

Southwest Alaska Salmon Habitat Partnership

Strategic Conservation Action Plan for Southwest Alaska Watersheds

2017 Update



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FISH HABITAT

ACTION PLAN

Preface

In studying the history of the decline of the salmon runs of the Pacific Coast, it is striking to notice how invariably these declines are blamed on over-fishing. These statements come most often from those least acquainted with the subject and are frequently made to cover up other causes, which may be of their own making.

While it is true that over-fishing is responsible for many declines, there is evidence to show that in numerous cases it is of minor or no consequence. The actual reasons are often found to be changes in the environment of the salmon due to natural and unnatural (man-made) conditions. This is especially true of the fresh water stages of its existence. Many examples could be cited. Some of the natural ones are cyclic climatic changes, floods, droughts, freezes, earthquakes, earth slides, beaver dams and increase in predators. On the other hand there are such man-made, or unnatural, causes as deforestation due to logging; hydro-electric, irrigation, flood control, and navigation projects; pollution, especially from pulp mills; soil conservation and reclamation schemes; gravel washing and mining operations; road construction such as stream culverts; insect control using poisonous sprays; and many others. The listing of these does not necessarily mean that all are inimical to the continuation of our salmon fisheries. It does mean, however, that if such projects are improperly and unwisely planned, the results will be disastrous to our fisheries. Alaska needs new industries, but not at the expense of her most important resource, which if properly cared for, will produce year after year.

1950 Annual Report, Alaska Fisheries Board and Alaska Department of Fisheries. The Alaska Fisheries Board was created by the 19th Territorial Legislature in 1949.

Southwest Alaska Salmon Habitat Partnership Steering Committee



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Acknowledgements:

This document is an update to our original Strategic Action Plan that was finalized in 2011. This update was conducted by the Southwest Alaska Salmon Habitat Partnership under guidelines provided by the National Fish Habitat Board's National Fish Habitat Action Plan and was created through the dedication of its partners. Local agencies and organizations provided hours of in-kind support. We would especially like to thank the following for lending their staff to the Technical Committee who were the primary authors of this document in 2011 and provided support for this update:

- Alaska Department of Fish & Game
- Bristol Bay Native Association
- Bristol Bay Native Corporation
- Bureau of Land Management
- The Conservation Fund
- National Park Service, Lake Clark National Park & Preserve
- The Nature Conservancy
- NOAA's National Marine Fisheries Service
- Bristol Bay Heritage Land Trust
- University of Alaska
- U.S. Fish and Wildlife Service
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President Obama receives can of Bristol Bay salmon while on visit to Dillingham in 2015. Photo by Bob Waldrop

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Strategic Conservation Actions

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Nushagak River Chinook salmon circa 1884



Southwest Alaska Salmon Habitat Partnership Strategic Conservation Action Plan

I. Executive Summary

The Southwest Alaska Salmon Habitat Partnership (SWASHP) developed this Strategic Conservation Action Plan (Plan) to continue carrying out its mission and the mission of the National Fish Habitat Partnership Initiative (NFHP) and to help partners set priorities for collaborative actions to conserve habitat for the wild salmon that migrate, spawn, overwinter and rear in Southwest Alaska watersheds. Relevant actions that could be guided by this plan include: statutory and regulatory action; project review and permitting; protection and restoration activities; fish or fish habitat assessments, scientific investigation, and education and outreach activities.

Each of the strategies in the Plan requires collaboration among multiple partners to successfully implement them. Some salmon conservation work is funded directly through the NFHP program. Other work is funded or carried out through SWASHP partners. Each partner has unique capabilities, responsibilities, and resources. Through the Partnership public agencies and private entities can more effectively and efficiently coordinate funding and actions to achieve results working together that might not be achieved separately.

The Plan:

1. Identifies major watersheds and prioritizes them for fish habitat protection based upon the amount of acreage in conservation status within each watershed. All of the major watersheds this Plan addresses currently satisfy the U.S. Environmental Protection Agency's definition of a "healthy" watershed.

The Plan focuses on the complexity of the large pristine habitat that produces the salmon resource that is the cultural and economic foundation of the region. Millions of acres of pristine habitat in the region are already afforded some protection as federal and state parks, refuges, wilderness and special use areas.

2. Identifies potential threats to salmon habitat in the region.

The Plan identifies human activities that could compromise the habitat foundation for salmon production over the next fifty years. The major threats identified include: mineral development; climate change; fragmentation of land ownership; energy development; invasive species; the growth of residential, commercial and industrial footprints; and transportation infrastructure.

3. Identifies conservation actions to protect and, when necessary, restore salmon habitat based on identified threats.

Specific conservation strategies are identified for each of these threats. These strategies include measures to protect water quantity and flow, preserve connectivity between habitats, protect water quality, prevent habitat fragmentation, and prevent invasive species. The Plan also recognizes that the lack of information and data can inhibit a complete understanding of the nature of a threat and the effectiveness of a strategy. Accordingly the Plan recommends areas for investigation and assessment.

4. Recognizes that education and outreach activities are necessary to help maintain a constituency for salmon and the protection of habitat in Southwest Alaska.

Education has two components. The first component targets the general public, both in and outside the region, and shares information about salmon habitat and the importance of providing for its protection in Southwest Alaska. The second component is directed to biologists, land managers and conservationists and provides a forum or conduit for the exchange of information on fish habitat research and assessments within the region, a forum to present and evaluate findings, and a venue to make recommendations for future funding under NFHP.

5. Accepts the inevitability of climate change, that climate change will affect how salmon exploit habitat in the future, and that habitat protection at the landscape scale is necessary to provide salmon the maximum opportunity to adapt.

None of the Partnership's conservation strategies can prevent climate change. However, the Plan recognizes that protecting the fully functioning salmon habitat of the region is the strategy that guides all partner efforts. The Plan encourages efforts to understand the likely impacts of climate change upon the salmon habitat of the region, and to monitor for those changes. The Plan directs Partnership funds be used, to the greatest extent possible, for projects that will lead to or provide conservation of salmon habitat at the landscape scale, or provide protection for microhabitats or landscape features that are important for a life stage of a particular population of salmon.

II. Introduction

Background of the Partnership

The Southwest Alaska Salmon Partnership was originally formed in 2001 as the Southwest Alaska Conservation Coalition. The Coalition, now Partnership, is a broad-based organization with a diverse membership of Native, business, Federal, State, non-profit, and private entities. The Partnership formed around a widely recognized need to conserve and protect habitat important for fish. Nested within the conservation of fish habitat is the protection



of other species of wildlife and a variety of human uses including commercial fishing, subsistence hunting and fishing, and recreation. The original boundary of the Coalition captured the range of Rainbow trout in Southwest Alaska. Southwest Alaska represents the northern limit of Rainbow trout habitat. However, the most compelling common thread in Southwest Alaska is salmon. Salmon are simply the keystone of Southwest Alaska's ecology and economy and they support an indigenous culture that is arguably the last intact salmon culture surviving on the planet. Accordingly, the Partnership's focus is to undertake and encourage measures to protect salmon habitat that in turn benefits numerous other species, including Rainbow trout, and humans.

The Partnership was originally modeled after the joint ventures formed under the North American Wetlands Conservation Act. For a variety of reasons, the Partnership as originally formed in 2001 was composed solely of non-governmental organizations. As the National Fish Habitat Partnership Initiative began and the Southwest Alaska Conservation Coalition became the Southwest Alaska Salmon Habitat Partnership with official NFHP board recognition in 2008, Federal and State agencies became more active and visible in the Partnership's efforts to protect salmon habitat.

The Partnership focuses on Southwest Alaska, an area of 39.8 million acres (62,200 square miles) and approximately the size of Washington State. The area has a high level of ecologic, economic, cultural, social, political and recreational commonality, all linked by a dependence on wild salmon. The Partnership includes Native villages, Alaska Native Claims Settlement Act Corporations, State and Federal Agencies, non-profits, universities, guides, fishing lodges, outfitters and other businesses.

The Partnership operates with a Steering Committee representing some of the diverse interests in Southwest Alaska. The Steering Committee meets at least twice a year. The Steering Committee has adopted an operating framework. The Partnership is also supported by a Technical Committee of agency biologists, managers and other resource experts. Other committees are created as needed.

Intent of the Strategic Plan

The intent of this Strategic Plan is to identify long-term goals, strategies, and voluntary but collaborative actions the Partnership and others can undertake to conserve and protect salmon habitat in each major watershed of Southwest Alaska. Specific purposes of the plan are:

1. Identify and characterize habitat in each major watershed that support and sustain salmon.
2. Identify potential threats to salmon habitat in each watershed.
3. Prioritize actions to protect, and if necessary restore salmon habitat based on identified threats.

4. Maintain an informed constituency that values salmon and the protection of salmon habitat in Southwest Alaska.

III. Southwest Alaska Salmon Habitat Partnership

Mission Statement of Partnership

To protect, conserve, and, if necessary, restore watersheds that sustain the wild salmon populations and the fisheries of Southwest Alaska.

The depletion and extirpation of Atlantic and Pacific salmon across much of their native range demonstrates their vulnerability to habitat degradation and fragmentation. The Southwest Alaska Salmon Habitat Partnership provides a point of synergy between existing habitat conservation efforts and conservation strategies that preserve the intact and diverse ecosystems necessary to maintain the region's salmon production and the fishery values it supports.

Vision Statement of the Partnership

The Partnership envisions the continuation of the world's largest populations of salmon that perpetually sustain the unique cultures, economies and lifestyles of Southwest Alaska.



Sockeye salmon spawning Iliamna River – Keenan Troll 2014

Southwest Alaska is home to the world's largest runs of wild salmon that, throughout history, have provided the foundation for human habitation of this area. For thousands of years, salmon have sustained indigenous people and subsistence fisheries continue to be a way of life for most inhabitants of Southwest Alaska. For over a century, Southwest Alaska has sustained the world's largest wild salmon commercial fishery and this industry continues to be the economic lifeblood of the region. For decades, Southwest Alaska has also been recognized as a world-class recreational fishing

destination. Southwest Alaska is one of the few areas on earth where wild fish populations continue to sustain the cultural and economic foundation for an entire region. The Partnership envisions keeping it that way.

Statement Regarding Fisheries Management

The Partnership recognizes that sustainable stocks of wild salmon are the key benefit of viable fish habitat. The Partnership supports fisheries management that provides the wild salmon spawning escapements necessary for normal ecosystem functioning. The Partnership takes no position on matters of fisheries allocation or regulation.

Sustained levels of salmon production in Southwest Alaska, and the fisheries they support, have only been possible because the habitat has remained intact and pristine. Of particular importance has been the maintenance of the largely undisturbed watersheds and near-shore marine waters that provide spawning and rearing habitat for all of the Alaska salmon species and their full genetic diversity. The focus of the Partnership is the conservation of this habitat.



The Partnership fully supports the concepts contained in the State of Alaska’s Policy for the Management of Sustainable Salmon Fisheries, which explicitly recognizes that fisheries management must: “protect the full range of spawning, rearing, and migratory habitats; and provide for spawning escapements necessary to both conserve potential production and maintain normal ecosystem functioning.” See 5 AAC

39.222. Although the Partnership focuses on salmon, it also recognizes and supports Alaska’s Sustainable Wild Trout Management Fisheries Policy (5 AAC 75.222).

Statement Regarding Advocacy as a Strategy

The Partnership will not advocate for or against legislation, regulation or the policies of Federal, State or local governments or private entities. Members of the partnership, however, are not prohibited from such advocacy or otherwise taking part in the political process.

Members of the Partnership have not come together to advocate for or against laws or policies so much as to help each other implement or take advantage of existing laws or policies available for the protection of salmon habitat. The Partnership will not direct efforts to advocate for or against legislation, regulation or policies of the Federal, State or local governments or private entities. However, the partnership may provide comment or technical assistance where such comment or assistance is requested by a government or private entity or is otherwise appropriate as part of a public comment or hearing process on a matter that may directly impact salmon habitat in Southwest

Alaska. Members of the partnership, however, are not prohibited from such advocacy or otherwise taking part in the political process.

Who We Work With

The conservation efforts of the Partnership represent the combined efforts of many individuals, tribes, academic institutions, organizations, businesses and government agencies working toward the common goal of protecting the habitat that produces the greatest wild salmon runs on earth.

The Partnership is an unincorporated organization with representation from diverse communities including: Native organizations (tribal and corporate); subsistence users; anglers; hunters; commercial fishing interests; lodge owners; hunting and fishing guides; tourism interests; non-profit organizations; federal, state, and local agencies; corporations; academic institutions; and private foundations. The Partnership strives to foster cooperation among its members.

The Partnership's record of accomplishment since formation in 2000 in preserving fish and wildlife habitat is nothing short of extraordinary. Its members have joined forces to artfully negotiate and protect thousands of acres of public and private land, assess the distribution of salmon and other fish throughout the region and preserve water flows for those fish in hundreds of stream and river miles.

Best Available Science and Traditional Knowledge Inform Our Conservation Efforts

The conservation efforts of the Partnership are informed by the most current scientific methods and the traditional knowledge of the people of Southwest Alaska about the plants, animals and fish in the region.

The conservation efforts and priorities for NFHP funding of the Partnership are informed by the most current scientific research. Partner organizations include research institutions and agencies like the Alaska Salmon Program of the University of Washington School of Aquatic and Fisheries Science and the Alaska Department of Fish & Game. This strategic plan is particularly informed by the research of the University of Washington on salmon diversity in Bristol Bay as described in the paper entitled *Population Diversity and the Portfolio Effect in an Exploited Species* by Daniel E. Schlindler, *et. al.* published in the June 3, 2010 edition, Vol. 466, Nature.



Traditional Ecological Knowledge (TEK) is the understanding and

awareness that people who are intimately connected to a particular place will likely have a unique understanding of the plants, animals, and environmental conditions of that place. Traditional knowledge has already been incorporated into some conservation planning efforts in the region, most notably the *Nushagak River Watershed Traditional Use Area Conservation Plan* published by the Nushagak-Mulchatna Watershed Council in 2007 and updated in 2012, and the Integrated Resource Management Plan of the village of Nondalton published in 2015. Traditional Ecological Knowledge will, to the greatest extent possible, inform the conservation efforts of the Partnership.

Geographic Scope of Plan

The Partnership directs its efforts to habitat protection throughout Southwest Alaska, including the Alaska Peninsula, Bristol Bay, and the watersheds flowing into the Kuskokwim Bay and River from the south and east up to and including the Aniak River; an area of 39.8 million acres.



