2020 Coldwater Conservation Fund

Funded Project Proposals

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Increasing the Scale of Habitat Reconnection through FEMA Funding

Project Overview

Reconnecting fragmented habitat is a pillar of TU's conservation strategy. This proposal requests $50,000 to tap into a new funding stream for habitat reconnection projects by working with local governments and the Federal Emergency Management Agency (FEMA) to upgrade culverts that block fish passage. Congress recently passed legislation reforming FEMA's pre-disaster mitigation program and increased funding by 300%. A grant from the CCF will enable us to take advantage of this opportunity, creating a new funding stream that increases the pace and scale of our habitat reconnection work in the East and Midwest.

Interconnected rivers and streams are vital to sustaining healthy coldwater fisheries. Trout often move throughout a watershed for a variety of reasons, including moving up into colder tributaries during hot summer months and accessing spawning and rearing habitat. TU has a strong focus on removing barriers to fish passage and has reconnected 1,400 miles of rivers and streams over the past three years.

Among the most common barriers to fish passage are the culverts beneath roads. The majority of culverts are undersized, and many of them are perched and angled in ways that prevent fish from moving through them to access upstream habitat. TU removes dozens of culverts each year, replacing them with larger structures that enable fish passage.

The work we have done to date is almost exclusively achieved through funding programs designed to improve aquatic habitat. Yet when we upgrade a culvert the benefits extend beyond fish, creating more resilient infrastructure for local communities. When Tropical Storm Irene hit Vermont more than 1,000 bridges and culverts washed out, but the culverts that had been replaced to fish passage standards withstood the flooding with no damage. As climate change drives more frequent and intense storm events, local governments are looking for ways to keep up with increasing flood risks. This creates an opportunity for TU to address its fish passage goals while helping towns and counties prepare for future flooding. It also creates an opportunity for TU to look beyond the usual natural resource funding programs to accomplish our work.

Project Description

FEMA would seem an unlikely partner for TU's mission. And for a long time, FEMA programs have acted at cross-purposes with our mission by incentivizing local governments to continue to construct undersized culverts that block fish passage. Reforms to FEMA programs passed by Congress in 2018 are changing that. The pot of funding that FEMA uses for infrastructure resiliency projects has gone from just $25 million in 2015 to more than $500 million in 2020. TU successfully applied for FEMA grants in Montana for a dam removal and a floodplain reconnection project. We are now in discussions with FEMA about developing a national Memorandum of Agreement to formalize our partnership. TU's success securing FEMA funding in Montana combined with the massive increase in funding levels has generated momentum that we will build on in our work with select local communities to access FEMA funding for culvert upgrades.

TU has field staff working on culvert upgrades across the East and Midwest. This project will fund a select group of project managers to work with local communities to prepare culvert upgrade projects for FEMA funding.

- Michigan. TU will work with counties in the Manistee, Pere Marquette, and Au Sable watersheds.
- New Hampshire. TU will work with communities in the Androscoggin, Saco, and Pemigewasset watersheds, all of which are brook trout strongholds in the White Mountains.
- New York. TU will work with towns and counties in the Hudson Valley.
- North Carolina. TU will work with counties in the French Broad and Tuckaseigee watersheds.

TU follows a three-step process in working with local communities. First, we meet to discuss the flooding related challenges they face and how we can help to solve them. Second, we look at the inventories of culverts in their town or county, and if the data are lacking, we have crews assess culverts to understand if they are fish passage barriers and if they are at risk of failing in a flood. Third, we identify the culverts that are of mutual interest and begin work with the community to design and fund the culvert replacement project, often using in-house TU staff engineers.

The other key step to receiving FEMA funding is to pass their benefit-cost analysis test. For our Montana projects, that meant we had to hire a consultant who knew how to make the benefit-cost analysis pencil out in our favor. We propose to contract with an expert to ensure we successfully clear the benefit-cost analysis hurdle for these culvert projects.

Most of our work takes place in small rural communities that lack the technical expertise to understand how to approach culvert upgrade projects. The only way for these communities to plan projects and access FEMA funding to upgrade their infrastructure is with TU's help.

Success in this project will fundamentally change what is possible for TU's habitat reconnection efforts. In most places where we work, we are already maximizing the available natural resource grant funds for culvert upgrades. In New York, for example, we would more than double the number of culvert projects we can get done each year if we begin to access FEMA funding. Furthermore, in a time of uncertainty for future grant funding, diversification of funding sources is increasingly important.

