



Prince William Sound Instream Flow Protection August 30, 2018



Introduction

The Alaska Department of Fish and Game (ADF&G) and the U.S. Forest Service (USFS) collaboratively propose to acquire the necessary hydrologic data and jointly file for reservations of water on identified priority streams and lakes within western Prince William Sound (PWS). Securing adequate instream flows in rivers and water levels in lakes with reservations will provide protection in perpetuity to fish and wildlife habitats within these important areas affected by the *Exxon Valdez* Oil Spill (EVOS).

The rivers and lakes of PWS support some of North America's most productive fish and wildlife habitat important for sport, commercial, and subsistence fisheries. From 1996 to 2016, approximately 355,296 anglers fished in freshwater in PWS and harvested 345,587 pink salmon, sockeye salmon, cutthroat trout, and Dolly Varden, listed as affected species by the *Exxon Valdez* Oil Spill (Kathrin Sundet, Research Analyst, ADF&G, November 21, 2017, personal communication). 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 species have adapted to natural streamflows and lake levels that provide essential seasonal habitats utilized by the various life stages of each species (Hynes 1970; Estes 1984; Hill et al. 1991; Poff et al. 1997; Bovee et al. 1998; Annear et al. 2004).

In 1980, Alaska's water law was amended to allow allocation of instream flows in rivers and water levels in lakes, commonly referred to as Alaska's instream flow law (AS 46.15.145). The Alaska legislature passed this amendment in 1980 in recognition of the economic, social, and other benefits of retaining water in rivers and lakes. This amendment provides the opportunity to maintain instream flows in rivers or water levels in lakes for four purposes, including the protection of fish and wildlife habitat, migration, and propagation. This instream flow water right is called a reservation of water.

Alaska water law is based on the doctrine of "prior appropriation", giving the first appropriator of water from a given water source a priority of right over subsequent appropriators on a "first-in-time, first-in-right" basis. With an established water right, the water right holder has a legal standing to assert that right against conflicting uses of water from others who are junior in priority. The priority date for a reservation of water application is the date the application is accepted by the Alaska Department of Natural Resources (DNR). After adjudication, a Certificate of Reservation is issued and remains in effect in perpetuity, unless DNR determines the purpose for which it was filed has changed or DNR finds that new information demonstrates a lower amount of water would provide the same level of protection, at which time DNR can amend the reservation.

DNR recommends a minimum of five-years of continuous streamflow or lake level data to support water management decisions, including reservations of water (Gary Prokosch, Chief Water Resources Section, DNR, April 26, 2005, personal communication). This five-year recommendation is intended to reduce potential bias that may be associated with intra- and interannual hydrologic variability.

To date, 790 miles of streams in PWS have been documented in the anadromous waters catalog (J. Johnson, Habitat Biologist, ADF&G, November 21, 2017, personal communication). Reservation of water applications to protect fish habitat have been filed on 86 miles of these streams (Copper River, Lowe River and Power Creek) and 66 miles have been granted a reservation of water certificate (Power Creek; Ann Marie Larquier, Habitat Biologist, ADF&G, August 22, 2018, personal communication).

Objective

The objective of this project is to collect the hydrologic data needed to file reservation of water applications on two lakes and four streams to maintain healthy habitat for fish species and the services of subsistence and passive use affected by EVOS. This project will also benefit affected wildlife species dependent on healthy rivers and lakes, including bald eagles, common loons and river otters. Project objectives will be accomplished by collecting sufficient hydrologic data to meet DNR guidelines, quantifying instream flow requirements for fish species at various life stages, and preparing reservation of water applications for submittal to DNR to protect fish and wildlife habitat, migration, and propagation.