Nushagak River. Mike Wiedmer

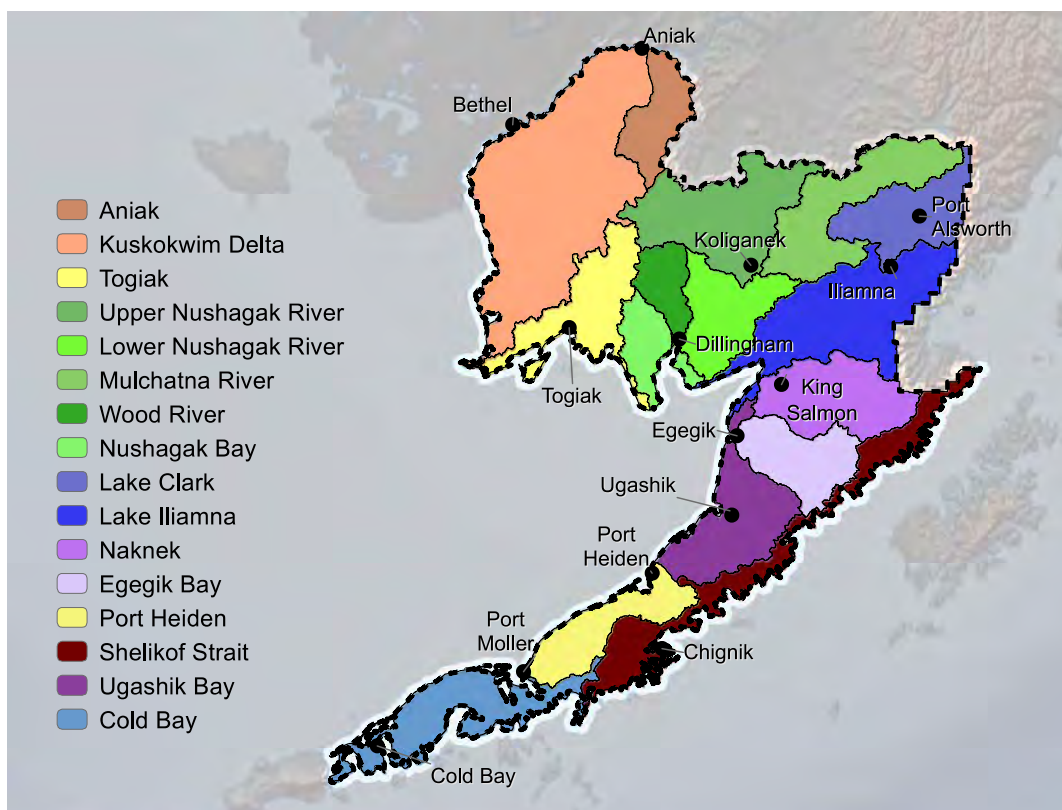
The Partnership is focused on conserving fish habitat to maintain the abundant production of salmon in Southwest Alaska. At the heart of this irreplaceable resource is the extensive complex of pristine watersheds. A striking geographic feature that defines many of the Bristol Bay watersheds, for example, is the large and productive lake basins that provide a stable spawning and rearing environment for salmon. A testament to the importance of this lake habitat is that Bristol Bay is home to the most abundant populations of Sockeye salmon in the world, a species largely reliant on lake environments for rearing and overwintering. Bristol Bay is defined by these large lake watersheds that are tributary to

the Bering Sea, and extends from Cape Menshikof south of the Ugashik River to Cape Newenham west of the Togiak River.

Salmon production in Bristol Bay, the Alaska Peninsula, and the lower Kuskokwim River are ecologically and culturally entwined. The fresh and near shore marine waters bordering the Bristol Bay watersheds to the south and east and are defined by watersheds that are tributaries to the Bering Sea on the Alaska mainland from Cape Menshikof to the southern end of Unimak Island at Cape Sarichef and tributaries to the Gulf of Alaska along the south side of the Alaska Peninsula north to Cape Douglas. Lower Kuskokwim River and Bay fresh and near shore marine waters border Bristol Bay watersheds to the north and west and are defined by watersheds that are tributary to the Bering Sea from Cape Newenham north to the Kuskokwim River, and watersheds flowing into the Kuskokwim River from the south and east up to and including the Aniak River.

The first version of this strategic plan focused solely on the major Bristol Bay watersheds, including the near shore marine waters north of the eastern and western bounds of this region. While the Bristol Bay watersheds remain a priority focus of the Plan because of the global importance of their salmon fisheries, the threats identified in this Plan, and the conservation strategies developed to address those threats, apply to all watersheds within the SWASHP service area. The conservation strategies of this Plan are framed by the major USGS HUC 3 watersheds, and their near-shore marine waters. The USGS designations for the Southwest Alaska watersheds are:

- Cold Bay Watershed – 19030101
- Port Heiden Watershed – 19030201
- Ugashik Bay Watershed – 19030202
- Egegik Bay Watershed – 19030203
- Naknek Watershed – 19030204
- Lake Clark Watershed – 19030205
- Lake Iliamna Watershed – 19030206
- Upper Nushagak Watershed – 19030301
- Mulchatna River Watershed – 19030302
- Lower Nushagak Watershed – 19030303
- Wood River Watershed – 19030304
- Togiak Watershed – 19030305
- Shelikof Straight Watershed – 19020702
- Tuxedni-Kamishak Bays Watershed – 19020602
- Aniak Watershed – 19030501
- Kuskokwim Delta Watershed – 19030502



(See <https://cfpub.epa.gov/surf/state.cfm?statepostal=AK> for more details about these watersheds)

IV. Southwest Alaska Landscape

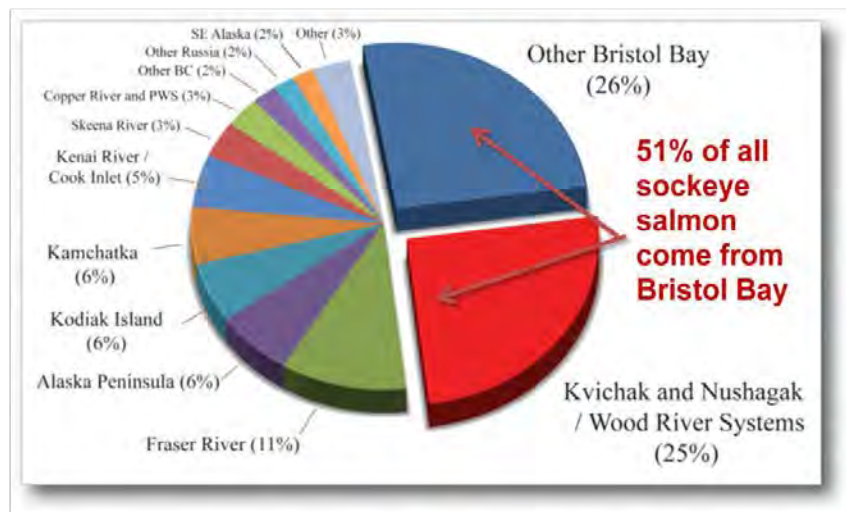
Southwest Alaska – A Wild Salmon Stronghold

Southwest Alaska is one of the world’s largest remaining wild salmon strongholds because habitat is still intact, water is still clean, and salmon species diversity tempers the effects of unpredictable environmental change.

The watersheds of Southwest Alaska and Bristol Bay in particular offer the world’s best example of how biocomplexity combined with large-scale intact habitat produces stable and sustainable salmon fisheries. In a narrow sense, biocomplexity is defined as the behavioral, biological, social, chemical, and physical interactions of living organisms with their environment. In Southwest Alaska biocomplexity describes how salmon have adapted to spawn and rear in specific natal streams and lakes, and even in specific microhabitats within those streams and lakes. The result is that salmon have evolved into many genetically distinct spawning groups with diverse life history characteristics and an innate ability to return to the locations where they were spawned.

In Southwest Alaska, the adaptation of different salmon populations and life stages to diverse habitats has sustained populations over the millennia because different habitats respond in different ways to various environmental conditions. During a particular climatic regime, certain geographic areas, habitat types, and salmon life histories are more productive than others, and this productivity shifts in response to changing climatic regimes. Key to this regional biocomplexity and the long-term stability and sustainability of salmon is maintaining the diverse, connected habitats still present in Southwest Alaska.

Bristol Bay produces ~51% of all sockeye and 10% of all salmon on earth



From: Ruggerone et al. 2010. Abundance of adult hatchery and wild salmon by region of the North Pacific. Univ. of Washington, School of Aquatic and Fishery Sciences, Report SAFS-UW 1001, Seattle WA.
and Pinsky et al. 2009. Range-wide selection of catchments for Pacific salmon conservation. Conservation Biology (23) 681-691.

It is evident from experience in California, Oregon, Washington, Idaho, and southern British Columbia, that protection of salmon habitat is more effective and less expensive than trying to restore lost or degraded habitat and salmon populations. The rationale for adopting a protection approach is that restoration is expensive and risky and it cannot replace what was lost. In fact, experts have concluded that current recovery efforts have a low probability of successfully restoring or even sustaining wild salmon runs through this century from southern British Columbia southward. In the past century the entire Pacific Northwest witnessed catastrophic declines in wild salmon populations and productivity due to a combination of degraded freshwater and estuarine habitat, poor hatchery practices, hydropower dams, natural cycles in riverine and ocean carrying capacity, and fishery management and harvest policies. One result is that numerous stocks of salmon and steelhead are now listed as endangered under the Endangered Species Act (ESA) in Washington, Oregon, Idaho, and California. Billions of dollars have been spent in failed efforts to recover salmon populations. Once habitat is lost and stocks of salmon with unique genetic diversity are gone, they cannot be replaced.

What's At Stake?

Healthy habitat for salmon is healthy habitat for most of the other species of fish and wildlife in Southwest Alaska and is the foundation for a sustainable natural resource based economy and subsistence culture.

A. Ecological Processes

Here we highlight a few of the key processes that interact to create and maintain the productive salmon habitats of Southwest Alaska. However, ecosystems are infinitely complex and it would be impossible to describe every process and interaction essential for the sustained productivity of the region's salmon.

From headwaters to estuaries, the physical structure of riverine habitats is determined by interactions between flowing water and the floodplain. Scouring and redeposition of substrates maintains a continually shifting mosaic of bends, pools, and riffles. As stream channels meander across their floodplains, they capture gravel from extensive deposits left behind by advancing Pleistocene glaciers. In forested areas, trees captured by stream channels create instream cover and cause pools to scour by deflecting and restricting flow. Together, these processes result in a complex array of channel depths, velocities, and substrates amenable to different salmon species and life stages, including an abundance of clean gravel essential for spawning and incubation.

The region's glacial gravel deposits also create an exceptionally permeable landscape, which allows rain and snowmelt from the uplands to move into aquifers. Once in the aquifer, groundwater flows slowly downhill and eventually surfaces in areas of relatively low elevation, like stream channels or lake basins, resulting in many areas of upwelling in streams and lakes and an abundance of spring-fed creeks, ponds, and sloughs that join stream channels. These spring-fed discharges enhance salmon habitat by providing seasonally stable streamflow and benefits to stream temperature. Groundwater temperatures remain relatively constant throughout much of the year. In this region, groundwater is warmer than surface water during the winter months and cooler during the summer months; this provides ice-free areas for wintering juvenile salmon and cool refugia for adults and juveniles during warm summer periods. In addition, spring-fed discharges into lakes and streams create important salmon spawning areas, including extensive areas of sockeye salmon beach spawning in Lake Iliamna and other lakes.



Chinook, coho, and sockeye salmon spend one or more years in fresh water prior to seaward migration. Growth during this time, which is critical for overwinter and marine survival, relies on freshwater food webs and on marine-derived subsidies carried inland by spawning salmon. Streams tend to derive their energy from inputs of terrestrial and

emergent organic matter (e.g., leaf litter, grass stems) and from in-stream production of diatoms and other photosynthetic algae, most of which live in the slippery biofilm layer on rocks and other substrates. Lakes derive most of their energy from diatoms and other photosynthetic algae that live in the upper water column (i.e. phytoplankton). These energy sources in turn support complex webs of invertebrates that are essential salmon prey – primarily aquatic insects in streams and zooplankton in lakes.

In addition to these food sources, the region’s spawning salmon populations convey massive amounts of nutrients and energy from the North Pacific to fresh waters each summer. Freshwater productivity is often limited by the bioavailability of nitrogen and phosphorus; salmon are rich in these nutrients, which are released through excretion by live salmon and decomposition of dead salmon. In Iliamna Lake, for example, nitrogen inputs from salmon greatly exceed inputs from all other watershed sources. These nutrients fertilize algae in streams and lakes throughout the region, leading to increased production of invertebrate prey. Nutrients carried into floodplains by flowing water and bears also fertilize riparian trees and shrubs, resulting in a dynamically stable and more productive floodplain.

The most direct and important benefit to stream-dwelling juvenile salmon (and also to rainbow trout and char) from spawning salmon is the massive and direct nutritional subsidy in the form of eggs and decomposing flesh. Juvenile salmon consume a substantial biomass of these energetically dense resources, sometimes travelling considerable distances to do so, leading to greatly enhanced growth rates. In fact, research from the Bristol Bay region has shown that the majority of a fish’s annual energy budget can be consumed during the relatively short time period when salmon eggs and flesh are available.

Salmon essentially subsidize the freshwater and terrestrial ecosystems through several pathways and if salmon are removed, the ecosystems of Southwest Alaska will likely crash.

B. Estuaries

Estuaries form where rivers meet the sea. All of the large rivers of Southwest Alaska empty into estuaries, but the Nushagak and Kvichak rivers of Bristol Bay shape the two most ecologically important estuaries for salmon production in the SWASHP service area. These estuaries provide an assortment of habitat types including fresh and salt water marshes, gravel beaches, mud flats, and sand bars. These habitats are among the most productive in Bristol Bay serving as nurseries for fish and invertebrates and staging points for large salmon runs.

The large tidal amplitudes form strong tidal currents in the Nushagak and Kvichak estuaries (velocities up to 4 knots) creating turbid water conditions. These tidal currents create classic tide-dominated morphology consisting of wide landward-tapering funnel shaped mouths that are bounded by various intertidal sedimentary features including intertidal flats, sand bars, and channels. Coarse sandy sediment is transported out of the estuary and forms large sand bars at the mouth and undersea dunes at offshore areas.

Barrier islands are absent as the wave action is not strong enough to build up coarse grained sediment onshore.

The Nushagak and Kvichak estuaries can be sub-divided into 4 habitat zones based on fauna, sediment, salinity, and average current velocity.

Four large rivers flow into Nushagak estuary: the Igushik, the Snake, the Wood, and the Nushagak. Three large rivers flow into Kvichak estuary: the Naknek, Alagnak, and Kvichak. Typical of tidally dominated estuaries, both the Nushagak and Kvichak estuaries have large openings that promote efficient marine flushing. River discharge in the summer is significantly higher than in the winter due to freeze up of water inputs. These estuaries have a diverse range of brackish, subtidal, intertidal and supratidal habitats. Due to the counter clockwise rotation of the current in Bristol Bay, the Nushagak estuary is less saline compared to the Kvichak. The highest recorded sea surface salinity measurement in the Nushagak estuary was 10 ppt compared to 20 ppt in the Kvichak.

Tidal strength and the fine grain of glacial sediment cause high turbidity in both estuaries. Turbidity limits light penetration reducing phytoplankton productivity. There are extensive areas where high turbidity and current swept sediments limit macro algae, seagrasses, and sessile animals from colonizing benthic areas. The mid to upper estuary zones of each estuary tend to have high turbidity averaging 200 NTU, while the river and lower estuary zones are often less turbid.

During the winter the strong currents and high tidal amplitude prevent the formation of shorefast ice, ice flows scour the beaches and shallow flats limiting plant and animal recruitment in benthic and shore environments. The benthic diversity in Nushagak Bay is lower than the Kvichak and is most likely due to its lower salinity and higher turbidity.