Statement of need for CCF funding

We are requesting seed funding from the CCF to develop projects in four states and request FEMA funding. Project costs will vary, but the total requested amount will be between $500K and $1 million.

Budget

- $10,000: Michigan Project Development
- $10,000: New Hampshire Project Development
- $10,000: New York Project Development
- $10,000: North Carolina Project Development
- $10,000: Benefit-Cost Analysis

Total: $50,000

ATTACHMENT

Image of a typical problematic culvert in Michigan before replacement. This is prone to clogging and failure during a flood, and the perch and in-culvert velocity impede fish passage.

Same site replaced with a flood-resilient structure that will pass both fish and flood waters and debris.

Leveraging Public Funding for Restoration in the Upper Delaware

Project Overview

A $50,000 grant would enable TU to leverage $400,000 in grants from the National Fish and Wildlife Foundation (NFWF) and other funders to restore habitat in the Upper Delaware River watershed. In 2016 Congress passed the Delaware River Basin Conservation Act, which established a new grant program administered by NFWF. Since then, the grant program has grown from $5 million to $9.7 million. TU has a successful track record securing funding in recent years, but the program requires 1:1 non-federal match, and we are always limited in the amount we can request by the availability of matching funds. A grant from the CCF would enable us to plan a suite of projects for the next grant cycle and provide us with matching funds that allow us to request more NFWF funding.

Project Description

The Upper Delaware is a coldwater resource of national significance. The headwaters of the Delaware flow from the Catskills and include storied fisheries like the Beaverkill and Willowemoc. Below the Cannonsville and Pepacton reservoirs the East Branch, West Branch, and mainstem Delaware River comprise the what may be the best wild trout fishery on the East Coast. Furthermore, Delaware River tributaries in New Jersey and Pennsylvania contain brook trout strongholds that TU is working to enhance.

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TU was instrumental in the creation and passage of the Delaware River Basin Conservation Act, and we have worked with Congress to increase annual appropriations for the program. TU has received $1.5 million to plan and implement restoration projects since the program was created. However, the lack of matching funds often limits the amounts we can request. A $50,000 grant from the CCF would help TU develop the following projects while meeting the required amount of matching funds to pursue grants in the 2021 grant cycle.

Little Beaverkill Stream Restoration

TU has reached agreement with a landowner who owns one mile of the Little Beaverkill above Livingston Manor to improve habitat by restoring badly eroding streambanks (shown to the right) and adding instream habitat with large wood.

Willowemoc Creek Projects

A landowner who provides public fishing access has agreed to work with TU on an instream habitat improvement project on 2,000 linear feet of stream using large wood additions. TU is working with another landowner to survey 6,000 feet of stream located between two public fishing easements. TU will use wood addition to stabilize the stream bank and narrow the stream channel on a 3,000-foot stretch that is now very wide and shallow with little instream habitat.

Flat Brook Dam Removal, New Jersey

Flat Brook is a native brook trout stronghold located in northwest New Jersey and is the focus of a multi-year restoration effort. TU is completing a prioritization of culvert upgrades and riparian plantings to enhance the brook trout population, but one project has already jumped to the top of the list: removal of a series of small dams on one of Flat Brook's coldest tributaries. On a 90-degree day in July water temperatures in this tributary were 48 degrees. The dams are on state land, and TU has already secured permission to remove them. We now will work through the Bureau of Dam Safety permitting process and prepare funding applications. Once complete, the project will triple the spawning and rearing habitat availability in the stream.

Statement of Need

CCF funding will serve two vital purposes. The first is to support the design and preparation of the projects described above. This work will be completed by TU's project managers for New York and New Jersey and TU's stream design specialist. The second is to provide private funding that will increase the amount of available matching funds, thus increasing the amount of funding TU can request from NFWF. Other matching contributions will come from the New York Water Quality Improvement Program, private donors, and in-kind contributions from landowners and volunteers.

