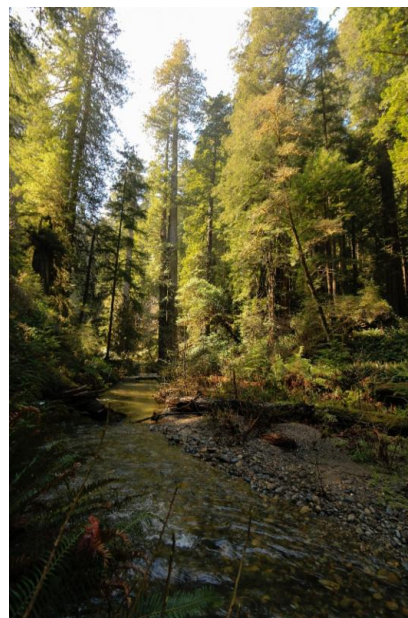


April 2015 - In This Issue:**Icefield to Ocean****SARP's Aquatic Connectivity****ACFHP's Habitat Restoration****Coastal Cutthroat Trout****PMEP Makes Prioritization Gains****PMEP to Host CERF Symposium****Forum Updates Fish Barrier Info****Salmon Nursery Rebounding**

Prairie Creek, Redwood National Park, California, provides high quality habitat for spawning and rearing of coastal cutthroat trout.

Photo credit: Brett Holycross.

Coastal Cutthroat Trout

Coastal Cutthroat Trout are a unique subspecies of western trout. They live in coastal waters from Northern California to Alaska, where they spawn and rear in small freshwater streams. If environmental conditions are right, a portion of a local population will migrate downstream to estuaries or nearshore marine environments. Once in the marine environment, these trout, known as "sea-runs" feed on small fishes such as sand lance, sticklebacks, northern anchovies, and marine invertebrates. Unlike their fully anadromous counterparts which overwinter in the ocean, sea-run Coastal Cutthroat Trout return to freshwater to overwinter. Coastal Cutthroat Trout are considered one of the four major subspecies of Cutthroat Trout, but they are the only subspecies that expresses a marine form.

The need to assess the status of this important subspecies was identified by the [Coastal Cutthroat Trout Interagency](#)

Icefield-to-Ocean Linkages across the Northern Pacific Coastal Temperate Rainforest Ecosystem

Alaska's coastal glaciers are among the most rapidly changing on the planet. They're also, as U.S. Geological Survey Alaska Climate Science Center communications lead Kristin Timm says, "more than just ice." Glacial runoff drives ocean currents and supports the habitats of the salmon that local fishermen rely on. In the recent paper, Icefield-to-Ocean Linkages across the Northern Pacific Coastal Temperate Rainforest Ecosystem, published in the journal *BioScience* and led by Shad O'Neel, also from the Alaska Science Center, synthesizes what scientists currently know about the physical, chemical and biological connections that link high elevation icefields and glaciers, streams, temperate rainforest, and the ocean. Authors discuss impacts of changing climate impacts noting that "rates of glacier mass loss in the northern Pacific coastal temperate rainforest are among the highest on Earth, and changes in glacier volume and extent will affect the flow regime and chemistry of coastal rivers, as well as the nearshore marine ecosystem of the Gulf of Alaska". You can check out a pdf of the article [here](#). Also, Timm collaborated with glaciologists and ecologists at the center to design this poster, which illustrates the impact of ice fields on both people and the environment. As a special note this poster From Icefield To Ocean won the People's Choice

Committee, an interagency working group with member agencies from throughout the trout's native range. The assessment is funded through grants from the [Western Native Trout Initiative Fish Habitat Partnership](#) and the National Fish and Wildlife Foundation's [Bring Back the Natives/More Fish](#) program. Additional support is provided by the [Pacific States Marine Fisheries Commission](#) and the [Bureau of Land Management](#). The outcome of the assessment will document the current status of the subspecies, identify data gaps, opportunities for restoration and conservation, and provide agencies with data to help them better manage this important native species. The information can also be used for [public outreach and education](#).

The assessment is a combination of existing data and new information gathered in a series of workshops held in key locations throughout the subspecies' range. The team held their first workshop in Orick, CA in March, 2014. Since then, they have covered over 29,000 square miles and engaged over 100 biologists. More information about the background of the assessment can be found [here](#). The assessment team will hold meetings in Washington in 2015, other locations and dates are to be determined. The assessment will be completed in late 2016.