The estuaries contain similar euryhaline fauna and true marine communities are encountered. In addition to the five species of Pacific salmon, other common species include rainbow smelt, starry flounder, bay shrimp (crangon), two types of amphipod, and Beluga whales. Transient marine visitors such as Orca whales are also present.



C. Terrestrial Mammals



Southwest Alaska provides important habitat for moose, especially in lowland forests near lakes and rivers. Caribou from the Mulchatna herd migrate and calve through the area where tundra and open boreal forest is found. Past post-calving congregations have numbered as high as 80,000 to 100,000 animals. Brown and black bear, wolverine, wolf, porcupine and fox are common. Lynx and marten tend to be found in the woodlands of the area. Beaver are abundant

throughout most streams and large lakes. Dall sheep are found in the mountains around Lake Clark. Also common are snowshoe hare, weasels, mink, ground squirrels, and microtine rodents.

D. Marine Mammals

The coastal and estuarine waters of Southwest Alaska support many marine species, a number of which have experienced significant population declines in Alaska during the last 50 years. The western Distinct Population Segment (DPS) (west of Cape Suckling) of Steller sea lions has been listed as endangered by the National Oceanic and Atmospheric Administration (NOAA) Fisheries since 1997. The Southwest DPS of Northern sea otters is listed as threatened by the U.S. Fish and Wildlife Service. Harbor seal populations appear to be stable as do populations of beluga whales. Populations of most other whales and porpoises are difficult to assess because of their large movements and dispersed life style. There are a number of haulouts for walrus in Bristol Bay, the Walrus Islands, Cape Newenham, and Cape Seniavin being the largest. There are no known resident populations of orcas, although transient orcas are occasionally observed during the summer months when salmon are returning.

A population of harbor seals has also adapted to the freshwaters of Lake Iliamna, Alaska's largest and deepest lake. This population, estimated between 300 and 400 individuals, remain in the lake



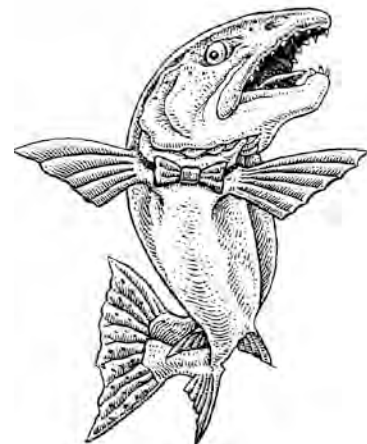
year round despite the lake's outlet to saltwater. A petition to list these seals as endangered under the Endangered Species Act was denied in 2016 by NOAA Fisheries. NOAA found the seals met the criteria for being different from saltwater harbor seals, but did not represent a distinct population segment. Despite failing to qualify for the protections of the Endangered Species Act, the harbor seals were the beneficiaries of a permanent conservation easement secured by The Conservation Fund in 2016 and granted to the Bristol Bay Heritage Land Trust to protect most of their primary haul-out areas in Lake Iliamna.

E. Birds

Bristol Bay and the Kuskokwim River Delta are Alaska's most impressive migratory funnels, providing staging, nesting, molting or year round habitat for some 150 species of birds. These include 32 species of waterfowl, 22 species of shore birds, 55 species of passerine, 17 species of raptors, 5 species of upland birds, and 10 species of sea birds. The Audubon Society considers Bristol Bay an *Important Bird Area* in the Bering Sea for waterfowl, seabirds, and shorebirds. The Western Hemisphere Shorebird Reserve Network and the East Asian-Australasian Shorebird Reserve Network have identified Bristol Bay for its importance to migrating godwits, dunlins, golden plover, western sandpiper, and black turnstone. Essentially all emperor geese and Pacific brant stage in Bristol Bay estuaries in spring and fall with steadily increasing numbers over-wintering, presumably because the climate is milder. The Bristol Bay lowlands may host up to 25% of the North American population of greater scaup and roughly 10% of the breeding population of red-throated loons. Bristol Bay also supports prime breeding habitat for black scoters and tundra swans. Steller's eiders molt in estuaries and king eiders molt in near-shore waters. Huge numbers of shearwaters and other marine birds summer in Bristol Bay. The abundant freshwater fish resources support Alaska's largest concentration of osprey.

F. Fish

All of Southwest Alaska is important for wild Pacific salmon, but Bristol Bay in particular is one of the last great global strongholds for these salmon. Bristol Bay tributaries host all five species of Pacific salmon and provide the freshwater habitat for the Bristol Bay sockeye salmon run — one of the world's great migrations. In addition, Bristol Bay supports at least 13 anadromous fish species, 16 resident fish species, and 4 species restricted to estuaries.



Sockeye salmon are by far the most abundant salmon species in the Bristol Bay region, where annual runs average ~30 million fish and constitute nearly half of the global production of wild sockeye salmon. Sockeye are unique among salmon in that most populations rely on lakes as the primary freshwater rearing habitat, and their abundance in Bristol Bay stems from the large, accessible lakes in this landscape. Some sockeye salmon spawn within the

nursery lake where their young will rear while others spawn in nearby stream reaches, and fry migrate to the nursery lake after emerging from spawning redds. Tributaries to Lake Iliamna, Lake Clark, and the Wood Tikchik lakes are major spawning areas, and juveniles rear in each of these lakes. Lake Iliamna produces more sockeye salmon than any other lake in the world. Some populations do not use lakes, and such riverine sockeye salmon spawn and rear throughout the Nushagak River watershed.

Rainbow trout are the cornerstone of the Bristol Bay sport fishery, although Pacific salmon, Arctic grayling, Arctic char, and Dolly Varden are also targeted. Bristol Bay’s rainbow trout tend to mature slowly and grow to relatively large size. For example, spawners in Lower Talarik Creek, a tributary to Lake Iliamna, were more than seven years old; the majority of these were longer than 20 inches and a few exceeded 31 inches (ADF&G data). Bristol Bay rainbow trout have complex and varying migratory patterns that allow them to capitalize on different stream and lake habitats for feeding, spawning, and wintering. Eggs from spawning salmon are a major food item for Bristol Bay trout and are responsible for much of the growth attained by these fish.

Table of Yup’ik, Standard and Scientific Terms for Fish Important for Subsistence in Southwest Alaska

FISH IMPORTANT FOR SUBSISTENCE	
<i>Cuukvak</i>	Northern pike, <i>Esox lucius</i>
<i>Amaqayak</i>	Pink salmon (Humpy), <i>Oncorhynchus gorbuscha</i>
<i>Kangitneq</i>	Chum salmon (Dog), <i>Oncorhynchus keta</i>
<i>Caayuryaq</i>	Coho salmon (Silver), <i>Oncorhynchus kisutch</i>
<i>Talaariq</i>	Rainbow trout, <i>Oncorhynchus mykiss</i>
<i>Sayak</i>	Sockeye salmon (Red), <i>Oncorhynchus nerka</i>
<i>Taryaqvak</i>	Chinook salmon (King), <i>Oncorhynchus tshawytscha</i>
<i>Iqalluaq</i>	Rainbow smelt, <i>Osmerus mordax</i>
<i>Yugyak</i>	Arctic char, <i>Salvelinus alpinus</i>
<i>Iqallugpik</i>	Dolly varden, <i>Salvelinus malma</i>
<i>Culugpauk/ Nakrullugpak</i>	Arctic grayling, <i>Thymallus arcticus</i>
<i>Can’giiq</i>	Alaska Blackfish, <i>Dallia pectoralis</i>

G. The Subsistence Way of Life

Although methods have changed, residents of the region, like their ancestors, still rely on the bounty of Southwest Alaska's watersheds. Hunting, fishing, and gathering are a vital part of the local way of life. Moose, caribou, salmon, geese, berries, and plants are the principal resources that fill smoke houses, drying racks, freezers, and canning jars. To lose these resources would not only jeopardize the health of people living in remote villages, but their cultures as well.



Historic Photo Credits: (top) Fish & Wildlife, US National Archive, circa 1910; (bottom) Dave and Mary Carlson collection, Samuel K. Fox Museum, circa 1940

H. Commercial Fishing Economy

Bristol Bay is the world's largest wild salmon fishery and sockeye salmon is the prize. The commercial exploitation of salmon resources of Bristol Bay did not begin until the period of American influence which coincided with the development of canning technology. The schooner Neptune prospected for salmon in Nushagak Bay in 1883 and in that same year the first cannery was built by the Arctic Packing Company at the village of Kanulik. The first salmon pack was produced in 1884, a harvest of about 4,200 salmon. From this meager beginning, it was not long before the firm, red-fleshed sockeye of Bristol Bay commanded a premium price. Within six years there were four operating canneries on Nushagak Bay. Two canneries were built on the Naknek River and one on the Egegik River by 1895. The first canneries on the Kvichak and Ugashik rivers appeared in 1896. Bristol Bay commercial fishing boomed in the first decade of the twentieth century. By 1910, Bristol Bay produced about 40% of Alaska's canned salmon. Over time more than 50 canneries would be built in Bristol Bay.



Fishing in the early days was done with traps. However traps were discontinued by 1924 in favor of drift gillnet fishing from sailboats, in particular the Columbia River sailboat with double-ended hulls and distinctive sprit sails. In their heyday, the sailboats netted 20 million salmon in a season; all snared in linen nets and pulled by hand. Sailboats were replaced in the early 1950's when a federal ban on the use of power boats for fishing was lifted in 1951. Today the salmon of Bristol Bay are harvested by modern vessels that can cost hundreds of

thousands of dollars. Vessels, however, cannot exceed 32 feet in length. In addition to the drift gillnet fishing fleet, salmon are harvested by set gillnets anchored on local beaches.

There is also a much smaller commercial fishery on the Lower Kuskokwim River that is largely driven by runs of summer chum and Chinook salmon. Most of the fishing takes place on the river and, unlike Bristol Bay, the salmon are harvested primarily by fishermen who deploy drift gillnets from open skiffs. Fishing in both regions is done by fishermen who own limited entry permits issued by the State of Alaska.

I. Recreational Fishing, Hunting and Tourism Economy

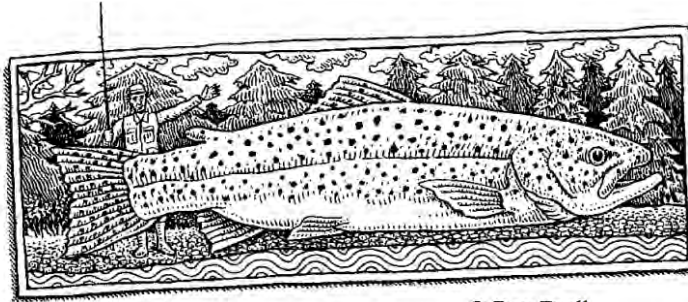
The bounty and world record size of rainbow trout in Southwest Alaska's Bristol Bay is responsible for the emergence of sport fishing as an important component of the visitor industry in Alaska. Unlike commercial fishing, the business of recreational fishing got its start on the east side of the Bristol Bay when Ray Peterson built the Angler's Paradise Lodge and hosted his first guests in 1950. John Pearson's Wood River Trout Camp, operating from an old scow, opened in 1959 and was the first lodge on the west side of Bristol Bay. Now there are more than one hundred lodges ranging from luxurious complexes to tent camps scattered throughout Bristol Bay, catering to a world-wide customer base of recreational fishermen.

In the 1980's, the Chinook salmon run on the Nushagak River began to attract more recreational fishing interest. The village corporation landowners along the river met the demand by making land available for temporary lease. Today, a river management program operated by all of the village corporations under the management of Choggiung Ltd. accommodates some 40 commercial sport fishing camps during the short Chinook salmon season.



Bristol Bay youth participants in Fly Fishing and Guide Academy supported by Partnership members

To a lesser extent, big game hunting in the fall provides a significant source of income for some local residents. The creation of new national parks and wildlife refuges in 1980 with the passage of the Alaska National Interest Lands Conservation Act has fostered a small but emerging ecotourism industry. The attractiveness of Southwest Alaska as a tourist destination, however, is tempered by remoteness and the cost of access.



© Ray Troll

V. Assessment of Salmon Habitat Viability in Southwest Alaska: **HEALTHY**

Salmon habitat within each of the major watersheds served by the Partnership is intact, and satisfies the EPA definition of a “healthy watershed.” Maintaining and protecting the health of these watersheds is the primary focus of the Partnership’s efforts.

The U.S. Environmental Protection Agency (EPA) defines a healthy watershed as one in which “natural land cover supports dynamic hydrologic and geomorphic processes within their natural range of variation (i.e., sediment storage and deposition), where there is habitat of sufficient size and connectivity to support native aquatic and riparian species, and where water quality is adequate to support healthy biological communities.”

The USGS HUC 3 watersheds targeted by this plan all satisfy the EPA definition of a healthy watershed and the fish habitat within each is functioning at an ecologically desirable condition. The Partnership does not expect to become significantly involved in habitat restoration or enhancement activities to restore watershed function in the foreseeable future. A measure of the Partnership’s success will be the prevention of the kind of habitat loss and degradation that requires extensive restoration and enhancement. Restoration efforts are extremely expensive, often relatively ineffective, and rarely recover the productivity of pristine watersheds.

The Partnership may undertake restoration and enhancement activities as part of an effort to protect a specific parcel of private property where the parcel is acquired for conservation and some measure of clean-up or restoration is needed. The mined streams and rivers in the vicinity of the communities of Platinum and Goodnews Bay in the Kuskokwim Delta Watershed are in need of future restoration efforts. However, restoration is not warranted until mining operations cease.



Framework for Monitoring the Health of Salmon in Southwest Alaska Watersheds

VIABILITY FACTORS	PROBLEM INDICATORS
Landscape Context	
Percent intactness of naturally occurring early seral and mature spruce forest mix in the riparian area.	More than 5% of riparian vegetation 300' back from ordinary high water along entire length of river has been disturbed, noticeable disturbance in important spawning and rearing areas.
Condition	
Salmon Population Structure and Recruitment	The average size, sex ratio, age, distribution, and migration timing of adults and juveniles have fallen outside normal ranges per ADF&G surveys for a period of five years.
Size	
Salmon escapement and commercial, recreation and subsistence needs satisfied	Restrictions have been placed on subsistence fishing or for a period of three years and limits have been placed on the maximum opportunity for sport and commercial fishing as defined by Alaska Board of Fish.
Water Quality	
No significant changes	<ul style="list-style-type: none"> • Dissolved Oxygen < 8mg/liter • pH Level < 6.5 or > 8.5, or varies more than 0.5 units from natural conditions • Temperature > 59°F or 16°C • Turbidity > 5 NTUs above baseline conditions
Water Chemistry	
No Significant Changes	<ul style="list-style-type: none"> • Heavy Metals – presence of heavy metals exceeds ADEC or EPA standards or is elevated above baseline levels • Hydrocarbons – presence of hydrocarbons or physiological indicators of hydrocarbon exposure exceeds ADEC or EPA standards or is elevated above baseline level

Objectives for Habitat Protection in Southwest Alaska Watersheds

To protect salmon habitat and species diversity and to assure salmon sustainability, the primary objectives of the Partnership are to: preserve the integrity of federal and state conservation units, and to secure the protection of salmon habitat outside of conservation units.

To date, human activity has not, except in a few small local areas, significantly altered the pristine habitat in Southwest Alaska watersheds. In large part this is because the Partnership service area remains a remote region accessible only by air or water and human populations are low. The Partnership recognizes, however, that remoteness will diminish over time and therefore greater human impact to salmon habitat is likely.