Budget

Project	CCF Contribution	Leveraged Funding	Total
Little Beaverkill Restoration	$15K	$125K	$140K
Willowemoc Restoration 1	$10K	$50K	$60K
Willowemoc Restoration 2	$15K	$135K	$150K
Flat Brook Dam Removal	$10K	$90K	$100K
Total	**$50,000**	**$400,000**	**$450,000**

Protecting the Nation's Greatest Brook Trout Strongholds in Maine

Project Overview

TU is seeking $30,000 to work with at least four land conservation partners to target priority watersheds for brook trout, help them plan conservation purchases (fee or easement) designed to maximize conservation of brook trout habitat, secure state and federal funding to conserve these lands, and help develop management plans designed to protect and enhance brook trout, particularly through changes to forestry practices in riparian zones. This project will leverage funding to protect these priority forest lands, including the Indian Pond Fisheries Enhancement Fund, a dedicated fund for brook trout conservation that has $500,000 for projects near the Cold Stream Forest Property.

Project Description

The Eastern Brook Trout Joint Venture called Maine the "last true stronghold for brook trout in the eastern United States," with more "intact" populations than all other eastern states combined and more than 90% of all remnant native lake and pond populations. TU's Conservation Portfolio analysis of brook trout populations shows these watersheds are primarily located in Maine's more than 10 million acres of "unorganized" townships along Maine's western border with Quebec. These lands have long been owned and managed for commercial timber, though changes in the forest and timber industry and the structure of land ownership in Maine threaten that long-standing pattern. Large parcels of Maine forestland have changed hands in recent years, and the new owners are increasingly real estate investment trusts or other institutional investors rather than lumber or paper companies. In addition, Maine's regulatory standards for forest practices are not protective of brook trout habitat. They allow far too much harvest in riparian areas to protect shading, water temperature regulation, and other key functions of riparian buffers.

These sales risk major changes in forest management or new patterns of development, but they also create opportunities for land conservation—like the CCF-supported state acquisition of the 8,200-acre Cold Stream Forest Parcel from Weyerhaeuser that TU helped broker in 2015. Recent passage of the Great American Outdoors Act permanently funded the US Forest Service's Forest Legacy Program. Forest Legacy, often matched with state bond funds, has completed 11 Maine projects since 2009, putting 108,000 acres into permanent conservation. The availability of these funds, combined with the success of TU's brook trout focus for the Cold Stream Forest Project to generate substantial public support and funding, has created an increase in interest for TU to help identify priority lands for brook trout conservation and design conservation plans that will maximize benefits to brook trout. We have been invited to participate in conservation planning in several regions that contain multiple stronghold populations of brook trout and are predicted to be resilient to climate change, to identify lands that can be protected from development, as well as fisheries-specific best management practices that are incorporated into conservation easements or binding management plans. The most important of these would be a 100' no-cut buffer next to all permanent streams.

- We will work with the Maine Mountain Collaborative to identify brook trout habitat priorities in a region that stretches along the crest of Maine's Appalachian Mountains from Rangeley in the southwest to Mt. Katahdin in the northeast.
- In the Androscoggin Headwaters, we will work with the Rangeley Lakes Heritage Trust on conservation planning for the Upper Magalloway and Upper Kennebago Rivers, two primary headwater tributaries for spawning brook trout from the region's two largest lakes, Aziscohos Lake and Mooselookmeguntic Lake. One project in partnership with the Rangeley Lakes Heritage Trust would protect up to 10,200 acres, 5 miles of the Kennebago River, and 11 miles of brook trout spawning tributaries, as well as significant shoreline acreage on Big and Little Kennebago Lakes.
- In the headwater of the Pleasant River, the Appalachian Mountain Club (AMC) owns more than 70,000 acres around the West Branch Pleasant River, protecting it from Silver Lake to its headwaters. They are currently working to acquire 30,000 additional acres that contain most of the Middle Branch Pleasant River watershed and several critical cold tributaries to the West Branch. These parcels include the entire seven-mile length of the Middle Branch Pleasant River, 14 miles of tributaries to the Middle Branch, and two native brook trout ponds and five miles of tributary streams on the West Branch Pleasant watershed.
- In the upper Kennebec watershed, we will work with the Forest Society of Maine to assess potential risks to brook trout habitat from retained development rights at three sites near Cold Stream Forest and to prioritize other adjacent lands for future conservation projects. The $500,000 Indian Pond fund could fund brook-trout-focused projects in this region. One potential project in this area would protect about 1,200 acres, including three native brook trout ponds and 1.5 miles of Tomhegan Stream and tributaries. Combined with other conservation lands, this would result in protection of the entire Tomhegan Stream watershed.

