

2017 Coldwater Conservation Fund Grants

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Casco Bay Salter Brook Trout

Project Overview: A \$35,000 grant from the CCF will enable TU to carry out the next phase of salter brook trout conservation work in Maine through the following actions: 1) angler surveys of unassessed coastal streams, 2) intensive study of three high priority coastal brook trout streams in Casco Bay, and 3) outreach to the Maine Department of Inland Fisheries and Wildlife (MDIFW) and local partners to increase salter brook trout protections.

Project Description: Anadromous or "salter" brook trout are rare, with only six documented populations in the northeast. In 2013, with funding from National Fish and Wildlife Foundation and data from state and federal fisheries agencies, TU completed a Status Assessment of Coastal and Anadromous Brook Trout in the United States.¹ Two key findings of the report were that "most coastal brook trout streams identified were in Maine", and that there was insufficient information regarding the status of sea-run brook trout populations, particularly in Maine. Since 2014, TU staff have been working with TU members and other volunteer anglers to systematically assess coastal Maine streams. Three small spring-fed



Volunteer Steve Dewick at head of tide on Mill Stream. Volunteers consistently catch brook trout in the salt marsh here.

streams (Mere Brook, Frost Gully Brook, and Mill Stream), all tributaries to Casco Bay, were discovered through the volunteer surveys and stand out for both their quality and their sensitivity to human development. Brook trout have been caught at or below the head of tide in all three. They flow through sections of Freeport and Brunswick, two adjacent towns that are highly developed with a mix of residential, downtown and "sprawl" development. With the discovery of these three populations, wild sea-run brook have been identified in the heart of Maine's most heavily developed landscape—a major surprise to both our local volunteers and to Maine's fisheries biologists.

Through this project, TU will work with the Merrymeeting Bay Chapter (MMBTU), MDIFW, the US Fish and Wildlife Service (USFWS) and municipal and other NGO stakeholders to continue volunteer survey efforts on coastal Maine streams, and to thoroughly characterize the three identified Casco Bay populations and their habitat by, (1) developing an assessment of fish passage and a detailed thermal profile; 2) using volunteer anglers to document use of tidal habitat through a mark/recapture study; and (3) working with local stakeholders to develop a long-term conservation plan for these streams.

Given what volunteer anglers report as the quality of the trout population and the extent to which these fish use tidal habitat, we believe Mere Brook, Frost Gully Brook, and Mill Stream have high potential as sites for the first dedicated salter brook trout conservation projects in Maine. To make them priorities for fisheries agencies and funders, we need to more formally document habitat quality and brook trout populations (including use of tidal habitat), prioritize conservation opportunities, and communicate both the quality of the resource and the conservation opportunities to key stakeholders.

¹Dauwalter, D.C. and J. McGurrian. 2013. Status Assessment of Coastal and Anadromous Brook Trout in the United States. Final report to National Fish and Wildlife Foundation. Trout Unlimited, Arlington, Virginia.

Key tasks.

- Continued volunteer angler surveys on remaining unassessed streams. The 2013 analysis identified 201 unassessed coastal streams, most of which were in Maine. To date, 130 streams have been surveyed by volunteer anglers who have found brook trout about 50% of the time. We will conduct volunteer surveys on an additional 25-40 streams.
- Brook Trout Population Assessments on Mere Brook, Frost Gully Brook, and Mill Stream by volunteer angling and electrofishing by MDIFW staff to document brook trout presence and collect population data.
- Brook Trout Habitat Use Study on Mere Brook, Frost Gully Brook, and Mill Stream. Use selective marking (tagging or fin clipping) in conjunction with volunteer angling, electrofishing, and potentially fyke or trap netting to assess movement between stream segments, including passage over potential barriers and movement from tidal to freshwater habitat. Brook trout collected via electrofishing and angling would be assigned marks unique to the stream segment they are collected from, and volunteer angler, e-fish, and other recaptures would document movement from the point of initial capture.
- Temperature Monitoring. We have funding for continuous temperature monitoring at 2 sites each on Mere Brook, Frost Gully Brook and Mill Stream (6 sites total). CCF funding would allow us to add continuous temperature monitoring at 10 additional sites and develop a temperature profile at peak summer temperatures of each stream from source to head of tide to identify potential thermal barriers and document cold water sources.
- Train MMBTU volunteers in Maine Stream Barrier Assessment protocol, and with staff assistance formally assess all known dams (4) and road and railroad crossings (22) to evaluate fish passage and document current conditions with photographs.
- Community Outreach. Staff presentations on fish population, fish movement, temperature, and migration barrier data to: Freeport Conservation Commission, Brunswick Conservation Commission, Freeport Conservation Trust; Brunswick Topsham Land Trust; MDIFW regional staff; US Fish and Wildlife Gulf of Maine Program staff.

Statement of Need for CCF Funding: For the past two years our Maine salters work was funded by NFWF. Now that the NFWF grant has closed, we need a new source of funding for the next phase of our salters work in Maine. CCF funding, combined with other state and private contributions described below, will support our 2018 salters work and set the stage for future grant proposals to NFWF and other funders.

With our limited amount of existing funding, TU staff can coordinate a volunteer-led project to monitor water temperatures and assess fish passage at culverts and other barriers in 2018, and MDIFW will assist in collecting electrofishing data on all three streams. With existing funding plus a \$35,000 contribution from the CCF, we can conduct volunteer surveys on 25-40 additional streams; thoroughly characterize habitat in the three Casco Bay streams through more water temperature monitoring sites, development of a peak water temperature profile for each stream, detailed assessments of fish passage barriers, and a mark/recapture study to document brook trout movements and use of tidal habitat. Importantly, we will also be able to conduct outreach to share results of these surveys with key stakeholders—most significantly, outreach to MDIFW to get them to formally recognize the presence of sea-run brook trout in these three streams, a key step to make habitat protection and restoration in these streams a priority.

Project Budget:

- **Revenue:** A CCF contribution of \$35,000 will be matched by grants already received from the Maine Outdoor Heritage Fund (\$10,000) and the Horizon Foundation (\$8,000), for a total budget of \$53,000.
- **Expenses:** Most of the project budget will cover salary, benefits and overhead for TU's Maine Brook Trout Project Director, Jeff Reardon, and allow him to spend 60% of his time on this project in 2017. An estimated \$1,000 will be allocated to cover mileage and printing costs for outreach materials. Temperature data loggers have been donated by the US Fish and Wildlife Service.



Frost Gully Brook (red), Mill Stream (yellow) and Mere Brook (pink). Black fish show locations volunteer anglers have caught wild brook trout; Red flags are proposed temperature monitoring stations.

Housatonic River Coldwater Tributary Restoration

Project Overview. A \$20,000 grant from the CCF will enable TU to plan and implement restoration projects on critical coldwater tributaries to the Housatonic River in Connecticut. The result of the project will be the completion of the final two large restoration projects on Salmon Creek, the planning and design work needed to leverage federal funds for reconnecting/restoring Macedonia Brook, and planning for restoration of a thermal refuge at the mouth of Mill Brook.

Project Description. The Housatonic River flows for 149 miles from its headwaters in northwestern Massachusetts through western Connecticut to Long Island Sound. Its popular trout fishery is limited by warm water temperatures in the summer months. Fortunately, the Housatonic has significant spring-fed tributaries that provide thermal refuge and support healthy resident trout fisheries. This project is designed to strengthen the most critical coldwater tributaries to the Housatonic through barrier removal and stream restoration. The project presents a rare opportunity in the East to restore a large river trout fishery with a network of interconnected coldwater tributaries. Warm summer temperatures will always be a limiting factor on the Housatonic, but by maximizing the influence of its coldwater tributaries we can restore the fishery to its full potential.

TU began work in the Housatonic watershed in 2012 when we received funding for the Salmon Creek Restoration Project as part of the Natural Resource Damages assessed to General Electric for the release of PCBs into the Housatonic River Basin. TU hopes to continue to work on Salmon Creek despite the ending of the initial grant, and our presence in the area has led to identification of two other important projects that need both attention and funding to advance towards completion.

Salmon Creek Restoration Project – Salisbury, CT

Salmon Creek flows into the Housatonic above the CT Department of Environment and Energy Protection (CT DEEP) Wild Trout Management Area (WTMA). The goal of the project is to address tributary degradation with the installation of large wood to help stabilize eroding banks, reconnect the floodplain, and provide exceptional trout habitat throughout the mainstem. During the initial assessment 24 potential restoration sites were identified, and to date TU has successfully completed 7 large wood installations. (The brown trout



shown on page two was electro-fished from one of our restoration sites.) Two more projects are planned for 2017. With CCF funding we can complete the last two major restoration sites in 2018. The remaining 13 sites are much smaller, requiring only a couple pieces of wood each. TU has lined up \$115,000 in Natural Resources Conservation Service (NRCS) funds, which will cover the material and contractor costs for the 2018 restoration implementation, but not TU staff time to manage and oversee the project. CCF funding is needed for Tracy Brown to complete the planning and oversight of 2018 restoration projects, and to plan and fundraise for the remaining 13 small projects.

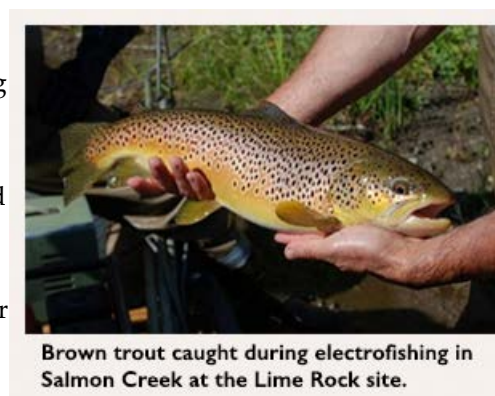
Mill Brook Thermal Refuge Enhancement Project – West Cornwall, CT

Mill Brook flows into the Housatonic River in West Cornwall, CT. Cold water from the brook accumulates at the edge of the river, providing a refuge for fish that may otherwise be unable to survive the warm water temperatures in the main river. However, this area is currently relatively shallow, and the dimensions and depth of the pocket of cool water that accumulates are less than ideal for holding large numbers of trout through the summer. TU and our partners propose to restore and enhance the thermal refuge at the Mill Brook confluence. Our goal is to increase the size and depth of the cold refuge pool by slightly altering the existing channel alignment of Mill Brook as it enters the Housatonic River, by diverting warm river water around the refuge pool with a new barrier of large boulders on the upstream side, and by increasing the dimensions and depth of the pocket where cold water accumulates at the confluence. TU currently has \$11,000 of the \$65,000 needed for this project. In 2018, Tracy Brown will work with partners to raise the remaining \$54,000.