The mission of the Coastal Cutthroat Trout Interagency Committee, administered by the Pacific States Marine Fisheries Commission, is to "develop a consistent framework to help guide and prioritize conservation, management, research, and restoration of Coastal Cutthroat Trout throughout their native range".

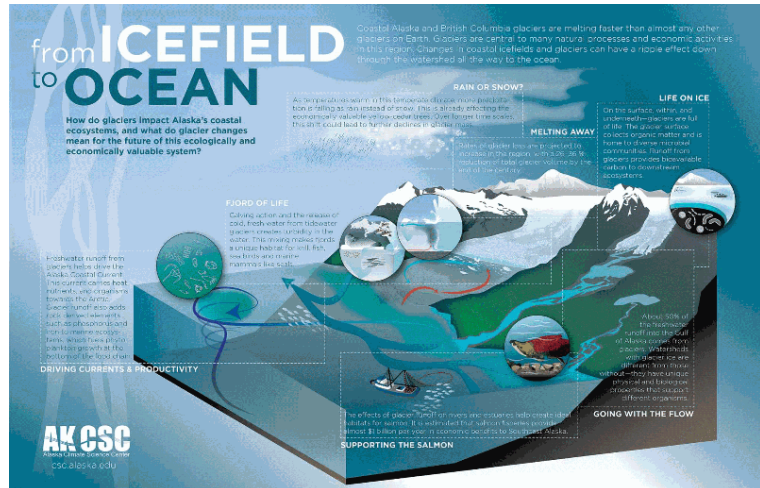
For more information, see <http://www.coastalcutthroattrout.org/>.



Coastal cutthroat trout use estuaries and nearshore marine environments for feeding and growth. Photo credit: ODFW Salmon River Estuary, Aquatic Inventory Project.

award for Posters & Graphics at the [2015 Vizzies](#).

Note: Shared by the [Southeast Alaska Fish Habitat Partnership](#). One of our partnership goals is to help raise awareness to the research and data efforts taking place across southeast Alaska.



The Southeast Aquatic Connectivity Assessment Program: Assessing Fish Barriers in Southeastern Rivers

The rivers and streams of the southeastern United States are extremely diverse, containing numerous threatened and endangered species. In fact, southeastern rivers contain the largest number of at-risk freshwater fish and invertebrates of any region in the country. The presence of dams and other man-made barriers fragment the river network, contributing to habitat loss and therefore negatively impacting freshwater biodiversity and inflows to estuaries. Changes in freshwater inflows to estuaries can adversely affect shellfish survival, and fish reproduction and distribution. Dams also often impede the movement of resident and diadromous fish species. Resident imperiled species of darter and redbreast are unable to move freely in the system, and anadromous fish such as the American shad and striped bass are unable to reach their historic spawning grounds upstream.

To help address this problem, the Southeast Aquatic Resources Partnership (SARP) and The Nature Conservancy (TNC) have completed an assessment of dams in the Southeast. The project, funded by the South Atlantic Landscape Conservation Cooperative (SALCC), supports planners and managers in their efforts to target fish passage and other aquatic connectivity projects where they have the most benefit.



Coastal Cutthroat Trout (*Oncorhynchus clarkii*) have a diverse array of life history forms, including resident, river, and lake migrants, and estuarine, or marine migrants. Photo credit: Dave Buchanan.

"Survival and growth of early fish stages are maximal in coastal and estuarine habitats where natural shallow areas serve as nurseries for a variety of widely distributed species on the continental shelf. Processes occurring in these nursery grounds during the juvenile stage affect growth and may be important in regulating the year-class strength of fishes and population size. The need, therefore, exists to protect these essential fish habitats..."

~ Estuarine, Coastal and Shelf Science

PMEP Makes Gains on Prioritization Scheme for West Coast Estuary Restoration and Protection Efforts

In April of 2015, the Pacific Marine and Estuarine Fish Habitat Partnership took the first steps toward drafting a prioritization scheme for West Coast Estuary restoration and protection efforts.

