# 2018 Coldwater Conservation Fund
# Funded Projects

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# Protecting the Great Lakes from Invasive Asian Carp

**Project Overview:** Asian carp are at the doorstep of the Great Lakes, and now is our chance to stop them. A $50,000 grant from the CCF would enable TU to lead a sportsmen's campaign to take three necessary steps to prevent Asian carp from invading the Great Lakes: 1) persuade the Army Corps to finalize a plan to stop carp at the Brandon Road Lock and Dam (see Figure 2); 2) ensure that Congress supports the plan and appropriates funds for its implementation; and 3) secure the state and local cost share funding.

**Project Description:** Native to Eastern Asia, silver and bighead carp were first imported to the United States in the 1970s. Now, these Asian carp have spread throughout the Mississippi River Basin, and are threatening to inhabit the Great Lakes, where they would imperil the ecosystem, including famous Great Lakes tributaries like the Pere Marquette, Boardman, Manistee, and many others.

They are invasive species with insatiable appetites. Capable of eating 40 percent of their body weight in plankton a day, they threaten the food supply of existing fish populations. Silver carp can top 100 pounds and are famous for hurling themselves airborne when disturbed, terrorizing and injuring boaters. If Asian carp multiply in the Great Lakes, they can be expected to destabilize the aquatic ecosystem, as they have done across the Mississippi River Basin, where they now make up 90 percent of the fish populations in some rivers. The voracious Asian carp, classified as "injurious wildlife" under the Lacey Act, would outcompete forage fish for plankton, upsetting the food chain not only in the lakes, where salmon, steelhead, lake trout, and brown trout are impacted, but in tributaries that benefit from lake-run fish. That would put at risk a $16 billion outdoor recreational economy and a $7 billion commercial fishery.

The invasion has been a slow-motion affair, progressing over decades, but two developments have the Great Lakes at a critical inflection point. Last year, a commercial fisherman caught a 28-inch silver carp in Chicago, just nine miles from Lake Michigan. The catch of a lone fish is a more significant harbinger than it might appear: Scientists suggest that only a few dozen Asian carp could provide a foundation for a thriving Great Lakes population.

Just as the threat reached critical status, the U.S. Army Corps of Engineers presented its long-awaited solution: $275 million worth of defenses against Asian carp and a host of other non-native species. The Corps proposes to dig in at the Brandon Road Lock and Dam on the Des Plaines River in Joliet, Illinois, where it will pound the carp with "complex noise," an electrical field, and water jets, and install a system to flush eggs and larvae out of the locks. The Brandon Road Lock and Dam is the only actively-used water connection between the Mississippi watershed and the Great Lakes.

It's now or never, and the plan to shore up the lock at Brandon Road is the best solution at hand. But hurdles remain, including opposition from the shipping industry, which argues that construction will impose costly delays. Last year, 16 congressmen—most of them from Illinois, Indiana, and Ohio—urged President Trump to hold up the plan, and successfully delayed release of the proposal for six months. That means a great deal of work is needed to ensure that decision-makers take this last and best opportunity to make a stand against Asian carp.

Objectives: First, we need to continue to encourage the Corps to adopt the plan—as quickly as possible, and no later than August 2019. Next, we need to ensure that Congress supports the proposal and appropriates the federal portion of the cost. And finally, we need to ensure that state and local governments agree to put up their share of the funding—an estimated $8 million annually—to make it a reality.

TU is well-positioned to galvanize support from Congress and the Great Lakes states, given our strong volunteer base and relationships in the sporting community. TU has started mobilizing our network of volunteers and partners to build support for this solution. Last year, we generated hundreds of public comments in favor of the Corps' plan, and thanks to foundation support, we have been working to soften opposition in Illinois and Indiana. This work has been

done by TU's Great Lakes Organizer with small foundation grants that enable him to dedicate about 25% of his time to working on Asian carp. But we need to do more.

**Statement of Need for CCF Funding:** Our TU volunteers, our sportsmen and women partners, and our TU-endorsed businesses, of which there are 38 in the Great Lakes basin, have proven to be effective voices in reaching decision-makers. We need to energize this network and help them educate congressional members and governors about the opportunity to prevent Asian carp migration into the Great Lakes.

Governors in Michigan, Ohio, Illinois, and Wisconsin have pledged to provide state funding to implement the Corps' plan; our volunteer advocates can press them to stick to their word. By engaging governors in Wisconsin, Illinois, and Ohio—all of whom are up for re-election this year—on the issue, we can ensure that a change in administration does not weaken state support.

With financial backing, we can put on a full-court press. Through educational sessions, meetings with decision-makers, social media campaigns, Action Alerts, and media outreach, we can deliver a steady stream of support for the Corps' plan.

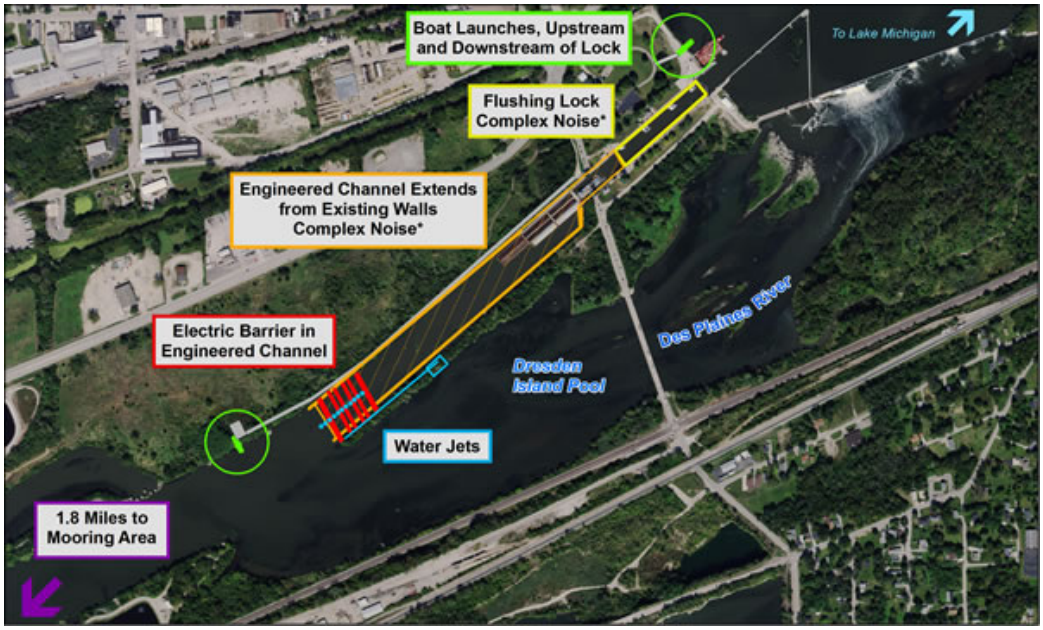
A $50,000 grant from the CCF will enable TU's Great Lakes Organizer to focus almost exclusively on leading the campaign to stop Asian carp. The Organizer will:

