasina River Reach G	29423	3/29/2007
Peterson Creek Reach B	29404	3/17/2008
Peterson Creek Reach C	29405	3/17/2008
Peterson Creek Reach D	29406	3/17/2008
Peterson Creek Reach E	29407	3/17/2008
Peterson Creek Tributary Reach F	29408	3/17/2008
Peterson Creek Tributary Reach G	29409	3/17/2008
Peterson Creek Tributary Reach H	29410	3/17/2008
Peterson Creek Tributary Reach I	29411	3/17/2008
Resurrection River near Seward	29785	7/1/2014
Snake River near Dillingham	29815	7/18/2014
Tanalian River	29917	9/5/2014
Tanana River Reach A	29781	7/1/2014
Tanana River Reach B	29782	7/1/2014
Tanana River Reach C	29897	8/28/2014
Tanana River Reach D	29898	8/28/2014
Tutka Lagoon Creek	29783	7/1/2014
Twitter Creek	29813	7/17/2014

-continued-

Table 2.–Page 2 of 2.

Name	DNR LAS No.	Priority Date
Yukon River Reach A	29786	7/1/2014
Yukon River Reach B	29787	7/1/2014
Yukon River Reach C	29870	8/15/2014
Yukon River Reach D	29913	8/29/2014
Yukon River Reach E	29916	9/4/2014

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 provide case file summaries and abstracts of information depicted on the State Status Plat.

Table 3.–Summary of ADF&G reservation of water applications granted in 2014 in Alaska.

Name	DNR LAS No.[a]	Priority Date	Granted Date	Miles of Fish Habitat Protected
Kuskokwim Reach A	28344	12/7/2011	9/17/2014	31.0
Kuskokwim Reach B	28345	12/7/2011	9/17/2014	48.0
Lemon Creek Reach A	21260	12/31/1996	9/17/2014	3.0
Lemon Creek Reach B	21261	12/31/1996	9/17/2014	1.0
Mendenhall River Reach A	13806	4/10/1992	1/3/2014	4.0
Mendenhall River Reach B	13807	4/10/1992	1/3/2014	1.0
Montana Creek nr Parks Hwy	27786	8/13/2010	9/23/2014	10.0
Nakwasina River Point F	29422	3/29/2007	5/9/2014	0.1
Nakwasina River Reach A	26363	3/29/2007	5/9/2014	2.0
Nakwasina River Reach B	29418	3/29/2007	5/9/2014	1.1
Nakwasina River Reach C	29419	3/29/2007	5/9/2014	1.6
Nakwasina River Reach D	29420	3/29/2007	5/9/2014	0.3
Nakwasina River Reach E	29421	3/29/2007	5/9/2014	0.3
Nakwasina River Reach G	29423	3/29/2007	5/9/2014	0.4
Peterson Creek Reach A	26817	3/17/2008	4/29/2014	1.4
Peterson Creek Reach B	29404	3/17/2008	4/29/2014	0.2
Peterson Creek Reach C	29405	3/17/2008	4/29/2014	0.2
Peterson Creek Reach D	29406	3/17/2008	4/29/2014	0.4
Peterson Creek Reach E	29407	3/17/2008	4/29/2014	0.7
Peterson Creek Reach F	29408	3/17/2008	4/29/2014	0.4
Peterson Creek Reach G	29409	3/17/2008	4/29/2014	0.2
Peterson Creek Reach H	29410	3/17/2008	4/29/2014	0.3
Peterson Creek Reach I	29411	3/17/2008	4/29/2014	0.3
Russian River	28751	10/24/2012	1/31/2014	5.0
Skwentna River	28727	9/28/2012	4/11/2014	16.0
Twentymile River	28750	10/24/2012	6/18/2014	5.0
			Total	133.9

Note: See figures 4 and 5 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 staff in 2014.

Project	FERC No.	Capacity (kW)	Status
Active Projects			
Southeast			
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
Cascade Creek	14360	70,000	Proposed 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
Reynolds Creek	11480	5,000	Licensed Hydroelectric
Salmon/Annex Creek	2307	6,700/3,600	Licensed Hydroelectric
Sheep Creek – Thane	14480	3,300	Proposed 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
Whitman Lake	11841	4,600	Licensed Hydroelectric
Yakutat Wave Energy	14438	750	Proposed Hydrokinetic-Tidal
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

-continued-

Table 4.–Page 2 of 2.

