CONSERVATION ACTION PLAN 2017-2021

SOUTHEAST ALASKA
FISH HABITAT
PARTNERSHIP

Rainbow Trout
Photo by Mark Hieronymus

EXECUTIVE SUMMARY

The Southeast Alaska Fish Habitat Partnership (SEAKFHP) works to support collaborative fish habitat conservation in freshwater and coastal ecosystems across the southern panhandle of Alaska (southeast). Covering nearly 17 million acres of this region is the Tongass National Forest, the largest national forest in the US, and a key producer of salmon. This region is comprised of over 13,000 miles of anadromous fish habitat with numerous watersheds supporting a variety of salmon and other commercially and culturally important fish and aquatic species. Freshwater and coastal habitats abound, including over 20,000 lakes and ponds, more than 18,000 miles of shoreline, over 12,000 estuaries, and countless streams and rivers in excess of 35,000 miles of fluvial habitat. The region is defined by rainforests, glacial fiords, rivers and streams, estuaries, mountains, and glaciers and ranks as one of the largest, most complex, and intact estuarine and temperate rainforest systems on earth.

Our partners include a diverse set of stakeholders who share a common interest to conserve and sustain the region's abundant and intact fish habitat, fisheries-based economy and culture, and quality of life these fish and aquatic resources bring to local communities. To achieve the broad mission of the partnership, partners have developed a strategic action plan that includes two focal Fish Habitat Conservation Strategies, one that focus on freshwater systems and a second that focuses on coastal areas of southeast. To bring context and support to those strategies the SEAKFHP Operational Strategy and Business Plan for 2017-2021 was developed and lays out the partnership's organizational and service strategies and shares the partnership's fiscal needs and goals.

In March of 2014, SEAKFHP became the 19th recognized National Fish Habitat Partnership and follows the guidelines outlined in the National Fish Habitat Action Plan (NFHAP, www.fishhabitat.org). Our conservation goals and proposed partnership actions are closely tied to this national plan and were first identified in the partnership's initial strategic action plan (SEAKFHP Strategic Action Plan 2014 – 2016) which remains an important resource for the partnership as it provides the history of the partnership and the foundational conservation actions achieved in the region.

The intent of this revised plan is to share a blueprint on the actions the partnership will engage in over the next five years (2017-2021). Current expertise and focus of SEAKFHP partners are the habitats of resident and anadromous salmonid species in freshwater and coastal environments. In addition, this revised plan builds upon efforts achieved by the partnership from 2012-2017; strengthening the partnership's focus on facilitating restoration efforts in freshwater areas in the region and beginning to gather needed resources to bring emphasis to coastal fish habitat areas in the near future.

This plan is a living document and revised versions will be pursued to capture continued growth of the partnership in future years. In addition to guidance offered through this plan, success of the partnership relies on continued collaboration and support of regional partners including federal, state, local and tribal governments, academic and research institutions, industry, nonprofit organizations, and citizens.

VISION:

Partners of the Southeast Alaska Fish Habitat Partnership share a common vision to ensure healthy, thriving habitats that support all life stages of resident, anadromous, estuarine, and marine-dependent fishes across their historical range in Southeast Alaska.

MISSION:

Support cooperative fish habitat conservation, restoration, and management across Southeast Alaska with consideration of the economic, social, and cultural interests of local communities in our endeavors.

3-PART STRATEGIC ACTION PLAN

SEAKFHP's strategic action plan includes three components – a two-part conservation strategy and a business plan outlining the partnerships organization structure, activities and funding strategy.

Here is a brief history to its development as well as some guidance for how to use and assess these components:

The partnerships initial conservation strategy reflected both overarching principles of the National Fish Habitat Action Plan and a thorough review of existing fish habitat conservation strategies at the local level in Southeast Alaska. Close attention was given to a conservation strategy developed by Audubon Alaska and The Nature Conservancy and an interagency effort to develop priorities for the State of Alaska's Sustainable Salmon Fund . In addition, the partnership's conservation strategy was developed as a result of pre-work performed by members of the SEAKFHP Steering Committee and other interested regional stakeholders through the use of a SWOT (strengths, weaknesses, opportunities and threats) analysis and initial elements of a Conservation Action Planning (CAP) process. As part of those efforts a list of risks to fish habitat and associated stressors were identified and used to develop associated conservation actions, this list has been updated and is included in Appendix 1 to reflect the unique aspects of freshwater and coastal areas in southeast and serve as a long-term planning guide as conservation efforts progress in this region.

In 2016, the SEAKFHP Steering Committee began to update the partnership's conservation strategy using two planning efforts, one focused on revising the existing conservation actions which primarily focused on freshwater systems across southeast and a separate effort focused specifically on coastal areas including estuaries and nearshore habitats. In addition, a bulk of actions by the partnership are characterized as services to partners to facilitate communication and convene partners to identify shared interests and leverage resources to produce conservation outcomes. Those efforts continue to be a core function for the partnership and are now characterized in the partnership's business plan, which fulfills the third leg of the partnership's strategic action plan.

As a result, the plan is laid out in three parts, that together make up the strategic action plan for the partnership for the next five years, 2017-2021. It includes SEAKFHP's two focal fish habitat conservation strategies, a Freshwater Fish Habitat Conservation Strategy and a Coastal Fish Habitat Conservation Strategy, that together make up the bulk of this document. The partnership's organizational and service strategies are captured in the SEAKFHP Operational Strategy and Business Plan that stands alone outside this document to help convey organizational and funding capacity needed for the partnership. Together these components serve as a blueprint for the partnership to meet its mission with measurable objectives and actions that partners and others can use to gauge progress and success in advancing shared conservation actions. It is envisioned that by fostering regional conservation strategies, strengthening partner collaboration, elevating work accomplished and planned by partners, incorporating science-based information, and articulating key priorities shared across mixed-ownership watersheds and coastal areas throughout southeast, the partnership will achieve improved on-the-ground fish habitat conservation outcomes across the region.

It is important to understand a few of the nuances in the development of our conservation strategies. First, the freshwater strategy relies heavily on previous partnership efforts and takes advantage of more abundant freshwater assessment information resources and partnership engagement. This revised strategy has expanded to include four conservation goals with specific objectives and conservation actions. Also, actions proposed under this strategy take two forms: broad actions that have general partnership support; and specific time-bound actions that the partnership itself will undertake or lead. The reason for this is that during the planning effort partners discovered needed actions that may be outside the partnership scope but are perceived as important actions in general. Partners want those actions captured in a regional planning effort. For the coastal strategy, four conservation goals are also identified and due to the emerging focus for these habitats early actions have been identified rather than the more thorough objective/action process developed for the freshwater strategy. In addition, those actions are focused on partnership led actions and are anticipated to expand during a future planning effort.

Freshwater fish habitat conservation goals:

- Protect fish habitats in freshwater systems in Southeast Alaska,
- Maintain water quality and quantity in those areas, and
- Restore and enhance fragmented and degraded fish habitats in impacted areas.
- Foster and support assessment and monitoring that informs fish habitat and restoration science.

Coastal fish habitat conservation goals:

- Strengthen coastal policies to maintain productive fish habitat in Southeast Alaska.
- Foster effective and sustainable assessment and monitoring networks for fisheries habitat along Southeast Alaska's coastal margin.Identify and protect critical coastal fish habitat areas that must be sustained long-term.
- Identify degraded coastal fish habitat that can be prioritized and restored.

FRESHWATER FISH HABIAT CONSERVATION STRATEGY

Southeast Alaska's Freshwater Landscape

Southeast Alaska is a complex geography with more than 1000 islands sitting adjacent to the highest coastal mountain range in the world. The Coast Range supports some of the largest glaciers and extensive ice fields in North America. Rivers that drain these glaciated slopes play an important role providing minerals and nutrients that fertilize bays and estuaries across the region. Interactions between the land and water are strong, southeast rivers discharge about 90 cubic miles of freshwater annually and carry nutrients from the land to nearby marine waters producing hotspots for primary productivity and create feeding areas for fish, marine mammals and birds. In addition, freshwater habitats across the region provide vital functions for fish, serving to provide needed habitat for spawning, rearing and wintering for anadromous fish species. The landscape of southeast is predominately forest and the ability to maintain habitats for fish is tied to the condition and integrity of the forests and watersheds around them. Salmon are an essential part of the region's ecology , they rely on the region's freshwater landscape and play a major role in transporting marine and freshwater nutrients to the forest ecosystem. Nine anadromous fish species are abundant in the region: king salmon (Chinook, *Onchorhynchus tshawytscha*), red salmon (sockeye, *O. nerka*), silver salmon (coho, *O. kisutch*), pink salmon (humpy, *O. gorbushcha*), chum salmon (dog, *O. keta*), steelhead (*O. mykiss*), Dolly Varden (*Salvelinus malma*), cutthroat trout (*O. clarki*) and eulachon (hooligan, *Thaleichthys pacificus*).