Statement of Need for CCF funding

Newly available funding for forest land conservation in Maine has created renewed interest in large scale forest conservation through in-fee or conservation easement purchases. TU is the obvious choice to spearhead brook trout-focused land protection work, and several conservation partners, both private and state, have approached us seeking our assistance to develop projects like the Cold Stream Forest purchase. However, because this is an unanticipated opportunity with an immediate start date, and because TU's current Maine funding sources are restricted to other projects, we do not have the flexible funding to take advantage of this moment. This is a rarely-occurring chance to protect native trout at a landscape scale, and between our Conservation Portfolio and other data analysis tools to prioritize watersheds, our local knowledge to guide the design of these conservation projects, our proven ability to steer conservation land funding towards landscapes that fill important gaps in the existing network of conserved lands, and the hard-earned respect that we enjoy in the state of Maine, TU is the natural leader for work. In addition to the immediate goal of conserving land, these efforts will also allow us to build relationships with conservation landowners and managers who support brook trout conservation but do not have TU's expertise to implement it, yielding future opportunities for restoration projects.

Budget

We are requesting $30,000 from the CCF. This will allow us to carve out a sufficient portion of the Maine Brook Trout Project Director's time to work with land conservation partners over two years ($15,000 in 2021, and again in 2022). Sustained funding over two years is important due to the long timeline for land conservation projects. This CCF investment will help leverage over $500,000 from the Indian Pond Fisheries Enhancement Fund into conservation of important brook trout habitat adjacent to the Cold Stream Forest, as well has substantial work by at least four conservation partners to advance land conservation projects with high value for brook trout.

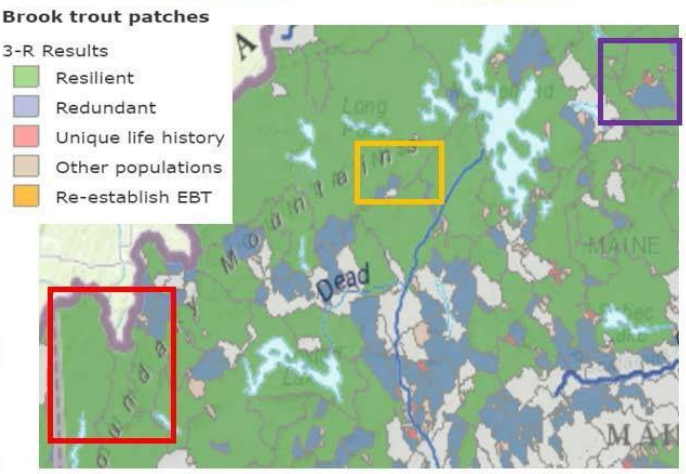
Maine Brook Trout Project Director, 2 years (Jeff Reardon) @ 15%: $30,000

Total: $30,000

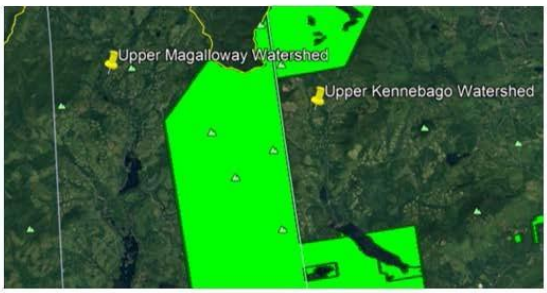
Conservation Portfolio Results and Focus Areas

North East: Resilient (Stronghold) Populations

Western Maine Brook Trout Focus Areas: Androscoggin and Pleasant River Headwaters; Cold Stream



Androscoggin Headwaters Focus Area



Pleasant River Headwaters Focus Area

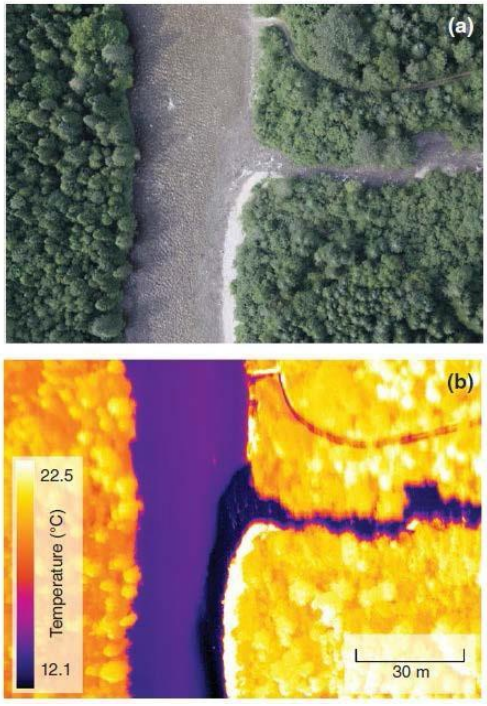
- Green: Existing State, Federal, and Private Conservation Lands.
- Cold Stream Forest Focus Area not shown.