Project	FERC No.	Capacity (kW)	Status
Chignik	620	60	Licensed Hydroelectric
Cooper Lake	2170	19,380	Licensed Hydroelectric
Dry Spruce	1432	75	Licensed Hydroelectric
East Forelands Tidal Energy	13821	100,000	Proposed Hydrokinetic-Tidal
Fourth of July-Godwin Cr.	14630	12,700	Proposed 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
Talkeetna River	14636	75,000	Proposed Hydroelectric
Terror Lake	2743	33,750	Licensed Hydroelectric
Turnagain Arm #13509	13509	240,000	Proposed Hydrokinetic-Tidal
Interior			
Tanana River – Whitestone	13305	100	Licensed Hydrokinetic-River
Projects Surrendered, Expired or Cancelled			
Southeast			
Lake 3160	13599	4,995	Proposed Hydroelectric
Moira Sound Hydroelectric	14285	20,400	Proposed Hydroelectric
Takatz Lake	13234	5,000	Proposed Hydroelectric
Walker Lake	14424	1,000	Proposed Hydroelectric
Declarations of Intent Filed			
Southeast			
Crater Creek	DI14-5	1,000	Proposed Hydroelectric
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

Table 5.–Summary of USGS streamgage sites in Alaska as of September 30, 2014.

Number of streamgages	Period of Record (Years)
20	0 < 1[a]
149	1 to < 5
99	5 to < 10
130	10 to < 20
109	20 to < 50
14	≥ 50
Total	521

Source: J. Conaway, USGS Hydrologist, Anchorage, December 15, 2014; personal communication.

[a] The number of streamgages with less than one year of record are difficult to enumerate with the existing database.

Table 6.–Summary of USGS streamgage sites operating in Alaska during water year 2014 (October 1, 2013 – September 30, 2014).

Region of State	Number of Sites
Southeast	22
Southcentral	39
Southwest, Northwest, Yukon and Arctic	46
Total Statewide	107

Source: J. Conaway, USGS Hydrologist, Anchorage, December 15, 2014; personal communication.

APPENDIX A.
ALASKA CLEAN WATER ACTIONS GRANTS – FY14
PROJECT DESCRIPTIONS

Appendix A1.–Alaska Clean Water Actions Grants, FY14.

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 2013 and finishing June 2014. The summaries are arranged by region of the state and include the contact information for the group conducting the project.

Southeast Region

Auke Lake Water Quality Monitoring

Juneau Watershed Partnership (JWP), $17,729

This project addresses an ACWA Protection priority. Auke Lake is a freshwater lake located approximately 12 miles north of downtown Juneau. Auke Lake is a popular site for motorized summer recreation. In 2012, JWP, in close coordination with DEC, collected limited petroleum hydrocarbon data to compare to the Alaska Water Quality Standards. This project collects additional petroleum hydrocarbon data. The data will be used to assess the summer pollutant loading to the lake primarily due to two-stroke engine use. To aid in the assessment, JWP will partner with the City and Borough of Juneau to conduct a recreational user survey designed to collect information on the motorized and non-motorized use on the lake. JWP will evaluate the water quality data and survey results and present them in a final project report. Contact: Nina Horne, (907) 586-6853.

Homeowner On-site Wastewater System Education Project

Ketchikan Gateway Borough Public Works, $10,000

This project addresses an ACWA Stewardship priority. Ketchikan Gateway Borough seeks to minimize or prevent accidental discharges from the 1230 on-site septic systems in Ketchikan by promoting proper use and maintenance. Building on DEC's existing guidance, the Borough will create and distribute educational materials to all homeowners with basic information on how an on-site septic system works, how to properly use and operate on-site septic systems, and how to prevent failures. Information about the Borough's Mandatory Sludge Pumping Program will also be provided with the educational materials, including asking for feedback on the program. Helping homeowners understand how their system works will increase the likelihood of proper maintenance. The project will also provide Borough officials with critical information they can use to improve their mandatory program making it more effective. Contact: Teri Holderman, 228-6733.

Juneau Hydrography – Storm Water Mapping Project

Juneau Watershed Partnership, $17,554

This project addresses an ACWA Stewardship priority. JWP, in cooperation with the City and Borough of Juneau (CBJ) and the Alaska Department of Transportation & Public Facilities (DOT&PF), will continue mapping storm water flow in Juneau. The project augments on-going efforts by CBJ and DOT&PF to map the storm water structures and flow direction for polluted waters in Juneau. The mapping information will assist in designing projects needed for restoration. Contact: Nina Horne, (907) 586-6853.

-continued-

Ketchikan Creeks: Storm Water Quality Assessment

Aquatic Restoration and Research Institute, $61,056

This project addresses an ACWA Protection priority. This project will evaluate water quality and the biotic community of Ketchikan, Hoadley and Carlanna Creeks to protect salmon fisheries. Residential runoff from developed roads, parking areas, and commercial lots can deliver heavy metals, fine sediment, and excess nutrients to local streams. More rapid runoff from compacted soils and impervious surfaces can also impact the timing and magnitude of flow. Data collected will help resource managers understand if water quality impacts from pollutants exist and will assist in making effective and targeted decisions to protect these fisheries. Contact: Jeff Davis, (907) 733-5432.