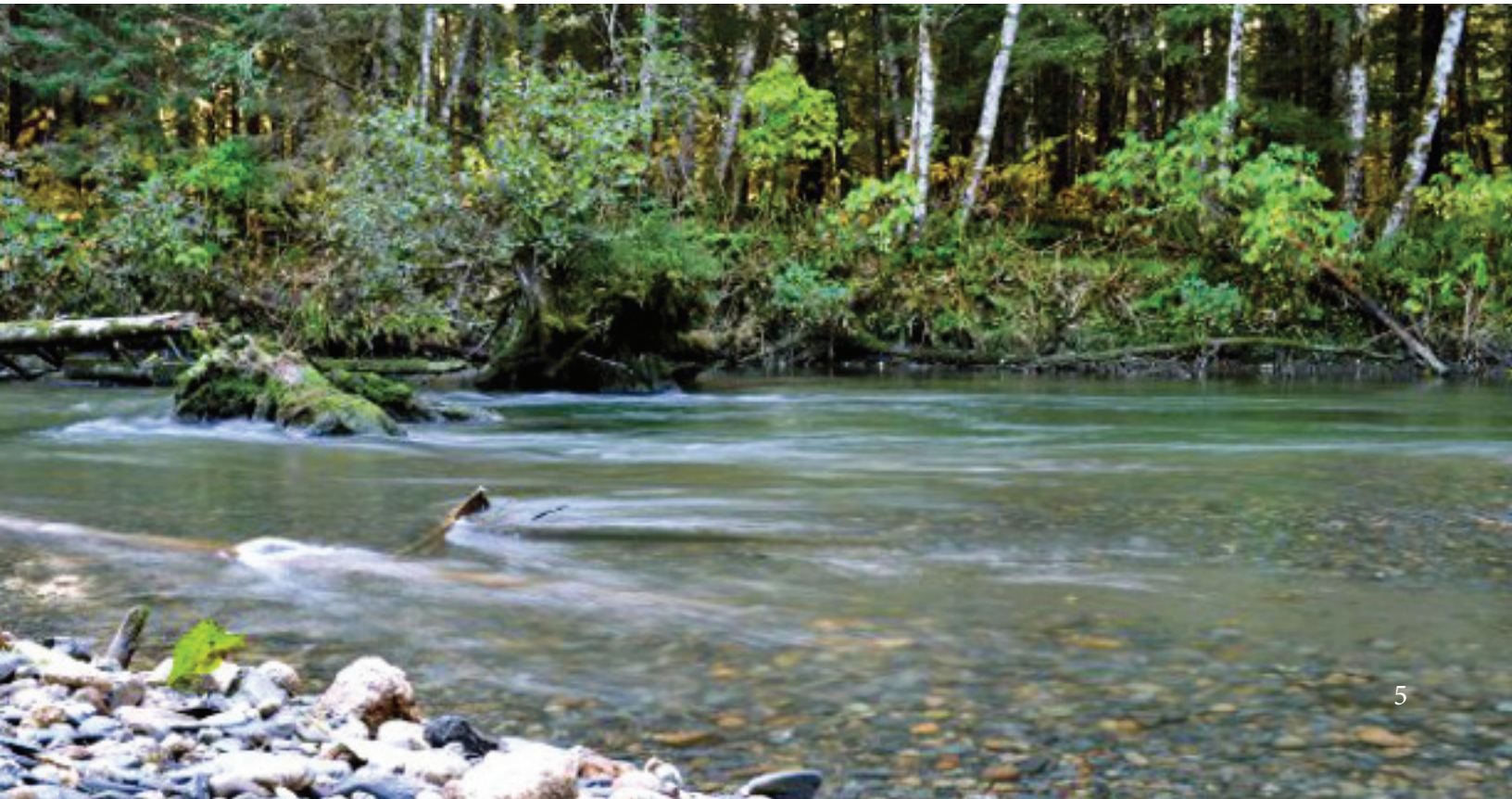
Photo: ShoreZone

SEAKFHP's freshwater fish habitat conservation strategy was developed with consideration of nationwide strategies developed through NFHP and thorough review of existing aquatic resource assessments, and conservation strategies used by federal and state agencies and other entities working directly on fish habitat conservation in Southeast Alaska. Through those efforts it is clear productive freshwater fish habitat in this landscape is a product of interactions and connections among the stream, floodplain, riparian area and uplands. As part of the 2007 Conservation Assessment and Resource Synthesis (Schoen and Dovichin 2007) the condition and management status were evaluated across 22 bioecological provinces in the region. An estimated 20% of floodplain forests associated with anadromous fish habitat have been logged since 1954. Regionwide 52% of anadromous floodplain forests are within non-development designations, with 38% in watershed-scale reserves. This conservation strategy looks to maintain this existing reserve network and build up additional habitat protections to preserve fish habitat for the long-term. The strategy also relies on the USFS Watershed Condition Assessment to assess watershed condition on Tongass National Forest lands and identify priority areas that have been impacted through previous forest practice activities. This revised plan builds upon efforts achieved by the partnership from 2012-2017; strengthening the partnership's focus on facilitating restoration efforts in freshwater areas in the region leveraging resources to improve on the ground freshwater habitat conditions. It is also understood fish face additional challenges resulting from urbanization, mining, fishing and aquaculture practices, and changing climate conditions. As such, SEAKFHP's freshwater fish habitat conservation strategy focuses in on four specific goals:

- Protect fish habitats in freshwater systems in Southeast Alaska,
- Maintain water quality and quantity in those areas,
- Restore and enhance fragmented and degraded fish habitats, and
- Foster and support assessment and monitoring that informs fish habitat and restoration science

The following outlines each of these goals in more detail including background information to reference the current condition of the landscape, and provides a list of actions the partnership can support either directly through partnership activity or indirectly through partner support. Time bound actions represent priorities and will be elevated in annual work plans for the partnership.

Photo by Mark Hieronymus



GOAL FCS1:
Protect fish habitat in freshwater systems areas in Southeast Alaska

Objective FCS1-1. Support progressive and consistent plans, policy, regulation, outreach and management practices necessary to maintain and protect aquatic habitats in watersheds throughout Southeast Alaska and the Tongass National Forest.

Background: Watershed protection within Southeast Alaska varies by scales, jurisdictions, and landownership. It is recognized that ecological integrity and the resilience of fish and their habitats in Southeast Alaska will depend in part on balancing urban and industrial development with sound conservation measures. This includes supporting existing management approaches and potentially expanding a watershed scale reserve network system for the region that preserves and maintains productive and diverse fish habitat (Schoen and Dovichin 2007, National Fish Habitat Action Plan 2010, Ecological Atlas of Southeast Alaska 2016).

To achieve this goal, Audubon and The Nature Conservancy (TNC) reviewed and analyzed existing resource information for Southeast Alaska and the Tongass National Forest. This included developing a process for ranking individual watersheds within 22 biogeographical provinces distributed across the region. A representative set of focal metrics were used for this conservation assessment including anadromous fish habitat. A Conservation Area Design for Southeast Alaska emerged from this effort which included identification of "Conservation Priority" watersheds with the highest concentrations of ecological values. The authors of the assessment outlined a selection of conservation measures including focal actions such as maintaining and expanding the existing conservation reserve network, applying best management practices as is included in the US Forest Service's Tongass Land Management Plan, and extending additional critical habitat areas surrounding state lands and waters that include high value or sensitive fish habitats. An additional outcome from this assessment was the development of the Tongass 77 (T77), a proposal developed by Trout Unlimited (TU) and other stakeholders in the region, to designate key watersheds in Southeast Alaska for permanent protection to safeguard important salmon habitat across the Tongass National Forest. Maps of the watersheds comprising the conservation reserve network for Southeast Alaska include land use maps showing the legislatively protected areas currently set aside through federal designation and the conservation and restoration priority areas identified under the Conservation Area Design effort. The T77 watersheds can be found in the Human Uses section of the 2016 Ecological Atlas of Southeast Alaska.

In 2016, the Tongass National Forest amended the 2008 Tongass Land and Resource Management Plan , incorporating recommendations to cease old-growth timber harvest in TU's T77 watersheds and conservation priority areas identified by TNC and Audubon Alaska. Under the 2016 Plan young-growth timber harvest is allowed in these areas; the Forest Service would conduct an internal scientific review in collaboration with a forest collaborative and other stakeholders to determine likely impacts to fish and wildlife habitat from young-growth timber projects that intersect with the 19 "modified" Tongass 77 watersheds. Best Management Practices (BMPs) and other measures to protect water quality and fish habitat are incorporated into the Forest Plan and implemented during all ground-disturbing activities in the Tongass National Forest. An annual monitoring program evaluates the implementation and effectiveness of these measures.

Watershed condition on non-federal lands of Southeast Alaska are managed through a variety of municipal ordinances and comprehensive plans, Alaska Department of Natural Resources (ADNR) Area Management Plans, Alaska Department Fish and Game (ADF&G) Special Area Plans, and specific State statutory authorities granted to ADF&G, ADNR and Alaska Department of Environmental Conservation (ADEC). BMPs as prescribed under the State of Alaska Forest Resources Practices Act are designed to protect fish habitat and water quality on non-federal lands. In addition, ADF&G has the statutory responsibility for protecting freshwater anadromous fish habitat and providing free passage for anadromous and resident fish in fresh water bodies (AS 16.05.841-871). Any activity or project that is conducted below the ordinary high-water mark of an anadromous stream requires a Fish Habitat Permit, which is the tool used to safeguard freshwater anadromous fish habitat. Municipal waterbody protections exist in the form of anadromous stream setbacks in Juneau and Haines, and most other communities have localized watershed management plans for drinking water protection.

Mechanisms for additional habitat protection beyond local, state, or federal management are more limited. Non-governmental organizations, such as the Southeast Alaska Land Trust (SEAL Trust), The Conservation Fund (TCF), and TNC have protected portions of watersheds, shorelines, wetlands, and riparian corridors in limited areas of Southeast Alaska through fee simple acquisition and conservation easements. In addition, SEAL Trust and TCF are wetland mitigation sponsors under agreements with the U.S. Army Corps of Engineers (Corps) governed by Section 404 of the Clean Water Act. Through SEAL Trust and TCF's In-Lieu Fee Programs, the organizations receive mitigation funds from private and public developers who are required to pay a "fee in-lieu" of mitigation under the Corps permitting program. All mitigation funds are used for preservation of wetlands, other aquatic resources, and important adjacent upland buffers. SEAL Trust uses all of its mitigation funds in Southeast Alaska, while TCF is statewide. These tools are largely applied at the parcel scale, and in aggregate have protected roughly 6,000 acres over the past 20+ years. Additionally, the In-Lieu Fee Program proposal from the Southeast Alaska Watershed Coalition (SAWC), a SEAKFHP partner, was approved in September of 2017 by the Corps.

Future Need: SEAKFHP partners recognize habitat protection processes are legislative, regulatory, or attained in other means beyond the scope of the partnership. However, maintaining and preserving intact habitat is critical to maintaining sustainable fish populations across the region. On federal lands, the Tongass National Forest Plan includes goals to "maintain ecosystems capable of supporting the full range of native and desired non-native species and ecological processes" and to "maintain or restore the natural range and frequency of aquatic habitat conditions on the Tongass National Forest to sustain the diversity and production of fish and other freshwater organisms." The State of Alaska, through a legislative process can nominate Conservation Areas on state lands, which collectively includes Critical Habitat Areas (CHAs), State Game Areas, State Game Refuges, and Wildlife Sanctuaries, and has designated 32 of these around the state to protect particularly rich fish and wildlife habitats that possess significant fish and wildlife recreational opportunities. The legislature has the ability to expand and refine the Conservation Area system on an annual basis. Currently at play in Southeast Alaska is possible transfer of lands both from the Federal Government to the State of Alaska and also to Tribal entities in the region. As such, SEAKFHP Partners support collaborative planning strategies among all land owners that can afford continued habitat protections and associated Best Management Practices to conserve fish habitat across the region.

On private lands, SEAKFHP will support habitat protection opportunities through non-governmental organizations to permanently protect wetlands and productive fish habitat throughout Southeast Alaska, with a goal of increasing protected acreage up to 10,000 acres over the next five years.