Description

To collect the hydrologic data necessary to file reservation of water applications for these streams and lakes, ADF&G and the USFS will establish a streamgaging network in the Eshamy Lake area (Figure 1). A streamgaging network consists of an index gaging station(s) that is continuously operated over the full study period and an associated network of semi-permanent discharge measurement stations (discharge stations) where instantaneous discharge measurements are recorded (Klein 2013). Discharge stations will be operated over a shorter, concurrent period on nearby streams that are hydrologically similar to the index gage. The index gage will be operated by USGS, while the discharge stations will be operated by ADF&G and USFS personnel. Measurement records from each discharge station will be extended using the USGS index gage to obtain five years of record, if the relationship proves to be statistically robust. Extending the records of discharge measurement stations is a cost-effective, scientifically sound approach to leverage resources and obtain additional fish habitat protection.

The Eshamy Lake streamgaging network will be located in southwestern PWS. The USGS will operate an index gage at Eshamy Lake and Eshamy Creek. ADF&G and USFS will operate a lake gage at Shrode Lake and discharge measurement stations at Shrode Creek, Jackpot Creek, and Gumboot Creek (Figure 1). Streamgaging and discharge measurement procedures will follow USGS standards and procedures (Rantz et al. 1982; Klein 2013). Hydrologic data collection is

anticipated for five continuous years but may be longer if there are any unanticipated disruptions. Hydrologic station type may change based on field reconnaissance. A summary of the proposed streamgaging network sites is shown in Table 1.

Table 1.–Summary of Eshamy Lake streamgaging network sites.

Water Body	List of Species Affected by EVOS	Stream length Protected (miles)	Lake Area Protected (square miles)	Hydrologic Station Type	Prior EVOS Investment
Eshamy Lake and Creek	Sockeye and pink salmon, cutthroat trout, Dolly Varden, bald eagles, common loons, river otters	0.3	1.5	Lake and stream index gages	More than 80 % of the watershed is state or federal EVOS acquired lands for conservation purposes.
Shrode Lake and Creek	Sockeye and pink salmon, cutthroat trout, Dolly Varden, bald eagles, common loons, river otters	1.5	0.4	Lake gage and discharge measurement station	EVOS funded steep pass, pool-and-weir reconstruction in 1995.
Gunboat Lakes and Gumboot Creek	Sockeye and pink salmon, cutthroat trout, Dolly Varden, bald eagles, common loons, river otters	0.2	<i>0.1</i> ¹	Discharge measurement station	EVOS funded cutthroat trout and Dolly Varden habitat restoration project (late 1990's).
Jackpot Lakes and Creek	Sockeye and pink salmon, cutthroat trout, Dolly Varden, bald eagles, common loons, river otters	0.5	<i>0.3</i>	Discharge measurement station	Approximately 70% of the watershed is federal EVOS acquired lands for the restoration and/or enhancement of resources affected from the oil spill.
Total		2.5	2.3		

¹ Numbers italicized-bold indicates water bodies receiving indirect protection without a formal reservation.

How Sites Were Selected

Sites were selected that would provide long-term habitat protection for fish species affected by EVOS, particularly sockeye and pink salmon. Site selection incorporated the location of EVOS acquired lands and considered locations that would benefit multiple fish and wildlife species and the services of subsistence and passive use that were affected by EVOS. The highest level of protection was identified for watersheds that have lakes, because they provide important habitat and production for sockeye salmon, as well as for other fish and wildlife species affected by EVOS. Eshamy Lake has a large return of sockeye and supports a variety of fish species, which is unusual for PWS because the majority of water bodies in PWS are short, steep streams that primarily support pink salmon populations. In addition, Eshamy Lake was identified as an optimal site for a USGS index lake and streamgage based on hydrologic characteristics and site access. This also provides an ideal opportunity to provide additional fish habitat protection on nearby waters in a cost-effective manner.

Reservation of Water Process

Reservation of water applications will be filed for two lakes and four streams as summarized in Table 1. To secure a priority date, an application can be initially filed after two full years of streamflow or lake data have been collected or after a robust correlation has been established for discharge stations (usually between 10-20 measurements). An amendment to include additional data can be filed after five years of data have been collected to complete the application.