- Conduct outreach to governors-elect in WI, IL, and OH to ensure that they understand the threats posed by Asian carp, the recommendations contained in the Brandon Road report, and their role in funding the project and pushing the Corps to finalize its recommendations.
- Meet with TU members in IL, IN, OH, and WI to educate them about the issue and opportunities to get involved in Asian carp advocacy.
- Recruit and engage other sporting organizations to activate more voices in support of Asian carp protections.
- Conduct outreach to the 38 TU-endorsed outdoor businesses in the Great Lakes basin to encourage them to participate in the campaign through the media and meeting with decision-makers.
- Publicize Governors' supportive positions on the Great Lakes Partnership to Block Asian Carp to rally public opinion and cement state and local funding commitments.
- Organize at least one DC fly-in for hunters and anglers from IN, IL, WI, and OH to meet with their congressional delegations in advance of the FY20 appropriations process to encourage funding for the next steps on Brandon Road.

**Budget:** The total budget for this project is $80,000, which covers the salary and benefits of the Great Lakes Organizer, along with travel and meeting expenses, and media campaign expenses. We have secured $30,000 from the Joyce Foundation and $6,500 from Patagonia, and $3,500 from TU chapters and councils. A $50,000 donation from the CCF will enable the Great Lakes Organizer to run this campaign through the critical period of post-election outreach to Governors, pressuring the Corps to finalize the study in early 2019, and convincing Congress to appropriate funding during the FY20 appropriations process.

Figure 1


Figure 2




The image above shows locations of key features, or measures, of the tentatively selected plan at Brandon Road Lock and Dam, which includes: nonstructural measures (i.e. over-fishing), complex noise, water jets, engineered channel, electric barrier, flushing lock, boat launches and mooring area.

# Going Directly to the People: Securing Long-term Protection for Coldwater Fish Habitat in Alaska and Montana

**Project Overview:** In recent years it has been extraordinarily difficult to pass well-conceived conservation bills through the federal and some state legislatures. Fortunately, at the state level, there is another option: going directly to the people through a ballot initiative, and that is precisely what TU is doing in Alaska and Montana to secure much needed long-term protections for exceptional coldwater fish habitat.

In both states TU has partnered with other organizations and has gotten citizen initiatives qualified for the November ballot. In Alaska, Ballot Measure 1 would substantially improve salmon habitat protection by subjecting proposed development projects, like Pebble Mine, to higher permitting standards and a more transparent process. In Montana, Initiative 186 would put the burden on mining companies to demonstrate that proposed new hardrock mines would not require perpetual water treatment, which would help protect Montana's exceptional trout waters, including the Smith.

Prevailing at the ballot box in November requires smart strategy and well-funded, well-executed campaigns. The opposition to both initiatives will amass a much bigger war chest, but we know through polling that we will have public sentiment on our side if we can get our messages out to our target audiences and turn folks out to the polls to vote.

**Project Description:**

*Alaska: Ballot Measure 1*

The focus of efforts to protect Bristol Bay from the proposed Pebble Mine has shifted from Washington D.C. to Alaska. **Of the 40-plus permits required for the construction of the mine and associated facilities, all but one will need to be issued by the state of Alaska.**

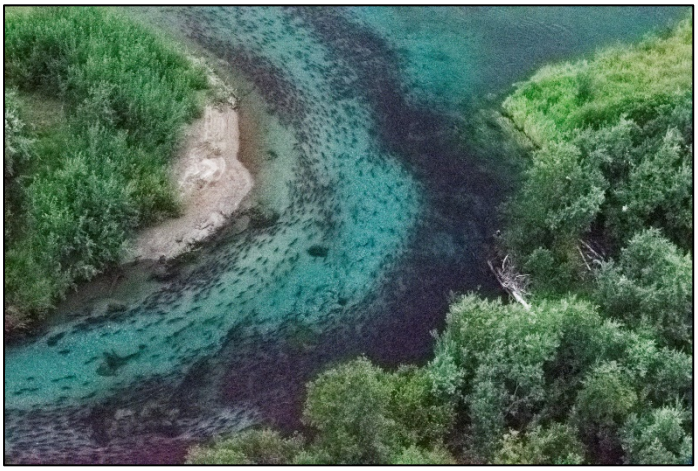


***Figure 1**. The initiative would offer important protections for Bristol Bay's rivers – which are on track to return an all-time record of more than 62 million salmon this year.*

Our campaign over the last decade to stop Pebble Mine has built strong support among Alaskans for protecting Bristol Bay. **Sixty five percent of the state's residents oppose Pebble**. This November, we have an opportunity to turn that support into a new state law that will substantially increase salmon habitat protections in Bristol Bay and throughout Alaska. After repeated failed attempts to strengthen habitat protection law through the Alaska legislature, a coalition of fishing, conservation and Alaska Native organizations secured the signatures necessary to qualify a citizens' initiative for the November ballot that, if passed, would achieve the same outcome.