Macedonia Brook Dam Removal and Restoration Project – Kent, CT

Macedonia Brook enters the Housatonic River across the river from Kent, CT. Macedonia Brook has an extensive network of first order streams (13 miles) that flow from the forested headwaters of Macedonia State Park. The lower section of Macedonia is managed by CT DEEP as a WMTA and flows along the western border of the Kent School athletic fields. 500 feet from the confluence with the Housatonic there is a small concrete dam that is a barrier for trout during low flow. The dam is under the Kent School maintenance bridge. There is potential for an extensive NRCS-funded restoration project that would address historic farming impacts to the stream upstream of the Kent School, as well as working with the School to maintain a wider buffer along the athletic fields. The removal of the dam would connect important tributary habitat for migrating Housatonic trout. In order to begin fundraising for the Macedonia Brook restoration project, we need to conduct outreach to landowners and complete the planning, survey, and conceptual design. Once those steps are completed, we will apply to the NRCS and other funders for project implementation.

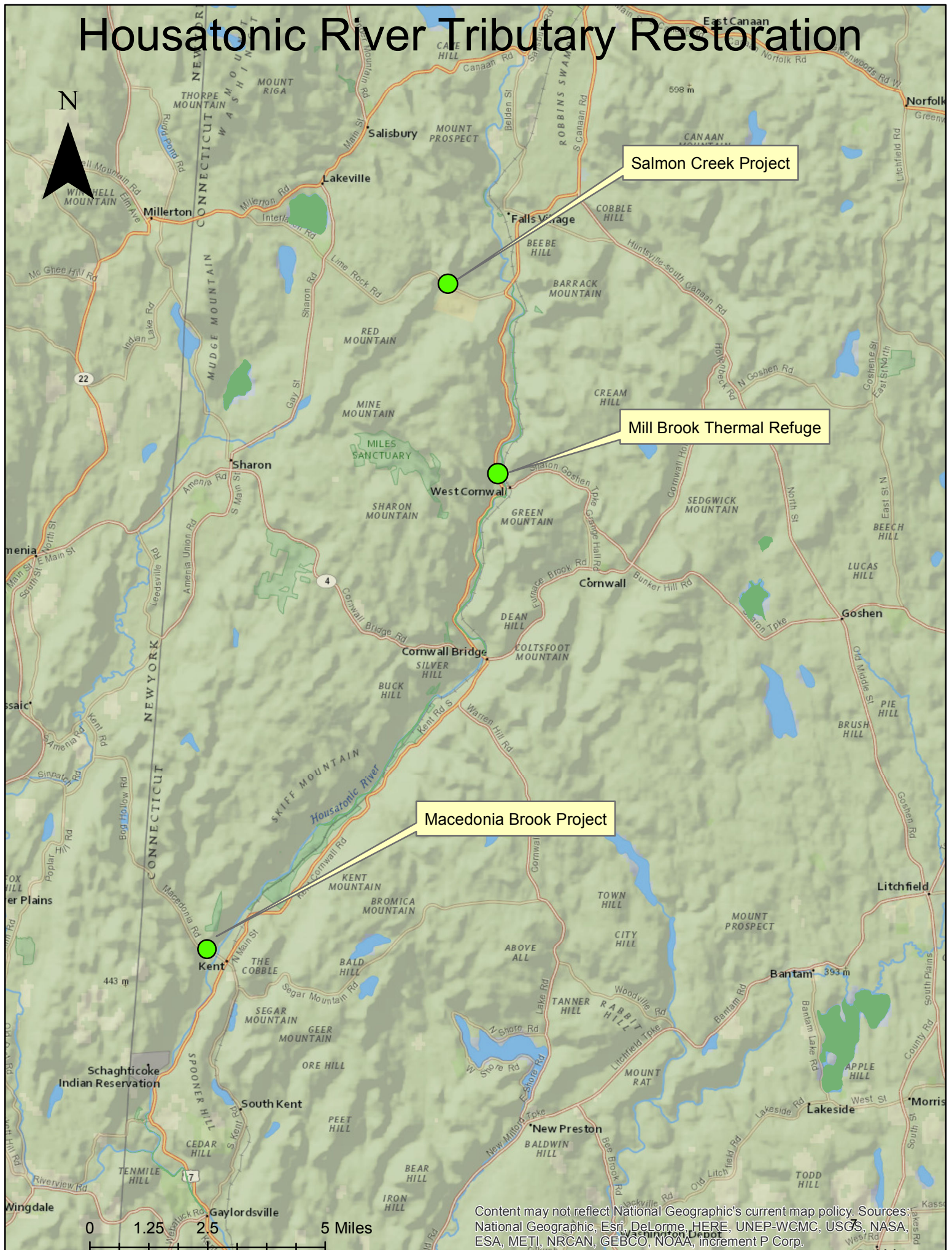
Statement of need for CCF funding. The initial General Electric funding that has supported TU's work in the Housatonic for the past several years has been exhausted. We have built up momentum for Housatonic restoration through the Salmon Creek project, but new funding is needed to continue our work. \$20,000 from the CCF will enable us to leverage \$115,000 in NRCS funds to complete the next round of Salmon Creek projects, while developing the plans and designs we need to restore other critical coldwater tributaries to the Housatonic.



Budget

Task Description	CCF Request
Task 1: Salmon Creek Restoration Project Planning and Construction	\$ 7,000
NRCS will provide \$115,000 for project implementation	
Task 2: Mill Brook Thermal Refuge Project Planning	\$ 4,000
Task 3: Macedonia Brook Project Outreach, Planning, Survey and Conceptual Design Development	\$ 9,000
Total	\$ 20,000

Housatonic River Tributary Restoration



Reintroduction of Native New Jersey Brook Trout in the Delaware River Watershed

A \$20,000 grant from the CCF would enable TU to restore 2.5 miles of habitat and reintroduce native brook trout to 8.5 miles of historic habitat in three watersheds. It will be the first ever reintroduction of native brook trout in the state of New Jersey.

Project description. Northwest New Jersey has lost many of its brook trout populations due to habitat degradation caused by agriculture, dams, and residential development, as well as competition from non-native species. At present there are 57 “patches” of occupied brook trout habitat in New Jersey’s portion of the Delaware River basin. Thanks to open space protection, dam removals, and improvements in agricultural practices in the New Jersey Highlands, some of the area’s streams are rebounding. TU, working with the New Jersey Department of Environmental Protection (NJ DEP), has identified streams that currently lack brook trout, but have the right water temperature and chemistry to support them once the habitat is improved. We have prioritized three tributaries to the Paulins Kill, Pequest River, and Musconetcong River for restoration and brook trout reintroduction. In these three watersheds we will complete the following:



A native NJ brook trout sampled by NJ DEP.

- 1) Restore a section of West Portal Brook that has been degraded by past agriculture. This section of river connects the quintessential step-pool headwaters with the rolling pocket-water of the middle river. TU will perform riparian and in-stream restoration on the degraded stream reach. The project site will double as a public display of restoration as it is located on a property frequented by the community and local schools.
- 2) Conduct site-specific habitat enhancements on tributaries to the Paulins Kill and Pequest to increase instream habitat, stabilize streambanks, and reconnect the floodplain.
- 3) Reintroduce brook trout to three tributary streams using heritage-strain native brook trout from nearby streams.
- 4) Establish a monitoring program with NJ DEP for brook trout populations, water temperature, and water quality. Our monitoring tools include pilot testing of a continuous Stroud Water Research [Sensor Station](#) that transmits live-feed water data to TU. The monitoring program will provide TU and the NJ DEP with detailed information that will help guide future reintroduction efforts.

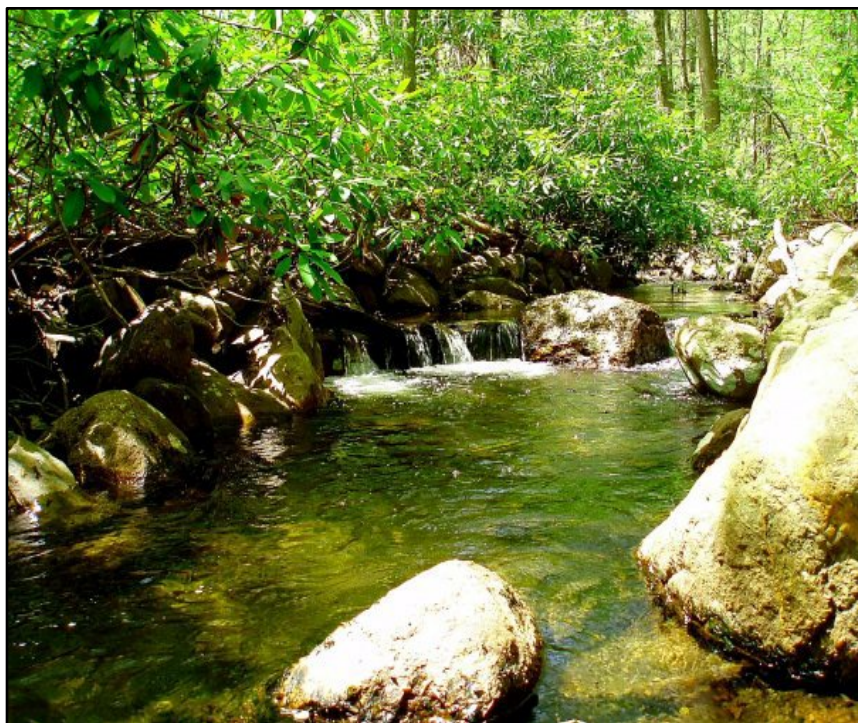
Brook trout reintroduction has never been done in the State of New Jersey, and TU and NJ DEP hope to use the success of this project as a springboard to expand reintroductions in the state. Brook trout

reintroductions support TU's Portfolio approach to brook trout conservation, specifically by increasing redundancy—the presence of multiple populations within each sub-region. In the entire Delaware Basin there are 487 brook trout populations, only 57 of which are in New Jersey. The immediate result of the project will be to begin expanding the number of occupied brook trout patches in New Jersey from 57 to 60. With TU's ongoing New Jersey Upper Delaware River Home Rivers Initiative and the continued support of the NJ DEP, the potential exists for more brook trout reintroductions in the future.