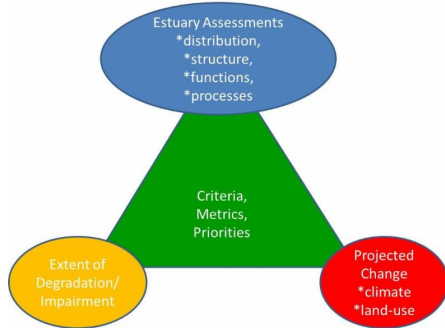
The team, spearheaded by representatives of federal and state agencies, tribal sovereign nations, and nonprofit organizations, established a goal to enhance ecological function and resilience of West Coast estuaries. The objective is to create a prioritization scheme to guide conservation and restoration actions supporting fish habitat functions in West Coast estuaries as well as measure the effectiveness of the scheme and use adaptive management principles to modify the scheme as learning occurs.



Figure 1. SEACAP Project Study Area.

The Southeast Aquatic Connectivity Assessment Project (SEACAP) identifies opportunities to improve aquatic connectivity by prioritizing dams based on their potential ecological benefits if removed or bypassed within watersheds that intersect the SALCC area, including southern VA, NC, SC, GA, AL, FL, and eastern MS (Figure 1). The project area is approximately 250,000 square miles with over 350,000 miles of mapped streams. Approximately 17,000 dams were located on streams in the GIS mapping and evaluated based on a suite of metrics, including the number of river miles that would be opened by a passage project, number of downstream dams, presence of diadromous or resident fish species, and metrics which assess watershed and stream ecological conditions. Metrics are combined to produce a relative prioritization and displayed in an interactive web map with a custom analysis tool for running user-defined scenarios.

The output of the custom tool is a list of dams ranked from highest to lowest representing which dams would provide a greater benefit if removed or bypassed. However, because differences between each dam may not be representative of true ecological differences, ranked dams are represented in five percent tiers within the map display (Figure 2). In addition to default prioritization outputs, the custom web-based tool will be available for use by managers to create their own prioritization scenarios for given geographic areas and scales. This tool will allow different managers to pick and choose the metrics they wish to use and provide relative weights to the metrics different from the weights used in the default scenarios. For example, a biologist living in coastal North Carolina can use the custom tool to place higher weights on diadromous fish metrics and limit the prioritization to the coast of the state in order to create a prioritization specific to their needs.



The scheme incorporates estuary assessments, projected climate change, and extent of degradation/impairment, and establishes criteria, metrics and priorities.

Stay tuned for more on this emerging prioritization scheme!

PMEP to Host Symposium at November CERF Conference

PMEP is hosting a symposium on its West Coast nursery habitat assessment work as part of the national Coastal and Estuarine Research Federation (CERF) meeting November 8-12, 2015, in Portland, Oregon.

The session, titled, "Assessing the status of estuary habitats for juvenile fish across California, Oregon, and Washington," includes speakers from Oregon Department of Land Conservation Development, The Nature Conservancy, SeaSpatial, Central Coast Wetlands Group, Industrial Economics, Inc., Pacific States Marine Fisheries Commission, Estuary Technical Group, University of Washington, US Geological Survey, and National Oceanic and Atmospheric Administration.

Session topics will focus on:

- lessons learned
- an inventory and classification of West Coast estuaries
- nursery functions of West Coast estuaries
- climate mediated impacts of hypoxia on nursery function