Developing In-House Expertise with Emerging Technologies to Map Coldwater Refugia

Project Overview

In the Midwest region, and throughout the country, climate change poses a major threat to coldwater fisheries. In particular, increasing stream temperatures present a critical management challenge for TU and our partners. Many coldwater streams already experience periods of thermal stress during warmer summer months. However, coldwater inputs (e.g. seeps, springs and headwater tributaries) both moderate the overall temperature within a stream system and create localized cold spots that function as thermal refugia, allowing coldwater species to inhabit these streams when average stream temperatures exceed the species' thermal tolerance.

These coldwater inputs represent an extremely important source of resilience as air and stream temperatures rise, but there has been insufficient research on their abundance and distribution. Traditional temperature monitoring methods include the deployment of in-stream sensors that log temperature at regular intervals. While these tools are effective in understanding coldwater habitat suitability for a given point, they do not provide a holistic view of the available coldwater refugia within a stream system. Even when deployed in one-kilometer intervals, which is considered fine-scale for this method, temperature loggers are likely to miss ecologically significant coldwater inputs and refugia that can exist on a scale of meters.



Thermal imagery shows coldwater input from a tributary (_____)

A $52,450 grant from the CCF would enable TU to address this challenge by using drone-mounted infrared (IR) sensor technology to map stream temperature in high resolution at a watershed scale. This technology is being used in the West, but in the Great Lakes, the lack of a cost-effective provider has stalled its adoption. With the equipment and expertise provided through this grant, TU can become the go-to provider of drone-mounted IR mapping in the region, providing valuable data that informs the coldwater conservation work of TU and our partners.

Project Description

TU has a robust conservation program in the Great Lakes, leveraging millions of dollars of restoration funds to reconnect and restore tributaries of Lake Michigan and Lake Superior in Wisconsin and Michigan.

Most of this work occurs in close collaboration with partners like the U.S. Forest Service and U.S. Fish and Wildlife Service. These partners are eager for TU to establish the capacity to conduct IR mapping so that we can continue to refine our

restoration targets. As the U.S. Fish and Wildlife Service put it in a letter to TU, "Currently, a cost-efficient source for thermal imaging data acquisition and processing does not exist in the Great Lakes, creating a barrier to obtaining these valuable datasets. Building the capacity within TU to conduct thermal imaging surveys will provide the USFWS with a new resource in the region, and we would contract with TU to conduct thermal imaging surveys in watersheds of mutual interest to our respective organizations."

Here's how thermal imaging works. First, temperature loggers are deployed in the survey area to allow for calibration and validation of thermal imagery. Second, drone flights are carried out capturing thermal and optical imagery. The imagery is then stitched together and corrected for atmospheric conditions (e.g. humidity) and calibrated using temperature logger data. Then a map displaying stream temperatures is created identifying potential coldwater refuge locations associated with areas of groundwater upwelling, coldwater contributions from tributaries, etc.

This proposal involves purchase of hardware to conduct thermal imaging assessments, including an IR camera, drone and insurance. Building off of drone expertise gained through a previous CCF grant, TU Great Lakes staff will take the necessary steps to become certified by the Federal Aviation Administration as drone pilots and build proficiency in thermal data acquisition. Support from the CCF would enable TU to purchase image analysis software and build expertise in data processing at our Boise, Idaho office. With the new hardware and capacity in hand, TU will conduct a demonstration project in Michigan to show proficiency and understand our costs for completing surveys. This effort will set us up to earn contracts and acquire grant funds to map stream temperatures in the region.

This proposal would also enable us to cost-effectively provide IR mapping for TU chapters and other local partners who operate in priority watersheds like Michigan's Manistee. Building this new capacity within TU will be a springboard to securing other sources of funding to conduct thermal surveys and improve the ability of TU staff, chapters and agency partners to include a fine-scale understanding of coldwater inputs and refugia in their decision-making process. Furthermore, with in-house image analysis capacity and development of broadly applicable best-practices and guidance for conducting drone-based thermal imaging surveys, the cost of creating other regional TU hubs with the capacity to conduct these surveys will be significantly reduced.