The project will also provide a boost to fishing. As TU continues its restoration work on the mainstem Musconetcong River and reestablishes small-stream brook trout populations, we will increase the angling opportunities within 75 miles of the New York City metro area.

Statement of need for CCF funding. The NJ DEP is prepared to reintroduce native brook trout for the first time, but will only do so when the habitat has been improved to the point where we are fully confident that the reintroductions will take hold. Funding from the CCF will enable us to complete 2.5 miles of restoration work early in the 2018 field season so that we can move quickly toward this first set of reintroductions, prove their effectiveness through monitoring, and begin expanding to other extirpated brook trout streams in the area.

Budget. The project will be led by TU staffer Cole Baldino in partnership with the NJ DEP. CCF funding would be used to pay for the time and materials needed to complete 2.5 miles of habitat restoration, and for Cole's time coordinating the reintroduction and monitoring work. The NJ DEP will contribute time to the project as an in-kind contribution.



West Portal Brook, awaiting brook trout

Task Description	CCF Request
Materials and labor for 2.5 miles of restoration	\$12,500
TU staff oversight of 2.5 miles of restoration	\$5,000
TU staff time to lead monitoring program and coordinate with NJ DEP on reintroductions	\$2,500
Brook Trout Reintroductions (<i>in-kind contribution from NJ DEP</i>)	\$0
Total	\$20,000

Engaging Anglers in Water Quality Monitoring

Project Overview. Clean water is critical to healthy populations of trout and salmon. However, numerous human activities have already impacted the water quality of cold-water streams and rivers, and future development could jeopardize healthy populations of trout and salmon residing in streams with intact water quality. This project would help angler scientists monitor water quality in two ways. It would 1) initiate the installation of a network of remote water quality monitoring stations on select rivers across the country, and 2) develop a water quality monitoring mobile application that allows anglers to submerge a 'dip & read' strip of paper in the water, take a picture of it with their phone, and get near real-time feedback on water quality issues at that location. Arming anglers with easily accessible tools to monitor water quality would help them track their home rivers harboring important fisheries, identify problem areas that could be the focus of restoration, and engage local agencies to protect valuable water resources.

Project Description. This proposal includes development of two distinct but complementary projects. The first project would initiate the installation of a network of real-time, streamside water quality monitoring stations on select cold-water fisheries. Cheap and

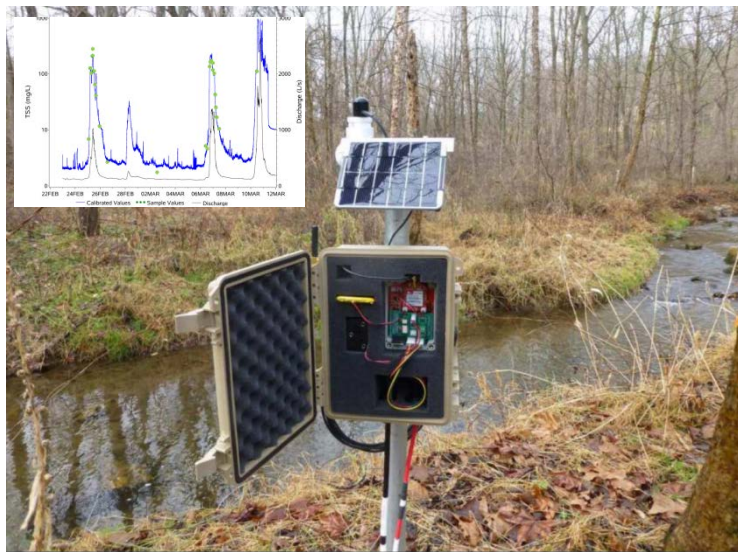


Figure 1. Streamside water quality monitoring stations.

accessible equipment and technology is now available to allow anglers to monitor their home rivers at low cost with a permanent water quality monitoring station. EnviroDIY is a nonprofit initiative of the Stroud Water Research Center that has developed low-cost water quality stations that monitor water level, temperature, conductivity, and other important water quality parameters using a platform that delivers data to the cellular network. This data can then be viewed via the internet in real time. This will allow Trout Unlimited chapters to continuously monitor water quality on their home rivers. Deployment of multiple sensors across the country will initiate a network of real-time water quality monitoring stations similar to the Weather Underground or USGS's streamflow gaging station network. TU Science will work with TU Volunteer Operations staff to identify chapters with needs for real-time water quality monitoring, and then provide technical support on installation, development of a web-based data platform, and assist with data management.

The second part of this project will develop simple smartphone-based water quality testing technology that provides immediate feedback to anglers. Originating from the swimming pool industry, this technology uses a 'dip & read' strip of paper that is dipped into the water. Reagents on the strip developed for specific water quality parameters change color, and, using a smartphone, a photo of the strip is taken against a calibration card. By comparing the colors on the strip with those on the calibration

card, a smartphone app can then determine water quality values. The data is then uploaded into a database that gives near instantaneous feedback on water quality at that location (using the phone's GPS). As the mobile app has a database in the background, it is coupled with a web-mapping platform so that the user – TU's angler scientists – understand water quality both in their current location as well as how that data point fits into the bigger picture of water quality in their watershed. TU chapters can also work with guides and fly shops to distribute the dip strips, which are cheap, for wide monitoring application that is truly crowd-sourced.

CCF Impact. Coldwater Conservation Fund monies would help get these two water quality pilot projects off the ground. A majority of the funds would go towards purchasing the necessary hardware to build the remote water quality stations. Since they are a DIY solution, some of the funds would go towards staff time to assist chapters with equipment set-up, equipment installation, and development of a data viewing platform and data management. Another portion of funds would go to a contractor, Centered Consulting International, LLC, to develop the 'dip & read' water quality monitoring application. This consultant works with the dip strip industry to develop strips that are custom made for specific applications, and TU Science will work with the contractor on identifying a suite of water quality parameters for development that are most relevant to angler scientists in particular locations. Another portion of the contractor funds will go towards development of the database and mobile application. Centered Consulting International has developed custom applications for other projects, including the testing of drinking water in India where dip and read strips are used in households to provide near real-time feedback to determine whether a household's drinking water is safe. TU Science sees these two complementary water quality monitoring applications as having high potential. They complement each other because one collects temporally continuous data at a few locations, whereas the other collects a snapshot of water quality at many different locations. The CCF funds will help get these pilot projects off the ground.

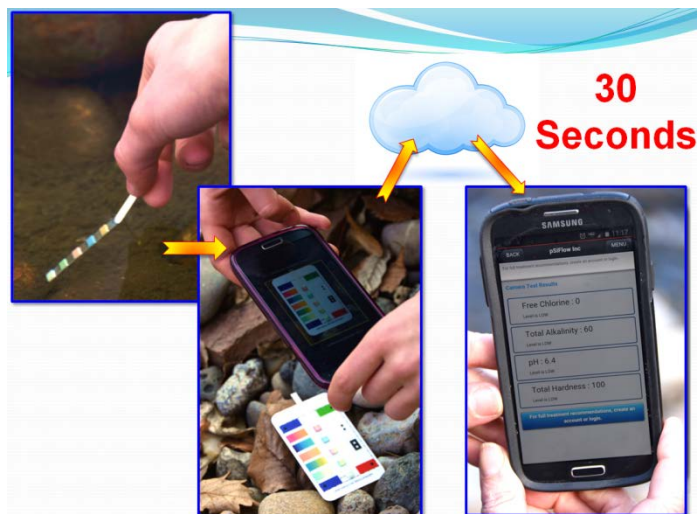


Figure 2. Dip and read water quality testing system coupled with a cloud-based mobile application for near real-time feedback.

Budget: \$30,000

\$15,000: Purchase of seven remote water quality monitors

\$10,000: TU staff support for technological assistance, data tracking, and outreach

\$ 5,000: Sub-contract to Centered Consulting International for water-quality strip and application development

Brook Trout Portfolio Southern Appalachian Focal Area Assessment & Visualization Tools

Project Overview. TU recently completed a map-based assessment of all known brook trout populations within their eastern US range, which was funded by a grant from the National Fish and Wildlife Foundation (NFWF). One portion of that analysis was the development of separate, “deep dive” assessments within a small set of geographies and production of web-based visualization tools for delivering the results as decision support tools to TU staff and other decision makers on the ground. We are requesting CCF funds to support an application of the focal area assessment methods to a new geography, the Southern Appalachian Mountains of NC, TN, SC, and GA.

Project Description. TU’s Science Program and Eastern Conservation staff developed three map-based planning products to help identify strategic conservation opportunities and evaluate potential projects within the eastern US range of brook trout. The assessments function as the next generation of TU’s Conservation Success Index approach. The Conservation Portfolio uses the 3-R framework (Representation, Resiliency, and Redundancy) to evaluate each brook trout population patch for its resiliency to disturbances, likelihood of demographic persistence, and representation of genetic, life history, and geographic diversity. The range-wide habitat integrity and future security assessment uses broad-scale map information to characterize the general habitat condition and vulnerability of brook trout patches based on factors such as land use and modeled stream temperature. The focal area analyses add regional data sources to provide additional resolution on unique habitat condition and threats within specific geographies – the Chesapeake, Susquehanna, Delaware, and Connecticut River basins. Taken together, the three products allow us to characterize the continuum of viability, habitat condition, and vulnerability of brook trout populations and the corresponding conservation strategies they likely require.