The initiative, Ballot Measure 1, would:

1. Create clear, science-based habitat protection standards with which the Alaska Department of Fish and Game can review, approve, restrict, and deny permits for development in or near salmon waters;
2. Provide meaningful opportunities for public input on proposed developments affecting salmon habitat; and
3. Establish standards for effective mitigation methods.

*Montana: Initiative 186*

Without question, Montana contains some of the best trout waters in the United States. Visitors come from around the world to experience exceptional fishing in unspoiled landscapes. But the future of these waters is not secured, and one of the most pressing threats is proposed new mines.

The Smith River is a prime example. Tintina Resources and its partners, collectively called Sandfire America, have applied to mine an underground copper mine called the Black Butte Copper Project, in the Sheep Creek drainage which flows into the Smith River, Montana's iconic blue-ribbon trout fishing and floating river. Other mining proposals have popped up that threaten the Yellowstone and Blackfoot Rivers in Montana.

Permitting responsibility lies in the Montana Department of Environmental Quality (DEQ), yet it **lacks the authority to deny mining proposals that threaten permanently to pollute waters**, thus causing the need to treat that water forever. In addition to allowing the destruction of Montana's world-class rivers, **existing law often leaves Montana taxpayers footing the clean-up bill (an estimated $36.6 million spent thus far) for undercapitalized, foreign-backed mining ventures like Sandfire's**.

TU and its partner organizations secured more than 45,000 signatures and qualified Initiative 186 for the November ballot. If passed, I-186 would require mining companies proposing new mines to provide clear and convincing evidence that the mine would not cause permanent pollution problems before receiving permits from the DEQ. The initiative reads:

> *I-186 requires the Department of Environmental Quality to deny a permit for any new hardrock mines in Montana unless the reclamation plan provides clear and convincing evidence that the mine will not require perpetual treatment of water polluted by acid mine drainage or other contaminants.*

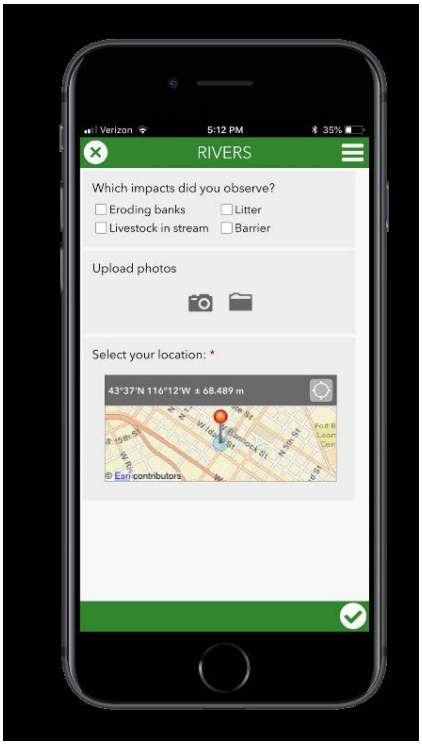
**Statement of Need for CCF Funding and Project Budget**: Winning ballot initiatives is an expensive endeavor. The keys to victory include: developing compelling messages, delivering those messages to target audiences, and activating supporters to vote. Opponents of our initiatives have a large financial advantage that we must combat with passion, grit, and smart strategy – and enough money to execute our campaigns.

Private foundations and government grants are a large source of funds for TU's conservation work, but their funding cannot be used to advocate legislation, regardless of whether the legislation is in the form of a bill or a citizens' ballot measure. Consequently, we must rely heavily on individual and corporate donations to conduct our ballot initiative campaigns in Alaska and Montana. **We are seeking an $80,000 investment from the CCF for these campaigns, which are top priorities for the organization.** We intend to allocate $50,000 to our Montana efforts and $30,000 to our Alaska efforts to cover advertising and voter outreach/mobilization activities in the critical final month of the campaigns.

# RIVERS App Development and Training

**Project Overview:** Trout Unlimited is a science-based organization that requires data to make strategic decisions. TU's Science, Eastern Conservation, and Volunteer Operations programs propose to develop a mobile application for use by TU grassroots volunteers and staff – called the RIVERS App (River Inventory by Volunteers for Efficient Restoration Strategies mobile Application) – that facilitates data collection and photographic documentation of stream and river impairments. The app would allow TU chapters and staff to use smartphones and tablets to generate a database of stream and river impairments – a database that can then be used to prioritize restoration projects in their home waters.

**Project Description:** TU chapters and staff expend significant time, energy, and resources to protect, restore and reconnect coldwater fisheries and their watersheds. In many watersheds the stressors are varied and numerous, and up-stream impairments may limit the integrity or restoration potential of downstream habitat, necessitating a watershed-scale approach to recognizing and prioritizing projects. By identifying, describing, photographing, and mapping attributes such as fish passage barriers, eroding stream banks, riparian cover, in-stream habitat, point-source discharges, agricultural practices, and more, we can create a comprehensive picture of river and stream impairments. This would allow for more strategic and effective identification of priority projects across entire watersheds in lieu of solely opportunistic or localized projects. Agency and field-based stream and river assessment protocols exist, but none are conducive to mapping the issues across entire watersheds in a manner that would be easily accessible to TU volunteers and staff.




A quick mock-up of a mobile app that would allow TU volunteers, staff, and the public to inventory stream impairments and identify restoration projects.

In a collaborative effort, TU's Science, Eastern Conservation, and Volunteer Operations programs propose to develop the RIVERS mobile app (River Inventory by Volunteers for Efficient Restoration Strategies mobile Application). The RIVERS App will allow documentation of common stream impairments via data fields and geolocated photos using mobile devices. Volunteers and professionals could walk every mile of stream within a focal watershed and identify, attribute, and photo document stressors that may be affecting the fishery, even while disconnected from the internet. TU volunteers and staff can then ensure they have a complete picture of impairments in a watershed, which allows restoration projects with limited resources to be prioritized efficiently for maximum benefit. The surveys would be focused on watersheds and would not be constrained by state, county, or other jurisdictional boundaries. The app could be available to crowdsource impairment information from other groups, and the general public, as they recreate.