However, the Partnership does not believe destructive human impact is inevitable. Although greater human access is a reason for concern, it does not have to be a reason for despair. There is much we still do not know about wild salmon, but there is much we do know about the kinds of human activities that threaten them. Southwest Alaska presents one of the last opportunities to apply the lessons learned from other parts of the world where wild salmon populations have declined or disappeared. The imperative is to focus efforts on conserving and protecting pristine habitat critical for maintaining salmon species diversity.

In Southwest Alaska, we have already made significant progress in institutionalizing safeguards to protect habitat, species diversity, and long-term sustainability of salmon at the ecosystem level. A system of federal and state parks and refuges now protects large areas of important salmon habitat. This foresight, though praiseworthy, did not see far enough. For example, within many of these conservation units there are private inholdings, which if inappropriately developed could compromise habitat connectivity, water quality and quantity, or fracture landscape complexity. Also, vast areas of pristine salmon habitat are outside conservation units and subject to the kind of landscape level habitat modification that can cause the loss of salmon populations. This includes populations intended to be protected by these parks and refuges but are at risk from the use or development of private lands within the same watersheds. That being said, it is not the purpose of the Partnership to prevent development. Rather, it is the purpose of the Partnership to promote and support activities directed to assuring that protection of wild salmon and their habitats are given priority consideration when development decisions are being made.

The broad goal of protecting salmon habitat in Southwest Alaska and within each of the key watersheds can be broken down into two primary objectives:

- Preserving the integrity of the protections for salmon habitat provided by virtue of inclusion within a legislatively created federal or state conservation unit. It is the position of the Partnership that salmon habitat already protected by virtue of inclusion within a federal or state conservation unit should not be compromised by changes in land or water use or inappropriate development of private or public lands within these conservation units.
- Securing appropriate protection for important salmon habitat located outside conservation units. It is the position of the Partnership that all protections for salmon habitat available under federal, state or local law should be in place and enforced before development is permitted to occur on lands or in waters outside conservation units, particularly where such development may collaterally impact salmon that spend a life stage within a conservation unit.



Threats to Habitat

Several threats to salmon habitat currently exist or are likely to be occurring in Southwest Alaska. Other threats are not presently occurring, but may in the future. For these threats the Partnership must be prepared to take action to preempt possible degradation to salmon habitat. For the purposes of this Plan, the Partnership takes a fifty-year time horizon regarding salmon habitat threats analysis.

The Partnership reviewed many possible threats and has identified the following human activities as existing or likely threats to salmon habitat in the Bristol Bay Region over the next fifty years: mineral development, climate change, fragmentation of land ownership, energy development, invasive species, residential, commercial and industrial development, and transportation infrastructure (Table 1). Other threats that may occur, but are considered less likely to have significant impact on salmon habitat in the next fifty years include: gravel mining, catastrophic spills (from fuel storage or transportation), and lack of land use regulations to protect habitat. The Partnership also recognizes that our ability to address many of these threats depends upon the cooperation of the major owners of land outside of conservation units. The lack of such cooperation is itself a threat.



The potential for mineral development, particularly large open pit mining, was identified as the major threat to salmon habitat in the next fifty years in the Mulchatna River and Lake Iliamna / Kvichak Watersheds

The following Table 1 summarizes the most likely threats to be encountered in the next 50 years, with the significance of the threat ranked from left to right, and its feared impact on each watershed (ranked from top to bottom in priority need for protection) indicated as “high,” “medium,” or low. A discussion and analysis of each threat follows the table.

Table 1
Overview of likely threats to salmon habitat in the watersheds
of Southwest Alaska over the next 50 years

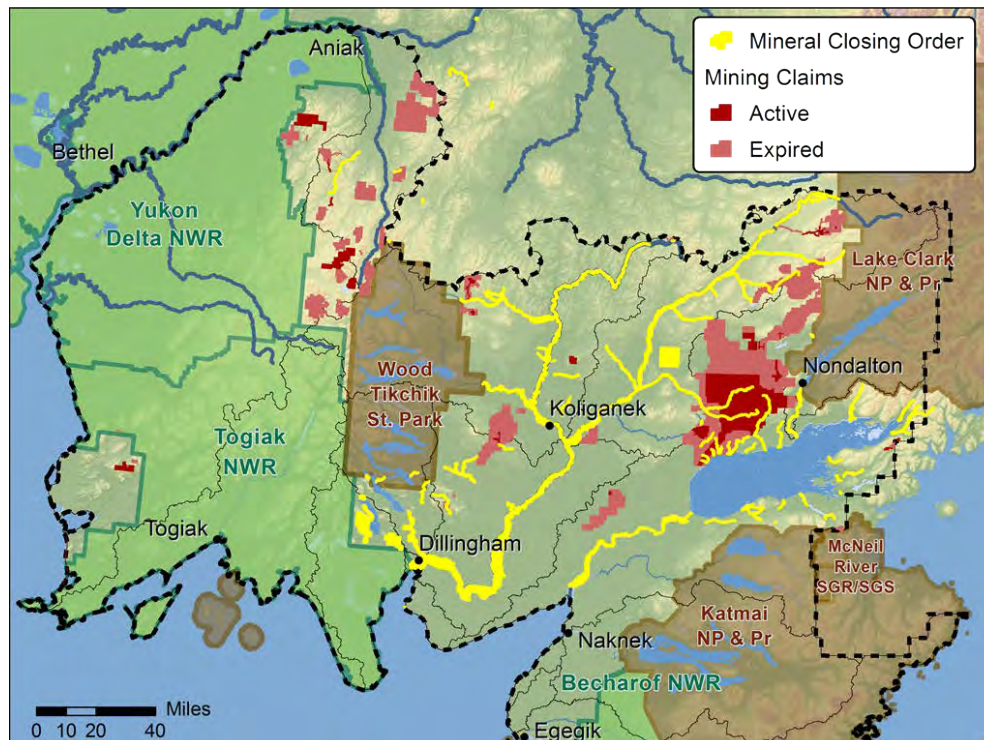
Watersheds	Percent Conserved	Mineral Development	Climate Change	Fragmentation of Land Ownership	Invasive Species	Energy Development	Community Growth	Transportation Infrastructure
BRISTOL BAY WATERSHEDS								
Lower Nushagak River 19030302	2%	Medium	High	High	Medium	Low	Medium	Medium
Mulchatna River 19030302	13%	High	High	Low	Low	Low	Low	High
Lake Iliamna - Kvichak 19030206	18%	High	High	High	Medium	Low	Medium	High
Upper Nushagak River 19030301	28%	Medium	High	Low	Low	Low	Low	Medium
Ugashik Bay 19030202	34%	Low	High	High	Low	Low	Low	Low
Port Heiden 19030201	41%	Low	High	Medium	Low	Low	Low	Low
Lake Clark 19030205	49%	High	High	High	Medium	Low	Low	High
Cold Bay 19030101	51%	Low	High	High	Low	Low	Low	Low
Wood River 19030101	68%	Low	High	High	Medium	Low	Medium	Low
Egegik 19030203	73%	Low	High	Medium	Low	Low	Low	Low
Naknek River 19030204	79%	Low	High	Low	Medium	Low	Medium	Low
Togiak 19030305	87%	Low	High	High	Low	Low	Medium	Low
Estuaries		Low	High	Low	Low	Low	Low	Low
KUSKOWKIM WATERSHEDS								
Aniak 19030501	1%	Medium	High	Low	Low	Low	Low	Medium
Kuskokwim Delta 19030502	64%	High	High	High	Low	Low	Medium	High
PACIFIC WATERSHEDS								
Shelikof Strait 19020702		Low	High	Low	Low	Low	Low	Low
Tuxedni - Kamishak 19020602		Low	High	Low	Low	Low	Low	Low

1. Mineral Development and Related Infrastructure

Southwest Alaska is a highly mineralized area and mining, unless prohibited by law, must be considered likely at some point in the future.

The possibility of large-scale open-pit mining poses the most significant threat to the integrity of salmon habitat within two watersheds of Bristol Bay, the Nushagak and Lake Iliamna - Kvichak. The potential impacts are both direct and indirect. The development of an open pit with the attendant processing facilities, waste storage areas, dams, roads and tailings ponds will destroy the habitat that falls within this footprint. Direct habitat alteration can also result from airborne or waterborne contaminants that escape from the mining site and from the diversion and pollution of surface and ground water. The legacy of mining around the world is unfortunately one of serious and long-term environmental damage to freshwater habitats. Although mining practices have improved, the risk of long-term, even permanent, environmental damage cannot be eliminated.

The indirect result of mining could be an acceleration of the impacts from some of the other threats we have identified. A mine will create a sizeable population base at the mine site and will likely result in more people moving into existing communities. A mine will create the need for roads. Roads will also provide access for commercial activities and more recreational users. More recreational users will likely create a greater demand for guide services, lodges, and land for both commercial and private use. These impacts may be viewed favorably by those who value development and access. However, the impact of increased population and the accompanying pressure on fish and wildlife habitat cannot be overlooked.



**Table 2
Mining Claims 2017**

Mining					
Watersheds	Percent Conserved	Active Claim Acres 2017	Inactive Claim Acres 2017	Total Claim Acres 2017	Acres Protected by MCO
BRISTOL BAY WATERSHEDS					
Lower Nushagak River 19030302	2%	2,308	34,537	36,845	113,392
Mulchatna River 19030302	13%	166,815	146,377	313,192	72,420
Lake Iliamna - Kvichak 19030206	18%	91,412	305,833	397,246	34,437
Upper Nushagak River 19030301	28%	11,214	89,134	100,348	41,745
Ugashik Bay 19030202	34%	-	10,193	10,193	463
Port Heiden 19030201	41%	-	1,728	1,728	3,959
Lake Clark 19030205	49%	51,270	305,833	357,103	2,914
Cold Bay 19030101	51%	-	-	-	9,774
Wood River 19030101	68%	-	-	-	9,111
Egegik 19030203	73%	-	-	0	0
Naknek River 19030204	79%	-	-	0	0
Togiak 19030305	87%	-	-	0	0
Estuaries		-	-	0	0
KUSKOWKIM WATERSHEDS					
Aniak 19030501	1%	8,423	185,740	194,163	472
Kuskokwim Delta 19030502	64%	49,389	59,124	108,513	0

High - Active Claims > 20,000 acres
Medium - Active Claims > 0 but < 20,000 acres
Low - No Active Claims

2. Climate Change

Arctic and Subarctic climates are already experiencing changes at a more rapid pace than the more temperate regions of earth. The most visible manifestations of this are melting glaciers, decreased snow cover, retreating sea ice, and coastal erosion. The response of salmon to climate change will differ among species and within species depending on their life cycles in freshwater. The following are some of the expected consequences of climate change for the salmon of Southwest Alaska:

- Changes in nutrient cycling that result in a mismatch between salmon fry emergence and available food sources;
- Changes in stream flow and magnitude caused by low snow cover in winter and increased precipitation in summer;
- Fragmentation of habitat as lower stream flows or lake levels isolate previously used habitat;
- Changes in sockeye beach-spawning habitats influenced by upwelling, wave action, and open water in winter;
- Shifts in predation;
- Shifts in competition for stream and lake habitat;
- Alteration of feedback mechanisms as marine nutrients derived from decaying salmon change.
- Enhanced salmon growth due to warmer summer water temperature
- Increased predation of out-migrating salmon smolts due to decreased spring flows
- Increased scour of incubating embryos due to winter rain-on-snow events
- Increased wintering habitat availability due to increased winter flows
- Earlier salmon fry emergence, due to increased incubating temperatures, that results in a mismatch with key food resources

All of these and a myriad of other predictions suggest a lifetime of research projects. However, all of these predictions and all further research will likely point to one overriding course of action – protect habitat. This course of action is also supported by the wealth of existing research that suggests salmon can adapt and move. So, if we can prevent or limit human alteration of our pristine salmon habitat we will be doing all we can to maximize the likelihood that salmon will remain a keystone species in Southwest Alaska.

In addition to habitat protection, maintaining genetic diversity within and among stocks will be important in retaining population resiliency in the face of climate change.

3. Fragmentation of Land Ownership

What good does it do to create a federal park and provide 100 percent protection to some fish and game habitat onto which caribou and salmon migrate, if the desecration allowed to occur outside its borders in the same ecosystem is left to the discretion of state or private owners.

Jay Hammond, “Tales of Alaska’s Bush Rat Governor”



Governor Jay Hammond with
Secretary of the Interior James Watt
in New Stuyahok Photo Credit:
Samuel K. Fox Museum

The decline of salmon over much of their global native range can largely be attributed to the fragmentation by humans of the interconnected complex of land and water that salmon need to survive. The fragmentation of habitat begins with the distribution of land and water to legally recognized persons – individuals, corporations or otherwise – who are generally accorded all the rights to use the land or water to maximum economic advantage without regard for the fish and wildlife that may also be using the water or the land. The watershed is the basic ecological unit that supports a population of salmon. The likelihood of protecting or restoring a population of salmon diminishes as the land within that watershed is subdivided among more and more owners and the water is appropriated to more and more users.

Until the grant of statehood in 1959 most of the land in Alaska remained in Federal ownership. Under the Alaska Statehood Act the new state was accorded the right to select 104 million acres. This right was temporarily suspended as a result of the Federal Government’s effort to reach a settlement of aboriginal land claims. The Alaska Native Claims Settlement Act of 1971 accorded Alaska’s Native peoples the right to select 40 million acres prior to state selection. The Act also required the Federal Government to withhold from State selection lands deemed to be in the “national interest” to protect. The passage of the Alaska National Interest Lands Conservation Act in 1980 removed additional millions of acres from State selection by placing these “national interest” lands into national parks, preserves and wilderness areas. For the salmon in Bristol Bay it meant that within a span of 25 years their habitat went from unified ownership to ownership by dozens of Alaska Native corporations and government entities and hundreds of individual Native allottees (see Table 3). The division of ownership was also not limited to the surface. Ownership of lands conveyed to Alaska Native corporations were further split into surface and subsurface estates. Mineral rights were also reserved to the Federal Government on most Native allotments.

To date the fragmentation of land ownership in Southwest Alaska has not resulted in significant fragmentation of salmon habitat. In part, this is because the region is remote, but it is also because land selection, survey, title preparation and transfer has to occur before any new owner is entitled to exercise the rights of ownership. These administrative tasks were overwhelming and cumbersome, but are now mostly complete. In those parts of Southwest Alaska not subject to the conservation status of new parks, refuges or wilderness, the rights of ownership are just beginning to be exercised. The result is a growing number of mining claims and mineral leases, an increase in the sale and conversion of Native allotments, and the development of lodges and subdivisions.

Within Southwest Alaska there is no single entity that can implement all of the strategic actions necessary to protect salmon because land ownership and regulatory authority is shared among many different private and public organizations. Further, these organizations, many of which participate in this Partnership, have different policy imperatives that will drive their priorities. Although land ownership and regulatory control in Southwest Alaska has become more fragmented since statehood, there has nevertheless been an enduring deference to traditional use and the protection of subsistence resources, particularly salmon, among most of the new landowners and regulators. To date, land ownership patterns in Southwest Alaska are not so fragmented as to make large-scale conservation efforts impractical. The owners are relatively few and the areas are vast. A viable opportunity still remains in the area served by the Partnership to protect whole salmon ecosystems for a fraction of the cost it currently takes to restore small runs of salmon in the Pacific Northwest or on the Atlantic Coast. In most Bristol Bay watersheds, these owners are the federal or state government and are within a conservation designation. Most of the lands in private ownership are owned by Alaska Native corporations whose shareholders still depend upon the abundance of salmon to support their livelihoods and culture.