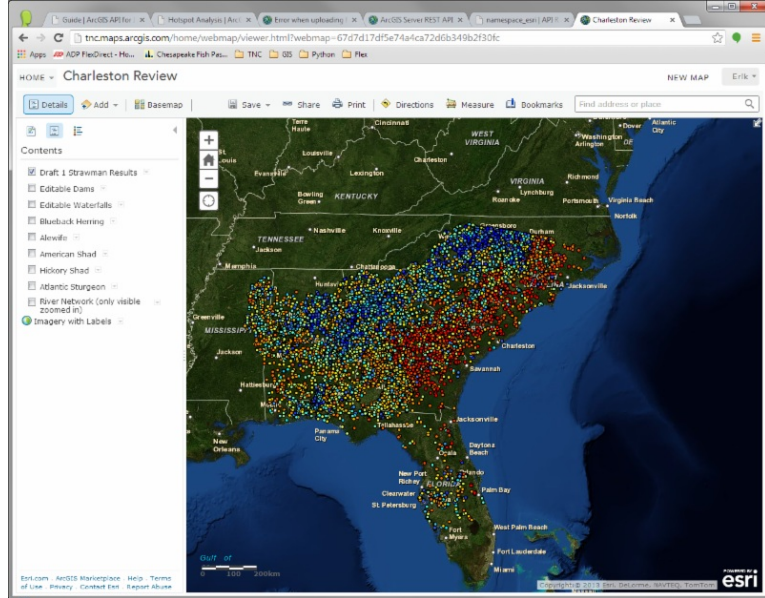


Figure 2. Draft Diadromous Fish Scenario, Top Tiers = Warm Colors

SEACAP was modeled from the Northeast Aquatic Connectivity Project (NAC) and the Chesapeake Fish Passage Prioritization Project (CFPPP) (both recently completed). The information provided by SEACAP used in conjunction with expert knowledge and field assessments will allow resource managers to be more efficient in selecting fish passage projects in their area.

From the SEACAP Project, SARP has partnered with American Rivers as part of a new Connectivity Program, which focuses on providing technical support and resources to managers working on dam removal and fish passage projects within the SARP states (VA, NC, SC, GA, AL, FL, LA, TX, OK, MO, KY, TN, MS, and AR). SARP currently has two other GIS decision support tools in addition to SEACAP: the North Carolina Barrier Prioritization Tool (NC BPT), and the Tennessee Cumberland Barrier Prioritization Tool, which is under development. In addition to decision support tools, SARP and American Rivers hope to foster collaboration between partners within states by creating Connectivity Teams; groups of resource managers from multiple sectors who can come together and discuss and collaborate around fish passage projects and identify new projects using the tools and resources provided.

Current efforts include using the recently updated North Carolina BPT to create custom outputs for smaller watershed groups and non-profits who participate in the North Carolina Aquatic Connectivity Team (NC ACT). These groups include the Cape Fear River Partnership, Trout Unlimited and local resource conservation development councils (RC&Ds). Using tool results, SARP and American Rivers have been communicating with resource managers within each group to perform reconnaissance on top ranked dams to initiate the dam removal process on the ground. In addition, the team is working with Appalachian State University to perform reconnaissance on dams within the Carolina Land and Lakes R&D Council region.

SARP is taking the project "on the road" to several SARP states included in the project area, performing tutorials on the web tool and discussing next steps for using the output. The goal is that from these initial SEACAP meetings, connectivity teams will form within each state and resource managers can further collaborate and initiate dam removal projects like those of the teams in North Carolina and Tennessee. To learn more about SEACAP contact [Kat Hoenke](#), [SARP's Habitat Analyst](#).

Updates on ACFHP's US Fish and Wildlife-Funded On-the-

- a spatial framework for assessing estuaries
- mapping the extent of current and historic tidal wetlands
- a draft prioritization scheme to prioritize estuary protection and restoration efforts
- ecological criteria to inform conservation priorities
- regional approaches to national estuary assessments, and
- abundance and composition of nearshore forage fish.

[CERF 2015](#)



Forum Updates Passage Assessment Database

The California Fish Passage Forum recently updated its strategic framework to incorporate the latest information from its Passage Assessment Database on progress made addressing fish passage barriers in California.



This photo features an example of a fish barrier on the Shasta-Trinity National Forest. An open-bottom arch composed of natural streambed will remediate this fish passage barrier and improve fish passage for several listed and non-listed fish species. Photo credit: Shasta-Trinity National Forest.

Ground Habitat Restoration Efforts

Exceptional progress has been made on many on-the-ground restoration efforts in ACFHP's region, where six US Fish and Wildlife (USFWS)-funded projects were in various stages of development over the past year. During this time, three of these projects were completed, and two projects broke ground. The following paragraphs highlight their accomplishments.

Completed Projects

Restoring the Mangroves of the Indian River Lagoon, South Florida

In January 2013, The Marine Resources Council began restoration in the Pelican Island National Wildlife Refuge in Sebastian, Florida, an aquatic preserve in the Indian River Lagoon. This is an estuary of National Significance, as determined by the Environmental Protection Agency, and is located within USFWS lands.