Hydrologic characteristics of a river will be used as the primary basis to delineate stream reaches for each stream application. This information will come from various sources, including: USGS topographic maps, ADF&G Anadromous Waters Catalog and Alaska Freshwater Fish Inventory databases, USGS National Hydrography Database, and direct observations. Major tributaries upstream and downstream of the chosen reach are generally selected as reach boundaries.

Fish distribution and periodicity data (seasonal use of habitat for migration, spawning, incubation, and rearing) by fish species and life stage will be compiled and summarized from ADF&G and USFS biologists, ADF&G's Anadromous Waters Catalog and Alaska Freshwater Fish Inventory databases, and scientific literature.

Hydrologic data from ADF&G and USFS operated lake gage and discharge measurement stations will be regressed with the USGS index gages to evaluate the potential for extending station records. If a robust relationship exists (positive linear relationship and strong regression results), the station will be extended to a five-year record for development of a reservation of water application.

Requested flows will be based primarily on flow duration analyses (Annear et al. 2004) combined with available fish use information. This approach provides a basis to mimic natural seasonal flows that fish are adapted to and depend upon (Estes and Orsborn 1986; Poff et al. 1997; Annear et al. 2004; Lytle and Poff 2004; Arthington et al. 2006).

Benefits

The natural flow regime of a river plays a vital role in creating and maintaining instream habitat and natural stream channel structure, morphology, and connectivity. Fish and other aquatic species depend on the natural variability of a river's flow regime to meet their spawning, rearing, incubation, overwintering, and migration habitat requirements. Human-induced perturbations of natural flow regimes beyond the bounds of natural variation have the potential to degrade aquatic habitat and reduce populations. Reserving instream flow water rights for fish and wildlife species affected by EVOS will identify and protect the amount of streamflow needed to sustain long-term production and conservation.

The history of water use in western United States has shown that identifying and protecting instream flows for fish and other purposes is preferable when competition for water is low. Protecting instream flows becomes increasingly difficult and costly as competition increases. Combining protection of water with land acquisitions is a proactive, long-term approach that provides protection from any future land or water management decisions that may affect these water bodies. This project would not be feasible without outside funding due to the cost of travel, USGS operated index gages personnel support, and the demand of other priority agency projects and mandates.

ADF&G and USFS have made considerable investments in PWS toward the stewardship of species and services affected by EVOS. ADF&G operated a sockeye monitoring project on Eshamy River. USFS completed fish improvement projects at Shrode Creek, Jackpot Creek, and Gumboot Creek. USFS and State of Alaska also acquired land acquisitions in the Jackpot Creek and Eshamy areas as part of the *Exxon Valdez* Oil Spill settlement (Table 1). Those lands were purchased with the goals of maintaining the land in perpetuity for the maintenance of conservation values and restoring or enhancing resources and services affected by the *Exxon Valdez* Oil Spill. Securing reservations of water on these lands will better protect the habitats of those species and services affected by EVOS.

In addition, hydrologic information collected by the project will be useful to scientists and managers for making scientifically sound water management decisions relating to water developments and land use practices that have the potential to impact water quantity and quality, fish populations, fish habitat, and natural resource stewardship. This information will allow scientists, engineers, and others to improve models used to predict streamflow and lake levels in ungaged water bodies. These benefits would also help resource agencies with their research and management responsibilities including: USGS, National Oceanic Atmospheric Administration, and DNR.

Schedule

- February 2019 – June 2019: USFS permitting
- July 2019: Installation of USGS index stream and lake gages.
- July 2019 – September 2024: Operation of USGS index gages. ADF&G and USFS perform

up to six field visits annually to lake gage and discharge measurement stations.

- April 2022: File reservation of water applications with initial data for Eshamy Lake and Creek.
- September 2024: Streamgaging and field data collection completed.
- June 2025: File reservation of water applications for Shrode Lake, Shrode Creek, Jackpot Creek, and Gunboat Creek. File amendments for Eshamy Lake and Creek with updated gage data, if necessary.