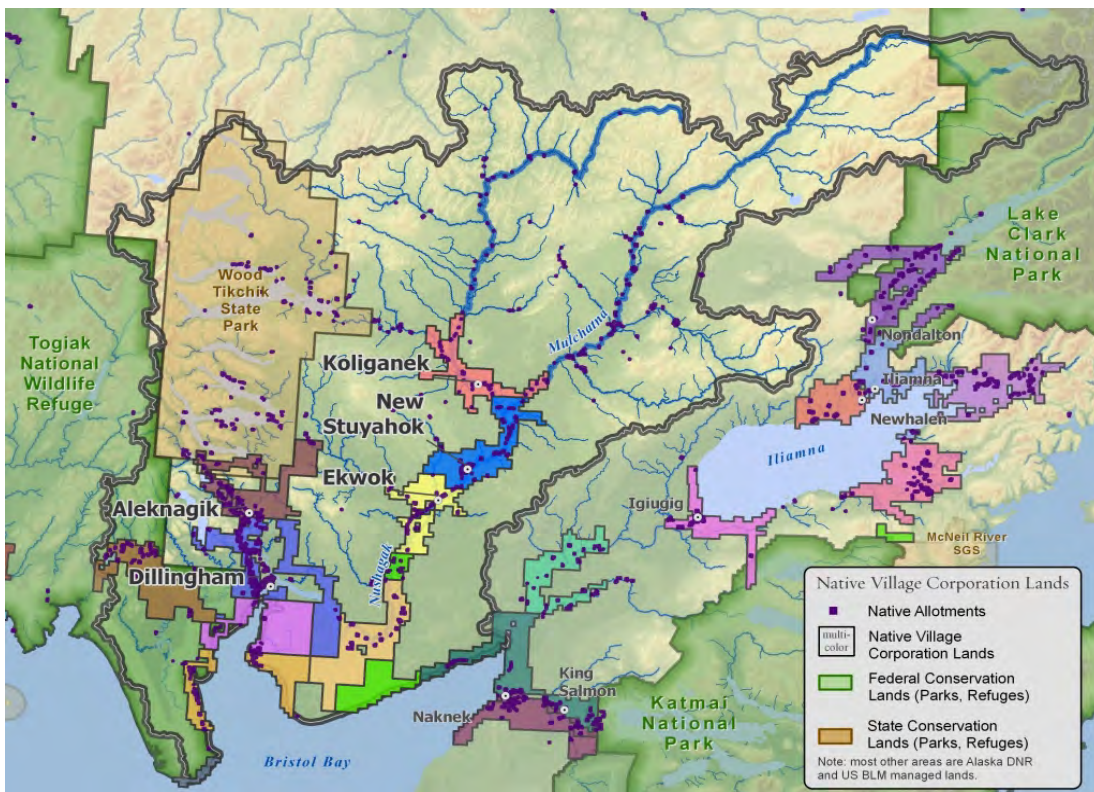
There is a measure of urgency, however, to take protective actions. Vast mineral resources have been discovered on State lands in Bristol Bay. These discoveries are within the Nushagak and Lake Iliamna / Kvichak watersheds. Significant portions of these watersheds are now subject to mineral claims. Also, there is a trend in ownership of Native corporations away from local control. Shareholders are increasingly moving to urban areas and becoming less dependent on the salmon resources supported by their corporate lands. In time, these shareholders are more likely to favor development of land as opposed to protection of habitat, especially if the latter produces no economic benefit for the corporation or dividend for the shareholder.

The problem this Partnership needs to address is the fact that each landowner and regulator is legally free to decide for itself what actions protect or threaten salmon, or for that matter, is free to decide that protection of salmon is no longer a priority. For this reason, it is a goal of the Partnership to secure active participation from Native corporations and each federal and state agency with management or regulatory authority over lands and waters in Southwest Alaska. Fish and wildlife do not respect legal boundaries drawn on a map. It is, therefore, essential to the long-term viability of salmon in any watershed that a cooperative management structure exist in which landowners,

land management agencies and regulators can institutionalize a shared vision for the region that balances development with the absolute need to protect salmon habitat, such a vision entails a mutually agreeable system of restrictions, incentives, and trade-offs that deter some human activities and encourage others.

Two important events occurred since this plan was adopted in 2011 that provide in one instance hope and in the other an incentive for cooperative action to protect salmon habitat. The first event was the adoption of a vision statement for Bristol Bay by the regional Native corporation and most of the local governments, tribes, village corporations, and local service agencies. The vision statement recognizes the importance of renewable natural resources as the basis for life, culture, and economic sustainability in Bristol Bay. The vision statement is found at Appendix A.

The second event was the passage of Federal legislation in 2015 that provides an attractive federal tax incentive for Alaska Native corporations that donate conservation easements. Alaska Native corporations can now take advantage of an enhanced federal tax deduction for conservation easement donations previously only available to ranchers and farmers. See Department of Treasury letter at Appendix B. The incentive treats the market value of the conservation easement as a charitable contribution and allows an Alaska Native Corporation to deduct the value against 100% of its taxable income with 15 years to recapture that value.



Commercially viable deposits of oil or gas in the Bristol Bay region have, to date, not been developed and the discovery of such deposits in the future is considered unlikely. Oil deposits are known to exist in offshore areas in the vicinity of Port Moller. Onshore deposits may also exist along the Alaska Peninsula. If these deposits should ever be developed there is the possibility that activity associated with that development could threaten populations of salmon bound for Bristol Bay watersheds. A federal moratorium on oil and gas leasing in Bristol Bay until 2017 was made permanent by a Presidential order withdrawing Bristol Bay from oil and gas development.

Local need for cheaper energy may pose a threat to salmon. Several sites throughout the region, including sites within the Wood-Tikchik State Park, have been under investigation by the State of Alaska for hydroelectric potential. To date, the sites within the Wood-Tikchik State Park have been found to be economically unfeasible.

5. Invasive Species

Salmon and their habitats are particularly susceptible to negative impacts resulting from the introduction and widespread establishment of invasive or non-native plants and animals. Invasive species often spread aggressively and may quickly become difficult and costly to manage and control. Invasions can lead to the loss of biological diversity, barriers to fish passage, altered water chemistry, changes to food webs, changes to stream temperatures, and changes to habitat structure. Invasive species can also introduce diseases and parasites.

Invasive species are introduced by human activity and can spread by human activity or natural forces like wind, water, and native species. Fishing waders, boots, nets, ropes, and other gear can move invasive species into remote areas, including tiny organisms such as the parasite *Myxobolus cerebralis* that causes Whirling Disease and can damage the nerves and spines of several fish species (e.g., rainbow trout), and New Zealand mudsnails (*Potamopyrgus antipodarum*), which can rob streams of food for juvenile salmonids. A single angler can devastate an entire fishery with contaminated gear. Float planes, boats, and trailers are also a significant vector for invasive species, with the potential to spread invasive species to many remote areas throughout Alaska.

While Alaska currently experiences fewer problems related to invasive species than the Lower 48, all ecosystems - even the most intact and pristine ecosystems in Southwest Alaska are susceptible to invasion. Further, the warming climate may provide a more hospitable environment for invasive species, increasing the risk of future invasions.

Baseline surveys conducted by the Bristol Bay Native Association have shown that in Dillingham and Aleknagik, invasive terrestrial plants, such as orange hawkweed, yellow toadflax, and oxeye daisy, have taken hold along the road system. Other riparian and aquatic plants, like reed canary grass and *Elodea* have not yet been found in the region but may show up in the future. If allowed to spread, these species can out-compete native plants to form monocultures, alter nutrient inputs to streams, and impede water flow. Other land managers in the region, including the National Park Service, actively survey for invasive plant infestations and implement control actions as needed.

Since this Plan was first adopted in 2011, *Elodea* was found at Lake Hood in Anchorage. Lake Hood is the major urban floatplane base serving private pilots and air charter operations that venture into Southwest Alaska. Greater vigilance is now required to prevent the spread of *Elodea* to those watersheds frequented by visitors and anglers whose trips originate from lakes in Anchorage used by floatplanes.

6. Growth of Residential, Commercial and Industrial Footprint

Currently all of the communities in Southwest would be considered small by any standard, though each in time could experience significant growth. Other than hub communities like Dillingham, Bethel and King Salmon / Naknek most community growth in the region has come from within, as opposed to people moving into the community. Community growth increases pressure on resources and results in tension between habitat preservation and need for community infrastructure like fuel storage, sewage disposal, landfills, roads, and gravel.

Archeological evidence suggests the region may have supported more people in the past, providing some assurance that more community growth can be absorbed without significant impact. However, any assurance must be tempered by the observations made by many elders of the region: life in the old days was hard. People followed the seasons and moved to where the game and fish were located. If a hunter saw moose tracks, he followed those tracks for days if necessary to catch it. People died of more diseases, people died of starvation, and many people died young. This kind of hard life existed well into the 20th century.

Life is easier today. People don't fall victim to disease so easily, starvation is no longer a worry, and more people live into old age. Even though the number of people may be smaller, they can have much more impact on the environment than their ancestors. Today, people use tools like boats, planes, and snowmachines that can pollute and can transport them quickly to places where fish and game were once relatively unthreatened. People now heat their homes and travel using hazardous substances like diesel fuel and gasoline that must be carefully stored. The trash and garbage that people generate no longer degrades innocuously into the environment, but must now be contained in sanitary landfills. Although it may be difficult, it is possible to plan for community growth and to develop infrastructure in such a way as to minimize the risk of damage to critical salmon habitat.

7. Transportation Infrastructure

Roads and related transportation infrastructure are a general concern because they often intersect with anadromous streams and extensive wetlands. Road crossings (culverts and bridges) have the potential, if poorly constructed and maintained, to block or disrupt the migration of juvenile and adult salmon and other fish. Roads can also foul salmon spawning and rearing areas. Major road construction in the region would most likely follow the development of mines, so at this time the impact from roads is projected.

Roads will continue to be built within the communities of the region, and the construction of intercommunity roads within the next 50 years is likely.

Since 2011, the Partnership has helped fund evaluations by the Alaska Department of Fish & Game of culverts located in anadromous streams in the larger communities of Bristol Bay. Although some culverts need attention, the current problem is not so extensive as to pose a significant threat to salmon in the watersheds in which they are located.

VI. Strategic Conservation Actions

To pursue our conservation objectives, the partnership will promote and support the following strategic conservation actions in the major watersheds. Projects that lead to greater protection in the least protected watersheds are a particular focus for partnership funding. The Partnership Steering Committee will meet annually to make recommendations to the National Fish Habitat Partnership Board of Directors for SWASHP project funding priorities.



**Table 4
Overview of conservation strategies to address likely threats to salmon habitat in Southwest Alaska**

Application-of-Strategies-to-Threats									
Threats	Conservation-Strategies (S)	Protect water-quantity and flow	Preserve-connectivity-between-habitats	Protect water-quality	Protect-riparian-corridors-from-fragmentation	Understand-Climate-change-Impacts	Maintain-a-constituency-that-values-salmon	Review-land-use-and-development-plans	Prevent-invasive-species
1	Mineral-Development	X	X	X	X	X	X	X	
2	Climate-change	X	X	X	X	X	X	X	
3	Fragmentation-of-Land-Ownership		X		X	X	X	X	
4	Energy-Development	X	X	X	X	X	X	X	
5	Invasive-Species					X			X
6	Community-Development	X	X	X	X	X	X	X	
7	Transportation-Infrastructure	X	X	X	X	X	X	X	

1. Protect Water Quantity and Flow

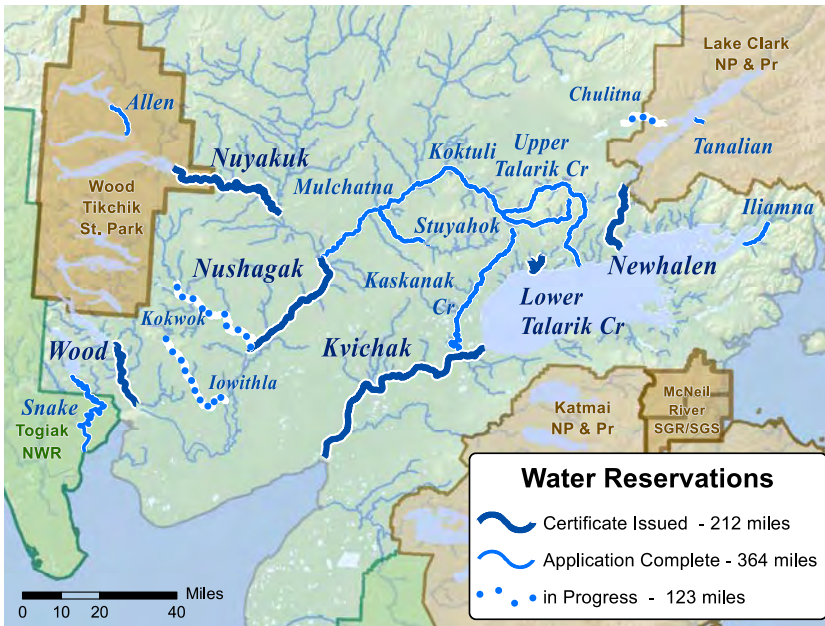
- Instream Flow Reservations

The strategy for the long term protection of water quantity in the lakes and rivers of each watershed is to take advantage of those provisions in Alaska law (AS 46.14.145) that permit government agencies, private individuals, and organizations to secure legally enforceable rights to keep water in rivers and lakes for fish, known as instream flow reservations. Reservations are by lake or river / stream reach. These reservations are effective but expensive to undertake because gauge sites are remote and can only be visited by helicopter or boat. Costs can be upwards of \$100,000 per year. The Alaska Department of Natural Resources administers the instream flow program and requires a minimum of five years of flow data collection before a reservation can be approved. Many of the pending reservations in Southwest Alaska have benefited from Partnership support. Since SWASHP was formed in 2008 the following instream flow reservations have been initiated by partners:

- Mulchatna River – SWASHP and ADF&G (42.8 miles)
- Stuyahok River – SWASHP and ADF&G (28 miles)
- Koktuli River – Curyung Tribal Council and Trout Unlimited (103.8)
- Kaskanak Creek – Trout Unlimited (75 miles)
- Allen River – Bristol Bay Heritage Land Trust (11.3 miles)

The value of the reservation process is that stream habitats obtain a priority right to water flows that is enforceable by law. Further, the process results in the collection of long-term baseline flow data that can inform research on the affects of climate change. The map shows the location of rivers within the Bristol Bay region that as of the date of this update are protected by pending or approved water reservations for fish.

Possible Projects: Partnership funds may be used to support partners applying for or completing reservations of water to maintain water flows and levels critical for the life stages of salmon and other fish. Priority will be accorded to supporting partners applying for reservations of water to protect fish in those watersheds most likely to be affected by industrial or commercial development. Reservations of water outside conservation units generally have a higher priority for partnership funding over waters entirely within a conservation unit.