When the project was completed in the summer of 2014, 10 acres of invasive plants (Brazilian pepper and Australian pine) had been removed, and 4,000 red mangroves and 11,000 individual smooth cordgrass plants (*Spartina alterniflora*) had been installed in their place. This resulted in the enhancement of 8,500 linear feet of nursery habitat for estuarine fishes and invertebrates, with the potential to benefit endangered species such as small tooth sawfish, the Florida manatee, Atlantic green, hawksbill, ridley, and leatherback turtles, as well as numerous fin- and shellfish. Over 350 members of the public were involved in over 40 hands-on events, ranging from restoration to monitoring fish populations and water quality.

Eelgrass Restoration with Conservation Moorings in Salem Sound and Buzzards Bay, Massachusetts

This project, conducted by the Massachusetts Division of Marine Fisheries, focused on the replacement of eight conventional boat moorings with Hazelett Marine elastic conservation moorings. The chain systems of conventional moorings scour seagrass beds (see Figure 1), whereas the elastic moorings have minimal contact with the seafloor. Over 0.2 acres of seagrass beds were restored during this process, due to both improved water quality (i.e. reduced turbidity) and the planting of eelgrass at replacement mooring sites. This work will benefit commercially-important species such as winter flounder, lobster, striped bass, and menhaden, all of which use seagrass beds for at least part of their life cycle.

In addition to the fish habitat restoration efforts, the project incorporated a strong outreach component. By working with the West Falmouth Boat Club and the Association to Preserve Cape Cod, multiple presentations were given to the public to demonstrate the impacts of moorings on seagrass, and the benefits of this new technology. Site selection for mooring replacement began in August of 2012, and final eelgrass plantings were completed in May of 2014.

Expanding Marine Meadow Habitat in the Peconic Estuary, New York

By the time the Cornell Cooperative Extension of Suffolk County (CCE) completed this project in the fall of 2014, over 4,500 seagrass (eelgrass and widgeon grass) shoots were planted at two different sites within the Peconic Estuary on Long Island Sound. Seagrasses in this region provide habitat for hard clam, bay scallops, tautog, winter and summer flounder, striped bass, and black sea bass, among other species. Seagrasses are also instrumental in stabilizing sediments, removing excess nutrients from the water column, and providing shorelines protection from erosion by

Figure 2. Fish Passage Barrier Types Common in Anadromous Watersheds in California.

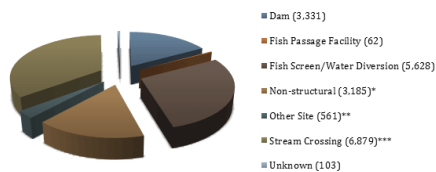


Figure 3. Fish Passage Improvement Projects Completed 2006-2014

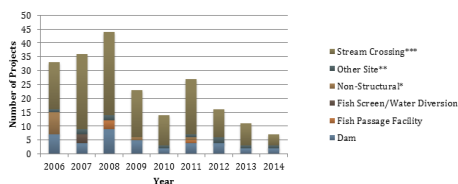
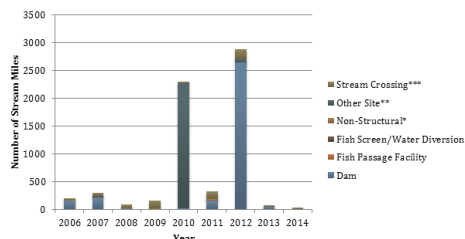


Figure 4. Number of Stream Miles Opened by Fish Passage Projects Completed 2006-2013



To review these charts in detail, check out the Forum's [strategic framework](#).

Salmon Nursery Nursed Back to Health

Tarboo Bay Restoration

The US Fish and Wildlife Service recently produced a one-page fact sheet on a project that was supported by the Pacific Marine and Estuarine Fish Habitat Partnership (PMEP).

The project, which had over 45 partners and began in 2001, is restoring nearshore tidelands, decommissioning a well and septic system, removing a house and 700 cubic yards of backfill as well as invasive species, such as ivy and Scotch broom. Elimination of a 150-foot bulkhead allowed the tide to flow where it had been blocked for decades.

For more information on the project, check out the [Tarboo-Dabob Bay project](#), and the [fact sheet](#) created by the US Fish and Wildlife Service.

diffusing wave energy. Over 50 volunteers helped to assemble seagrass units over the last year, which also provided the CCE opportunities to demonstrate the importance of marine habitat to the public.