Budget

Total project request is for \$452,500. These costs include: the installation and operation of one USGS index lake gage and one streamgage for five years, installation of one ADF&G/USFS lake gage and three discharge measurement stations, field staff time for USFS personnel, purchase of acoustic Doppler velocimeters and hydrologic software to collect and analyze hydrologic data, USFS reservation application fees, and travel by ADF&G and USFS personnel (up to 6 trips a year) for field visits. Travel will occur by float plane or boat depending on conditions. Year one project request is \$136,300.

The total amount of uncommitted, leverage resource costs are \$166,000. These costs include: ADF&G staff time for data collection and data analysis, USGS match for one lake gage and one streamgage, USFS boat time and fuel, and the use of additional field equipment needed to conduct stream discharge measurements.

A summary of requested and leveraged project costs are shown in Tables 2 and 3. Itemized budget tables for requested and leveraged costs are shown in Appendix A.

Table 2.–Summary of requested costs.

Requested Costs						
Year	Line 100 Salaries	Line 200 Travel	Line 300 Contractuals	Line 400 Supplies	Line 500 Equipment	Total
1	38,000	1,800	37,000	5,500	54,000	136,300
2	38,000	1,800	37,000	0	0	76,800
3	38,000	1,800	40,000 ^A	0	0	79,800
4	38,000	1,800	37,000	0	0	76,800
5	38,000	1,800	43,000 ^A	0	0	82,800
					Total	\$452,500

Notes:

^A Includes USFS reservation application fees for Eshamy Lake and Creek in year 3 (\$3,000) and for Shrode Lake and Creek, Jackpot Creek and Gumboot Creek applications in year 5 (\$6,000). ADF&G has an MOU with DNR that covers reservation application fees.

Table 3.–Summary of leveraged costs.

Leveraged Costs						
Year	Line 100 Salaries	Line 200 Travel	Line 300 Contractuals	Line 400 Supplies	Line 500 Equipment	Total
1	19,000	4,000	10,000	0	1,000	34,000
2	19,000	4,000	10,000	0	0	33,000
3	19,000	4,000	10,000	0	0	33,000
4	19,000	4,000	10,000	0	0	33,000
5	19,000	4,000	10,000	0	0	33,000
Total						\$166,000
GRAND TOTAL						\$618,500