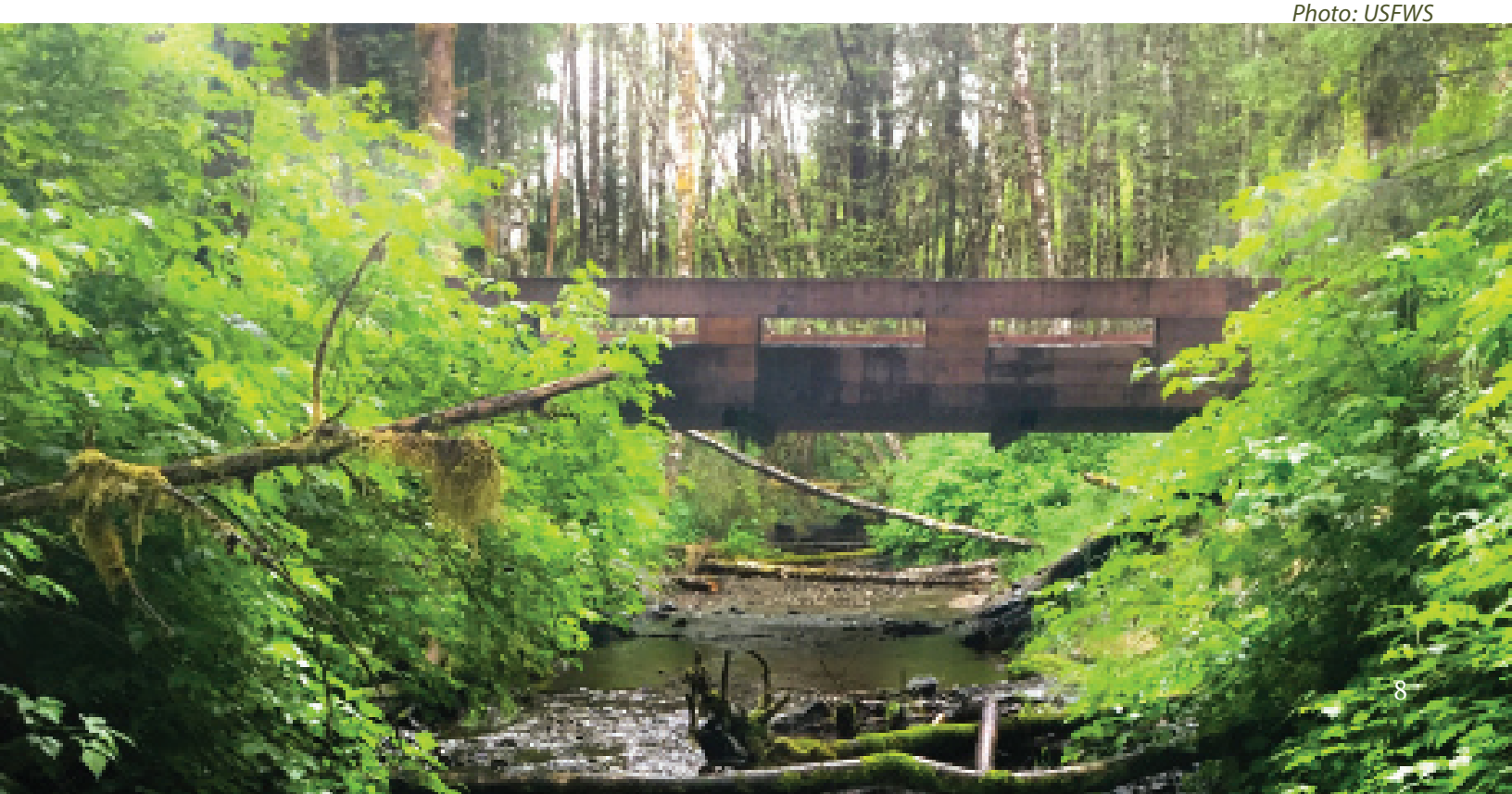
Priority Actions:

- Action FCS1-1.1. Continue to identify under represented audiences and elevate assessment work and conservation strategy recommendations completed as part of The Coastal Forests and Mountains Ecoregion in Southeastern Alaska and the Tongass National Forest, edited by J. Schoen and E. Dovichin in 2007.
- Action FCS1-1.2. Continue to identify under represented audiences and raise awareness and understanding of current habitat protection initiatives such as the Tongass 77 initiative developed by Trout Unlimited.
- Action FCS1-1.3. By 2019, convene regional discussions and activities among regional land owners that consider establishing additional aquatic habitat protection areas that include high-value fish habitats in Southeast Alaska (such as Critical Habitat Areas surrounding state lands, and adoption of conservation easements through local land trust organizations)

General Supportive Actions:

- Action FCS1-1.4. Support awareness of and participation in the Tongass National Forest Best Management Plan monitoring program.
- Action FCS1-1.5. Support awareness and information sharing about impacts of climate change on fish habitats. Engage broad partner participation in the development of vulnerability assessments and developing adaptation measures to inform protection of resilient freshwater fish populations.
- Action FCS1-1.6. Support evaluations of the habitat permitting process overseen by the State of Alaska that maintain the statutory responsibility to protect freshwater anadromous fish habitat.
- Action FCS1-1.7. Support efforts to more fully characterize the economic contribution of intact fish and wildlife habitat, pristine areas for recreation and ecosystem services provided to adjacent communities by undeveloped lands.
- Action FCS1-1.8. Support creation and implementation of financial mechanisms to support habitat protection opportunities through non-governmental organizations (such as land trusts) as part of a larger watershed restoration/protection strategy, including the development and implementation of high quality compensatory mitigation strategies for aquatic habitat restoration and protection (i.e. mitigation banks, In-Lieu Fee programs, and carbon market credits).

Photo: USFWS



Objective FCS1-2. Foster regional support necessary to ensure that additional anadromous fish habitat in Southeast Alaska is included in the Anadromous Waters Catalog (AWC), and thus is eligible for basic protections afforded under state law.

Background: The Southeast Alaska landscape is home to an incredible amount of freshwater habitat that supports millions of anadromous fish. The habitat comes in the form of streams, rivers, and lakes and the numerous other finer distinctions inherent therein. Estimates of known anadromous habitat as identified from the Anadromous Waters Catalog (2017) include over 6,300 streams and rivers encompassing approximately 12,500 km. Over 1,200 lakes covering 35,000 ha also provide habitat to anadromous fish. Most of this stream, river, and lake anadromous habitat that is known to host anadromous fish is in good to pristine condition, due in part to protections afforded through Alaska Statute. Other protection measures are similarly afforded through Tongass National Forest and state of Alaska provisions.

Although Alaska Statute provides protection to known anadromous waterbodies (as reflected by inclusion in the AWC), it is widely assumed that a significant amount of anadromous habitat in Southeast Alaska is not yet officially listed in the AWC and afforded the same protection. Several other ways in which the AWC is known to be lacking involve species- and life stage-specific accounting; although a waterbody in the AWC might accurately identify the upper extent of anadromous habitat for one species, other species extents might be truncated (or extended too far). Another example is related to identifying the entire spawning or rearing habitat extent for individual species, as opposed to just a species being noted as present.

Estimates of the remaining unmapped anadromous habitat in the region are significant. Numerous evaluations suggest at least 50% more anadromous habitat exists on the landscape. This could amount to another 6,000 streams and rivers and over 1,000 lakes included in the AWC. Based on these numbers the total estimated anadromous habitat in Southeast Alaska likely encompasses over 12,000 streams and rivers and more than 2,000 lakes.

Every year there are significant efforts to document and inventory additional anadromous habitats for inclusion into the AWC. These efforts are absolutely critical if additional anadromous habitat is to be afforded basic protection under state law.

Cowee Creek Coho Salmon.
Photo by Mark Hieronymus.

AWC Survey Prioritization: There is no single, all-encompassing and agreed upon prioritization strategy or final listing of watersheds in which AWC surveys could be implemented resulting in the most efficient and effective use of resources and ultimately, inclusion into the AWC. However, a number of strategies using similar data sources have been used for the same end desire for different areas across Southeast Alaska.

AWC Survey Protocols: Similar to the lack of a single, all-encompassing prioritization strategy, there is no standard reference for how to conduct an AWC survey, although one Division of Habitat Technical Report is published and readily available and contains valuable information and methodology which could assist future efforts. The ADF&G website contains an AWC page that describes the minimum criteria needed to submit a nomination to the AWC, this website provides helpful suggestions regarding survey protocols.

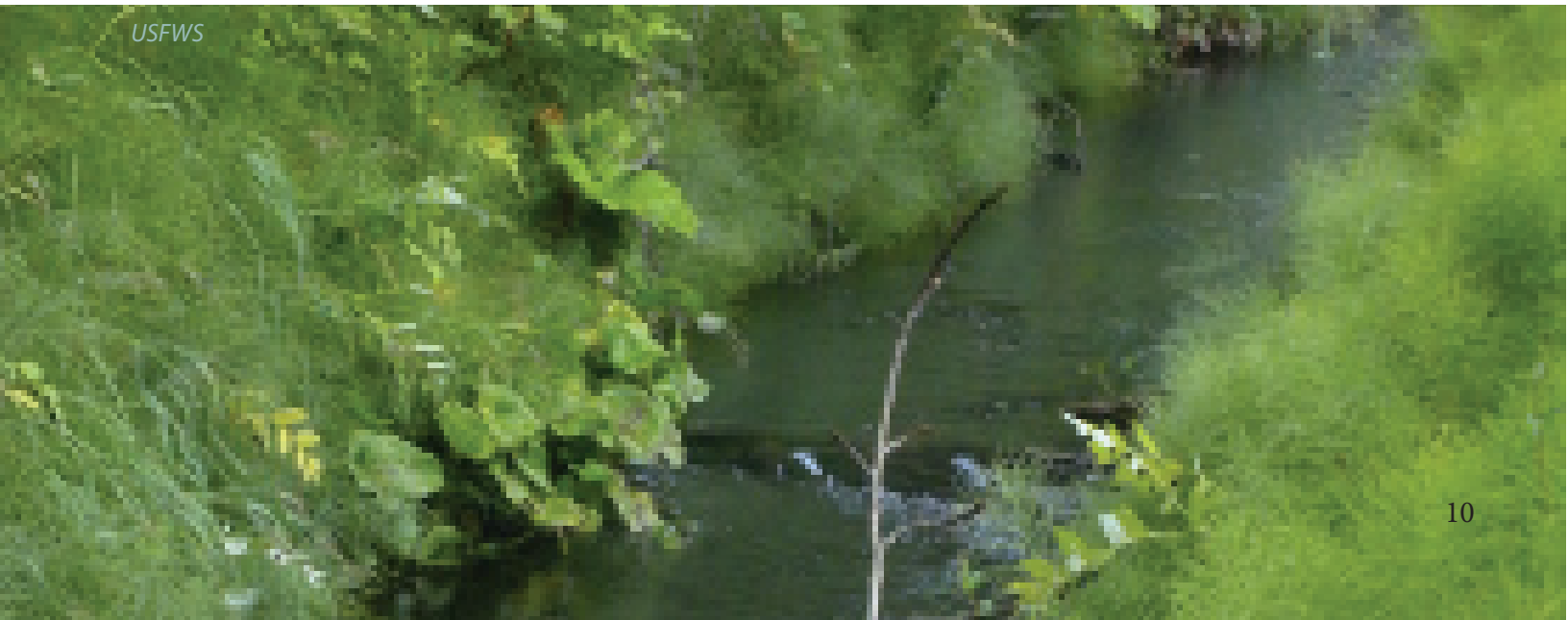
Future Need: SEAKFHP supports development of prioritization strategies and utilization of consistent survey methodologies to update and expand the AWC in order to represent the diversity and extent of anadromous fish habitats across the region. Efforts to catalog anadromous fish habitat should also identify and document non-anadromous fish habitat and distribution patterns with a focus on rainbow trout, cutthroat trout, and Dolly Varden. Such information should be used to populate ADF&G's Alaska Freshwater Fish Inventory (AFFI) database and associated mapping interface (Fish Resource Monitor).

Priority Actions:

- Action FCS1-2.1. Annually facilitate communication among SEAKFHP partners to develop AWC prioritization strategies that consider current and future development or land management activities placing anadromous waters at risk.
- Action FCS1-2.2. By 2019, facilitate a final review of watersheds in Southeast Alaska where AWC surveys would provide the most significant expansion (or correction) of the AWC.
- Action FCS1-2.3. By 2021 leverage funding opportunities to host training opportunities and share methods necessary for producing AWC nominations.