In 2016, the CCF funded the development of a [Brook Trout Atlas](http://www.tu.org/brook-trout-atlas) (www.tu.org/brook-trout-atlas), a reference tool for presenting the Conservation Portfolio and range-wide habitat integrity and future security results to general audiences for exploring the pattern of brook trout resources in the East. Within the focal areas, we developed separate map-based data visualization tools using Tableau software. The visualization tools present interactive filters and criteria linked to a map and corresponding to Portfolio, range-wide assessment, and unique focal area attributes related to a common suite of restoration activities. For example, the Delaware basin riparian restoration visualization includes filters related to stream side vegetation cover, current stream temperature, regional brook trout abundance models, and Portfolio attributes. Another Delaware basin visualization tool presents filters related to abandoned mine lands and associated water quality impairments. Within the tools, users can perform a customized analysis to identify their brook trout populations of interest. Figure 1 shows how the tool can help identify suitable brook trout populations for further investigation for potential riparian planting or similar projects by highlighting those populations with moderate amounts of stream-side vegetation impairment and regionally cold temperatures.

We propose developing a similar focal area tool for the Southern Appalachians, with a particular emphasis on regional conservation issues such as warming stream temperatures and habitat connectivity as affected by culverts and other fish passage barriers. Southern Appalachian brook trout are a major conservation priority for TU. Over the past few years we have reconnected more than 15 miles of habitat to improve the resiliency of brook trout populations. Since much of the prime brook trout habitat in the Southeast is found on National

Forests, TU has developed a strong partnership with the US Forest Service focused on brook trout conservation. Not only will the focal area analysis help TU identify and pursue the most impactful brook trout projects, it will also help TU and the US Forest Service collaborate on a regional strategy for brook trout conservation.

CCF Impact. The primary focus of TU's work in the Southern Appalachians is identifying and restoring fish passage barriers on U.S. Forest Service lands. This CCF funding request would enable us to build a tool to identify potential projects and facilitate the development of common priority criteria with the US Forest Service for evaluating fish passage projects. The tool will also serve as a resource for identifying new projects with other conservation emphases, such as stream temperature monitoring. While previous efforts did not provide support for us to complete a focal area analysis for the Southeast, this CCF funding would leverage prior investments that TU and NFWF have made in brook trout map tools and data development. Additionally, the Wildlife Conservation Society's Climate Adaptation Fund has pledged to support outreach for the tool.

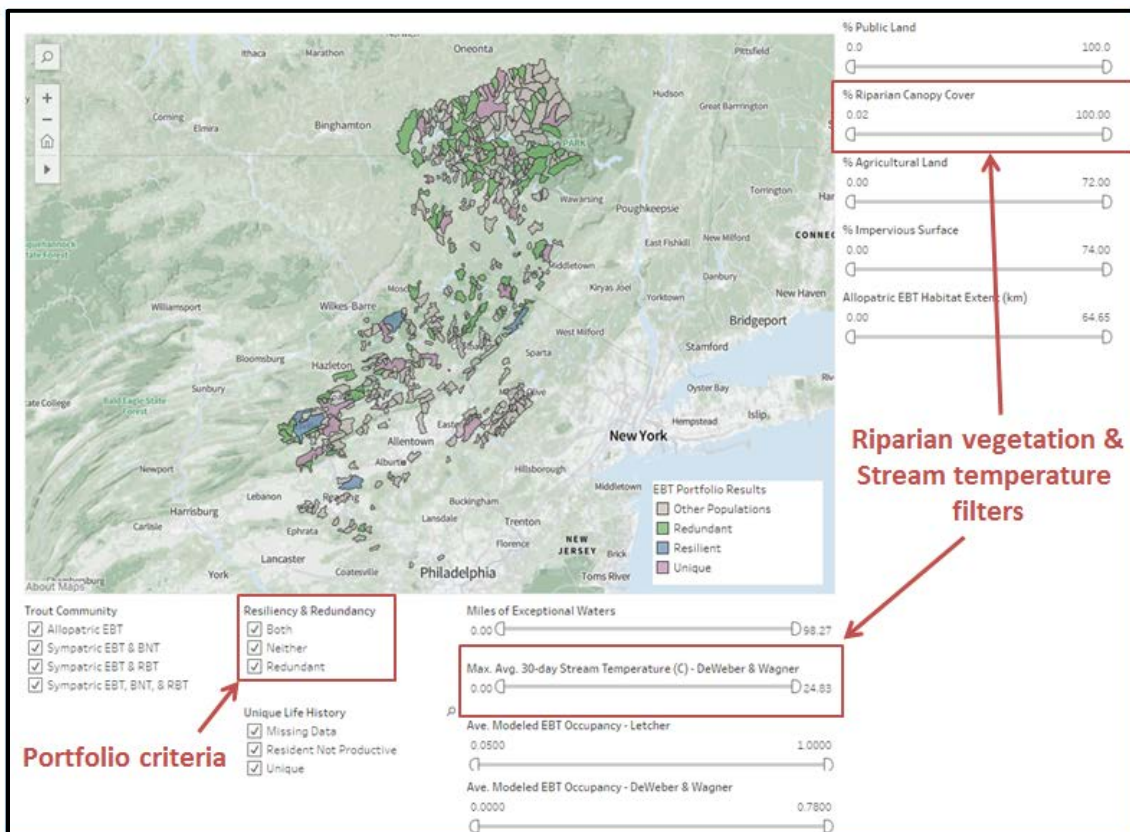


Figure 1. Example focal area visualization tool for the Delaware basin, showing key criteria and filters for identifying priority brook trout populations for riparian restoration.

Budget: \$15,000

\$15,000: TU staff support for data gathering, data summary, and tool development

Innovative Monitoring Technologies

Project Overview. As Trout Unlimited works to restore trout, salmon, and their habitats, one important component of that work is to monitor results: making detailed measurements of our on-the-ground successes so that we can understand what works and track changes over time. New cutting-edge tools are now available that can enable us to be more efficient in the way we monitor – covering more space in less time – and that allow us to gather visually compelling information can promote TU’s work to new and larger audiences. The CCF funding requested here will allow us to explore two new monitoring tools: drone-based aerial photography and ground-based 360-degree photography.

Project Description. Until recently, acquiring high-resolution aerial photography of a project site required a full size aircraft and a professional pilot. Today’s Unmanned Aerial Vehicles (UAVs, or “drones”), equipped with miniature cameras, can accomplish similar missions far more cheaply, with much higher-resolution and lower safety risks. UAVs typically carry on-board GPS and can navigate autonomously or can be piloted remotely via radio control.

A limited number of TU staff are already using small drones for project monitoring, primarily as a means to collect photo stills or video of project activities for outreach (Figure 1). This proposal will leverage skills within our science staff - including GIS, remote sensing analysis, software development, microelectronics design, and remote-controlled aircraft operation, design, and construction - to evaluate the potential for additional drone-based monitoring applications. Future

capabilities include vegetation monitoring using near infrared cameras, 3D mapping with oblique imagery, stream temperature monitoring with thermal infrared, and data retrieval using radio telemetry (to download data from ground-based water quality or temperature-monitoring stations).



Figure 1. Examples of UAV footage of a TU instream habitat restoration project on Sheep Creek, ID. The Before/After footage was blended as a video which swipes between the time periods.

360° cameras are a new tool which can expand the classic “photo point” monitoring technique by collecting geo-located, omni-directional photographs. Not only can the information serve as a resource for documenting changes, but the photos can also be uploaded to Google Earth and Google Maps as immersive Google Street View experiences. We believe showcasing restoration projects in a Google Street View context, especially with the embedded time component, potentially introduces new audiences to TU’s work.

In sum, CCF funding would allow us to: 1) acquire a professional-grade drone, capable of longer flights and a wider variety of missions, and a 360° camera; 2) evaluate the ability of the tools to support our science mission, using ongoing restoration projects in Idaho as test sites, and 3) develop training materials for the systems that, when packaged with existing science expertise, allow the UAV and 360° cameras to become a resource that can be used across TU programs nationally.

CCF Impact. It is critical for TU to quantify the results of its on-the-ground conservation work. Collecting pre- and post-restoration monitoring data builds a body of knowledge that informs our science-based approach to conservation, while helping us

understand which practices and techniques have been the most impactful, lasting, and cost-effective. CCF funding will allow us to evaluate and apply two new monitoring tools to improve the efficiency of our monitoring efforts and develop compelling visual products which convey the impacts of TU's work.

Budget: \$25,000

\$12,000: UAV, control hardware, and cameral with mount

\$12,000: TU staff time and travel

\$ 1,000: UAV flight-planning and post-processing software

\$ 400: 360-degree camera

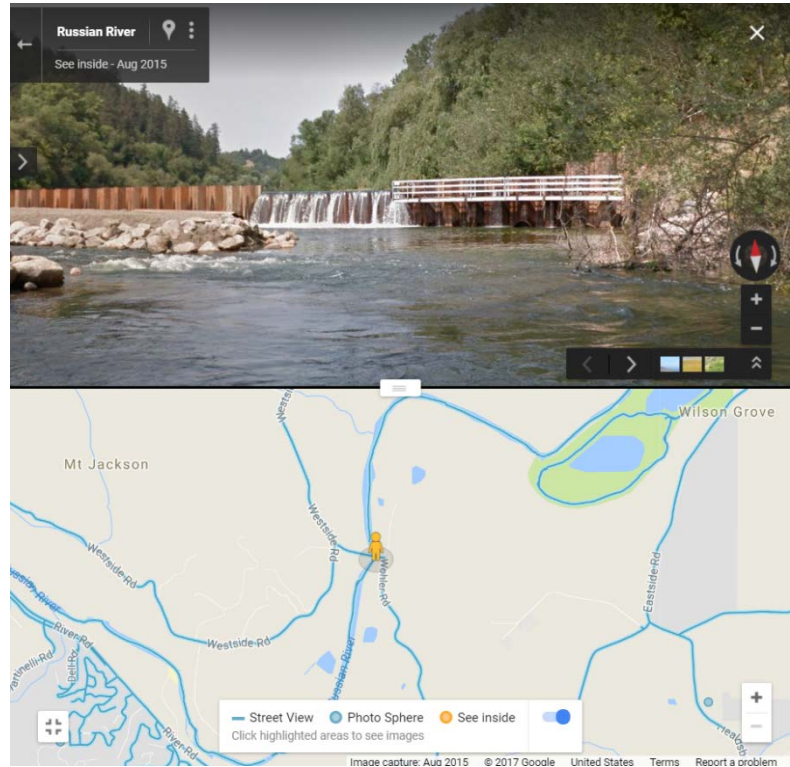


Figure 2. 360° view of Russian River, CA, dam, visible in Google Street View

California North Coast Coho and Steelhead

Project Overview. The Coldwater Conservation Fund launched the North Coast Coho Project in the 1990s as TU's first significant investment of staff resources in California. Since then, it has grown into the state's most successful coastal steelhead and coho salmon restoration program, routinely securing the largest share of the state's coastal fisheries grants. Now, CCF has an opportunity to help the program expand to take advantage of new state of California funding opportunities by providing another infusion of seed money in the sum of \$15,000.