In addition to developing the RIVERS App, this project also contains a four-tiered approach to training TU volunteers and staff: 1) conduct a pilot on-the-ground training for volunteers and staff in the Rogue River watershed in Michigan, 2) pilot projects with 3-5 high-functioning TU chapters across the country, 3) provide training at TU regional meetings, and 4) conduct webinars that are open to all 420 TU chapters and councils across the country.

The RIVERS App will be piloted on the Rogue River near Grand Rapids, Michigan. The Rogue River Home Rivers Initiative is working to implement stormwater and agricultural best management practices, replant riparian areas, and reconnect and improve stream habitat. In this heavily-developed watershed, the myriad impacts to rivers and streams

have not been inventoried and mapped. As such, TU staff and volunteers are unable to take a comprehensive watershed-scale view of stressors to the fishery when developing and prioritizing projects. We propose to use the RIVERS App for a comprehensive assessment of focal subwatersheds within the Rogue River watershed to identify stream issues. These data will be mapped and serve as the basis for identifying and prioritizing future stream treatment projects by TU staff and volunteers.

In addition to the Rogue River pilot, we propose to launch the RIVERS App with 3-5 high-functioning TU chapters across the country. For example, a local Connecticut municipality is currently developing a watershed-based plan to improve water quality, and has asked for the local TU chapter to identify areas where simple "low hanging fruit" projects could be implemented that would reduce water temperature, remove sediment, and buffer and improve water quality. This RIVERS App would be used by the chapter to send teams of volunteers to inventory watershed impairments that could quickly inform management plans and become funded restoration projects.

TU holds regional meetings each year, and the meetings are attended by 100 or more volunteers from area chapters and councils. TU Volunteer Operations staff, along with science and conservation staff, would train volunteers on identifying river and stream impairments and how to document them using the RIVERS App. Training would include using the RIVERS App during the conservation tour organized as part of the meeting. The data and photographs collected could then be presented during training to demonstrate how the information could be used to plan and prioritize restoration projects.

As a next step, TU's Volunteer Operations, science, and conservation staff will publicize the RIVERS App among the 420 chapters and councils, lead online webinar trainings on its use and encourage chapters and councils to conduct their own watershed impairment assessments using the app on their home waters.

**CCF Funding Need and Budget:** Coldwater Conservation Funds would enable this project to be completed from front to back. CCF funds will allow dedicated staff time to research stream assessment and inventory protocols, develop the RIVERS App, train TU volunteers in the Rogue River watershed, travel to and lead training sessions with focal TU chapters and at TU regional meetings, and broadcast the RIVERS App to all TU chapters and councils via webinar. TU's staff and volunteers need easily accessible ways to inventory stream impairments and document restoration opportunities across entire watersheds to effectively prioritize projects with limited restoration funding. The RIVERS App will put that power directly at their fingertips – literally!

**Budget: $30,000**

$ 4,000: Development stream inventory protocols

$ 10,000: Mobile application development

$ 7,500: Rogue River pilot project

$ 5,000: TU regional meeting training

$ 3,500: Travel

The RIVERS App would allow photo documentation of river impairments such as sources of fine sediments.

# Salter Brook Trout Streams Recovery

**Project Overview:** A $30,000 grant from the CCF will provide matching funds for public and private grants to complete site assessment, design, permitting, and continued landowner outreach for three dam removals and a culvert modification on Frost Gully Brook and a culvert replacement on Mare Brook, two sea-run brook trout streams that discharge into Casco Bay in southern Maine.

**Project Description:** One of the pillars of TU's brook trout conservation strategy is to conserve "unique life histories," ensuring that brook trout are not relegated to small headwater streams but also occupy historic habitat such as large rivers, lakes, and ponds. The rarest life history today is the sea-run or "salter" brook trout, with only six officially documented populations in the U.S. In 2013, TU completed a salter brook trout assessment which found that "most coastal brook trout streams identified were in Maine", and that population status of most sea-run brook trout populations was undocumented, particularly in Maine. In 2017-18, the CCF supported a project to document salter streams and identify specific conservation actions Casco Bay tributaries. [1] In the past year TU documented highly suitable water temperatures for brook trout in Frost Gully Brook and Mare Brook; and documented five critical passage obstructions on these two streams. Most significantly, we obtained landowner agreement to address every obstruction on Frost Gully Brook, including three dam removals, and to replace the highest priority culvert on Mare Brook.

*TU volunteers and Maine fisheries staff electro-fish Frost Gully Brook, 8-17-2017.*

The 2013 salter assessment analyzed 457 coastal streams, finding that 207 streams—mostly in Maine—were of uncertain status. TU has since surveyed 155 coastal Maine streams and found brook trout in 74 of them. The most robust populations were found in Frost Gully Brook and Mare Brook, and became the focus of our efforts. By completing the proposed restoration projects, we will create a model for salter brook trout restoration that can be replicated on other newly-discovered coastal brook trout streams.

Specifically, the restoration projects include: (1) Removal of all three dams and modifications to provide fish passage through a culvert[2] on Frost Gully Brook in Freeport, to reconnect fully the system from source to sea, allowing brook trout to migrate throughout the brook and its tributaries, including a cold tributary that supports an isolated population of brook trout and, absent the dam, would be an important thermal refuge and spawning site. In addition to fish passage benefits, the dam removals will remove three impoundments, two of which are warm and currently support populations of largemouth bass, restoring brook trout habitat in the former impoundment and improving water temperatures downstream. (2) Replacement of a completely impassable town-owned culvert on Mare Brook in Brunswick. The culvert is located immediately downstream of a known coldwater source that provides a thermal refuge and would reconnect 0.8 miles of stream habitat from the culvert upstream to the headwaters of Mare Brook to 0.7 miles of stream habitat below the barrier. On Frost Gully Brook, our work would address all known barriers to fish

[1] Dauwalter, D.C. and J. McGurrin. 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.