General Supportive Actions:

- Action FCS1-2.4. Support implementation of AWC surveys in the specific areas or streams WITHIN the 5 highest priority watersheds (identified via Action C1-2.2) associated with individual communities or areas where AWC surveys would be conducted.
- Action FCS1-2.5 Support ADF&G to update relevant AWC nominations reporting associated with their Collection Permits process for all fish sampling applicants.



USFWS

Objective FCS1-3. Support coordination and collaboration efforts directed at the prevention, early detection, response, and control of aquatic invasive species (AIS) in Southeast Alaska.

Background: An invasive species is defined as a species that is non-native to a particular ecosystem and whose introduction causes or is likely to cause economic or environmental harm or harm to human health (Presidential Executive Order 13112). The annual cost of invasive species to the U.S. economy is estimated at $120 billion. Invasive species represent an increasing threat to Alaska's economy and environment as nonnative plants, animals, and pathogens invade aquatic and terrestrial ecosystems, either through accidental or intentional introductions.

Pathways for invasive species introductions to Southeast Alaska have not been studied, but likely mirror those common in other parts of the world. Typical pathways include transportation (e.g. goods, equipment, ballast water) and the accidental or intentional release of nonnative species (e.g. pets, aquatic farm biota, nursery plants). Nonnative invasive species that live in water or the riparian zone have the greatest potential for impacting fish and fish habitat.

Although few freshwater aquatic invasive species are known to occur in Southeast Alaska, these species, as well as those that may invade or get introduced in the future, pose a serious threat to fish and fish habitat. Invasive plants, animals, and other organisms can harm fish-dependent economies and ecosystems by outcompeting and displacing native fish and their prey, or by altering or degrading native riparian and aquatic habitats that sustain fish populations. Waterweed (Elodea spp.) is not native to Alaska, and it is the first invasive freshwater aquatic plant known to occur in the state. It has the potential to impact freshwater resources and fish habitat statewide but has yet to be found in Southeast Alaska. Reed canarygrass (Phalaris arundinacea) and Bohemian knotweed (a hybrid of Japanese knotweed, Fallopia japonica and Giant knotweed, Fallopia sachalinensis) are highly invasive plants intentionally introduced to Southeast Alaska. These plants are widely distributed in the region and thrive in both aquatic and riparian habitat. Infestations can alter stream flow and sediment transport, and dense monocultures in riparian zones can impact ecological functions that support fish and fish habitat.

The red-legged frog (Rana draytonii), the only freshwater aquatic invasive animal known from the region, was intentionally released on Chichagof Island in the early 1980s. Adult red-legged frogs are known to prey on three-spine stickleback and the herbivorous tadpoles can potentially alter aquatic food webs that support fish.

State and federal agencies, along with non-profit and other organizations are actively involved in efforts to document and manage invasive species in Southeast Alaska. ADF&G produced the Alaska Aquatic Invasive Species Management Plan to address the threat of invasive species on aquatic ecosystems in the state. The plan identifies actions to prevent the introduction and spread of these species. Invasive plant management plans have been developed for several communities in Southeast Alaska and the USFS is currently developing an invasive plant management plan for the northern Tongass National Forest. Individual USFS Ranger Districts in the southern part of the Forest have developed invasive plant management plans. The Takshanuk Watershed Council leads a cooperative weed management area for the northern Lynn Canal area. The National Park Service conducts invasive plant surveys and actively manages priority infestations on their park lands and properties in Southeast Alaska. The Sitka Tribe of Alaska is developing an invasive plant program. USFWS and its partners have conducted invasive plant surveys and treatments in the City and Borough of Juneau.

Future Need: Preventing new introductions and managing existing infestations in a strategic manner is key to protecting fish and fish habitat from aquatic invasive species. Prevention is most likely to succeed by proactively identifying those species most likely to be introduced and the potential pathways for their introduction. Once identified, invasion pathways can be eliminated or managed through outreach and education to increase awareness and change practices or through existing or new regulations/policies. Monitoring efforts are necessary to detect aquatic invasive species as early as possible followed by rapid control efforts if warranted to ensure eradication. Some of the species that could invade freshwater aquatic habitats in Southeast Alaska include Atlantic salmon, Eurasian watermilfoil, purple loosestrife, and Elodea. Finally, understanding the current distribution and abundance of aquatic invasive species relative to the most vulnerable and productive fish habitat is necessary to develop management plans that use limited resources most effectively.

General Supportive Actions:

- Action FCS1-3.1. Support activities that complement invasive species programs administered by ADF&G, USFWS, NOAA-NMFS, and implemented on smaller scales by local and tribal government or non-government entities.
- Action FCS1-3.2. Support current and future pathway analyses that identify vectors contributing to the introduction and spread of AIS in Southeast Alaska.
- Action FCS1-3.3. Support activities that identify target audiences; increase target audience awareness about the species, pathways of concern, and impacts imposed by AIS; and result in behavior changes (e.g., reporting AIS sightings to the State of Alaska, following BMPs to prevent introduction and spread of AIS).

Photo: USFWS

Objective FCS1-4. Facilitate regional support and funding for evaluation of potential effects to fish and their habitats from development projects in transboundary watersheds.

Background: Southeast Alaska shares the Taku, Stikine, Unuk, Alsek and several smaller rivers within British Columbia and the Yukon Territory; these are commonly referred to as transboundary rivers. Within the Canadian headwaters of these watersheds, more than 10 large-scale mining projects are in various phases of operation and development. These types of operations have the potential to harm fish and fish habitat in these systems through direct and indirect impacts. Protecting productive and intact habitats throughout these transboundary river systems is necessary to ensure healthy freshwater and anadromous fish communities. Current efforts are underway at various levels to work collaboratively with British Columbia and Canadian governments to ensure the necessary regulatory and policy frameworks are in place to protect Southeast Alaska from downstream impacts:

- Memorandum of Understanding and Statement of Cooperation between the State of Alaska and the Province of British Columbia which convenes the Bilateral Transboundary Working Group and the Transboundary Technical Working Group.
- Formation of the United Tribal Transboundary Mining Working Group – a consortium of 15 federally recognized Indian Tribes that reside in Southeast Alaska and live along theses rivers.
- Salmon Beyond Borders a campaign driven by sport and commercial fishermen, community leaders, tourism and recreation business owners and concerned citizens, in collaboration with Tribes and First Nations, united across the Alaska/British Columbia border to defend and sustain transboundary rivers, jobs and way of life.

In addition, numerous SEAKFHP partners are involved in habitat assessment and water quality monitoring efforts of these river systems, these include Central Council Tlingit Haida Indian Tribes of Alaska water quality monitoring on the Taku, Stikine and Unuk; ADEC AKMAP sampling planned for 2017-2020 in Southeast Alaska lakes, rivers and coast including transboundary river systems and ADEC/SEACC Inside Passage Waterkeeper joint project to inventory and aggregate water quality data across Southeast Alaska. Additionally, support from the Alaska Congressional Delegation may include funding for baseline data collection in the near future. Support for these efforts can be seen through a recent study by the McDowell Group completed in 2016 highlighting the economic impact to Southeast Alaska as a result of the productivity provided to the region by transboundary rivers and by 2017 Alaska State Legislature – House Joint Resolution No. 9 addressing these concerns through the state legislature resolution process.

Future need: To maintain habitat quality for transboundary rivers entering into Southeast Alaska a transboundary land use framework is needed that ensures equal representation across the international boundary, amongst governing entities, including Tribes and First Nations, provincial, state and federal jurisdictions. To be effective, this framework must include a scientific assessment of impact and risk with respect to water quality and fish production and include land use protection mechanisms to ensure fish habitat quality is maintained, connectivity from headwaters to marine waters are maintained and water quality standards are developed and maintained.

Priority Actions:

- Action FCS1-4.1. Continue to foster awareness of transboundary river development projects proposed adjacent to Southeast Alaska and support cross border collaboration and regional discussions on potential impacts to fish habitats. Encourage land use protection mechanism opportunities as part of these dialogs; for reference see the land use plan created for the Atlin Taku region of northwestern British Columbia, Canada.
- Action FCS1-4.2. By 2019, coordinate and disseminate fish habitat distribution maps for the Taku, Stikine, Unuk and other transboundary rivers in Southeast Alaska and British Columbia.
- Action FCS1-4.3. By 2019, coordinate a summary of reservations of water adjudications for Southeast Alaska transboundary river systems and associated tributaries.

General Supportive Actions:

- Action FCS1-4.4. Support cross border participation and financial support for the State of Alaska Technical Transboundary Working Group and others to collaboratively assess and develop baseline fish habitat and water quality parameters for transboundary rivers. By 2019 facilitate a convening role among the stakeholders involved with the collection of transboundary water quality/fish/wildlife data - these groups may include the bilateral Technical Working Group on Monitoring, including universities on both sides of the border, NGOs, bilateral federal and state agencies, tribes, etc.
- Action FCS1-4.5. Support funding opportunities for baseline evaluation of potential effects for transboundary development projects, including baseline hydrography, water quality, fish and wildlife data, etc. and include understanding for cumulative effects.

Photo: ShoreZone

GOAL FCS2: Maintain water quality and quantity in freshwater systems in Southeast Alaska

Objective FCS2-1. Support water quality monitoring programs to track and manage changes occurring in freshwater aquatic systems across Southeast Alaska.

Background: The ADEC Division of Water has the responsibility to report and identify causes and sources of water quality impairment by "characterizing all the waters in Alaska" but funding and capacity limit the ability for robust water quality monitoring across the region. One way the division works to monitor and report on water quality is through the Alaska Monitoring & Assessment Program (AKMAP), although partners recognize this inadequately tracks changes within individual water bodies and does not provide the level of monitoring to adequately track effects of mining, restoration or other land cover changes in the region. The Environmental Protection Agency (EPA) created the Environmental Monitoring and Assessment Program (EMAP) in the mid-1990s to survey the environmental condition of the Nation's water resources. AKMAP is part of this nationwide effort and is responsible for surveying Alaska's water resources. This effort is now part of EPA's National Aquatic Resource Surveys (NARS). No similar probabilistic sampling surveys are currently providing regional, ecological information on such a large scale within Alaska. The EMAP implementation strategy is ADEC's plan to sample and report monitoring data for large regions of Alaska in the near future.

The AKMAP has sampled coastal and fresh waters in Alaska since 2002. Additional information and links to interactive maps can be found here: http://dec.alaska.gov/water/wqsar/monitoring/AKMAP.htm. AKMAP is planning to conduct aquatic resource surveys in Southeast Alaska over the course of the next 4 to 5 years. AKMAP partners with NARS to complete this work. NARS are statistical surveys designed to assess the status of and changes in quality of the nation's coastal waters, lakes, rivers, streams, and wetlands. Using survey sites selected at random, they provide a snapshot of overall condition of the nation's waters. AKMAP applies NARS methodology, adapting methods to fit Alaska's large size and often remote nature. AKMAP will be conducting these surveys in Southeast Alaska, beginning with a lakes survey in 2017, a rivers and streams survey in 2018 or 2019, and a coastal survey in 2020. A similar coastal survey was completed for Southeast Alaska in 2004, details can be found here:
http://dec.alaska.gov/water/wqsar/monitoring/2004Southeast.htm.