Project Description. Steve Trafton launched the North Coast Coho Project when he was the first and only TU staff person in California. Named for the species that receives the most targeted funding from government agencies, it is also the state's largest coastal steelhead habitat program.

The project's location is California's Lost Coast. These fabled rivers formed the heart of what Russell Chatham called the "Angler's Coast," the birthplace of fly fishing for steelhead, but fisheries collapsed in the late 20th Century after decades of irresponsible clear-cutting and overfishing. Today, however, the Lost Coast is recovering and its rivers are in better shape than they were 20 years ago. These redwood forests and rivers are healing, and the hard work of TU and our partners is a major reason why.

Our first partner was the Mendocino Redwood Company, then a newly formed timber corporation promising to develop a sustainable business model. With the "timber wars" in full swing, it was a novel concept. But it succeeded and the MRC owners later purchased the bankrupt Pacific Lumber company to create another partner, the Humboldt Redwood Company. Meanwhile, TU established partnerships with other timber companies and other landowners. Since most of the Lost Coast is privately owned by these large operations, TU has been able to work in the most important salmon and steelhead habitat in Coastal California.

For 20 years, TU has been decommissioning old roads, stopping sediment pollution, removing dams and culverts, and adding large wood to create habitat complexity and jump-start the rivers' natural capacity to form the deep pools needed by fish. In recent years we are averaging about 10 large habitat restoration projects completed each year, for a combined total of \$1-2 million dollars. With MRC and HRC alone, we have treated close to 200 miles of forest road, remediated 1,269 sediment sources and 928 stream crossings, and kept an estimated 37,560 dump trucks' worth of dirt out of the rivers.

Our primary focus area for this proposal ranges from the Eel River, which is already developing a reputation as revived fishing destination, through the Navarro, Garcia, and Gualala rivers to the south. In between are hidden gems such as the Ten Mile, Big, and Noyo rivers that are almost completely owned by private timber companies; they are hard to access and therefore off the radar for anglers but important reserves for steelhead and coho.

Since the Lost Coast is almost entirely free of large dams, hatcheries, and big cities, it represents one of the best restoration opportunities on the West Coast. There is no reason fishing in Northern California can't be fully restored to its former glory.

Need for CCF Funding. Although federal funding is uncertain, California state funding remains strong and seems likely to grow. For instance, the state recently passed a \$7.2 billion water and habitat bond, and TU is working with partners on another wildlife and parks bond for the 2018 ballot. With support from our partners in the timber industry, the state also created a “timber tax” to fund habitat restoration and responsible timber management. Finally, TU and our partners succeeded in getting two separate revenue streams for fisheries restoration into the state’s new scheme to legalize and tax marijuana.



With CCF support, TU can complete complex and high-visibility projects like remediating sediment sources and river crossings for the “Skunk Train” – a 33 mile lumber railway now operating as a tourist attraction

To take advantage of these public funds, a small amount of private funding is needed. Although public habitat funding is able to support the majority of our staff’s time, it cannot pay for all of the time we spend identifying projects, cultivating partners, and preparing grant applications. Moreover, public grant programs are becoming more complex and require more administrative support to manage.

For these reasons, private philanthropy is required. But not much. For every dollar we receive in private funding, TU is able to leverage at least 10 dollars in public grants. When CCF launched the program, Mr. Trafton predicted that CCF seed money would not be needed for very long because it would leverage a huge investment of state and federal fisheries funding. The program succeeded beyond expectations.

Budget. The program is run by Anna Halligan and a second project manager Elizabeth Mackey. They are close to having funding for a third staff person, which means they also have more work than should be managed by two people. This proposal to CCF – the first request to CCF in close to 20 years – will enable TU to add a third person. Specifically, we intend to hire or contract with someone to help with grant management, invoices and contracts with funders and sub-contractors, and other administrative tasks. This will free up time for Ms. Halligan and Ms. Mackey to cultivate partners, develop projects, write grants for funding to carry them out, and promote TU’s successes to our members and supporters. If we cannot secure this support, other groups will step into the void. The opportunity is there – if we can take advantage of it.¹

Grant Administrator Staff Position	Expenses
Salary and Benefits	\$ 56,628
Supplies, mtg. expenses, local office costs, etc.	\$ 5,000
Travel	\$ 4,200
TU Indirect Expenses (16.12%)	\$ 10,611
Total	\$ 76,439
<i>CCF Request</i>	<i>\$ 15,000</i>

¹ For all its successes, TU’s work on coastal steelhead is not very well known. Other groups do less work but more publicity, creating films about places like the Eel River while TU is busy restoring it. This is partly because TU is lean and prides itself on getting work done, but it is also because we do not have very much private funding and government grants are not suited to publicity.

Chinook Salmon Conservation Initiative

Chinook salmon runs throughout Alaska have been in alarming decline in recent years. Although individual rivers may on occasion experience above-average returns, the overall trend has been decreasing abundance and lower average fish size. In Alaska's famous Kenai River, where a 97-pound, 4-ounce Chinook set the world record in 1985 and anglers regularly landed fish in excess of 70 pounds, a typical fish now weighs around 35 pounds. Western Alaska's Nushagak River, which has historically returned upwards of 200,000 Chinook per year, returned 56,000 fish this year. The Alaska Department of Fish and Game (ADFG) preemptively closed sport fishing for Chinook salmon near Juneau this spring when returns to the Taku River were projected to fall below the river's minimum escapement goals of 19,000 fish for a second year. After relaxing fishing regulations at the start of 2017 in upper Cook Inlet due to abundant "jack" Chinook salmon the past two years ("jacks" are small male salmon that return to spawn after just one year in salt water and typically indicate strong future runs), the ADFG had to close the area mid-season when strong runs failed to materialize.

These high-profile examples have unfortunately become the norm for many rivers throughout the state. A recent poll showed that the proposed Pebble mine and declining Chinook salmon runs were the two issues of greatest concern to TU members in Alaska. While concern over reduced runs has spread amongst anglers, state regulators remain slow to react. The ADFG convened a symposium in 2012 to identify and discuss key knowledge gaps and develop a research plan with recommended studies to address those gaps. Phase one of the research plan was funded by the Alaska Legislature in 2013, but more recent state budget shortfalls limit available funding and many questions remain about how to address recent Chinook declines.

While various factors contribute to declining runs (including but not limited to poor ocean survival during the first months of life at sea; ocean by-catch; increased pressure from sport, subsistence and personal-use fisheries; and habitat degradation) and significant information gaps remain, we also know we cannot sit idle and allow our incomplete understanding of the complex issues affecting Chinook salmon to be an excuse for inaction.

Project Description. Recognizing the severity of the issue and the great importance of Chinook salmon to the public and TU members, we are launching an initiative to implement proactive actions that ensure runs don't continue to decline further. The Chinook Conservation Initiative will raise public awareness about the Chinook salmon declines, educate anglers based on best available scientific data about what they can do to help and ultimately establish the building blocks for working with conservation-minded anglers and business partners to urge implementation of management actions aimed at curbing recent population trends. As we build our full Chinook salmon conservation plan in Alaska, we are undertaking three initial projects that will lay the groundwork upcoming strategies:

1. This fall, timed to occur around the annual meeting of the Alaska Board of Fisheries, we will be hosting a workshop featuring research scientists, fisheries managers, and sportsmen with a strong historical and conservation perspective. This event will build on the ADFG's 2012 symposium by identifying specific actions that can be undertaken to conserve Chinook fisheries even within our limited understanding of the causes. Because of the timing of our workshop in relation to the Board of Fisheries meeting, this event will help set a strong conservation tone for the Board proceedings and the decisions it makes for future management.
2. After the symposium, we will produce and distribute a series of education materials (blogs, mini

videos, angler education cards, etc...) focusing on the importance of Chinook salmon, their concerning population trends and outlining specific steps anglers can take to help promote conservation of this keystone species.

3. Initiate and highlight a pilot program that forms partnerships between conservation-minded fishing lodges and nearby, small-scale commercial fishermen that highlight positive ways anglers can still take home salmon and help Chinook salmon. The program centers on an option for lodge clients who choose to release sport-caught Chinook salmon are able to take home a box of abundant, commercially-caught sockeye salmon. We will highlight the initial partnership between the Wilderness Place Lodge and the Su Salmon Company, and plan to expand to other lodges and guides in the future.

Ultimately these initial tactics will build a good base from which to organize anglers, outfitters and guides to become strong advocates for more conservative management of sport fisheries that focuses on the long-term viability of Alaska's Chinook fisheries.

Statement of Need & Budget. The Chinook Conservation Initiative is being developed in direct response to serious concerns about population declines. Support from the CCF would allow us to launch this new program in Alaska by implementing initial base-building tactics, supporting staff, and giving us time to secure longer-term funding. Specifically \$10,000 from the CCF would support the following activities that do not currently have alternative funding sources:

- **Chinook Salmon Workshop expenses** including: limited travel expenses for speakers at the fall workshop; promoting the workshop to help encourage participation by members of the Board of Fisheries and other interested stakeholders; and publishing a set of recommendations for fisheries managers. (\$2,500)
- **Public educational materials** including: producing, publishing and disseminating the findings of the workshop including educational materials for angler including steps individuals can take to help promote sound management and conservation of vulnerable Chinook runs. (\$1,500)
- **Lodge materials for lodge/commercial fishing business partnership** including: Producing, publishing and disseminating materials to promote the lodge-commercial fishing partnership and to recruit expanded participation. (\$2,000)
- **Staff time and travel expenses** for organizing outfitters and guides and meeting with fisheries managers; attending Board of Fisheries meetings; (staff time \$3,000; travel \$1,000)

Montana Smith River Campaign

Overview. The Sportsmen's Conservation Project of Trout Unlimited (TU) is currently involved in a campaign to stop a proposed copper mine at the headwaters of Montana's famed Smith River. The Smith River is the only river in Montana where public access for boating and camping is allotted through a permit lottery system, making it an extremely popular and unique outdoor experience. In 2017, a record breaking 10,077 people applied for one of the coveted permits to float the stunning 60-mile stretch of Smith River. The massive cliffs, rolling hills and Blue Ribbon trout fishing draw people from all 50 states and from other countries – boosting Montana's economy by more than \$7.5 million every year.