Newly Funded Projects

Oyster Reef Restoration in Great Bay Estuary, New Hampshire

As ecosystem engineers, oysters play a significant role in maintaining a healthy and reliable environment. Oysters stabilize sediments, provide nursery habitat for estuarine-dependent and migratory fishes, buffer against ocean acidification, and filter nutrients from the surrounding water column. This project, led by the New Hampshire Chapter of the Nature Conservancy, will begin to reverse the 90% decline in oyster standing stock that the area has experienced since the 1970's.

These restoration efforts will rely heavily on community volunteers to lend their time and private docks to growing oyster spat over a ten week program. Over 350,000 oyster spat attached to surf clam shell will be added near the mouth of the Lamprey River, which will create two acres of reef. Eventually, this reef will support species including river herring, winter flounder, and striped bass, and benefit coastal residents through shoreline stabilization and climate change resiliency.

Oyster Reef and Salt Marsh Restoration in Stump Sound, North Carolina

The shoreline in Stump Sound, North Carolina has been experiencing erosion from boat wakes and storms, as well as degradation due to dredging, shoreline hardening, and high harvest pressure on natural oyster reefs. This in turn has led to a reduction in available habitat for estuarine-dependent species. To remedy this problem, the North Carolina Coastal Federation will protect 200 feet of estuarine shoreline in the sound by restoring 0.05 acres of fringing oyster reef and 0.07 acres of tidal salt marsh, benefitting species such as red drum, sheepshead, spotted seatrout, weakfish, and more.

This restoration will increase the extent of living shoreline, which not only provides important marine habitat, but will provide resilience to sea level rise and augment the capacity to rebound after storms. An estimated 100 volunteers will be directly involved in project monitoring and implementation, and multiple outreach materials will be developed as well.

For more information on these and all of our projects, please visit www.atlanticfishhabitat.org, or contact [Lisa Havel](#).



U.S. Fish & Wildlife Service



Salmon Nursery Nursed Back to Health

Turbo Bay Restoration

"It was wonderful to see the tide come in again where it had been blocked for many decades. The salmon and other fish come in on the high tides to feed in the productive mudflats and saltmarsh of the bay."

Peter Buhle, Executive Director, Northwest Watershed Institute

Turbo Bay within the Dabob Natural Area in Washington's Puget Sound was once a pristine salt marsh, ideal for rearing juvenile salmon. Over time, approximately 60% of the estuary has been lost due to the construction of levees and dikes, and only 10% of the salt marsh habitat remains. Despite this degradation, it is one of the largest and least developed salt marsh estuaries remaining in Puget Sound.

To protect this valuable nursery and restore natural vegetation, U.S. Fish & Wildlife Service has been working with over 40 agencies, businesses, conservation groups, tribes, and others since 2011.

Last fall, the partnership was able to take a big step in restoring nearly one-quarter mile of marsh shoreline. After purchase of the residential property, we decommissioned a wall and septic system and restored a house, 700 cubic yards of backfill and invasive ivy and Scotch broom.

Revegetation will take place in early 2015. Elimination of a 150-foot bulkhead allowed the tide to flow where it had been blocked for decades.

The newly restored parcel provides habitat for a diversity of fish species, including juvenile Hood Canal summer chum salmon and Puget Sound Chinook salmon, both federally listed as Threatened under the Endangered Species Act. The site also provides important nearshore habitat for coastal cutthroat trout, fall chum salmon, Hood Canal coho salmon (Federal candidate species), and steelhead (federally Threatened) all of which return to Turbo Bay and spawn in Turbo Creek, the



Haloing around conventional boat moorings caused by chain scouring the seagrass beds. Photo credit: Tay Evans, Massachusetts DMF.

[Atlantic Coastal Fish Habitat Partnership](#) | [California Fish Passage Forum](#) | [Hawaii Fish Habitat Partnership](#) | [Kenai Peninsula Fish Habitat Partnership](#) | [Mat-Su Basin Salmon Habitat Partnership](#) | [Pacific Marine and Estuarine Fish Habitat Partnership](#) | [Southeast Aquatic Resources Partnership](#) | [Southwest Alaska Salmon Habitat Partnership](#) | [Western Native Trout Initiative](#)

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