Additionally, local municipalities, tribes and non-profit groups have become increasingly engaged in water quality monitoring in the region. A few examples include the Southeast Alaska Stream Temperature Monitoring Network, a collaborative group of agencies and stakeholders developing protocols and data streams to track temperature changes in freshwater systems across the region; the Inside Passage Waterkeeper, a small, grassroots group who cares for, protects, and restores its local water bodies, and who are compiling and archiving regional water quality data and monitoring information for the region in partnership with the Southeast Alaska Conservation Council (SEACC); and Central Council Tlingit and Haida Indian Tribes of Alaska (CCTHITA) who are collecting baseline water quality information in transboundary watersheds as part of a three-year study funded by the Bureau of Indian Affairs. An emerging interest is growing regarding the importance of nutrient transfer and how this may impact water quality. Local researchers at the USFS Pacific Northwest Research Station are engaging in important studies across the region on associated topics.

Future Need: SEAKFHP desires robust water quality monitoring across the region to maintain aquatic habitat necessary for sustainable fish populations across the region.

Priority Actions:

- Action FCS2-1.1. In 2018, work with SEACC and other SEAKFHP partners to support development of a data archive for making available and sharing regional water quality information across Southeast Alaska.
- Action FCS2-1.2. In 2019, elevate awareness of CCTHITA water quality sampling work in transboundary areas in the region and support leveraging partner resources for this work to connect to long-term monitoring in the region, including with the AKMAP.

General Supportive Actions:

- Action FCS2-1.3. Work proactively with ADEC to encourage partner participation and engagement with the AKMAP to leverage in kind and fiscal resources for water quality sampling in lakes, rivers and coastal areas of Southeast Alaska. Support a regional workshop to elevate the findings from the Southeast assessment.
- Action FCS2-1.4. Support the Southeast Alaska Stream Temperature Monitoring Network to leverage resources needed for monitoring stream temperatures at key locations across Southeast Alaska. Support a regional workshop to elevate awareness of outcomes.
- Action FCS2-1.5. Support ADEC through the Alaska Clean Water Actions program and AKMAP to leverage fiscal and other needed resources to promote development of a long-term water quality monitoring and tracking program for Southeast Alaska that includes guidelines and protocols to standardize water quality data collection in the region.

Photo by Mark Hieronymus

Objective FCS2-2. Secure Reservations of Water (ROW) on important salmon, trout, and steelhead-producing systems.

Background: According to ADF&G's anadromous waters catalog, over 19,000 stream rivers or lakes have been specified as supporting anadromous fish populations in Alaska (Johnson and Litchfield 2016). These waterbodies are all potentially subject to water withdrawals and modification of their natural streamflow. Most waterbodies in the state are currently not subject to withdrawals, diversions, or impoundments of water and remain free flowing at this time. It is important to protect these unallocated streamflows before competition over the water arises.

An appropriation of water that remains within its waterbody is legally defined under Alaska law (AS 46.15.145) and regulations (11 AAC 93.970) as a reservation of water (ROW). To reserve water, an application with supporting data and analyses must be submitted to the ADNR. A minimum of 5 years of mean daily streamflow data is recommended to quantify instream flow. Priority dates for ROW applications are based on the date they are accepted by ADNR. Alaska water law is based on the doctrine of prior appropriation, also known as "first in time first in right." The legal process of determining the validity and amount of a water right is called an adjudication.

In 2001, ADF&G started a project supported by the Alaska Sustainable Salmon Fund to collect the data necessary and to file ROWs on priority waterbodies in Southeast Alaska. Since that time ADF&G has filed ROWs on 110 reaches, three lakes, adjudicated 52 reaches, and collected streamflow data at 60 stations. Currently ADF&G is operating stream gages at Peterson Creek, Windfall Creek, multiple sites in the Thorne River drainage, and Eva Creek. Klein 2016, provides a full list of ROWs that ADF&G has filed and adjudicated.

Photo by Darren Dorris

Future Need: A lack of streamflow data on Southeast Alaska waterbodies will severely limit the future filing of additional ROWs and potentially leaves thousands of stream reaches without adequate protection of instream flows. In Southeast Alaska there remains only 15 stream reaches with sufficient streamflow data to file a ROW. ADF&G will continue to file ROWs on these waterbodies, including: Thorne River, Blossom River, Alsek River (downstream of Alsek Lake), Chilkat River (near Klukwan), Salmon River (Gustavus), Eva Creek, Hatchery Creek (POW), and Ahrnklin River (Yakutat).

To ensure that ROWs can be filed in the future, ADF&G will continue to operate existing stream gages and investigate installing new stations on priority waterbodies. Future potential ADF&G stream gage locations include streams on the Prince of Wales road system (Eagle Creek, Control Creek, Logjam Creek), Hoonah road system streams, Davies Creek (Cowee Creek near Juneau), and Steep Creek (near Juneau). The USGS has recently begun and will continue to operate new stream gages on Salmon Creek (Gustavus) and Hatchery Creek (POW). Alaska HydroScience, Inc. operates a stream gage on the Ahrnklin River and will have five years of streamflow data in November of 2018. Takshanuk Watershed Council in Haines maintains a gage at Sarah Creek, five years of data collection will conclude in 2018. Cooperative projects to collect streamflow data with the USGS, USFS, consultants, and local watershed councils will also continue to be explored. In 2017, ADF&G anticipates beginning the adjudication process with ADNR on the Lost River (5 reaches), Hamilton River, Kadashan River (4 reaches), and Maybeso Creek (5 reaches).

Priority Action:

- Action FCS2-2.1 By 2021, increase awareness of the current status and the process used to prepare and file ROWs in the following ways:
  1. support public meetings/partner updates on current state of ROWs in Southeast Alaska
  2. provide training opportunities in the process and data requirements to file ROWs
  3. increase awareness of ADF&G Instream Flow Protection Annual report and Interactive Mapper http://dnr.alaska.gov/mlw/mapguide/wr_intro.cfm

General Supportive Actions:

- Action FCS2-2.2 Support projects that prepare, file, and adjudicate ROW for instream use applications including the collection of water quantity and quality data to obtain five years of record.
- Action FCS2-2.3 Support projects that collect the streamflow data necessary to file ROWs through supporting training needs, equipment purchases, and travel costs necessary to install and operate stream gages.

Objective FCS2-3. Increase awareness of the adverse impacts of urban stormwater runoff on fish and fish habitat and support efforts to improve water quality and aquatic health.

Background: Stormwater runoff is rainwater or meltwater (from snow and ice) that flows off of impervious or partially impervious surfaces in developed landscapes like urban environments. Runoff rates from these areas are typically much higher due to lower infiltration and storage rates. Elevated runoff rates can physically alter fish habitat by scouring the streambed and eroding banks. Stormwater from urbanized landscapes frequently contains petroleum hydrocarbons, heavy metals, sediment, fecal coliforms, and other pollutants. Upon entering water bodies, these pollutants can impair fish habitat (i.e. elevated turbidity, sedimentation) and have chronic and acute effects on fish and other aquatic organisms.

Several urban anadromous streams in Southeast Alaska have been designated as impaired water bodies by ADEC because they do not meet one or more state water quality standards. For each impaired water body, ADEC establishes a total maximum daily load (TMDL) for each pollutant impacting water quality. The TMDL establishes a daily limit on the amount of the pollutant that can enter the stream to ensure compliance with state water quality standards. Most TMDLs for impaired streams in Southeast Alaska identify stormwater as the source of one or more pollutants. There are likely other urban fish streams in the region that should be evaluated for potential stormwater impacts to water and habitat quality.

Watershed restoration and action plans have been produced for several Southeast Alaska streams on the state list of impaired water bodies. These plans often recommend best management practices for specific sites that address stormwater. Regional watershed councils, ADEC, and USFWS are working with landowners and other partners to map stormwater systems and manage stormwater in several urban watersheds. The City and Borough of Juneau has produced a manual of stormwater best management practices.

Future Need: SEAKFHP partners envision a future where local communities have greater access to resources, including regionally-appropriate Best Management Practices (BMPs), to better protect aquatic communities from poor water quality conditions associated with urban settings.

General Supportive Actions:

- Action FCS2-3.1. Support work with ADEC, ADF&G, and local communities to identify where stormwater is likely impacting fish and fish habitat and support development of associated action plans and watershed restoration projects.
- Action FCS2-3.2. Support efforts to map stormwater runoff, identify and prioritize stormwater management projects, and implement and monitor stormwater BMPs.
- Action FCS2-3.3. Work with communities to develop stormwater management requirements for new development and redevelopment to maintain or improve water quality and fish habitat.
- Action FCS2-3.4. Support public outreach efforts that communicate the benefits of stormwater management practices and stream buffers and result in increased public support for those activities.

GOAL FCS3: Restore and enhance fragmented and degraded fish habitats in southeast Alaska

Objective FCS3-1. Foster activities that maintain and restore fish habitat connectivity at road/stream crossings in Southeast Alaska

Background: Interagency efforts in Southeast Alaska to inventory, assess, prioritize, develop design methods, and restore aquatic habitat connectivity at road/stream crossings have been ongoing with varying levels of intensity since 1997.

Early efforts by the Environmental Protection Agency (EPA), ADF&G and USFS focused on inventory and assessment on Tongass National Forest (TNF) system roads, culminating in the only regionally comprehensive publication to date, Tongass Road Condition Survey (ADFG, 2000). TNF staff continued an intensive assessment program through 2005 and developed a comprehensive GIS, an Upstream Habitat Assessment protocol, an estimate of barrier severity, a biological significance index, and various prioritization schemas to inform remediation efforts. Although less intense, assessment work continues today and includes capture of previously missed road segments, filling in of data gaps, and updates to previously identified road/stream crossings. As of 2016, the TNF has surveyed 3,668 fish stream road crossings along 5,000 miles of road. Of the 2,019 crossings that are culverts, approximately 34% of these crossings do not meet current standard for fish passage. Between 1998 and 2016, the TNF reinstalled, retrofitted, or removed approximately 516 non-compliant crossings. Since 2013, approximately 10 crossings per year have been reconstructed and a total of 44 crossings were removed from roads (TNF, 2015 Monitoring and Evaluation Report).

Formal fish passage assessment on Alaska Department of Transportation (ADOT) and municipal roads trailed behind the TNF efforts. Localized assessments were conducted by ADF&G Habitat Division in the Klawock watershed in 2002, by Takshanuk Watershed Council along the Haines Borough road system in 2010, and by Alaska Department of Natural Resources (ADNR) Division of Forestry on State and private forest lands in 2009. Since 2011, the ADFG Sportfish Division Fish Passage Improvement Program has conducted formal inventories of ADOT and local municipal roads across Southeast. As of 2016, ADFG has assessed 625 culverts along these roads at fish streams; of these 254 were classified red (not passing fish), 151 gray (partial passage of fish), 187 green (passing fish) and 33 black (unclassified). ADFG will complete the remaining ADOT assessment in late 2017 and also has a draft prioritization schema in development. ADFG maintains its data, photos, and mapping information on a publicly accessible website/mapper.

Fish passage barrier restoration on non-federal ownerships in Southeast has largely been conducted by ADOT as part of road reconstruction projects and occasional maintenance or special projects. ADOT projects have occurred on almost all of their road systems, and 26 fish culvert replacements are currently in a planning and design phase as part of ongoing Haines Highway improvements. Various non-governmental organizations and watershed councils have collaborated on site-based fish passage restorations, and the USFWS Fish Passage Program has partnered with these entities, as well as local governments, on approximately 48 culvert replacements or removals since 2003.