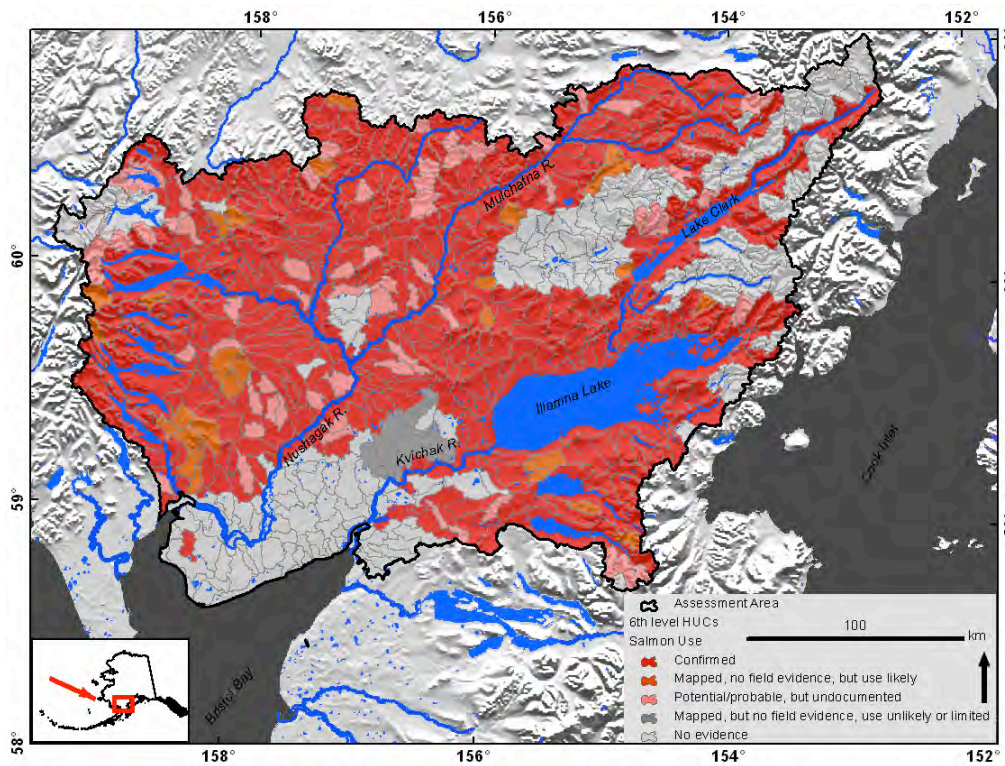
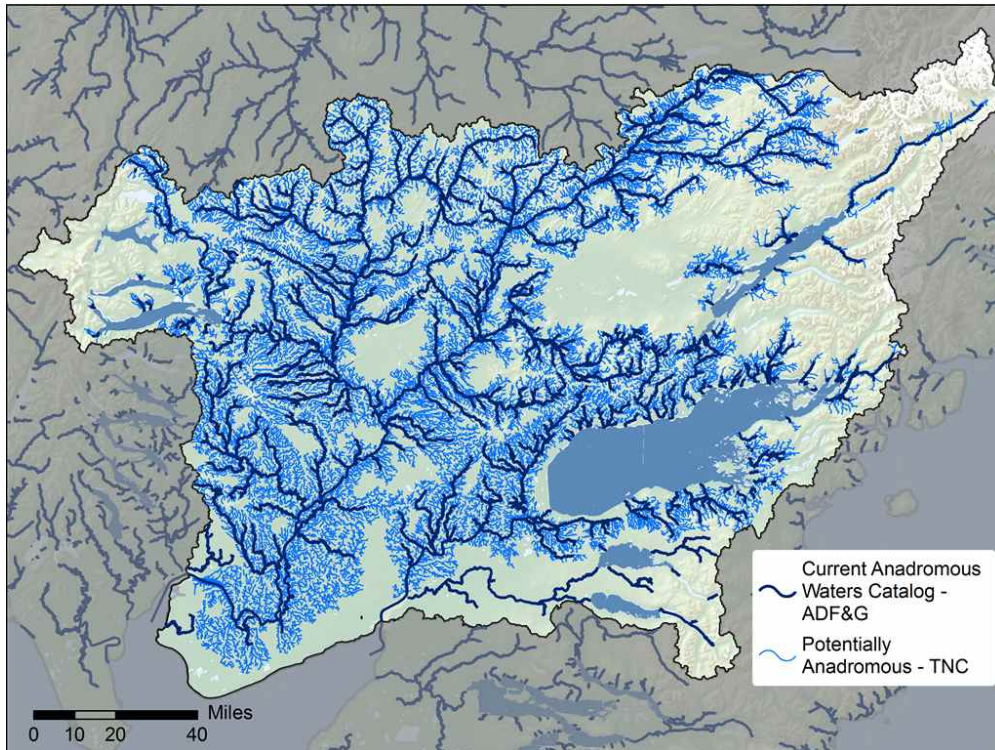
2. Preserve Connectivity Between Habitats

- Identify and Preserve Anadromous Waters

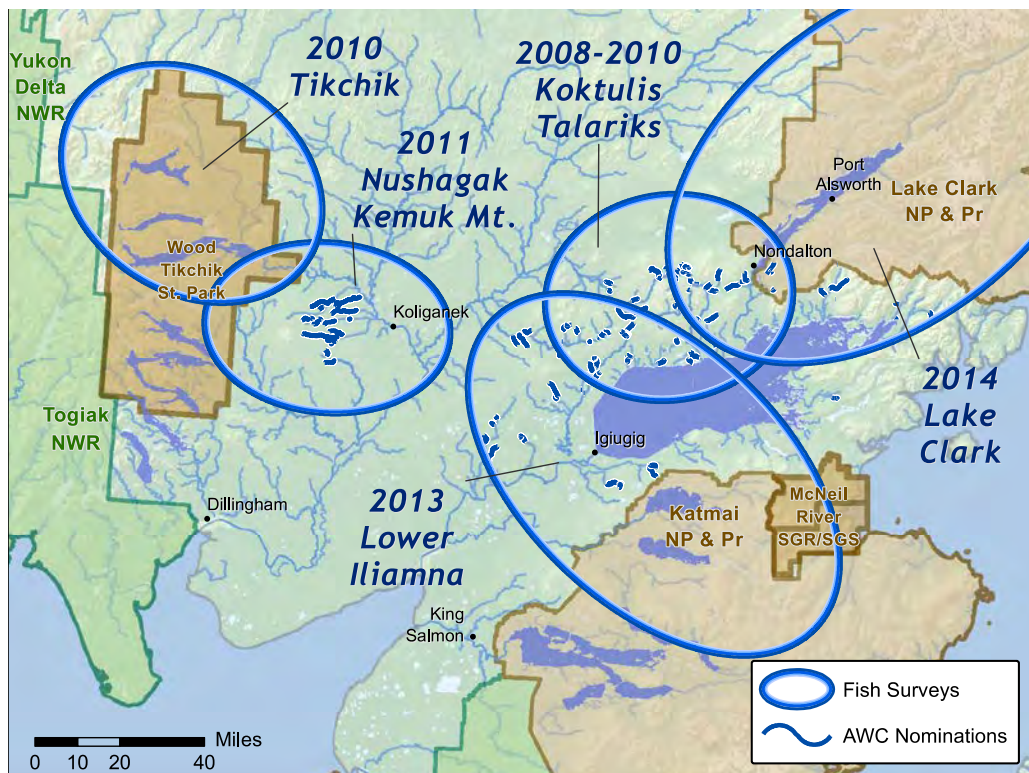
The most basic legal protection afforded in Alaska to a stream or lake containing salmon is to include it in Alaska’s Anadromous Waters Catalog (AWC), as described in Alaska Statute 16.05.871 (Anadromous Fish Act) and Alaska Administrative Code 5 AAC 95.011. Once included in the AWC, a waterbody cannot be disturbed without prior notice to, and a permit from, the Alaska Department of Fish & Game. To nominate a waterbody for inclusion in the AWC, it is necessary to survey the stream for the presence of anadromous fish (primarily salmon) and credibly document any observation of juveniles and/or adults. It is the position of the Partnership that all streams and lakes within Bristol Bay should be surveyed, and if ADF&G standards are met, nominated for inclusion within the AWC. This task remains large given the number of streams that have not been surveyed.

Special Note: It is the position of the Partnership that all waterbodies in Bristol Bay should be assumed to be important for anadromous fish, unless proven otherwise. A waterbody in Bristol Bay should not be disturbed before that waterbody is surveyed for the presence of anadromous fish and nominated for inclusion in the AWC if anadromous fish are documented.





Since recognition of the Partnership in 2008 partners have added hundreds of miles of streams to the AWC. While many miles of anadromous streams remain undocumented, many of these streams are in protected areas or remote from areas potentially affected by development. As such, in the absence of threatening development, it is difficult to justify the huge expense of surveying these streams solely for the purpose of including them in the AWC.



For waterbodies not threatened by development, a better investment of Partnership funds may be to support the creation of spatial models (as hydrography data for Southwest Alaska improves), or the use of emerging technologies like eDNA analysis, that may be able to provide a reliable picture of salmon and fish distribution throughout the region at far less cost.

Possible Projects: Partnership funds may be used to support partners conducting fish distribution surveys for the purpose of including streams in the AWC especially where development presents a threat. Partnership funds may be used to develop more cost-effective techniques (improved spatial models) and emerging technology (Drones and eDNA) that might be used to identify areas that most likely support anadromous fish. Partnership funds may be used to support fish distribution surveys for the purpose of including streams in the AWC where those surveys can be cost effectively added as a component to another field project or assessment.

- Identify and Preserve Connectivity Between Surface and Groundwater

Upwelling groundwater is critical for the early life stages of developing salmon and for the overwinter survival and summer thermal refuge of rearing salmon. Areas that are under consideration for future industrial or commercial development should be surveyed for groundwater interaction with surface water and, to the greatest extent possible, development should avoid places where such interactions are identified.



Possible Projects: Partnership funds may be directed to supporting partners seeking to identify ground and surface water interactions in watersheds most likely to be affected by industrial or commercial development.

- Identify and Preserve Connectivity Between Watersheds

Studies conducted in conjunction with mineral exploration have confirmed groundwater connectivity between tributaries flowing into the Nushagak and Kvichak watersheds. Similar connectivity may exist between other watersheds in Bristol Bay. Areas that are under consideration for future industrial or commercial development should be surveyed for groundwater connections between watersheds and, to the greatest extent possible, development should avoid places where such connections are identified.

Possible Projects: Partnership funds may be directed to supporting partners seeking to identify groundwater connections between watersheds in areas most likely to be affected by industrial or commercial development.

3. Protect Water Quality

Maintenance of clean water for salmon spawning, rearing, overwintering, and migration is a key strategy for preserving pristine salmon habitat throughout Bristol Bay. Changes in water chemistry or temperature could prove detrimental to salmon and other species and reduce or destroy salmon production in affected areas. The current status of water quality should be measured and defined as a baseline. Priority areas include waters near communities to ensure that contaminants (e.g. human waste, fuel, and landfill leachate) are adequately contained and waters within the ecological footprint of potential commercial development, including areas with oil and gas or mineral deposits.

Evaluation of contaminant levels that impact salmon, including sub-lethal toxicity that affects fitness (e.g. avoidance behavior, functioning of the olfactory system), provides vital information that can describe the resiliency of salmon populations. Contaminants may enter the water as a result of residential, commercial or industrial activity, or be released as a result of climate change effects like a rise in water temperature. The Partnership encourages projects to characterize water quality and chemistry that can be used as a baseline for monitoring changes that may indicate an occurring or developing threat to salmon viability. The Partnership also encourages long term monitoring for change in baseline conditions. Important assessments also include evaluations and updates to water quality standards to ensure they accurately reflect onsite water conditions and provide realistic protection for the species and life stages in question. Of particular concern is providing protection to salmon during sensitive life stages, and from acute or chronic toxicity that could affect fitness.

Special Note: Alaska should undertake a comprehensive review of water quality standards for copper to determine whether those standards provide adequate protection to spawning, rearing and migrating salmon in headwater streams potentially affected by mining.

Possible Projects: Partnership funds may be directed to supporting partners seeking to undertake the following:

- Long-term water quality baseline assessment and monitoring programs for the Nushagak and Kvichak watersheds.
- Development, implementation, and maintenance of the comprehensive water temperature monitoring program for Bristol Bay begun with Partnership and Western Alaska LCC funding.
- Work with Alaska Clean Waters Actions Program, local communities, and other partners to develop a comprehensive water quality monitoring program in high-risk areas.
- Conduct site-specific toxicology tests for copper and other possible metal contaminants in watersheds where mineral development is under consideration to evaluate the extent to which local water chemistry modifies the toxicity of inorganic contaminants. Toxicity tests should assess both acute and sublethal toxicity levels to salmon during all life stages.