Tintina Resources, an inexperienced Canadian mine company, has proposed an underground copper mine, named the Black Butte Copper project, in the Sheep Creek drainage. Sandfire Resources, an Australian mine company, has also invested \$24 million into this project to help see it through the permitting process. If this mine is permitted and allowed to move forward, the company would dig an 18x18 foot audit directly beneath Sheep Creek and its surrounding streams. Sheep Creek is the primary source of clean, cold water to the Smith River and where the majority of the trout in the Smith spawn. Trout have been found to travel 200 miles, round trip from the Missouri River, to spawn in the Sheep Creek drainage. In order to operate, a massive amount of water will need to be pumped from the audit throughout the life of mine. In addition, the ore body is extremely high in sulfide content, which when exposed to air and water, turns into sulfuric acid creating acid mine drainage. Dewatering and permanent pollution of Sheep Creek and the Smith River-and the ultimate destruction of this Blue Ribbon trout fishery- are TU's primary concerns. For Montanans and visitors the world over, the battle to protect the Smith from lasting acid mine drainage is on the scale of the fight to protect Alaska's Bristol Bay from the proposed Pebble Mine. The Smith and its canyons are an ecological treasure unmatched in the Northern Rockies.

Strategy. Trout Unlimited is pursuing multiple strategies to stop this project. All of these strategies are supported by a concerted effort to educate, organize, and mobilize a diverse coalition of sportsmen and women, conservation groups, politicians, local businesses, outfitters and guides, local communities, landowners, and others. Building a strong ground game has been a priority for TU over the last three years. Through this coalition, TU is creating the political will necessary to delay and, ideally, stop the mine completely. Due to Montana's permissive mining laws, all options available for stopping the proposed mine will need to be pursued.

A current priority of the campaign is engagement in the mine permitting process led by the Montana Department of Environmental Quality (DEQ). To this end, a team of independent experts (e.g. geologists, hydrologist, etc.) have been hired to assist in reviewing Tintina's mine operating permit application. Trout Unlimited is working closely with Montana DEQ, Fish, Wildlife and Parks and the Smith River Advisory Council, as well as other state agencies and boards, to ensure this proposed mine is thoroughly vetted. To date, Montana DEQ has returned Tintina's mine application three times due to deficiencies.

A second strategy being employed is using the proposed mine to highlight the lack of adequate state policy and irresponsible mine management throughout Montana. As part of this strategy we have

introduced new state laws in the 2015 and 2017 Montana legislature aimed at giving Montana DEQ the authority to deny a permit for the proposed Black Butte Mine and be prepared to address future mining threats in the state.

A possible strategy to change Montana's permissive mining laws outside the legislature would be to run a ballot initiative. This has worked in the past. In 1998, Montanans voted 53% to 47% to support a citizen's initiative to phase out open pit, cyanide-leach mining in Montana. This initiative was upheld in court two years later. This strategy is currently being researched and a go/no-go decision is anticipated by fall of 2017.

Existing Funding. The 2017 budget for this campaign is \$157,960, with around \$85,000 of that going to salary, benefits and expenses of the Montana Field Coordinator in charge of the campaign. Considering that Tintina Resources has \$4 million in cash at their disposal, this is a classic David versus Goliath story. Our campaign is primarily funded through foundation grants. However, we are actively soliciting smaller donations through public events and Smith River donor trips.

Coldwater Conservation Funding. We are seeking \$10,000 from the Coldwater Conservation Fund (CCF). This money will help scale-up our efforts to stop this proposed mine in the coming year. Specifically, by fall of 2017 we expect the Montana DEQ to issue Tintina a draft permit. This will trigger the development of an Environmental Impact Statement. As part of this regulatory process, as well as introduction of state legislation in 2019 and a possible ballot initiative, building the army is critical. With generous funding from the CCF, TU would scale –up its efforts to build the Smith River Watch Coalition and to create a state-wide “buzz” around this issue. Specifically, these funds would be used to create paid ads in local and state newspapers and sporting publications, place radio ads and to complete a mailing to the 251,000 of Montana fishing license holders and the 10,000 Smith River permit applicants. Anglers and recreational floaters are two of the most effective and credible voices in this debate and we need to find creative ways to mobilize them at this critical juncture.

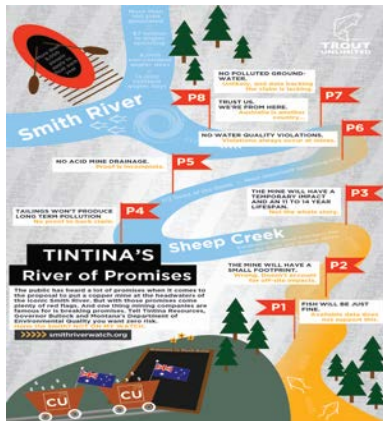
Visit Smithriverwatch.org for more information.



Smith River landowner sign



Active partnership with Upslope Brewery



Informational handout



Sticker produced by Rep Your Water

Wading into New Waters: Lower Snake River and Mid-Columbia Program Development

Background and Conservation Need. The Blue Mountain Ecoregion in NE Oregon and SW Washington provides habitat for numerous threatened and endangered trout and salmon, and Trout Unlimited (TU) is building a program focused on three of its critical basins – the John Day, Umatilla, and Upper Grande Ronde.

Each of these watersheds is a stronghold for resident and anadromous salmonids. Wild steelhead (threatened), spring Chinook (endangered), coho (threatened), bull trout (threatened), pacific lamprey, and redband trout inhabit these watersheds. These native fishes are struggling for survival due to a range of limiting factors that includes water diversions, passage barriers and levees, degraded habitat, degraded riparian areas, and non-native species competition.

TU's role as a national leader in cold water conservation, supported by a vast group of stewards and anglers, uniquely positions the organization to fill an important regional niche. Recently, TU capitalized on this opportunity by hiring a full-time project manager, who started on-the-ground work in April 2017, and refocusing existing policy staff to support this important work.

Developing Partnerships and Building Trust. At first, TU is focusing on project development in the Upper Grande Ronde and Umatilla, while exploring the John Day, Powder-Pine, and Middle Grande Ronde (Wallowa and Lostine).

After a thorough three-month stakeholder engagement and outreach process that reached 46 regional experts from over 20 organizations, it is clear there are many opportunities to engage in key restoration activities. In fact, the conservation and restoration community has been welcoming and supportive of the additional expertise and capacity TU brings to the region. **Support from the Cold Water Conservation Fund (CCF) will further our restoration project development and implementation during this critical start to the program, insuring a solid foundation long into the future.**

Budget and Funding Need. TU has secured seed funding for project scoping and development in the Upper Grande Ronde and Umatilla from the Bureau of Reclamation, National Fish and Wildlife Foundation, and Confederated Tribes of the Umatilla Reservation. However, these funding sources are specifically for work in the Upper Grande Ronde and Umatilla Basins and don't support project development in the John Day, Powder-Pine, and Middle Grande Ronde tributaries, or the related policy efforts, all of which are critical to the long-term success of TU's new program. For example, TU's new NE Oregon Project Manager, Levi Old, recently spent a day spreading the word about TU and teaching students about natural resources. This effort had a huge impact on the students and resulted in an opportunity to work with a partner on an instream flow project on a critical Tributary to the John Day. At the moment, TU does not have the funding to pursue this effort because it is outside of the Umatilla and Upper Grande Ronde focus area. CCF funds would not only support the pursuit of this type of project lead, it would also provide critical match to leverage further grant funds from regional funding entities.

To bolster our efforts we are asking for \$15,000 which will support:

- Salary/benefits for new NE Oregon Project Manager for program development, outreach, grant writing, and education activities outside of the Umatilla and Grande Ronde basins
- Travel and materials for landowner and partner training workshops
- Salary/benefits for our existing Senior Oregon Policy Advisor to lead TU's engagement in the Columbia and Snake River FERC and stakeholder negotiation processes.

Specific On-the-Ground Opportunity. TU seeks funding to support our participation in a conservation partnership effort that is developing a collaborative science-based geo-spatial prioritization process to identify projects across the John Day watershed. Once the geospatial tool is built, all of the partners will work together to divvy up projects and funding across the basin. By developing projects while this prioritization is occurring, TU will cement its commitment to the region and in turn, be more competitive for project funding once the prioritization is complete.

In addition, TU is anxious to pursue several restoration efforts. These include a flow project on a springfed steelhead rearing stream along the John Day that contributes cold-water refugia during hot summer months, and a partnership effort with the US Forest Service to replace two culverts that will open up several miles of spawning habitat. TU will also pursue an opportunity to partner on a large Regional Conservation Partnership Program grant from the Natural Resources Conservation Service. In the John Day Watershed, these promising project leads are simply the tip of the iceberg. The John Day has bountiful opportunity for important science-based restoration work. TU needs the seed funds to step up as a watershed leader. TU has similar leads in the Wallowa and Powder-Pine subbasins, where momentum is building, local support is strong, and significant restoration projects are within reach.

From a policy standpoint TU will advocate for a comprehensive and balanced water management solution for the Columbia watershed. Specific activities will include preparing comments on the Draft Environmental Impact Statement (DEIS) for Federal Columbia River Power System operations; and encouraging comprehensive review of stressors and solutions including dam operations, hatchery impacts, harvest impacts and habitat restoration. TU will also continue discussions with Hells Canyon Project stakeholders on a solution for ensuring the Project can meet applicable water quality standards on reasonable timescale.

Summary. Enhancing and protecting the most intact habitats and populations through flow restoration, habitat projects, and better policy will ensure a brighter future for native pacific northwest salmon, steelhead, redband trout, bull trout and pacific lamprey in Blue Mountain Ecoregion. It is essential that TU develops a strong and meaningful presence in this region well into the future. After only a few short months, TU is already demonstrating an ability to synthesize the best science and expert knowledge to choose and implement strategic projects with a measurable impact. As TU wades into new waters, the Bureau of Reclamation and National Fish and Wildlife Foundation funds are a start. CCF funds will help take TU's efforts to the next level and allow us to expand our regional footprint for generations to come.