Quantitative monitoring of the physical habitat metrics of replaced culverts has been part of the Tongass National Forest Monitoring and Evaluation Program, and is the only ongoing formal monitoring of its type in the region.

Future Need: SEAKFHP desires no new barriers constructed on new development or as part of existing road re-construction. This will require increased awareness, training opportunities and consistent application of policy, regulation and minimum design guidelines. We recognize the benefit in developing a regional fish passage mapper across land ownerships. We strive to leverage SEAKFHP partnerships to remove or restore 50 fish passage barriers over the next five years and commit to annually tracking fish passage remediation accomplishments in the region.

Priority Actions:

- Action FCS3-1.1. Annually support interagency cooperation and policy to improve fish habitat connectivity and prevent the installation of new barriers.
    1. Support interagency cooperative agreements related to fish passage, for example the recent Tongass Top 5 fish passage design initiative.
    2. Encourage periodic review, updates and adoption of fish passage design guidelines among agencies and municipal entities.
    3. Foster awareness to and within agencies and landowners of guidance and cooperation for fish friendly ORV road-stream crossing structure design and evaluation.
    4. Support training and utilization of USFS upstream fish habitat assessment protocol on state and private land road-stream crossings to inform prioritizing crossings for remediation.
    5. Support regional fish passage restoration prioritization efforts.
- Action FCS3-1.2. By 2018 support completion of fish passage barrier inventory on ADOT road/stream crossings.
- Action FCS3-1.3. By 2020 support development of unified interagency (USFS, ADF&G, DNR) fish passage inventory mapper and database for Southeast Alaska ownerships.
- Action FCS3-1.4. By 2018, convene fish passage design workshop for Southeast Alaska.
- Action FCS3-1.5. By 2021 support SEAKFHP partners to remove or restore 50 fish passage barriers across all ownerships.

Photo: USFWS

Objective FCS3-2. Restore and enhance fish habitat function and complexity and inform future restoration activities through adaptive management.

Background: The commercial, sport, and subsistence fisheries for salmon in Southeast Alaska are world renowned and provide high-value economic returns to local communities; the health of Southeast Alaska fish stocks depends on functioning aquatic habitat. The USFS Tongass Watershed Condition Assessment (2015) found that most of the 900 watersheds within the TNF are in near natural condition (Condition Class I). Less than 7% of these watersheds may be "at risk" for maintaining ecological function due to past management practices and likely have restoration needs. Degraded watershed condition in the TNF primarily results from timber harvest and road building between 1950 and 1979. More restrictive measures to protect watershed condition and salmon habitat were included in the Tongass Timber Reform Act (1990) and subsequent TNF Plans (1997, 2008, 2016). Per the 2016 Tongass Forest Plan Amendment, old growth timber harvest is not allowed in Trout Unlimited's "Tongass 77" watersheds.

Following a review by USFS staff and stakeholders, "Priority Watersheds" were established in the TNF, focusing restoration plans and activities. Restoration projects include road storage and decommissioning, removal and remediation of fish barriers at road-stream crossings, wildlife habitat improvements in young-growth forests, riparian young-growth forest treatments, and large wood placement to restore floodplain and stream functions that provide freshwater spawning and rearing habitat features critical to salmon life stages.

Large and small-scale stream restoration manipulations have been undertaken on a number of streams throughout the TNF since the 1990's. The TNF continues restoration work on Priority Watersheds and At-risk watersheds identified in their assessment activities. The Fisheries and Watershed Programs on the TNF have committed substantial funds toward continued identification, design, implementation, and monitoring of watershed restoration work. Essential restoration has been completed in Harris River and Twelvemile Creek on Prince of Wales Island and Sitkoh River and Sitkoh Creek on Chichagof Island. The National Fish Habitat Partnership recognized Twelvemile Creek as one of ten "Waters to Watch" in 2014.

New collaboratives are forming across the region to leverage multiple landowners and improve salmon habitat. For example, the Hoonah Native Forest Partnership, a Natural Resource Conservation Service (NRCS) funded "all-lands" collaboration of private landowners including Tribes, state and federal agencies, and conservation organizations seeks to improve watershed condition to benefit the community of Hoonah. This is a new model beginning in the region and other communities are watching closely to see how this process may help them to engage more effectively in restoration work.

Future Need: Through a combination of natural recovery and active management, SEAKFHP partners work cooperatively to restore watersheds and aquatic habitat adversely affected by past management actions. As a result, functioning habitats and diversity of fish stocks will be retained, benefitting all user groups. Partnerships increase our ability to provide these opportunities in a more efficient and cost-effective manner.

Ongoing partnerships support restoration that will soon be completed in the Tongass National Forest: Shelikof (Iris Meadows), Saginaw, Staney and Luck Creek watersheds. Additional TNF Priority Watersheds will be identified to help focus strategic restoration plans in the next five years.

Priority Actions:

- Action FCS3-2-1. Support utilization of the Forest Service Watershed Condition Framework, climate change projections, other analytical tools and emerging on-the-ground resource assessments (examples: Prince of Wales Landscape Level Analysis and the resource inventory in Hoonah) to identify long-term watershed restoration and resiliency opportunities and priorities.
    1. Annually review and facilitate outreach of partner out-year restoration plans
- Action FCS3-2-2. By 2019, convene regional restoration symposium to share projects, innovations, and outcomes.
- Action FCS3-2-3. By 2021 host interagency meeting to review draft U.S. Forest Service Tongass National Forest Watershed Restoration Effectiveness Monitoring (WREM) work products and reports.

General Supportive Actions:

- Action FCS3-2.4. Support further development and dissemination of reference watershed condition data that informs establishment of quantitative restoration and enhancement objectives.
- Action FCS3-2-5. Review effectiveness of on-going mitigation and restoration projects to identify opportunities to employ adaptive management leading to improve practices.
    1. Support fish habitat utilization investigations in response to bank stabilization techniques (e.g. rip rap, large woody debris placements).
    2. Support further development of physical / geomorphic response monitoring protocols for in-stream restoration/enhancement activities.
    3. Evaluate efficacy of fish production response models/tools/protocols for in-stream restoration/ enhancement activities.
- Action FCS3-2-6. Support training opportunities for conducting smaller scale hand-crew stream restoration work across all land ownerships that can be planned and implemented with minimal impact.

Photo: USFWS

GOAL FCS4. Foster and support assessment and data collection that informs fish habitat and restoration science

Background: Southeast Alaska is often termed "Alaska's Salmon Forest," due to the complex make-up and interaction of the terrestrial and aquatic environments in this region and how coupled together they produce robust and abundant fish populations. Advancements in soil science, forest ecology, localized hydrology, and food web dynamics are informing us of the region's landscapes and how aquatic systems interact and transfer energy for the production of fish. More work in these and associated fields are needed and are supported by the partnership.

A tremendous amount of information and data resources are available for freshwater systems in Southeast Alaska; however, more research and continued data collection are needed to better understand the region's anadromous and resident freshwater fish species and associated habitats that sustain them, including climate change across the region. There are many archives and sources for these types of information, a few are highlighted here:

- Localized fisheries information for fish stocks in Southeast Alaska can be found on the ADF&G website including life history information and annual fish stock assessment data
- Federal, state and local land managers and other interested stakeholders periodically assess and monitor fish habitat conditions in the region; a summary for some of this information is located on the SEAKFHP website: http://www.seakfhp.org/resources/
- The National Fish Habitat Assessment has localized habitat degradation information for Southeast Alaska
- Resource agencies and the science community continue to conduct research in the region and produce a variety of informational resources important for understanding local fish species and their habitats; a few sources are included here:
    - US Forest Service, Tongass National Forest
    - US Forest Service, Pacific Northwest Research Station
    - NOAA's Habitat Restoration Center
    - ADF&G Habitat Division
    - Alaska Coastal Rainforest Center
    - UAS GIS Library
    - Sitka Conservation Society
- In 2016, a regional climate workshop was held in Southeast Alaska that focused on impacts to local freshwater fisheries; numerous research projects were noted and resources provided, these can be found here: http://www.seakfhp.org/2016-climate-change-workshop-resources-page/.

Future Needs: The implications of future forest and land management, human population distribution, and climate change on fish habitat suitability in this region are difficult to predict. Climatically, Southeast Alaska is projected to experience changes in precipitation, temperature, associated snow melt and impacts to flow regimes for freshwater systems. Recent work regarding increased freshwater temperatures and periods of hypoxia offer insights to potential changes to local aquatic systems. More work in these and associated areas will help managers better prepare for changing anthropogenic and environmental conditions in the region.

Priority Action:

- Action FCS4-1.1. By 2019, SEAKFHP will facilitate a regional dialog to develop a collective list of information and research gaps in the region.

General Actions:

- Action FCS4-1.2. In general, the partnership is supportive of research studies and data collection efforts that support the following:
    1. Refine baseline hydrology in the region and across the state,
    2. Map fish-habitat communities and assemblages in the region,
    3. Support comprehensive surface and groundwater studies, or other habitat changes associated with climate change or other forms of habitat alteration,
    4. Examine effects of partial fish passage on salmon movements and populations,
    5. Characterize salmon movement within watersheds to inform and improve fish passage models and structure design,

Shelikof Creek Cohos by Julianne Thompson/Tongass National Forest

COASTAL FISH HABIAT CONSERVATION STRATEGY

Southeast Alaska's Coastal Landscape

Southeast Alaska, a unique landscape encompassing more than 18,000 miles (29,000 km) of shoreline, collectively supports a variety of fishery habitats including over 12,000 individual estuaries that serve as important nursery areas for a variety of fish and invertebrate species (Albert and Schoen 2007; Ecological Atlas of Southeast Alaska 2016). In addition to estuaries, Southeast Alaska's coastal landscape is characterized by extensive nearshore areas connecting over 5,000 islands spread across the Alexander Archipelago including intertidal and beach habitat and other wetland features. Within these rich ecosystems aquatic resources abound and include diverse and abundant populations of commercially and culturally important fish and shellfish species, such as Pacific salmon (Oncorhynchus sp.), herring (Clupea pallasii), blackcod (Anoplopoma fimbria), Pacific cod (Gadus microcephalus), halibut (Hyppoglossus stenolepis), king crab (Paralithodes sp.), dungeness crab (Metacarcinus magister), geoducks (Panopea generosa) and many others. This region is also home to 74,000 people dispersed across 34 communities, all of which occur along the shoreline and tidelands. Fishery and other aquatic resources critical to these communities are robust and flourishing yet potentially at risk as human activities increase due to urbanization and through dispersed activities, such as marine related ship traffic and residual impacts from historical land-use practices (Baker et al. 2011; TNC Coastal-GIS Human Activities Database 2011). In addition, they face additional challenges linked to emerging changes in climate and ocean conditions. These changes not only threaten important fish populations in the region, but they also alter the ways in which these resources need to be considered to ensure resilient ecosystems foster healthy communities and indigenous cultures in the future.