4. Protect Riparian Corridors from Fragmentation

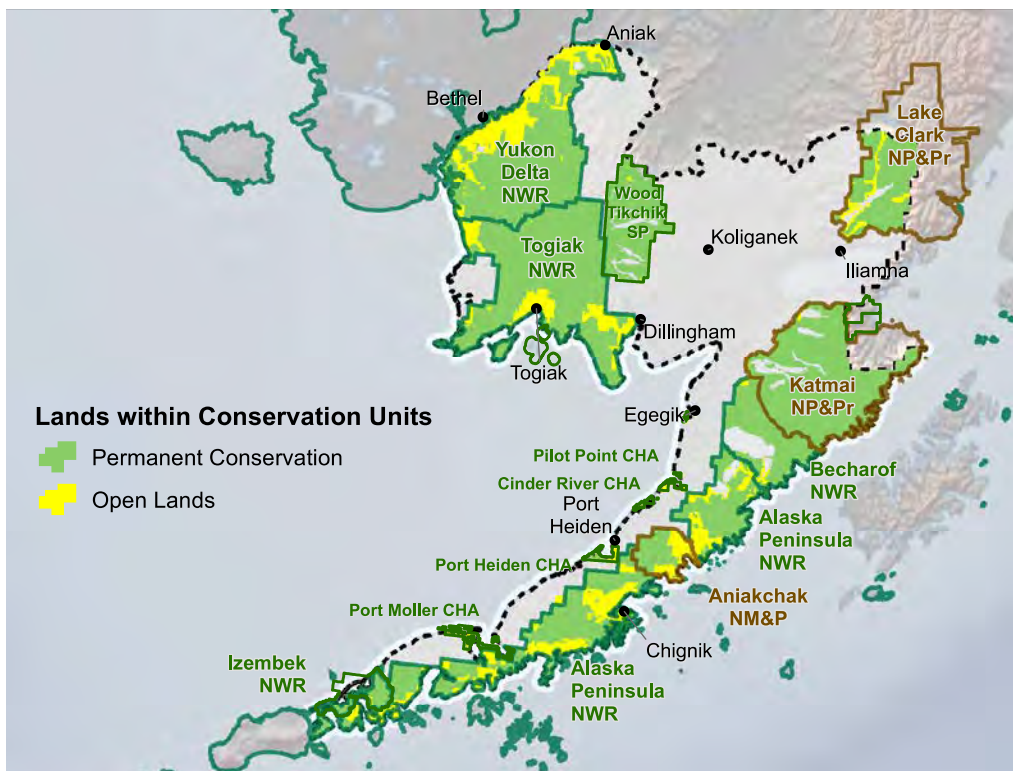
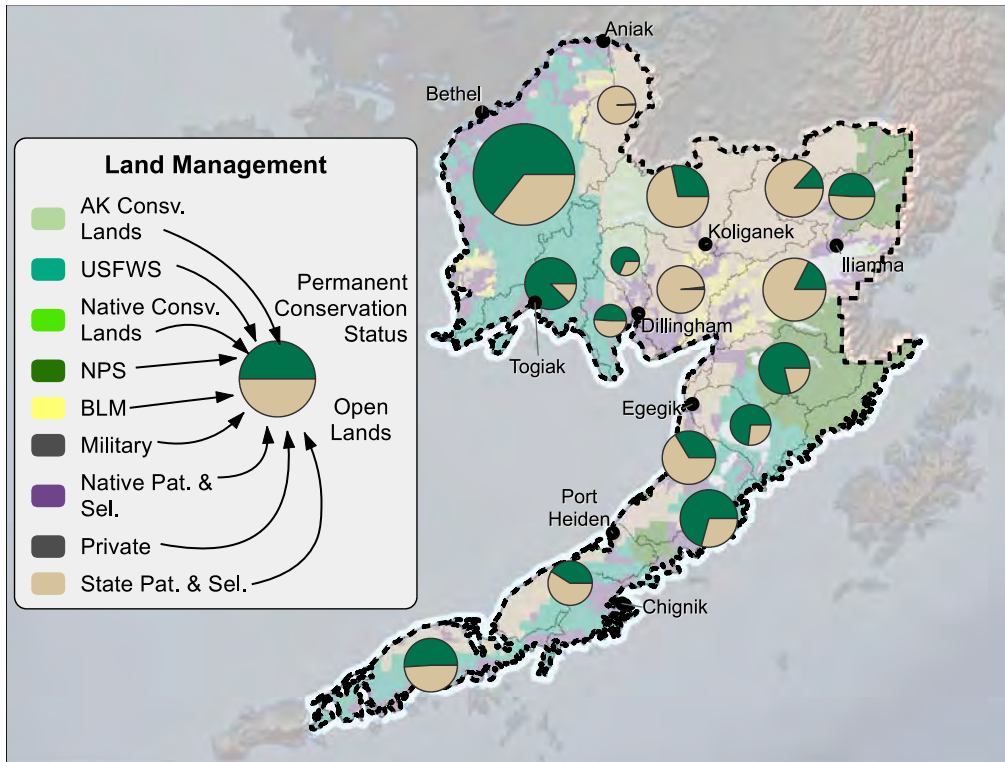
The key to assuring that habitat for salmon remains viable is to protect the vegetative complex within the riparian corridors of the many rivers, streams and lakes of the Partnership service area. Different areas within a riparian corridor have different vegetative features that are largely determined by an interaction of climate, geology, landform, soils, and hydrology (surface and groundwater flows). These features define the unique influence that any given location has on habitat for the life stages of salmon. A vegetative complex can straddle both public lands and private lands, and it is this difference in land ownership that largely directs the conservation strategies of the partnership for protecting that complex.

While Partnership funds cannot be used for the direct purchase of properties or conservation easements they can be used for support costs ancillary to an acquisition such as prioritizations of properties for protection, appraisals, subsurface mineral evaluations, attorney fees, document preparation, and closing costs. Partnership funds can also be used for evaluations of habitat on State, Federal and Alaska Native Corporation lands for the purpose of assisting those entities to evaluate the uses of lands they manage.

In general, priority parcels for protection are those that, if developed beyond low-impact cabins or subsistence use, are most likely to lead to the destruction or diminishment of important salmon habitat. The following is a recommended prioritization for the acquisition of properties or conservation easements by partners:

- a. Landscape-scale acquisitions in the least protected watersheds;
- b. Landscape-scale acquisitions inside the boundaries of federal and state parks, refuges, and other legislatively created conservation units;
- c. Small parcel acquisitions inside the boundaries of a park, refuge, designated wilderness, or special use area that removes a threat to the conservation purposes of the conservation unit;
- d. Small parcel acquisitions outside the boundaries of a conservation unit that protect a microclimate important for a population of salmon (e.g. spring site, tributary confluence, wetland complex, or spawning beach).

Millions of acres of land throughout Southwest Alaska are not in conservation status. 10.3 million acres are in State ownership and managed by ADNR and an additional 1.5 million acres have been selected by the State. The State also owns 7 million acres of tidelands. The Bureau of Land Management oversees 1.9 million acres. Alaska Native village corporations and the regional Bristol Bay Native Corporation own and manage approximately 6 million acres. Individual Native Allottees own thousands of more acres. The future of salmon productivity in Bristol Bay may well be determined by how these agencies and organizations manage lands within their respective jurisdictions.



The watershed is the first and last nation whose boundaries, though subtly shifting, are unarguable. If public lands come under greater pressure to be opened for exploitation and use in the twenty-first century, it will be the local people, the watershed people, who will prove to be the last and possibly most effective line of defense. Gary Snyder

ADNR revised its Bristol Bay Area Plan in 2005 and BLM revised its Bristol Bay Resource Management Plan in 2007. Both of these plans relaxed prior restrictions that protected salmon habitat in deference to policies that favor multiple use and mineral development. While mineral development may not necessarily be harmful to salmon, it cannot be ignored that such development has been a major contributing factor to the loss of salmon habitat and productivity in other parts of the United States and Canada. Also, most of the land within the two watersheds that have historically produced the most Chinook and sockeye salmon in Bristol Bay, the Nushagak and Lake Iliamna / Kvichak watersheds, are managed by ADNR and BLM and contain extensive mineral deposits and mining claims.

Residents and tribes from the Bristol Bay Region challenged ADNR's 2005 Bristol Bay Area Plan and in the process prepared a *Citizens' Alternative Bristol Bay Area Plan*. ADNR accommodated many of the changes recommended in the Citizens' Alternative and revised the Bristol Bay Area Plan in 2013 to restore habitat and recreation classifications to millions of acres and reduce the acreage classified for multiple use and mineral development. Most of the restored designations were in the Nushagak, Mulchatna, Lake Iliamna / Kvichak, and Naknek watersheds.

The Partnership strategy for protecting salmon habitat on lands outside of conservation units is one of thoughtful engagement. The partnership will:

- Serve as a resource for each agency providing recommendations for the long term protection of salmon habitat on these lands;
- Serve as a resource for each agency providing comment and evaluation of development projects to assure to the greatest extent possible that such development does not result in the irretrievable loss of salmon habitat such that salmon productivity is placed at significant risk;
- Serve as a resource for each agency providing recommendations regarding mitigation measures within the region as an offset for development activities;
- Assist each agency with the identification of salmon habitat and with implementing measures available under State and Federal law to provide protection for habitat before development activities occur.

5. Understand and Address the Impacts of Climate Change

The global inevitability of climate change suggests a good conservation project should meet specific criteria:

1. The project has to incorporate a large geography because biodiversity won't survive in a habitat fragmented by development;
2. The project has to respect and accommodate the people already living in and around it; and,
3. The project needs to be resilient in the face of climate change either by virtue of its size (criteria 1) or by incorporating multiple microclimates.

These criteria suggest how the Partnership should respond to climate change and, in particular, how the Partnership should factor climate change into the allocation of Partnership funds. Fortunately, Southwest Alaska and the salmon habitat it encompasses remains largely intact, and most of the conservation projects that have occurred in the region, either by design or good fortune, have met the first two criteria.

With the passage of the Alaska National Interest Lands Conservation Act (ANILCA), many large landscapes in Southwest Alaska received protection through the expansion or creation of new conservation units (i.e., federal parks, wilderness areas, wildlife refuges, and wild rivers). In 1978, the State of Alaska created the Wood-Tikchik State Park. These federal and state legislative actions provide protection for the lakes in which roughly half of the sockeye salmon returning to Bristol Bay spawn and rear.

With respect to the second criteria, all of these conservation units accommodate the continuation of traditional and cultural subsistence use of the resources within these units and continued recreational use of the resources by residents and visitors. The preservation of the lake habitat for sockeye salmon is a direct benefit to both resident and non-resident commercial fishermen and processors whose income depends upon the continued availability of sockeye salmon.

The satisfaction of these two criteria for much of Southwest Alaska underscores the need to focus conservation efforts on those areas outside of legislatively protected conservation units where private initiative or administrative action by federal or state government agencies can fragment intact habitat or eliminate locally important microclimates important for salmon survival.

The likely impacts of climate change to salmon habitat in Southwest Alaska and the application of the three criteria for local conservation projects in an era of climate change suggest the following factors weigh heavily in the allocation of Partnership funds:

1. Whether the project provides or may lead to landscape scale protection in one of the least protected watersheds;
2. Whether the project provides or may lead to protection for an unprotected microclimate within a protected landscape; or

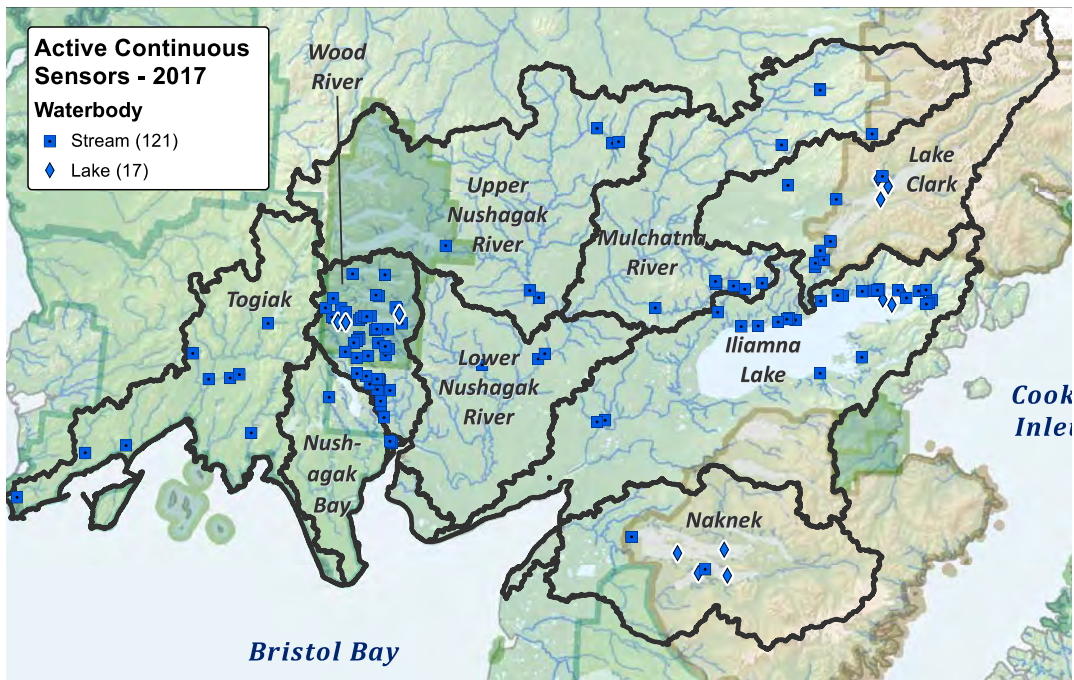
3. Whether the project provides or may lead to protection for an unprotected microclimate within an unprotected landscape.
 - Coordination with Western Alaska Landscape Conservation Cooperative.

Most of the Partnership service area falls within the service area of the Western Alaska Landscape Conservation Cooperative (LCC). LCCs are unincorporated associations that are solution-oriented science cooperatives initiated with funding from the Department of Interior. LCC's were formed to identify climate change impacts and address those impacts within a discrete geographic area. Once an LCC determines strategies to further conservation goals in its geographic service area, it works with others to collaboratively implement those strategies.

The expected outcomes of the LCC program are:

- Increased access to, and integration of, baseline data;
- Application of down-scaled climate models to spatially explicit management actions;
- Landscape level analyses that support conservation planning;
- Identification of locations for high priority on-the-ground conservation efforts;
- Risk and vulnerability assessments for species, habitats, and ecological processes;
- Evaluation of conservation strategies.

Stream Temperature Sensors in Bristol Bay



These expected outcomes align with the Partnership’s response to climate change. The Partnership and the Western Alaska LCC have combined efforts to implement a stream temperature monitoring program in the Nushagak and Lake Iliamna watersheds.

Possible Projects. To understand and address climate change Partnership funds may be used to support projects that:

- Monitoring physical parameters such as flows and freshwater/estuarine water temperatures;
- Assess freshwater smolt production to partition freshwater from marine effects on survival;
- Incorporate genetic or within-watershed population data into fishery management strategies such as escapement goals or ceilings on exploitation;
- Improve the assessment of salmon species other than sockeye, such as Chinook;
- Identify representative streams and stream reaches to conduct baseline and long-term monitoring for climate change effects;
- Examine existing data sets, in particular long term data sets that may have added value for assessment of climate change or population resiliency.

6. Maintain an Informed Constituency that Values Salmon

Alaskans in general and Southwest Alaska residents in particular have consistently articulated their dependence upon and interest in protecting the state’s wild salmon. Educational programs that help maintain this interest should be an important component of Partnership efforts. In addition, the Partnership recognizes it is important to develop vibrant communities and a local economy that thrives upon salmon and a local culture of caring for them.



Possible Projects: It is well within the Partnership’s mission to support educational projects and outreach programs that focus on the current and historical economic importance of salmon to Southwest Alaska. Efforts to retain or expand local participation in the economic activities of the region that rely upon salmon are critical. Such

projects might include efforts to retain commercial fishing permits for local residents, or increasing local participation in the commercial lodge industry.

7. Provide Tools and Assessments Useful for Land Management

When asked to do so by federal, state, or local government agencies or Alaska Native Corporations, the Partnership will review and comment on Land Use and Development Plans for consistency with this Strategic Plan and will lend technical support where appropriate to further the mission of the Partnership.

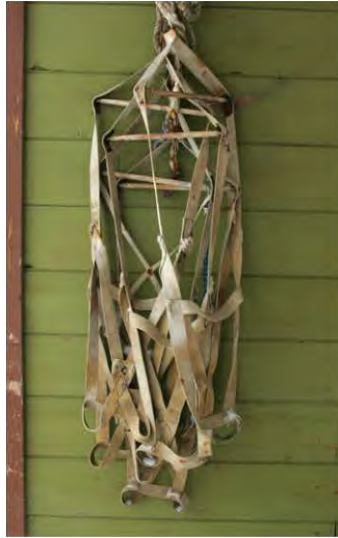
Possible Projects: Partnership funds may be used to assess salmon habitat values on lands in Southwest Alaska that are owned or managed by federal, state or local government agencies, or Alaska Native Corporations. Funds may also be used to develop models and the digital and spatial tools needed to undertake habitat assessments.

8. Prevent the Establishment of Invasive Species

The region's world-class recreational and commercial fishing attracts people from all over the world, underscoring the likelihood for introduction of invasive species in Southwest Alaska and the economic importance of implementing early detection and prevention programs. Additional collaborative detection and assessment work is needed to understand the current and potential threat to fish and wildlife habitat in the region and to design and implement control and eradication programs.