[2] This culvert, on the busiest section of Route 295, one of Maine's two interstate highways, is not a candidate for replacement in the near future. Passage will be provided through installation of baffles and tailwater control to ensure suitable depth and velocity for passage at most flows.

passage in Frost Gully Brook and its tributaries. On Mare Brook, this project is an initial engagement with the town of Brunswick that we hope will lead to additional work at several downstream barriers also owned by the town.

Key tasks.

- Site survey, mapping, and development of preliminary restoration plans for five restoration sites.
- Engineering work to develop construction design drawings and support permit applications for five restoration sites.
- Community outreach to keep key partners engaged in the project: Maine Water (a water utility and owner of the Frost Gully Dam); Freeport Conservation Trust (owner of the other two dams on Frost Gully Brook); Maine Department of Transportation (owner of the culvert on Frost Gully Brook); the town of Brunswick (owner of the culvert on Mare Brook); and Casco Bay Estuary Partnership (who are supporting some of the initial survey and restoration planning). Maine Water, Freeport Conservation Trust, and the town of Brunswick have all committed to pursue restoration at these sites if TU can develop appropriate design plans and identify funding to complete the project on their property. Maine DOT will likely complete the enhancements for passage at their culvert with state funds that can be used as match.
- Permit applications for four sites. (No permitting will be required for the Frost Gully Brook culvert work.)
- Preparation of bid packages for each project.
- Fundraising for dam removal/culvert replacement/culvert enhancements.

*Frost Gully Dam; Max Daily Water Temps in impoundment are 3 degrees C higher than free-flowing reaches.*

In addition, we will continue to work with volunteers to:

- Conduct volunteer angler surveys on remaining unassessed streams.
- Maintain continuous temperature monitoring at 12 sites established in 2017, and add an additional 12 sites in 2018 and 2019.
- Community outreach to develop additional restoration projects on Mare Brook and other Casco Bay tributaries where our survey efforts identify brook trout populations with access to tidewater.

**Statement of Need for CCF Funding**: The past year's salter brook trout work was funded by the CCF, an extension of our 2015 grant from NFWF, and grants from two private foundations and the state of Maine. That work has positioned us to seek larger grants for restoration project planning and implementation, as indicated by the National Fish and Wildlife Foundation's invitation for us to submit a proposal to fund much of the restoration planning and design. Several opportunities for significant funding will be available in the next 6 months. CCF funding will allow us to continue efforts uninterrupted and serve as cash match other funding opportunities. It will also focus attention on populations of salter brook trout in a highly visible watershed in Maine's most densely populated county, providing a model for future salter restoration projects.

**Project Budget**:

- Revenue: A CCF contribution of $30,000 will be matched by grants already received from the Davis Conservation Fund ($5,000), support from the Casco Bay Estuary Partnership for site survey and preliminary design ($8,000) and a request for $70,000 from NFWF's Bring Back the Natives (full proposal invited, due August 2018) and planned requests to the Maine Outdoor Heritage Fund ($12,000, next opportunity January 2019) and Horizon Foundation ($20,000, next opportunity April 2019). The total project budget is $145,000.
- Expenses: Salary, benefits and travel, Jeff Reardon, Maine Brook Trout Project Director, 75%: $70,000. Contracted engineering: $75,000.

# Restoring River Function to Ensure Idaho's Trout and Salmon Legacy

**Project Overview:** Idaho supports many storied fisheries and wild places – including the largest designated wilderness area in the contiguous United States and some of the longest inland migrations of salmon and steelhead in the world. In total, Idaho boasts 10 species of native trout and salmon, including 5 subspecies of cutthroat trout, and is the only non-coastal western state that still supports anadromy (amazingly, Nevada also used to support salmon). But, Idaho has not escaped the impacts of human settlement and expansion over the past century and a half, and associated activities like logging, mining, road building, and agricultural development have interrupted natural watershed processes and degraded in-stream and riparian habitats. As a result, fish populations have declined.

No two Idaho rivers better illustrate this plight than the Clearwater and Big Wood rivers. Both are inextricably linked to the Snake River – one as a present-day tributary; the other via historical drainage connections and groundwater. Both support unique native fish species – redband trout and endemic sculpins in one; steelhead, two species of salmon and native cutthroat and Bull Trout in the other. Both currently fall far short of their fish-production potential due to legacy and ongoing habitat degradation. Most importantly, both offer incredible opportunities to increase fish numbers by restoring healthy stream habitat and reestablishing the natural watershed processes that maintain it.

*Big Wood River* – In a recent *Geomorphic Assessment of the Big Wood River*, Trout Unlimited found that more than 50% of the 40-mile river corridor no longer functions naturally, and that the river has been straightened more than 1.7 miles, resulting in a significant loss of habitat for native redband trout, rainbow and brown trout, mountain whitefish, and endemic Wood River sculpins.

**Figure 1**. Aerial photo of the 'Bridge to Bridge' reach during the 2017 flood.

The assessment identified one of the most impaired reaches of the Big Wood River upstream from the town of Hailey, Idaho. This "Bridge to Bridge" reach extends from the Highway 75 bridge upstream to a historic Sheep Trailing Bridge – roughly 1,250 ft of river channel. Human development both upstream and downstream have created dramatic alterations to the river channel, and, as a result, the 'Bridge to Bridge' reach is highly unstable, experiences severe erosion, and lacks the ability to transport sediment. The 100-year flood event in 2017 exacerbated these problems, further limiting habitat and increasing the risk of future catastrophic flooding.

Over the past two years, TU has worked with project partners and consultants to develop a restoration plan for the Bridge-to-Bridge reach that will restore instream habitat, riparian areas and streambanks, and rebuild floodplain capacity. The project will restore natural hydrologic processes that build and maintain fish habitat, and will increase both flood and drought resiliency by attenuating flood flows and augmenting base flows. **We seek critical funding to match a $179,000 grant from Blaine County, ID, to implement the highest-priority river restoration project in the Wood River Valley.**

*Upper Clearwater River* – The upper Clearwater and its primary tributary, the Lochsa River, contain some of the highest salmon production potential in the entire Clearwater Basin, but Spring Chinook and Steelhead populations remain "depressed" as per the 2000 Interior Columbia Basin Ecosystem Management Project. For that reason, the Lochsa and its tributaries are top priorities for restoration in the 2017 NOAA Snake River Spring & Summer Chinook and Steelhead Plan. The watershed also comprises multiple Westslope Cutthroat Trout stronghold streams and at least one Bull Trout stronghold. Instream sediment, lack of stream habitat complexity, water temperatures and floodplain connectivity are the limiting factors for fish productivity.