The Sapphire Divide Fish Passage Project

Background and Conservation Need. Straddling the 85-mile-long massif called the Sapphire Range two of the most popular trout fisheries and recreation areas in Montana – Rock Creek and the Bitterroot River – flow northwards into the Clark Fork River. The Sapphire Range is about 50 miles across at its widest point, terminating with the East Fork of the Bitterroot River to the south and the fishing hub of Missoula to the north.

Although the Sapphires have ample roads and logged-over areas, they are also blessed with at least 320,000 roadless acres and 29,235 acres of designated wilderness – not to mention the 255,000-acre Selway-Bitterroot Wilderness on the west side of the Bitterroot River and the 158,000-acre Anaconda-Pintler Wilderness in the southern headwaters of Rock Creek; all creating the backbone for a robust native trout fishery.

The foothills and valley bottoms of these storied rivers include both recreational properties and traditional ranches focused on cattle and hay production. The private lands are surrounded by USFS, BLM and state lands with around 75% of the watersheds administered by the Beaverhead-Deerlodge, Bitterroot and Lolo National Forests. Agricultural practices including livestock grazing and irrigation diversion have contributed to degradation of westslope cutthroat, bull trout and wild trout habitat in Rock Creek and Bitterroot River by reducing stream flows, fragmenting migration corridors, entraining fish in irrigation ditches and increasing sedimentation. Management of Forest Service, county and private roads has also impacted habitat by increasing sediment inputs and blocking aquatic organism passage at undersized culvert locations.



Rock Creek tributary

While climate projections indicate that a continued warming trend in mainstem and lower tributary water temperatures could reduce native trout distribution in the future by nearly 50% of their current range, a recent climate vulnerability assessment by the Lolo National Forest identifies Rock Creek as a coldwater refuge with high prioritization for protection and restoration efforts. Likewise, the Upper Bitterroot River watershed, particularly tributary streams on the Bitterroot National Forest, remains the stronghold for native fish in the watershed.

Project Objectives. Based upon the recreation values and potential for native fish recovery and resilience, Trout Unlimited is partnering with private landowners, conservation districts, local watershed groups, Montana Fish Wildlife and Parks, the U.S. Forest Service, Bureau of Land Management, and U.S. Fish and Wildlife Service to increase project management capacity in Rock Creek and the Upper Bitterroot River, with the following objectives:

- Reconnect tributaries by removing fish passage barriers, installing fish screens and improving streamflows.

Western Conservation: The Sapphire Divide Fish Passage Project

- Increase coordination between Montana Trout Unlimited, TU staff and the Bitterroot and Westslope TU chapters by hiring a cooperatively-funded staff position and developing a collaborative project fundraising model.
- Restore riparian and instream habitat and improve water quality by protecting riparian areas, improving grazing management, planting native vegetation, and reducing sediment inputs.
- Improve streamflows through voluntary water rights transactions and irrigation efficiency improvements.

Current estimates indicate that more than 50 irrigation diversions in Rock Creek and 40 irrigation diversions on tributaries to the Upper Bitterroot River potentially impact migratory fish. This summer, TU Clark Fork River Project staff and field technicians are completing an assessment of irrigation diversion structures and culverts in these two watersheds and conducting a landowner outreach effort. With this data, TU will be developing a Watershed Restoration Plan for the Rock Creek drainage with the Montana Department of Environmental Quality, a fish passage prioritization plan for the Upper Bitterroot River with the Army Corps of Engineers, and a funding agreement for project implementation with the Montana Natural Resource Damage Program, which has allocated \$3.2M to the Rock Creek headwaters and surrounding area. Together, these efforts and the emerging partnerships with local, state and federal agencies, along with the relationships developed with private agricultural and recreational landowners, will provide a road map for successful implementation of the Sapphire Divide Fish Passage Project.

Budget and Funding Need. Trout Unlimited is requesting \$5,000 from the Coldwater Conservation Fund to support a new staff position and launch a program to implement cooperative restoration projects and demonstrate best management practices on private, Forest Service and BLM lands that restore, reconnect, and re-water priority streams in Rock Creek and the Upper Bitterroot River. CCF Funds will be matched 5:1 by Montana TU and the Bitterroot and Westslope TU chapters to leverage other state and federal funds, and launch this new restoration initiative.

Specifically, CCF funding will pay:

- **\$5,000** for salary/benefits/travel for new Project Manager for program development and capacity in the Rock Creek and Bitterroot River watersheds

Summary. TU staff, chapters and the Montana Council see great opportunity to protect, reconnect and restore fisheries populations in the Rock Creek and Upper Bitterroot watersheds. By partnering with a diverse group of stakeholders and developing a strategic blueprint for future conservation work, TU can improve connectivity, habitat and climate resilience for bull trout, westslope cutthroat and wild trout in this iconic landscape. Furthermore, a recent survey of TU leaders and staff in Montana showed that the integration and coordination within local, state and national TU was seen as the greatest opportunity – and current limitation – for TU’s continued improvement and success in the state. Developing this new, joint program will boost these emerging integration efforts and lead to other benefits to TU’s volunteer engagement, advocacy, and fundraising efforts in western Montana.

Establishing the “Gold Standard” Escapement Methodology for Steelhead and Salmon

Project Need. Successful conservation and good fishing comes down to two basic elements: (1) ample high quality habitat and (2) enough fish adapted to use the productive capacity of that habitat. TU is unquestionably the leader in protecting, reconnecting and restoring coldwater habitat so trout and salmon can thrive, and while we have made tremendous progress there is unquestionably much more work to be done. This project, however, focuses on the second element – ensuring that we allow enough locally adapted fish to use the habitat we work so hard to conserve.

Nowhere is this need more acute than in steelhead and salmon rivers. For far too long we have allowed too many wild, locally adapted fish to be killed in fisheries or swamped by hatchery fish that cannot use the productive capacity of the habitat. The result has been both depressed wild steelhead and salmon populations and a lack of return on our substantial habitat investments.

We must allow enough adult steelhead and salmon to “escape” fisheries and spawn to take full advantage of the habitat’s productive capacity. That is accomplished by establishing, through applying rigorous science, habitat-based escapement goals and managing fisheries to meet them. Most rivers lack such goals. Instead, they have escapement goals set decades ago based on inadequate data and antiquated scientific methodologies with a strong bias to maximize harvest, not sustain wild populations.

Project Description. TU’s lead Wild Steelhead Initiative Science Director, John McMillan, will partner with leading scientists at the National Marine Fisheries Service and the Wild Salmon Center to use rich data sets and the latest life-cycle modeling techniques to develop scientifically rigorous escapement goals for wild steelhead populations on Washington’s rugged Olympic Peninsula (OP).

The undammed rivers of the OP, the headwaters of which are protected in Olympic National Park, have some of the best steelhead and salmon habitat in the lower 48, but their wild steelhead populations have declined 30-50% since the early 1980s. Wild steelhead are harvested in commercial American Indian gillnet fisheries and also face heavy sport fishing pressure.

Current OP escapement goals were set over 30 years ago with limited data. Establishing scientifically robust escapement goals is essential to proper management and rebuilding the OP’s legendary wild steelhead. The importance of accurate escapement goals for wild fish is difficult to overstate as they are the basis for setting fishing seasons and managing hatcheries. No matter how much habitat we protect and restore, wild steelhead (and salmon) populations will not thrive unless we get enough adults on the spawning grounds.

By using rich data sets and the latest life-cycle modeling techniques, our goal is to establish the “gold standard” methodology for setting escapement goals. We intend to publish the model results in a peer-reviewed science journal. Once the methodology is developed and validated, we will advocate its adoption by state steelhead and salmon managers.

It bears emphasis that the methodology will be applicable to steelhead and salmon populations throughout their range, not just on the OP. For example, applying it to steelhead and salmon in the Snake River Basin will bolster our case that the lower Snake River dams should be removed.

The information produced through application of this methodology will also greatly improve our ability to strategically target habitat conservation efforts. It will do so by revealing the capacity of habitat to support wild steelhead and salmon at each life stage. For example, it might reveal that, while there is plenty of spawning habitat, juvenile rearing habitat is limited due to a loss of side-channels and mainstem channel complexity. This information would enable us to strategically focus our conservation efforts on improving rearing habitat, where we would get the most “bang” for our restoration buck.

Need for CCF Funding. TU and the Wild Salmon Center will partner on this project and jointly fund the work. We have an excellent relationship with several top-notch steelhead and salmon scientists and modelers at the National Marine Fisheries Service’s Northwest Science Center who would develop and run the model. The cost of retaining the NMFS scientists for this work is \$50,000. We have agreed to split the cost with the Wild Salmon Center. Our request of \$25,000 from the CCF would cover TU’s share of the contract cost. John McMillan’s time on the project will be covered by funds we have already raised to support our Wild Steelhead Initiative.

Funding for fish management work is hard to come by. No large foundation or government grants are available for this work. A CCF grant would fill this problematic funding gap and enable this critically important project to move forward. Without CCF support, we will need to raise the money from individual donors whose support would otherwise be used to fund core staff positions necessary to execute TU’s Wild Steelhead Initiative, a national strategic opportunity under our five-year strategic plan.

Project Budget: \$90,000

- \$50,000 for model development (contract w/ NMFS NW Science Center)
- \$20,000 each for John McMillan (TU staff) and Dr. Matt Sloat (Wild Salmon Center staff) to gather and analyze data, assist with model development, and manage project

Upper Klamath Basin, Oregon Fish Passage Inventory and Prioritization

Project Goal. Inventory and prioritize potential fish passage barriers in the upper Klamath basin to inform restoration of connectivity across aquatic habitats, enhance existing native fish populations, and prepare the basin to better accommodate salmon and steelhead, expected after Klamath River dam removal in 2020.