Photo: ShoreZone

Coastal Definitions

To support development of conservation strategies for Southeast Alaska's coastal fish habitat, SEAKFHP partners focused on the coastal areas most used by humans and vital to the rearing and development of local fish species. In general, these coastal areas are referred to in this document as coastal zone, coastal interface and coastal margin, used interchangeably to reflect the language used to describe this area by regional partners. To further assist in structuring focus for this effort functional definitions for both estuaries and nearshore areas were also defined (Appendix 2). As such, estuarine and coastal wetlands and the nearshore sub-tidal zone out to approximately 5 meters below the low tide line, including key attributes such as habitat structure and function, water quality, sediment regime and ecological interactions, are the primary foci for the partnership.

Coastal Fish Habitat Conservation Strategy

The coastal fish habitat conservation strategy SEAKFHP partners embrace over the next five years (2017-2021) includes a mixture of collaborative actions that support monitoring and science needs for the region, activities and actions partners have some control over through mechanisms of sound policy development and decision making, and investment in landscape stewardship that conserves resources for long-term sustained use.

Partners recognize that the current ecological status of coastal areas is relatively strong in Southeast Alaska, threats are relatively localized, and foremost, existing coastal areas must be maintained to ensure productive fish populations and resilient coastal communities and indigenous cultures thrive into the future.
In addition to maintaining healthy coastal fish habitats our partners recognize that the larger issue of coastal resilience in our region depends on a suite of factors which local communities are uniquely positioned to maintain and support.

Strategy development relied heavily on previous assessment activities in the region including A Conservation Assessment and Resource Synthesis for the Coastal Forests & Mountains Ecoregion in Southeastern Alaska and the Tongass National Forest (Conservation Assessment; Schoen and Dovichin 2007) and A Conservation Action Plan for Estuarine Ecosystems of Southeast Alaska (Baker 2011).

As such SEAKFHP's coastal fish habitat conservation strategy focuses in on four specific goals:

- Strengthen coastal policies to maintain productive fish habitat in Southeast Alaska.
- Foster effective and sustainable assessment and monitoring networks for fisheries habitat along Southeast Alaska's coastal margin.
- Identify and protect critical coastal fish habitat areas that must be sustained long-term.
- Identify degraded coastal fish habitat that can be prioritized and restored.

The following outlines each of these goals in more detail including background information to help establish reference to the current condition of the landscape, and provide a list of actions the partnership can support either directly through partnership directed activity or indirectly through partner support. Time bound actions represent priorities and will be elevated in annual work plans for the partnership. These actions are also subject to SEAKFHP partner engagement and active participation.

Goal CCS1. Foster interagency and Southeast Alaska Community communication and collaboration to strengthen coastal development policies and maintain productive fish habitat in Southeast Alaska

Background: In the 2011 Conservation Action Plan for Estuarine Ecosystems of Southeast Alaska, authors provide a detailed summary of Alaska's coastal management approach including description of the management resources and authorities (federal, state, local) for coastal activities in Alaska. One significant change since that publication is the closure of the Alaska Coastal Management Program (ACMP). This program operated for over 30 years and in 2011, the Legislature and the governor failed to agree on conditions for extending the coastal program and the program expired. Now, Alaska is the only coastal state without a coastal management program. Perceived benefits of the program included:

- Empowers local input in federal decisions that impact coastal activities and development
- Helps applicants navigate the permitting process by coordinating local, state and federal processes. By bringing federal, state and local governments together with developers, the coastal program facilitates communication and resolves disputes
- Gives communities an effective voice in balancing competing demands on coastal resources.
- A coastal management program gives coastal communities the opportunity to develop policies for the coastal resources important to the people of the community. This gives communities an active and effective voice, but not a veto power, in the decisions that may affect their area.

Future Needs: SEAKFHP partners encourage a strong communication and collaboration structure among coastal resource management agencies and Southeast Alaska communities that promote effective coastal policies that provide for sustainable aquatic resources across the region.

Priority Actions:

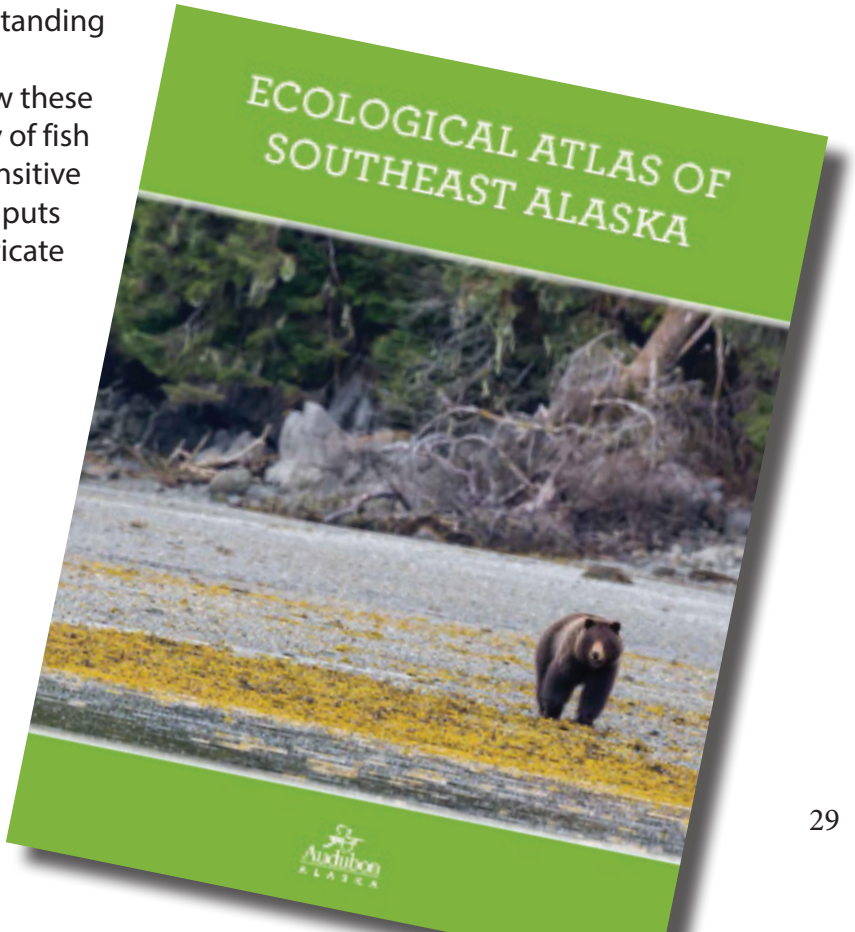
- By 2019, communicate lessons learned and benefits of Coastal Zone Management programs taking place in other parts of the country with state, municipal, and tribal leaders.
- By 2020, support a management gap analysis and associated document for Southeast Alaska, to identify which coastal resources are being effectively conserved and managed and which need further conservation actions (examples: habitat protection standards, policies and guidelines, best management practices, and implementation of effective mitigation opportunities).
- By 2021, facilitate improvements to coastal management in Southeast Alaska that arise as options garnered in the management gap analysis (examples associated opportunities to maintain and protect salt marsh and eelgrass bed habitats in the region).

Goal CCS2. Foster effective and sustainable assessment and monitoring networks for fisheries habitat along Southeast Alaska's coastal margin

Background: In 2016, Audubon Alaska published the 2016 Ecological Atlas of Southeast Alaska, this document brings together a wealth of regional information synthesizing a variety of datasets, scientific papers and reports as well as spatial analysis for Southeast Alaska. This publication strongly draws upon work completed a decade ago when Audubon and The Nature Conservancy (TNC) partnered on A Conservation Assessment and Resource Synthesis for the Coastal Forests & Mountains Ecoregion in Southeastern Alaska and the Tongass National Forest (Conservation Assessment; Schoen and Dovichin 200724). That multi-year project collected, analyzed, and synthesized extensive biological data, resulting in a comprehensive Conservation Area Design for Southeast Alaska. Associated with that work, TNC completed a conservation action plan for estuarine ecosystems of southeastern Alaska (Baker, 2011) as well as created a database mapping human activity within these areas (TNC Coastal-GIS Human Activities Database and Report, 2011). Other important regional monitoring and research information exists and links to these resources are archived on the SEAKFHP website under a page for developing the partnership's coastal fish habitat conservation strategy. Briefly these additional resources include:

- University of Alaska GIS Library Coastal Resource Module, an on-line GIS database with information helpful to planners, researchers, NGO's, students, consultants, recreationalists, conservation planners and anyone who is involved in land or resource management. The resource module includes a variety of mapping resources, habitat information, and geospatial data of all types.
- ShoreZone, a close-up inventory of the biology and geology of North America's Pacific coast from Alaska to Oregon.
- Classification design for Southeast Alaska estuaries.
- Nearshore Fish Atlas of Alaska, including fish distribution information for Southeast Alaska.

From these resources we have a good understanding of the spatial extent of estuaries and coastal nearshore areas in Southeast Alaska. We know these areas provide vital rearing habitat to a variety of fish species, including salmon. These areas are sensitive to complex hydrologic processes including inputs from the terrestrial environment and also intricate processes occurring in the Gulf of Alaska.



Future Need: SEAKFHP partners envision an engaged network working collaboratively together to identify priority needs for assessment and monitoring in support of conservation and management of fisheries habitat along Southeast Alaska's coastal margin. Partnership efforts will focus on collaborative ways to address assessment and monitoring gaps in the region and implement efforts to leverage fiscal and other resources leading to filling these gaps.

Priority Actions:

- Objective CCS2-1. Cultivate a connective and dynamic network focused on priority coastal margin habitat assessment and monitoring needs for Southeast Alaska.
  1. By 2018, convene existing forums to develop a more connected network where regional scientists, fishery managers and others can convene regularly to collaboratively address assessment needs on priority coastal margin habitats through identification of collaborative actions and available funding opportunities.
  2. Support the SEABANK initiative and assist in growing the hub of scientific and economic information showcasing Southeast Alaska and the natural capital that drives a sustainable marketplace built around the regions abundant aquatic resources (www.seabank.org).
- Objective CCS2-2. Engage diverse stakeholders in identifying key assessment and monitoring priorities at the coastal margin for Southeast Alaskan communities.
  1. By 2019, host regional workshop to engage stakeholders, inventory fish habitat data available for the coastal interface of Southeast Alaska, and identify and prioritize associated assessment and monitoring gaps. Some initial gaps identified in developing this strategy include:
     - Advancing knowledge of the freshwater runoff and nutrient/sediment transport to the marine environment in Southeast Alaska (Coastal Rainforest Research Network).
     - Assessment and monitoring of species-habitat relationships, including the distribution, abundance, and growth of nearshore species along environmental gradients.
     - Food web interaction studies working in the coastal interface of Southeast Alaska.
     - Assessment and monitoring efforts that examine cumulative impacts from multiple sources, including emerging impacts from changing environmental conditions such as ocean acidification, harmful algal blooms, and other impacts that affect fish health in the coastal interface of Southeast Alaska.
- Objective CCS2-3. Foster a robust and sustainable network of coastal margin monitoring efforts around Southeast Alaska.
  1. By 2019, support identification of marine water monitoring needs for the region (water quality, toxicology, pollution vectors, and terrestrial influence/sedimentation/nutrient transfer /log transfer facilities, boat harbors and marine infrastructure sites, heavily used transportation corridor sites) and share with Alaska Department of Environmental Conservation (ADEC) as they begin to develop plans for nearshore monitoring efforts in 2020. Include local communities, Tribes and citizen science groups in outreach for this effort.
  2. By 2021, work with SEAKFHP partners to establish a network for Southeast Alaska that supports coastal community-based monitoring and climate change adaptation planning and implementation by building the technical and social support network necessary for success. Includes supporting existing monitoring work ongoing through the Southeast Alaska Tribal Ocean Monitoring Research Network.
- Objective CCS2-4. Become a central location for publicly accessible information regarding assessment and monitoring efforts.
  1. By 2018, link the SEAKFHP website to the UAS GIS Coastal Module and annually update as progress with SEAKFHP coastal fish habitat strategy develops.
  2. By 2021, communicate what we learn from this goal to the broader public through community outreach, media stories, reports, enhanced website resources stressing the importance of estuaries and nearshore habitat to regional fisheries.