Since 1996 the Nez Perce Tribe and U.S. Forest Service have worked successfully to decommission failing roads and restore fish passage and habitat in the upper Clearwater. However, Forest Service capacity on the Nez Perce—Clearwater National Forest now is waning as retired biologists and hydrologists are not replaced. The Tribe approached TU in 2018 with a request to help fill that void by providing project management expertise, and we subsequently implemented our first joint project in summer 2018 to install log jams and restore the associated natural fluvial processes in two critical Lochsa tributaries. With that success has come a huge opportunity for TU to grow the new tribal partnership and develop additional habitat restoration and reconnection projects throughout the upper Clearwater Basin. **We seek necessary funding to match an invited National Fish and Wildlife Foundation proposal that will allow TU to support a dedicated staff Program Manager and become a lead restoration practitioner in the Basin.**

**Figure 2**. Functioning log jam in a Lochsa tributary reference reach. Structure provides cover, and facilitates pool and riffle formation, substrate sorting and floodplain connectivity.

**Project Description:** The projects supported by this funding proposal are designed to restore natural hydrologic and fluvial processes that build and maintain the critical habitats upon which trout and salmon depend. Our overall objective is to reestablish the ability of these streams and the fish populations they support to adjust to climate change and environmental disturbances. Our specific objectives include the following:

- Stabilize eroding banks, reconnect floodplain, and restore sediment transport capacity to improve habitat and restore fish populations in the Big Wood River.
- Restore fish passage, floodplain connectivity and habitat complexity to increase juvenile rearing and fish production in key tributaries to the Lochsa River, including Shotgun, Pete King, Wendover, Russian and Swede creeks.

**CCF Funding Need and Budget:** Both the Idaho projects described above provide time-sensitive opportunities for TU to achieve measurable and significant gains for trout and salmon with modest investments to leverage significant funding from public grant sources. Both river basins support unique fishery resources that are important to TU members, and these projects provide an opportunity to protect that legacy for future generations.

A $50,000 contribution from CCF will provide critical matching funds to secure immediately $247,000 in public funding to implement top-priority restoration projects. **Specifically, CCF funding will cover**:

- **$22,000** for salary/benefits for TU's new Clearwater Basin Program Manager
- **$25,000** for engineering oversight and construction contracts to complete the Big Wood River Bridge-to-Bridge project
- **$3,000** for travel and materials associated with project implementation in both basins

# Remote Sensing Tools

**Project Overview:** Monitoring the effects of TU's on-the-ground efforts is an important component of the organization's work to restore coldwater habitats. The detailed measurements gathered during monitoring allow TU to quantify what works, and track changes over time. Emerging remote sensing tools, from cloud-based satellite imagery analysis to on-demand drone flights, provide new opportunities to be efficient and effective in the way we monitor TU's work – and communicate success. We are requesting CCF funding to support continued development and application of our remote sensing skills and tools in three focal areas.

**Project Description:** Remote sensing refers to the science of obtaining information about objects or areas from a distance. Over the past several years, with funding from NASA, TU has invested in developing in-house expertise in remote sensing technologies, and is now regarded as a leader in remote sensing applications for aquatic conservation. Just last year, TU scientists led a comprehensive review of these tools which was published in the peer-reviewed scientific journal "Fisheries". To date, TU has used remote sensing data and tools in a variety of conservation and outreach applications: for mapping side channels and inundation areas in floodplains using Lidar; for producing compelling pre-/post-project videos using aerial photographs, and for tracking streamside vegetation response to improved livestock management using satellite imagery. Resulting images and analyses allow us to quantify and characterize habitat in ways we never could before – at landscape scales and over long periods of time, with visuals and metrics that enable incredibly effective communication. For instance, in the latter example above, our application of satellite imagery for monitoring vegetation response to cattle management over 30 years has shown that altered grazing strategies and increased beaver activity can confer the same benefits to riparian vegetation as adding 10 inches of precipitation per year. This type of quantification is a game-changer for describing the benefits of TU's work in ways that matter to a varied and diverse audience: in the desert of Nevada, 10 inches of precipitation is as compelling to a rancher as it is to an agency manager or a state senator.

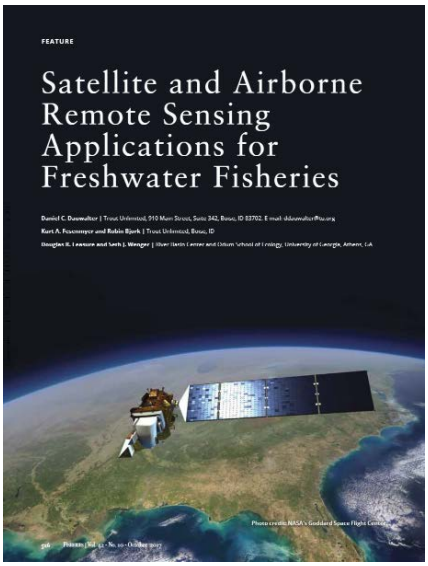



**Figure 1.** Fisheries article by TU scientists, Oct 2018

CCF funding would allow us to expand these efforts in three additional directions. First, CCF support would enable us to apply remote sensing tools to Project Finder, TU's archive of restoration activities. Project Finder contains project details such as location, timing, and type of project. By linking specific remote sensing products to specific project types – e.g., connecting satellite imagery with riparian restoration work or pre-/post aerial photos with dam removals – we will be able to characterize and communicate the response of habitats to TU's restoration efforts efficiently and effectively. Second, CCF support would allow us to evaluate new and emerging remote sensing technologies. For example, satellite imagery is now being used to characterize evapotranspiration (ET) and quantify the seasonal water use of individual agricultural fields from space. This has the potential to revolutionize how TU monitors water transactions and other projects designed to alter agricultural water use for restoring instream flows. However, we need the capacity to