Project Overview. Trout Unlimited (TU) proposes to develop an inventoried and prioritized assessment of passage barriers in the UKB to allow for the systematic and strategic removal of these barriers in future years by TU and other local restoration partners. The upper Klamath basin (UKB) is home to a number of migratory fish species that require connectivity across aquatic habitats to fulfill their life histories, including Redband Trout (*Oncorhynchus mykiss newberryi*) and Endangered Species Act-list Bull Trout (*Salvelinus confluentus*), Lost River Sucker (*Deltistes luxatus*), and Shortnose Sucker (*Chasmistes brevirostris*). Chinook Salmon (*Oncorhynchus tshawytscha*) and steelhead, once present in the UKB, are anticipated to return after removal of 4 mainstem Klamath River dams in 2020 and facilitating effective migration to historic spawning and rearing stream reaches will be essential for the benefits of dam removal to be realized.

Project Description. Artificial fish passage barriers are numerous throughout the UKB, constructed over the past 150 years to serve a variety of purposes. These barriers reduce the migratory capacity and amount of habitat available to ecologically, culturally, and socially important coldwater fish species. The benefits to fish of removing any specific barrier depends on its location within the watershed, its passability to fish, and the relative position of other barriers within the watershed. Therefore, in order to strategically and systematically assess barriers for removal or repair, a comprehensive inventory of potential artificial passage barriers within a watershed is necessary.

The Oregon Department of Fish and Wildlife updates a state-wide passage barrier priority list every five years; however, these data used in this prioritization effort are variable in their completeness and are anadromous-focused, often lacking important passage information for potadromous fish species. Additionally, past prioritization models used for barriers within Oregon ranked barriers independently, potentially leading to an inefficient set of barriers being selected for mitigation. To address these limitations, TU proposes to survey potential artificial barriers in the UKB using methodology developed by the U.S. Forest Service, calculate a passability score for each barrier for species endemic to the UKB, and develop an optimization model to prioritize identified barriers for removal or repair. Finally, an interactive online decision support tool will be produced and available to restoration practitioners and managers to allow for easy visualization of barriers at various spatial scales and to identify portfolios of removals or repairs that provide the greatest amount of habitat access for a given budget. Researchers have recently developed optimization models to account for the spatial relationships amongst barriers, providing an objective framework for decision making to maximize potential habitat gains and inform restoration scenarios.

The proposed project will provide information that will be incorporated in to the Oregon Department of Fish and Wildlife passage database and a restoration plan for the UKB currently being developed by TU and other local restoration partners. The restoration plan is part of the broader Klamath water settlement work and will likely drive federal and state investments in restoring of the basin. A well-prioritized list of passage barriers will assist in generating future funding to move barrier removal or repair projects towards implementation. Most importantly, this project will guide the systematic and strategic removal or repair of barriers in the UKB to assist in the recovery of federally-listed fish species,

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protect existing populations of trophy Redband Trout, and prepare the basin to better accommodate future salmon and steelhead populations (expected in 2020 after Klamath Dam Removal). Trout Unlimited will collaborate with a number of partners to complete this project, including the Oregon Department of Fish and Wildlife, U.S. Fish and Wildlife Service, U.S. Forest Service, and The Klamath Tribes.

Statement of Need for CCF Funding. Trout Unlimited has applied for funding from the Oregon Watershed Enhancement Board to fund a portion of the survey work and model development for the passage barrier assessment, but we cannot receive Oregon Watershed Enhancement Board funding without 25% match. Funding from the Coldwater Conservation Fund is crucial, not only to provide the 25% match, but also for completing the survey work, optimization model development, and creation of the online decision support tool. The proposed project presents an important opportunity to use recently developed models to strategically guide restoration of aquatic connectivity across the UKB and will further TU's mission in the UKB to conserve, protect, and restore coldwater fisheries and their watersheds. Completing this inventory and prioritization effort will improve TU's ability to fund passage work in the basin by providing an opportunity to demonstrate project value and importance.

Budget.

Item	Unit Type	Unit Number	Unit Cost	CCF Funds	OWEB Funds	Total
TU Restoration Coordinator (Project design, model development, project management)	Hours	250	\$40.00	\$6,000.00	\$4,000.00	\$10,000.00
TU Restoration Coordinator (field survey)	Hours	350	\$40.00	\$4,000.00	\$10,000.00	\$14,000.00
Restoration Intern (field survey)	Hours	196	\$13.00	-	\$2,548.00	\$2,548.00
Data Scientist to assist with model development	Hours	31	\$200.00	-	\$6,200.00	\$6,200.00
Travel	Miles	2500	\$0.54	-	\$1,337.00	\$1,338.00
Total				\$10,000	\$24,085.00	\$34,086.00

Project deliverables.

1. List of barriers in the UKB, with associated metadata, in Excel and ArcGIS formats.
2. Prioritized list of barriers. This list will then be incorporated in to a basin-wide restoration plan being developed by The Klamath Tribes, Trout Unlimited, The Nature Conservancy, Oregon Department of Environmental Quality, Klamath Watershed Partnership, the U.S. Fish and Wildlife Service, and other partners.
3. Online decision support platform to display barrier information, run models for identifying selections of barrier removals or repairs, and provide crowd-sourced data modification.

Sucking Life Out of Our Rivers – Reforming Suction Dredge Mining in WA

Background and Conservation Need. Washington is the only state with populations of Endangered Species Act (ESA)-listed Pacific salmon and steelhead that still allows suction dredge mining and other forms of motorized mineral prospecting without requiring permits or regulatory oversight. Due to proven impacts to ESA-listed fish species and designated Critical Habitat caused by suction dredging, California, Oregon, and Idaho have all enacted tight restrictions on the activity.

Miners displaced from other West Coast states due to these recently tightened regulations have moved into Washington State, creating much greater pressure on our streams and a dangerous situation for our native fish. Virtually all waterways (including coastal beaches) in Washington are open for suction dredging, including areas designated as Critical Habitat under the ESA. Suction dredging occurs across Washington State: from the South Fork Nooksack River with its spring Chinook salmon on the brink of extinction to Peshastin Creek in the Cascade Mountains with its steelhead trout that must travel 500 miles and navigate seven dams to return to their spawning waters.

Recognizing the acute threat inadequate suction dredging regulations pose to Washington's struggling fish populations – as well as to the hundreds of millions of taxpayer dollars invested in salmon recovery in Washington State – TU has been on the front lines of this issue since 2013.



Figure 1. Suction dredge mining on Swauk Creek, tributary to the Yakima River and ESA-designated Critical Habitat for steelhead and bull trout.

Project Objectives. Building on TU's successes on this issue in other states, our staff and dedicated grassroots army have worked diligently with agency representatives, legislators, and a diverse stakeholder coalition to identify a balanced legislative path forward that brings the state's system into compliance with federal laws.

Specifically, our objective is to pass legislation that improves protections for Washington's wild fish and safeguards clean water by reforming Washington's suction dredging regulations to include the following:

- Tracking and accountability through an individual permit system.
- Tight controls and restrictions in habitat identified as critical to supporting Washington's native fish.
- A mechanism for evaluating cumulative impacts.
- Increased penalties for violations

Through close collaboration with our stakeholder coalition and legislative sponsors, we have introduced common-sense legislation embodying these objectives in the last three legislative sessions, but have not successfully passed a bill. While a frustrating slog at times, our years of experience on this issue have shown us advancing this legislation in the current political climate requires significant leverage. During the 2017 legislative session, many legislators indicated legal action would likely be required as a necessary driver to advance legislation. This leverage is now coming to the fore, tipping the scales in our direction.

A 60-day [Notice of Intent](#) to sue filed in January 2017 by the Center for Biological Diversity and Cascadia Wildlands highlights the significant inadequacies of Washington State's current system, which is operating in violation of both the ESA and the Clean Water Act (CWA). A subsequent lawsuit, *Cascadia*

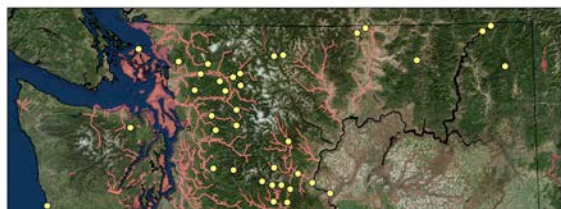


Figure 2. Map analysis completed by TU Science Team illustrating significant overlap between ESA-designated Critical Habitat for salmon, steelhead, and/or bull trout (red) and known suction dredging hotspots (yellow).



Wildlands v. WDFW, Case No. 17-2-03912-34, was filed in Thurston County Superior Court on June 30th, 2017. With precedent set in other states on this issue, Washington is in a very tenuous legal position with its lack of regulation of suction dredge mining.

Successful suction dredge mining reform efforts in Oregon and California have shown the importance of legislation and litigation efforts working in tandem. Litigation will require the state to act, but the degree to which that action aligns with our objectives will be directly tied to how effectively we can influence key decision-makers. Given TU's prominent role in this issue the last four years, our close relationship with

state agency staff and legislative sponsors, our ability to coordinate with the plaintiffs, and our national track record of finding science-based, common-sense solutions to problems such as this, we are well-positioned to play a key role in negotiating a path forward.

Funding Need and Budget. Consistent with TU's observations and experiences in neighboring states, reforming suction dredge mining regulations in Washington is proving to be a formidable challenge. Lessons learned from veterans on the front line of this effort in other West Coast states, including TU grassroots and staffers, have highlighted the need for a multi-pronged campaign approach, dedicated advocacy, and patience. Based on conversations with internal and external advisors, and given the changing playing field on the legal front, we are confident our current campaign structure – with legislative, administrative, and legal efforts working in concert, supported by a robust outreach strategy – will provide the solid backbone needed for impactful results.

One challenge we face with the “long road” nature of this effort is overcoming campaign fatigue with funders and finding fresh sources of funding to support the necessary, but very time-consuming, ground game – hosting events, giving presentations, face time with grassroots and community groups, meetings with legislators – essential activities for increasing awareness among constituents and building legislative support. A \$20,000 contribution from CCF will provide critical funding for the campaign by supporting both TU staff and our contracted counsel to continue this work through the 2018 legislative session. CCF funding will cover:

- \$7,500 for salary/benefits for TU's SCP Campaign Manager and WWHP staff technical support
- \$5,000 for contracted legal counsel providing lobbying services
- \$5,000 for contracted outreach coordination
- \$2,500 for travel and materials associated with TU outreach activities

This CCF contribution will provide critical match funding for TU to leverage as we pursue other sources of grant funding in the coming months.