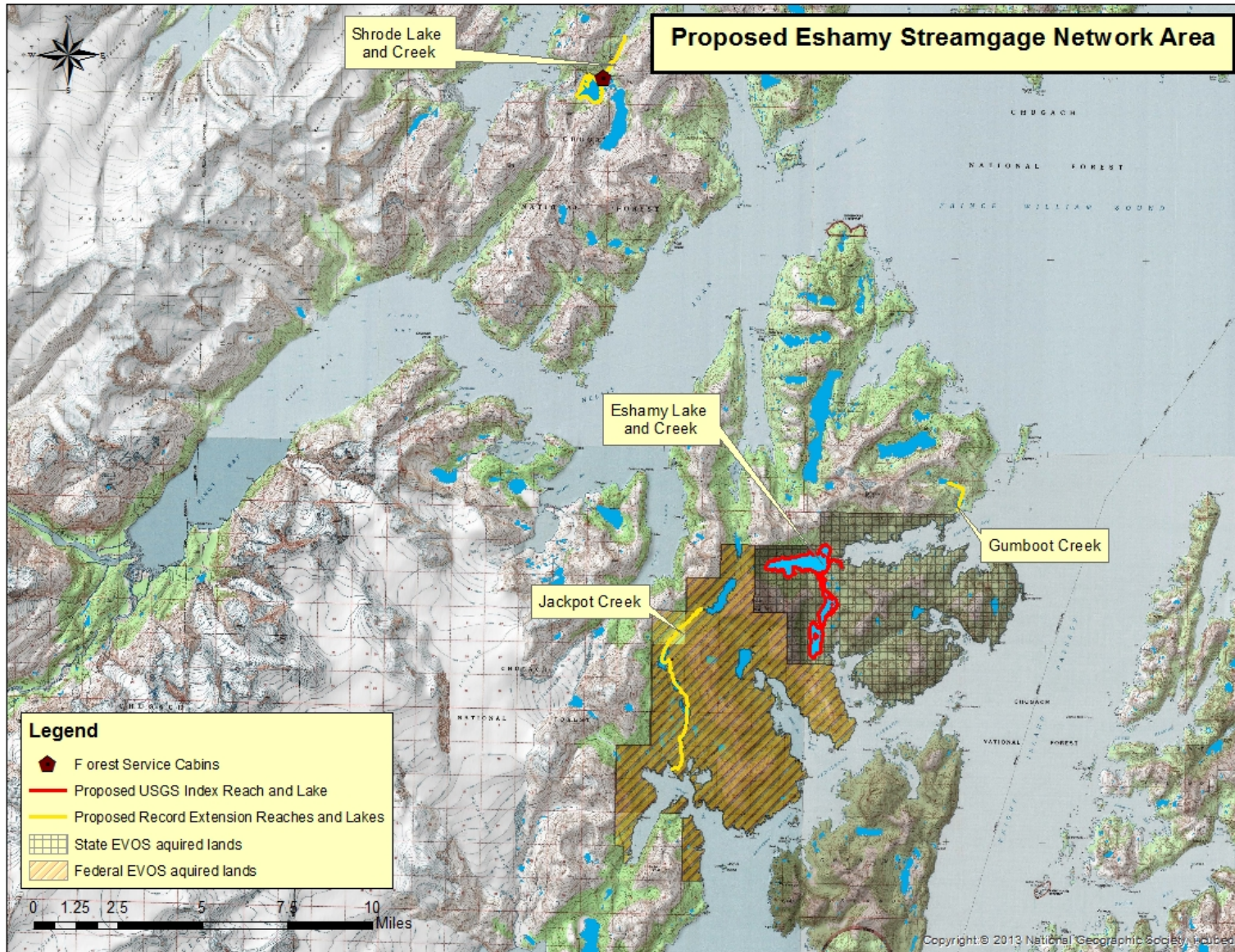
Total project cost is approximately \$618,500. This project will provide instream flow protection for fish and wildlife on four priority watersheds in PWS, resulting in protection of 2.5 stream miles and 2.3 square miles of lakes.

References

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Figure 1.— Location of Eshamy Lake streamgauge network for instream flow protection.



APPENDIX A
ITEMIZED BUDGET TABLES

REQUESTED COSTS – YEAR 1				
Line 100-Salaries				
Position	Cost/mo	# of Mo	Sub total	Notes
USFS Hydrologist/Biologist	11,000	1.5	16,500	Data collection, Project management
USFS Hydrologist/Biologist	11,000	1	11,000	Agreements, NEPA, WSA
USFS Biological Science Technician	5,000	0.5	2,500	Data collection, equipment preparation
USFS Boat Operator	8,000	1	8,000	Boat operator, equip maintenance, logistics
			Total Line 100	\$38,000
Line 200-Travel				
Item	Cost	Qty	Sub total	Notes
Field Per diem	60	30	1,800	For ADF&G and USFS field staff per season
			Total Line 200	\$1,800
Line 300-Contractuals				
Item	Cost	Qty	Sub total	Notes
USGS Gaging Contract	27,000	1	27,000	For Eshamy Lake and Creek
Charter-plane	5,000	2	10,000	For field work
			Total Line 300	\$37,000
Line 400-Supplies				
Item	Qty	Cost	Sub total	Notes
Pressure transducer (one-time cost, year 1)	2	2,500	5,000	For Shrode Lake data collection
Gage station supplies (one-time cost, year 1)	1	500	500	For Shrode Lake data collection
			Total Line 400	\$5,500
Line 500-Equipment				
Item	Qty	Cost	Sub total	Notes
Acoustic Doppler Velocimeter (one-time cost, year 1)	2	12,000	24,000	For streamflow measurements
Aquarius Time-Series software (one-time cost, year 1)	1	30,000	30,000	For hydrologic analyses and computations
			Total Line 500	\$54,000

TOTAL \$136,300

^A USFS reservation application fees for Eshamy Lake and Creek will be filed in year 3 (\$3,000) and for Shrode Lake and Creek, Jackpot Creek and Gumboot Creek applications in year 5 (\$6,000). ADF&G has an MOU with DNR that covers reservation application fees.