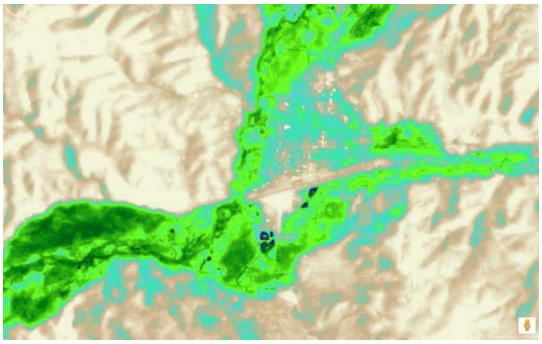


**Figure 2.** ET mapping using satellite imagery

develop expertise with applications like these so we can apply them to TU's work. Finally, thanks to 2017 CCF funding, TU's Idaho-based science program now has a drone and a licensed pilot, and our exploratory applications have immediately generated interest and demand for these services. Continuing CCF support will allow us to ramp up our drone monitoring program to provide pre-and post-project imagery and 3D models for regional restoration projects. CCF funding will support monitoring at least four western conservation projects in the coming year.

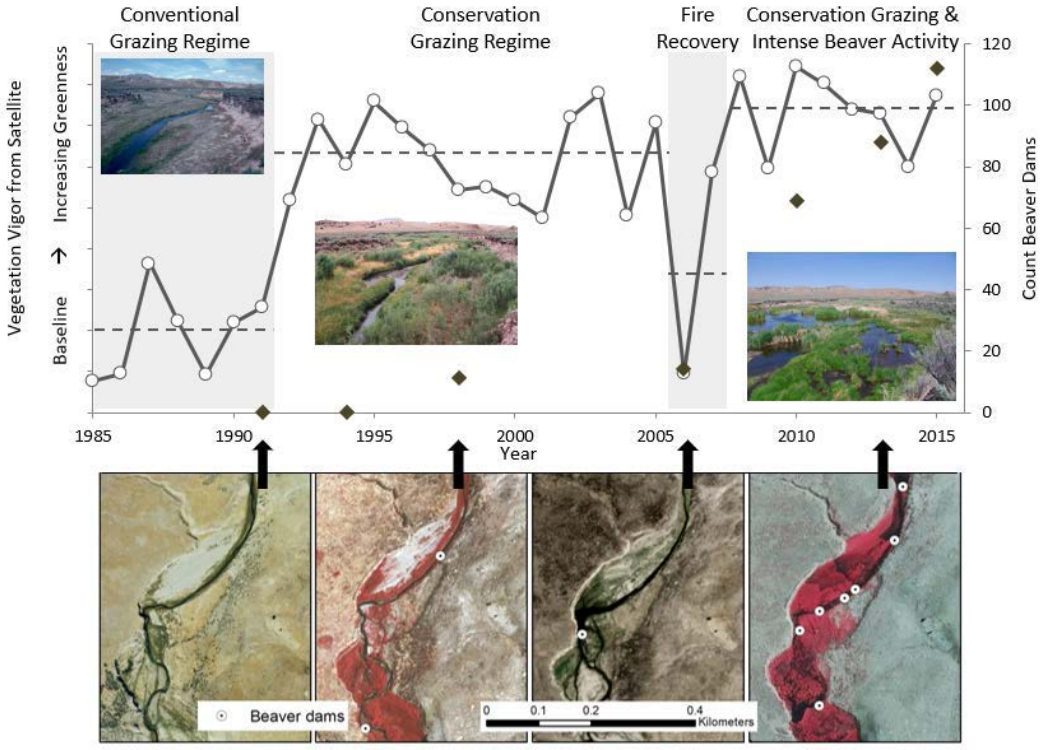



**Figure 3.** Satellite imagery shows 30-year streamside vegetation trend in response to grazing management.

**CCF Funding Need and Budget:** CCF support will allow TU scientists to take advantage of the latest technology and breakthroughs in remote sensing to facilitate project evaluation and monitoring. These tools are a powerful and efficient way to monitor project effectiveness, and the data they provide will help TU continue to evaluate our restoration work, quantify its outcomes, and generate compelling visual documentation of project results.

**Budget:** $30,000, including $28,000 for TU staff time and $2,000 for travel.

# Decision Support Products for Eastern & Western Conservation and VolOps

**Project Overview:** Mapping and data visualization are core skills of TU's science program. We create compelling cartographic products and build interactive, web-based decision support tools. These tools synthesize key information for decision makers and facilitate bringing the best science and data to bear on "where questions": Where are the strongest remaining populations for a protection focus? Where are the least-disturbed habitats that should be prioritized in our restoration work? Where are the coldwater refuge streams that could anchor large reconnection efforts? Where can TU's on-the-ground efforts achieve the greatest conservation benefit for the least cost? Answering these questions based on strategic, integrated information helps us do smarter, more effective work. We are requesting CCF funds to develop 3 solicited decision support products for TU's Eastern Conservation, Western Conservation, and Volunteer Operations programs.