South-Central

Clean Boating on Big Lake

Cook Inletkeeper, $18,491

This project addresses an ACWA Restoration priority and continues a 2012 project. Big Lake is a popular recreational lake in the Mat-Su Borough and an important economic asset to the Big Lake community. In 2006, Big Lake was listed as impaired (polluted) from petroleum hydrocarbons. The source of the pollution is gasoline powered watercraft. Beginning in 2010, local community members and other stakeholders of Big Lake developed an Action Plan for reducing pollution in Big Lake through targeted public outreach and education. Using the Big Lake Action Plan as a guide, this project will address the goal of reducing pollution in Big Lake through a comprehensive educational clean boating campaign. This project has two objectives: to continue to implement the education campaign and to empower regional boaters to practice and encourage clean boating. A final report summarizing the project will be provided. Contact: Rachel Lord, (907) 235-4068 ext. 29.

Clean Boating on Little Susitna River

Cook Inletkeeper, $18,247

This project addresses an ACWA Protection priority building on other efforts. The lower Little Susitna River is at risk of water quality impairment from petroleum hydrocarbon pollution and turbidity. This project continues the educational campaign on the impacts of petroleum and turbidity pollution to aquatic species and ways to reduce this pollution. The outreach campaign will build off DEC's current "*Fuel Out – Fish On!*" outreach message coordinating efforts with the work on Big Lake. In addition, one-on-one education of users of the lower Little Susitna River recreational fishery will be conducted. The goals of the project include improved water quality through a more educated boating public. A final project report summarizing results will be provided. Contact Rachel Lord, 235-4068 ext. 29.

-continued-

Cottonwood Creek Septic Smart: Homeowner Outreach

Mat-Su Resource Conservation Development Council, $17,555

This project addresses an ACWA Restoration priority. Cottonwood Creek is polluted from fecal coliform. This project will work with homeowners, local engineers, and septic system pumping services to develop a pumping co-operative to share costs where one street with several home septic systems can be inspected/ serviced at once at reduced costs. The project will also include an education component, to raise awareness of septic systems' potential impact on water quality through education efforts. Contact: Marty Metiva, 373-1016.

Evaluate Scoop-the-Poop Stations in Anchorage

Anchorage Waterways Council, $35,000

Water quality monitoring has shown that there is too much bacteria in Anchorage streams; people coming in contact with the bacteria can become ill. This project addresses an ACWA Restoration priority for streams polluted from fecal coliform bacteria. Anchorage is a popular city for pets with approximately 65,000 dogs creating about 24 tons of dog waste every day. Many of these pets recreate on the hundreds of miles of trails within the city. This project will help to reduce the amount of pollution by helping to ensure pet owners have the necessary supplies and reminders to "scoop the poop". The project will develop an inventory using GIS mapping of existing stations that span Anchorage's seven watersheds. The condition of each station, as well as determine which stations are most frequently used. The project will prepare a final report that could be used by the Scoop the Poop Committee and the Municipality of Anchorage to determine where the most cost-effective improvements, such as additional stations, could be made. Contact: Cherie Northon, 272-7335.

Kenai River Bacteria Monitoring

City of Kenai, $80,695

This project addresses an ACWA Stewardship priority and continues 2012 work. Elevated levels of enterococci and fecal coliform bacteria have been measured in samples at the mouth of the Kenai River. This project will monitor and test for bacteria at two locations at the mouth of the Kenai River (one site on the North Beach and one site on the South Beach) and at one upriver location near the Warren Ames Bridge (River Mile 5) to see if the beach management improvements have reduced the bacteria levels. Contact: Rick Koch, (907) 283-8222.

Mat-Su Palmer Rain Garden Demo

Mat-Su Resource Conservation Development Council, $34,500

This project addresses an ACWA Stewardship priority. Through partnerships, this project constructs a rain garden at the Mat-Su Senior Service Center. The rain garden will minimize run-off from post-construction development by creating a natural system that mimics pre-development conditions. The public will be educated on the benefits of low impact development through hands-on and on-site education. Contact: Marty Metiva, 373-1016.

-continued-

Storm Water Runoff Control for Odiak Pond

Copper River Watershed Project, $16,308

This project addresses an ACWA Protection priority. Odiak Pond receives storm water run-off. The inlet to the pond has been nominated to the State of Alaska's Anadromous Waters Catalogue, because coho salmon spawn and rear in the pond. This project will construct a bioswale adjacent to one of the stream drainages to the pond. A historical stream channel will be re-established creating a vegetative buffer on the bank. The project will be used to demonstrate best management practices for the use of vegetative buffers that could be used elsewhere in Cordova. A best management practices manual will also be developed for Cordova. Contact: Kristen Carpenter, 424-3334.

Interior

Chena River – Our Living River

Tanana Valley Watershed Association, $24,900

This project addresses an ACWA Restoration priority. The Chena River is Alaska's second largest producer of juvenile Chinook salmon that migrate to the Yukon River. The project will improve water quality in the Chena River watershed through reduction of un-filtered storm water run-off and education of local property owners. The project will construct three green infrastructure projects along the river and demonstrate to the local residents the benefits of using green infrastructure as a way to mitigate pollution and improve water quality. A Living Resource Guide will also be produced. The guide will serve to raise awareness of the importance of the river and provide practical ways to improve water quality. Contact: Jewelz Nutter, 322-2633.