Goal CCS3. Work with SEAKFHP partners and other regional entities, to identify and protect critical coastal fish habitat that must be maintained long-term

Background: The Conservation Area Design recommendations made in the 2007 Audubon-TNC Conservation Assessment24 can be used to identify intact coastal habitat and develop long-term plans for sustaining these areas into the future. Under Goal 2, SEAKFHP and partners will work to support the existing conservation mechanisms in the region, while recognizing that designated national parks and wilderness areas also provide some level of resource protection to nearshore areas.

SEAKFHP recognizes that in addition to federal and state designations of parks or wilderness areas, there are other protection mechanisms being implemented at the local level by municipal governments and non-governmental organizations to protect nearshore habitat. Under Goal 2, SEAKFHP will support and amplify these local efforts to preserve nearshore habitat.

At the municipal government level, local land management processes and tools can be employed that minimize potential pollutant inputs to estuarine and nearshore areas such as establishing stream buffers, building set-backs and other nonpoint source regulations. Non-governmental organizations, such as the Southeast Alaska Land Trust (SEAL Trust) and the Southeast Alaska Watershed Coalition (SAWC), also offer protection mechanisms. For example, SEAL Trust directly protects nearshore habitat by holding conservation easements or through fee-ownership of land. In addition, SEAL Trust is a wetland mitigation sponsor under an agreement with the U.S. Army Corps of Engineers (Corps) governed by Section 404 of the Clean Water Act. Through the SEAL Trust In-Lieu Fee Program, SEAL Trust receives mitigation funds from private and public developers who are required to pay a "fee in-lieu" of mitigation under the Corps permitting program. SEAL Trust uses all mitigation funds it receives for preservation of wetlands, other aquatic resources, and important adjacent upland buffers in Southeast Alaska. Similarly, SAWC's newly approved Aquatic Resource Mitigation Program, allows focus on stream and wetland restoration in the region.

Future Need: The SEAKFHP Conservation Strategy seeks to both maintain the existing conservation reserve network and to protect additional nearshore habitat from degradation within the next five years. Partnership efforts will focus on sharing information that helps guide partner organizations leverage funding and other sources to increase protection for coastal habitat in the region.

Priority Actions:

- Objective CC3-1. Identify priority estuarine and nearshore areas across Southeast Alaska for conservation action at multiple levels.
  1. At the workshop planned for 2019, facilitate a session on developing a collaborative regional prioritization process for the protection of high value coastal habitats.
  2. By 2020, work with local communities to help identify overlapping priority estuarine and nearshore areas for conservation as part of their municipal land management processes and partner with entities like the Southeast Alaska Land Trust to provide permanent protection options.
  3. By 2021, facilitate the development and maintenance of a regional list of coastal areas in Southeast Alaska that have high priority fish habitat identified for protective conservation actions.
- Objective CCS3-2. Engage a diverse group of stakeholders to support conservation implementation, including fostering funding support.
  1. By 2020, facilitate a pilot project to support habitat protection opportunities through local land trusts and others by identifying and prioritizing high value nearshore land protection projects and applicable funding sources.

Photo: ShoreZone

Goal CCS4. Work with SEAKFHP partners and other regional entities, to identify degraded fish habitat in the coastal interface areas of Southeast Alaska that can be prioritized and restored

Background: While Southeast Alaska's estuarine and nearshore ecosystems are generally intact, activities associated with urban development, historical land-use practices and dispersed activities such as marine ship traffic have all created disturbed habitat and can have impacts to aquatic communities (Albert and Schoen 2007). There are legacy disturbed areas in the region such as log transfer facilities, abandoned mining areas, and abandoned docks and canneries. We do not have a prioritized list as to which ones to clean up first to derive the most ecological benefit or address community needs including meeting traditional use needs expressed by Southeast Alaska tribes. In A Conservation Action Plan for Estuarine Ecosystems of Southeast Alaska (Baker, 2011), authors document agency responsibilities and landownership which is helpful in understanding the complex mosaic of overlapping management interest across the region. In 2011, TNC completed a project to map human activities in the estuarine and nearshore marine ecosystems in Southeast Alaska (TNC Coastal-GIS Human Activities Database and Report, 2011). This project included compilation of best available spatial datasets and a cumulative index to inform future conservation, management and research opportunities. This project includes coastal, marine and land-based activities that can be useful in identifying fish habitat in coastal areas of Southeast Alaska that can be targeted for restoration.

Marine debris and other materials impacting fish, such as derelict fishing gear, are also a concern in the region. Debris washing up upon the shore can destroy habitat critical to fish and aquatic organism survival. Additionally, marine debris, especially large or heavy pieces, can scour, smother, and disrupt both marine and shoreline habitat. Coastal cleanup efforts are routinely implemented across the region and NOAA maintains an active program to address these needs across the state, as such we recognize this as an issue but have not specifically addressed actions the partnership will engage in, rather we will point partners to the NOAA efforts. This may become a focal topic for the partnership in the future and so is identified here to be archived in our planning process and potentially addressed more specifically in future years.
Future Need: Within the next five years, develop a regional tool that is used by governments and nonprofits to prioritize fish habitat restoration opportunities in coastal interface areas of Southeast Alaska. Additionally, complete a high-profile fish habitat restoration project within the coastal margin through a SEAKFHP partner

Priority Actions:

- Objective CCS4-1. Identify and prioritize degraded fish habitat that could be restored.
  1. By 2018, coordinate the identification of sites along Southeast Alaska's coastal margin where restoration activities could improve fish habitat. Part of this action recommends working with local communities to help identify overlapping priority estuarine and nearshore areas suitable for restoration as part of their municipal land management processes and partner with others to implement restoration actions. An anticipated outcome from this action is to create a tool for communities to use in identifying key coastal areas that need conservation or require some form of restoration.
  2. At the workshop planned for 2019, facilitate a session on restoring degraded coastal habitats.
- Objective CCS4-2. Identify willing partners and funding mechanisms to facilitate coastal restoration activities.
  1. By 2020, coordinate among conservation partners to engage in coastal habitat restoration activities and seek associated funding resources.
- Objective CCS4-3. Work with SEAKFHP Partners and others develop best management practices for maintaining resilient shoreline.
  1. At the workshop planned for 2019, bring together diverse stakeholders including the development sector to discuss fish friendly shoreline development/green infrastructure approaches applicable to Southeast Alaska.

Photo: ShoreZone

Appendix 1. Recognized risks and associated stressors to fish habitat in Southeast Alaska identified as part of SEAKFHP's strategic planning effort, this list will be refined and used in future efforts to refine the partnership's conservation strategies.

Risks and associated stressors to fish habitat	Addressed in Freshwater Strategy	Addressed in Coastal Strategy
Changing Environmental Conditions		
Global climate change	yes	yes
Ocean acidification	no	yes
Catastrophic events	no	no
Marine debris	no	yes
Habitat Loss		
Urban/community development	yes	yes
Shoreline modifications	yes	yes
Loss of Habitat Connectivity and Complexity		
timber harvest/logging practices	yes	yes
energy development (hydro/tidal)	yes	no
road/stream crossings	yes	yes
Degraded Water Quality and/or Quantity		
mining development	yes	no
contaminated sites	yes	yes
marine vessel contaminants	no	yes
mixing zone contaminants	no	yes
alteration of hydrology	yes	yes
Ecosystem Imbalance		
Invasive species ntroduction/persistence	yes	yes
Algal blooms	no	yes
Fishing/Harvest	no	no
Mariculture/Hatcheries	no	no

Appendix 2. Definitions used in developing SEAKFHP's Coastal Fish Habitat Conservation Strategy.

Estuary (Estuarine Wetland): *A mixed terrestrial/aquatic area of varying salinity created by a perennial stream entering the marine environment.*

- The stream must have moved enough material to significantly change the shoreline and local bathymetry since the glaciers receded. (even without a stream layer, you could identify it on a topographic/bathometric map)
- The stream bed must currently have a slope that allows for deposition of fine material. At least 100 meters of length with less than .05% slope.
- Stream channel shifts back in forth over whole area within a century.
- 10 + hectares area exists between the MHW and MLW (matches TNC map cutoff)

Three subsections of estuaries:

- Fresh Water Marsh (Riverine–Lower Perennial): This area is dominated by fresh water and is a deposition zone for the stream. On a monthly basis there is some salt water inundation and soils are salty.
  1. Area from the HAT (High Astronomical Tide) to the MHW.
- Brackish Classic Estuary (Estuarine–Intertidal): Large daily swings in salinity, usually protected from heavy surf, and generally highly biologically productive.
  1. Area from the MHW to MLW
  2. Often a long flat valley just above mean sea level
- Estuary Fringe (Estuarine–Subtidal): Submerged in saltwater to a significant depth every day. Area which normally has a salinity similar to seawater at depth, but with bottom substrate, temperature and clarity influence by the perennial stream.
  1. MTL to LAT (Low Astronomic tide) submerged to a significant depth every day or always submerged.
  2. Estuary fringe may be considered Nearshore Habitat.

Nearshore Habitat (Marine –Subtidal and Intertidal): A*n area that provides significantly different (better) habitat for a suite of fish species (especially juvenile life stages) compared to deep open water. Habitat improvement can be from: 1) cover created by submerged aquatic vegetation (SAV); 2) greater variety of food sources; 3) cover provide by uneven bottom or coral 4) greater amounts of light increasing primary productivity.*

- This generally extend from MTL line to the 5 M below Lowest Astronomical Tide (LAT)(tends to be 10 M below MLW)
- If the landscapes transitions from HAT to LAT in less than 10 m this narrow strip does not count as nearshore for SEAKFHP (So narrow and steep that it's value as habitat is much reduced)
- Subsections are divided by predominant physical/biological bottom features. (Each section of coastline gets only one designation)
  1. Submerged Aquatic Vegetation (Marine – Subtidal – aquatic bed – rooted vascular): Dominated by submerged aquatic vegetation (canopy kelp, seagrass beds or similar); A section of shoreline is counted as SAV even if some area is too shallow for SAV and some too deep.
  2. Coral (Marine –Subtidal – Reef): Oceanic conditions exist to facilitate coral growth; A section is counted as Coral/reef even if only 1/3 of the total sea floor area is coral.
  3. Rocky substrate (Marine – Subtidal – rock bottom): Dominated by bottom surface with areas for juvenile fish to hide from predation; May contain small areas of SAV or cobble or sand.
  4. Smooth Bottom Benthic Marine Habitat (Marine – Subtidal – unconsolidated bottom): Mud, silt, sand or gravel bottom with very little cover; This is similar to "estuary fringe" but could exist without a perennial stream.