**Project Description:** Web-based, interactive decision support products enable TU's science program to deliver our analytical work and information synthesis in accessible platforms that provide the backbone for effective communication, strategic planning, and prioritization. Our tools make it easy for a variety of decision makers and partners – TU staff, TU grassroots, agency managers, NGOs, industry, politicians, and funders – to make good decisions using the best available science and data. For example, CCF support in 2017 allowed us to build an

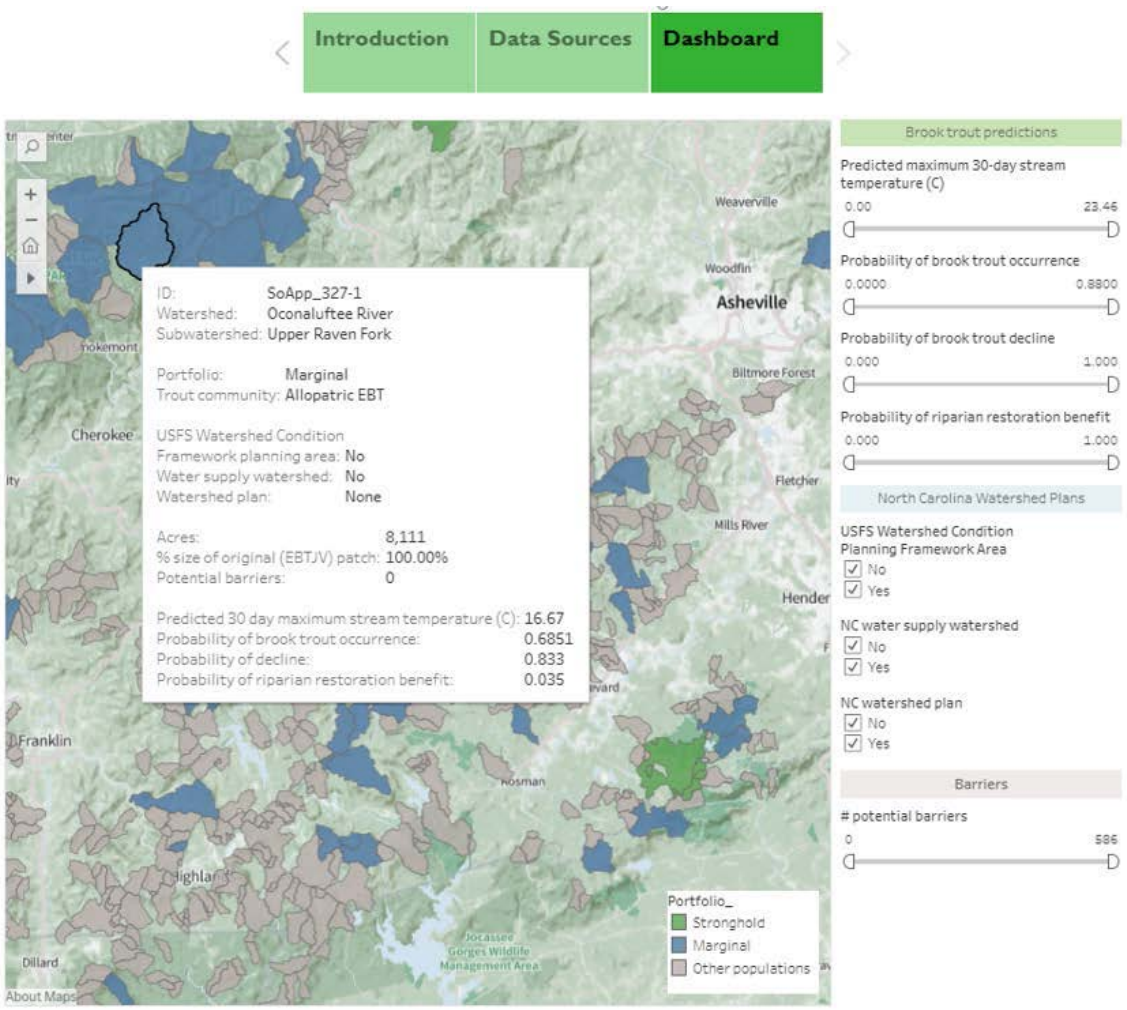



**Figure 1.** NC brook trout decision support tool showing key criteria and filters for identifying priority populations for fish passage improvements.

interactive data visualization and mapping tool that is currently being used to develop common priority criteria with a key partner, the US Forest Service, and to prioritize road crossings for assessment by citizen scientists. The tool included recent brook trout distribution models under current and future climate conditions, a comprehensive road crossings dataset, and regional priority watersheds data, bringing all this information together in one web-based platform to assist TU staff in North Carolina in identifying potential fish passage projects that will benefit Southern Appalachian brook trout.

CCF support in 2018 would allow us to provide decision support tools for 3 new efforts identified by program staff as priority needs. For TU staff in Wisconsin, we propose to build on our success in the Southern Appalachians and develop a similar tool for brook trout conservation on the Chequamegon-Nicolet National Forest, where important information for prioritizing barrier removals exists but has not yet been compiled in a single tool. We will assemble brook trout habitat suitability data, stream crossing inventories, climate change forecasts, and stream habitat condition assessments within an interactive viewer. This tool leverages the infrastructure behind the Southern Appalachians tool and will provide TU staff and partners with key information for considering where barrier removal efforts can best benefit brook trout in the region.

Second, in support of salmon and steelhead conservation efforts in the Columbia Basin of the Pacific Northwest, we will create a variety of compelling map products contrasting recovery goals for individual runs of salmon and steelhead with their current abundance. These maps will highlight those places with the greatest potential for recovery and provide powerful visuals that help frame conversations on recovery actions between TU and decision makers with a wide range of perspectives, from conservation to industry.

Finally, we will develop an interactive web-based tool that will increase our ability to partner with local land trusts on priority land protection work. The tool will house spatial information characterizing priority coldwater fish habitats and proximity to private lands. This integrated information and end-user tool will support TU chapter efforts to work collaboratively with local land trusts to identify opportunities for conservation easements which are most beneficial to trout and salmon.

**CCF Funding Need and Budget:** TU Science is uniquely placed to produce these tools as we have strong expertise in mapping and spatial analysis and we operate across jurisdictional boundaries. Previous investments from CCF and other funders have allowed us to develop a toolkit for delivering map products to support effective decision making. We can now build these comprehensive tools quickly in response to the needs of TU staff and partners. All 3 projects are being requested by program and Volunteer Operations staff but have no identified source of funding. By investing in these tools, CCF is supporting not just the staff time required for tool development, but also increasing the efficiency and effectiveness of our work, within TU and in partnerships, by facilitating broad access to the best available science and information.

**Budget:** $25,000 for TU staff support for data gathering, data summary, and tool development.