Possible Projects: Partnership funds may be used to support projects that:

- Enact prevention measures;
- Result in early detection of and rapid response to invasive species;
- Increase understanding of the current and potential threat of invasive species to salmon and their habitats;
- Convene public and private land owners to compile the current state of knowledge and control activity in the region; understand vectors for the introduction of invasive species; identify priority watch-list species;
- Devise and implement species-specific early detection, prevention, and control strategies for both public and private lands;
- Conduct assessments to document invasive species along riparian corridors in the Partnerships' priority watersheds;
- Conduct surveys at entry points to the region (e.g. airports, docks, lodges and barge ports) to detect and destroy invasive species;
- Implement projects with villages, tribes, private lodge owners, recreational fishing outfits, and others to increase invasive species awareness and prevention among local residents and visitors to the region.



Appendix A



Bristol Bay Regional Vision

www.BRISTOLBAYVISION.ORG

COMMISSIONERS

Luki Akelkok
Ekwok

Molly Chythlook
Dillingham

Annie Christensen
Port Heiden

Helen Gregorio
Togiak

John Nelson
Kokhanok

Hjalmer "Ofi" Olson
Dillingham

Erin Peters
Naknek

AlexAnna Salmon
Igiugig

ALTERNATE

Annie Fritze
Dillingham

A PROJECT OF

*Bristol Bay Native
Association*

*Bristol Bay Native
Corporation*

*Bristol Bay Area
Health Corporation*

*Bristol Bay Housing
Association*

*Bristol Bay Economic
Development
Corporation*

Vision Statement

February 2011

The foundation of the Bristol Bay Region is committed families, connected to our land and waters.

We believe future generations can live healthy and productive lives here. Across our region, we share common values of community, culture, and subsistence.

We see a future of educated, creative people who are well prepared for life. This requires:

- Excellent schools
- Safe and healthy families
- Local jobs
- Understanding our cultural values and traditions

We assert the importance of local voices in managing our natural resources to continue our way of life.

We welcome sustainable economic development that advances the values of Bristol Bay people. Our future includes diverse economic opportunities in businesses and industries based largely on renewable resources. Large development based on renewable and non-renewable resources must not threaten our land, our waters, or our way of life.

We foster cooperation among local and regional entities to coordinate infrastructure planning for stronger, more affordable communities. Investments in energy, housing and transportation promote sustainable communities and spur economic development.

We recognize the need to locate new sources of capital to implement this vision with a goal of generating self-sustaining regional economies.

We are unified to secure a prosperous future.

Appendix B



OFFICE OF THE CHIEF COUNSEL

DEPARTMENT OF THE TREASURY
INTERNAL REVENUE SERVICE
WASHINGTON, D.C. 20224

MAR 17 2016

CC:ITA:B01
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UIL: 9300.40-00

Land Trust Alliance
1660 L Street, NW
Suite 1100
Washington, DC 20036

Attention: Russell Shay, Director of Public Policy

Dear Mr. Shay:

This letter responds to your request for information dated February 23, 2016.

In your request, you ask (1) whether an Alaska Native Corporation may claim a deduction equal to one hundred percent of its taxable income in connection with its qualified conservation contribution, and (2) how many years it may carry forward any amount in excess of its taxable income.

A "qualified conservation contribution" is a contribution of a qualified real property interest to a qualified organization exclusively for conservation purposes. Section 170(h)(1) of the Internal Revenue Code. A deduction for a qualified conservation contribution made by a "Native Corporation" in a taxable year beginning after December 31, 2015, and which is a contribution of property that was land conveyed under the Alaska Native Claims Settlement Act, 43 U.S.C. §§ 1601-1629h (2015), is allowed to the extent that the aggregate amount of such contributions does not exceed the excess of the taxpayer's taxable income over the amount of charitable contributions allowable under § 170(b)(2)(A). Section 170(b)(2)(C)(i).

If the aggregate amount of qualified conservation contributions made by a Native Corporation exceeds the amount allowed by § 170(b)(2)(C)(i), the excess is treated as a charitable contribution under § 170(b)(2)(C)(i) for each of the 15 succeeding taxable years in order of time.

For purposes of § 170(b)(2)(C), the term "Native Corporation" has the meaning given such term by section 3(m) of the Alaska Native Claims Settlement Act, 43 U.S.C. § 1602(m).

This letter has called your attention to certain general principles of the law. It is intended for informational purposes only and does not constitute a ruling. See section 2.04 of Rev. Proc. 2016-1, 2016-1 I.R.B. 1, 5 (Jan. 4, 2016). If you have any additional questions, please contact me or Jason Kristall at (202) 317-7003.

Sincerely,



Karin Goldsmith Gross
Senior Technician Reviewer
Office of Associate Chief Counsel
(Income Tax & Accounting)

Appendix C

Organizational Structure and Operating Framework

The Southwest Alaska Salmon Habitat Partnership was formed in 2000 as the Southwest Alaska Conservation Coalition to bring together local communities, non-profit organizations, state and federal agencies, Alaska Native corporations and tribal governments and residents to protect salmon habitat in the wild salmon stronghold of southwest Alaska through conservation and education. The coalition petitioned for recognition as a partnership under the National Fish Habitat Initiative and was recognized by the National Fish Habitat Board of Directors (NFHB) in 2008. The name was changed at that time to the Southwest Alaska Salmon Habitat Partnership.

The Southwest Alaska Salmon Partnership is a collaborative effort to carry out in Southwest Alaska the mission of the national initiative to “protect, restore, and enhance the nation’s fish and aquatic communities through partnerships that foster fish habitat conservation and improve the quality of life for the American people.” (NFHP; www.fishhabitat.org).

Organizing and Operating Principles

The partnership formed and operates under these principles for decision-making and collaboration:

- Strive to work and make decisions by consensus;
- Ensure accountability and transparency for all Partnership activities;
- Focus Partnership activities on issues pertaining to habitat conservation - not fishery management allocation decisions. For purposes of the Partnership, ‘conservation’ includes land and water protection, habitat and fish passage protection and restoration where necessary, and the development of scientific information that informs decisions about salmon conservation;
- Apply the best available scientific information, including traditional knowledge, to Partnership funding and management decisions and the development and evaluation of partnership projects;
- The Partnership is a voluntary self-directed organization actively working to achieve the goals and objectives of its approved Strategic Action Plan.
- Individual member groups of the Partnership retain their various missions and activities and participate in the Partnership to the extent they are able to support the Partnership’s vision, mission, and strategic plan. All resource agencies who are members of the Partnership maintain all statutory authorities and do not relinquish any of their responsibilities for managing fish and wildlife resources or budgetary responsibilities per their agency missions through partnership participation.

Organizational Structure

The Southwest Alaska Salmon Partnership works to achieve the goals of its Strategic Conservation Action Plan through collaboration of its partners and guidance from standing and ad hoc committees.

Partner Organizations

The Partners will include federal and state agencies, non-profit and non-governmental organizations, businesses, Native Alaska corporations and tribes, and private citizens.

The Partners shall:

- Promote conservation of fish habitat in Southwest Alaska;
- Work to meet Partnership goals by contributing funds, people, equipment, or access to shared activities;
- Attend annual meetings of the Partnership;
- Serve on Partnership committees and working groups;
- Be listed on all Partnership publications;
- Endorse and support the implementation of the Strategic Conservation Action Plan;
- Be eligible for funding that comes through the Partnership to implement the Strategic Conservation Action Plan, if eligible by the criteria of the funding source.

Steering Committee

The Steering Committee is the advisory body for the Partnership. The Steering Committee will be consistent in composition with the National Fish Habitat Board and be comprised of representatives of local, state, and federal governments, academia/conservation, Native Alaskans and other organizations interested in fish habitat conservation. The following organizations are to be represented on the Steering Committee: U.S. Fish & Wildlife Service, The Nature Conservancy, Bristol Bay Native Association, Bureau of Land Management, The Conservation Fund, Trout Unlimited, Alaska Department of Fish & Game, Bristol Bay Native Corporation, Alaska Department of Natural Resources, and the Bristol Bay Heritage Land Trust. Additional organizations may be selected from the partnership to serve on the Steering Committee.

The Steering Committee shall:

- Act as the guiding body for the Partnership;
- Select a Chairman who will serve at least one year;
- Serve as a forum and mechanism to work cooperatively to protect habitat that supports the fishery and aquatic resources of Southwest Alaska;
- Actively seek and encourage partner participation;
- Support partner projects through endorsements for funding, technical assistance, and recommendations for collaboration and funding sources;

- Make recommendations, as requested by granting agencies and organizations, on distribution of funds for fish habitat projects in Southwest Alaska;
- Prepare reports of Partnership activities as needed for the partners, NFHB, and other interested organizations;
- Complete, maintain, and implement a strategic action plan that prioritizes conservation strategies and locations for fish habitat in the Southwest Alaska;
- Ensure that the Partnership follows guidelines set forth by the NFHB;
- Convene meetings of the Partnership annually or more frequently as required;
- Coordinate with other NFHAP Partnerships where there is geographic overlap with species and habitats.

Steering Committee operating procedures:

- The steering committee shall meet at least once per year, and more frequently as needed. These meetings shall be open to all partners and the public.
- Positions of Facilitator and Note taker shall rotate by meeting among Steering Committee members.
- Five member organizations constitute a quorum, and decisions will be made by consensus.

Expectations of Steering Committee members:

- Each organization on the Steering Committee shall identify one person who will attend most regular meetings to select projects for NFHAP funding, and other special meetings as may be required to advance the Partnership's goals. Attendance may be either in person or via teleconference. When that person is unable to attend, s/he will notify the coordinator or another steering committee member and assign a substitute to attend, if possible.
- Act as Facilitator and/or note-taker approximately once per year.
- Participate on a standing committee or ad hoc committee.
- Evaluate partner proposals for NFHAP funding.
- Participate in national NFHAP activities that have particular relevance to the Southwest Alaska Salmon Habitat Partnership or one's organization. These activities might include regular teleconferences of fish habitat partnerships, review of the national fish habitat assessment in Alaska, and meetings with other partnerships that work in Alaska.

Standing Committees and Working Groups

There shall be a standing science and technical committee and such other committees as the steering committee may establish.

- **Science and Technical Committee:** This committee was initially formed to provide a science-based foundation for the development of the Strategic Conservation Action Plan. This committee continues to meet on an as-needed basis to review the plan and to implement science goals and strategies in the plan. Members of this group are biologists, hydrologists, and ecologists from partner organizations. This committee shall review and rank proposals for partnership funding and make recommendations to the steering committee.

- **Ad Hoc Committees and Working Groups:** Additional committees or work groups may be formed on a temporary basis as needed to perform particular tasks or projects of the Partnership.

Coordinator

A Southwest Alaska Salmon Habitat Partnership Coordinator will assist the Steering Committee in accomplishing goals and objectives, provided that funding becomes available to support that position. The coordinator would provide primary staff support to the Steering Committee. He/she would be responsible for disseminating information, coordinating meetings, coordinating and facilitating overall implementation of actions and projects of the Partnership, outreach activities, and pursuing funding and grant opportunities that carry out the Strategic Conservation Action Plan. The coordinator would be employed and provided office support by one or more of the member agencies or organizations.

In the absence of funding, one or more of the partners may volunteer to provide the services of the coordinator.

Project Review and Endorsement

There are three scenarios under which the Southwest Alaska Salmon Partnership would conceivably provide advice or make recommendations on projects: (1) allocation of funding made available to the Partnership; (2) periodic reviews of ongoing projects, and (3) other funding opportunities, e.g. State Wildlife Grant. This section explains the Partnership's role with respect to the first scenario – funds allocated to the Partnership through NFHAP or provided to the Partnership by a partner or other agency for the purpose of carrying out the Strategic Conservation Action Plan.

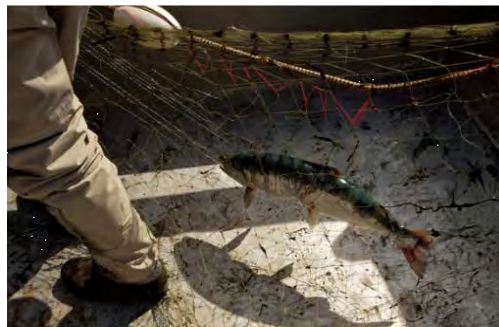
Funding provided to the Partnership for the purpose of carrying out the Strategic Conservation Action Plan shall generally be made available to partners through a Request for Proposal (RFP) process approved by the Steering Committee. Any RFP process should be directed to encouraging projects that:

- Directly apply to conservation of or increasing knowledge of fish and/or fish habitat issues that affect Southwest Alaska;
- Address the goals and strategic actions of the Partnership Strategic Action Plan;
- Are consistent with the goals of the National Fish Habitat Action Plan; and
- Are not political in nature.

The Science and Technical Committee, or other committee designated by the Steering Committee, shall review projects submitted to the Partnership for funding and shall make recommendations to the Steering Committee.

The Steering Committee may upon request endorse projects for other funding opportunities when doing so will not require the Committee to choose between

competing proposals from partners. As a general rule the Partnership encourages all partners to use the Strategic Conservation Action Plan as a statement of priorities for fish habitat in Southwest Alaska and to reference the plan both for programs in which it provides funding and from which it may be requesting funding.



Appendix D

Comprehensive Conservation Plans, General Management Plans, Watershed Plans, and other management plans available for use by the Partnership.

A. Comprehensive and Master Plans

Wood-Tikchik State Park Master Plan
Alaska Peninsula National Wildlife Refuge Comprehensive Conservation Plan
Becharof National Wildlife Refuge Comprehensive Conservation Plan
Togiak National Wildlife Refuge Comprehensive Conservation Plan
Izembek National Wildlife Refuge Comprehensive Conservation Plan
Yukon Delta National Wildlife Refuge Comprehensive Conservation Plan
Alaska Maritime National Wildlife Refuge Comprehensive Conservation Plan
Lake Clark National Park and Preserve General Management Plan
Katmai National Park and Preserve General Management Plan
Aniakchak National Monument General Management Plan
Alagnak Wild River Management Plan
Bristol Bay Resource Area Management Plan

B. Fisheries Management Plans

Alaska Peninsula National Wildlife Refuge Fisheries Management Plan
Becharof National Wildlife Refuge Fisheries Management Plan
Togiak National Wildlife Refuge Fisheries Management Plan
Izembek National Wildlife Refuge Fisheries Management Plan
Yukon Delta National Wildlife Refuge Fisheries Management Plan

C. Land Protection Plans

Alaska Peninsula National Wildlife Refuge Land Protection Plan
Becharof National Wildlife Refuge Land Protection Plan
Togiak National Wildlife Refuge Land Protection Plan
Izembek National Wildlife Refuge Land Protection Plan
Yukon Delta National Wildlife Refuge Land Protection Plan

D. Other Relevant Plans

Nushagak Bay Watershed Plan
Nushagak River Watershed Traditional Use Area Conservation Plan
Bristol Bay Coastal Zone Resource Area Management Plan
Bristol Bay Ecoregional Plan
Wood-Tikchik Site Conservation Plan
Pacific Coast Joint Venture Strategic Plan
ADF&G Special Areas Management Plans
Citizens' Alternative Bristol Bay Area Plan