LEVERAGED COSTS – YEAR 1

LEVERAGED COSTS – YEAR 1					
Line 100-Salaries					
Position	Cost/mo	Indirect	# of Mo	Sub total	Notes
ADF&G HB III	8,700	0.21	1	10,530	Data collection, project mgmt, application prep
ADF&G HB I	7,000	0.21	1	8,470	Date collection, equip maint, logistics
					Total Line 100
					\$19,000
Line 200-Travel					
Item	Cost	Qty	Sub total	Notes	
Marine Fuel for USFS boat and supplies	1,000	4	4,000	Estimated costs associated per year	
					Total Line 200
					\$4,000
Line 300-Contractuals					
Item	Cost	Qty	Sub total	Notes	
USGS Streamgaging Cooperative Match	10,000	1	10,000		
					Total Line 300
					\$10,000
Line 400-Supplies					
					Total Line 400
					0
Line 500-Equipment					
Item	Cost	Qty	Sub total	Notes	
Misc. hydrologic field equipment (one time cost, year 1)	1,000	1	1,000	Field supplies (pipe, tools, tag line, waders, etc.)	
					Total Line 500
					\$1,000

TOTAL \$34,000

LETTERS OF SUPPORT



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January 7, 2018

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Elise Hsieh
Executive Director
Exxon Valdez Oil Spill Trustee Council
4230 University Drive, Suite 220
Anchorage, AK 99508-4650

RE: USFS/ADFG Prince William Sound Instream Flow Protection

Dear Ms. Hsieh and EVOS Trustee Council Members;

This letter is in support for the joint U.S. Forest Service and Alaska Department of Fish and Game proposal to the EVOS Trustee Council, "Prince William Sound Instream Flow Protection."

Ensuring that the priority watersheds of Coghill and Eshamy anadromous fish spawning streams have comprehensive long-term hydrology and water quality data collected, analyzed and archived is vital for managing sustainable fish production in Prince William Sound (PWS). Data gathered also serves to secure water rights and instream flow reservations on EVOS protected lands in PWS, which is necessary to fulfill EVOS settlement habitat protection requirements.

The proposed project will also provide baseline data that will be able to be utilized far into the future for other projects that focus on anadromous fish streams, instream flow reservations, and long-term production and conservation on these, and similar watersheds.

Prince William SoundKeeper's asks that the EVOSTC support this project for funding.

Sincerely,

Kate McLaughlin, President



Grass Roots Advocacy for Preserving Water Quality in Prince William Sound, Alaska for All



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PO Box 939 | 509 First Street | Cordova, AK 99574
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January 31, 2018

Ms. Elise Hsieh
Executive Director
Exxon Valdez Oil Spill Trustee Council
4230 University Drive, Suite 220
Anchorage, AK 99508-4650

Ms. Hsieh,

Cordova District Fishermen United (CDFU) supports the Prince William Sound Instream Flow Protection project proposed by Alaska Department of Fish & Game and the USDA Forest Service.

This project will benefit CDFU's mission to promote and perpetuate the commercial fishing industry in Alaska's Area E, including the waters of Prince William Sound. As you are already aware, the Area E fisheries experienced a wide range of negative impacts after the Exxon Valdez Oil Spill in 1989.

The State of Alaska law allows for reservations of water to protect valuable instream resources, including fish propagation. The proposed project will gather the data necessary to file for reservations of water in a number of priority watersheds important to salmon.

Securing adequate water flows will provide long-term habitat protection for salmon fisheries in Prince William Sound.

On behalf of over 900 commercial fishermen and their families who sustainably harvest seafood from Alaska's Area E waters, we request that the EVOS TC support this project moving forward.

Sincerely,

Jerry McCune
President
Cordova District Fishermen United
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