CCF funding would enable us to obtain and build the necessary equipment, software, and knowledge-base to establish TU as a go-to provider of drone-mounted IR mapping. The funds will support TU staff time and essential hardware and software to conduct thermal imaging surveys. With this new capacity, TU will be positioned to contract with partners such as federal agencies and other conservation organizations and seek grant funds to create these highly useful datasets in the Great Lakes.

- $17,850: TU staff support for training, acquiring certifications and conducting surveys.
- $4,600: TU staff support for image analysis
- $30,000: Image Analysis Software, IR Camera, Drone, and other supplies

Total: $52,450

From:	Lisa Elliott
To:	Jacob Lemon
Cc:	Keith Curley
Subject:	Letter of Support
Date:	Monday, July 27, 2020 2:59:03 PM

July 27th, 2020

Dear Mr. Lemon,

I am writing to express my keen support for your Coldwater Conservation Fund proposal, titled "Using Emerging Technologies to Map Thermal Refugia." In my position as a landscape fisheries ecologist for the University of Minnesota (UMN) I appreciate the imperative for better information on coldwater inputs and refugia. These stream features play a critical role in supporting coldwater species, such as brook trout, on the Great Lakes landscape.

My collaboration with USFS NRS and TU on a Great Lakes Restoration Initiative funded project seeks to identify factors that influence brook trout occurrence, including land use, land cover, changes in canopy cover, ownership, and other aquatic and terrestrial characteristics of watersheds. In the course of this project, we've come to recognize that we lack adequate high resolution data on the distribution and characteristics of coldwater inputs and refugia. Without such finely detailed information, our recommendations for prioritization of management actions aimed at protecting and enhancing habitat for coldwater species will be unable to account for this essential resource. Thermal imaging technology could help us solve this problem, and we are excited to map coldwater inputs and refugia at a watershed-scale. UMN's Remote Sensing Lab does not currently have the capacity to collect such data, and alternative options for data acquisition and processing in the Great Lakes are not cost-efficient. I believe that building the capacity within TU to conduct thermal imaging surveys will improve the state of knowledge in the Great Lakes, and allow us to be far more competitive in collaboratively pursuing additional funding opportunities to support thermal mapping and effective prioritization of watersheds for restoration activities. In addition to aiding in the prioritization of restoration activities to support coldwater fisheries, these data will improve our understanding of how land use and land cover interact with the distribution and characteristics of coldwater inputs and refugia, to the benefit of decision-making to support these coldwater resources.

I am excited to be a part of future collaboration with TU and other partners, such as the US Fish and Wildlife Service, to pioneer novel thermal imaging datasets that enable more efficient and effective use of conservation dollars at local and regional scales.

Sincerely,

Dr. Lisa Elliott

Postdoctoral Associate

Department of Forest Resources

University of Minnesota

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Lisa Harn Elliott
Postdoctoral Associate
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Pronouns: She, her, hers

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Green Bay Fish & Wildlife Conservation Office
2661 Scott Tower Drive; New Franken, WI 54229
Phone (920) 866-1717 | Fax (920) 866-1710

July 9th, 2020

Jake Lemon
Eastern Angler Science Coordinator
Trout Unlimited
jlemon@tu.or

RE: Using Emerging Technologies to Map Thermal Refugia

Dear Mr. Lemon,

The U. S. Fish and Wildlife Service (USFWS) Green Bay Fish and Wildlife Conservation Office (GBFWCO) is pleased to provide a letter of support for the Trout Unlimited (TU) proposal, *Using Emerging Technologies to Map Thermal Refugia*. We recognize that coldwater inputs and refugia play an essential role in maintaining coldwater ecosystems. The proposed project is in complete alignment with our organization's mission to work with others to conserve, protect, and enhance fish, wildlife, plants, and their habitats for the continuing benefit of the American people. We enthusiastically support this work as it helps us fulfill our goals to conserve aquatic species and their habitats and enhance recreational aquatic resources.

The GBFWCO recently underwent a strategic planning process to create a habitat plan to guide our work throughout the Lake Michigan Basin. Brook trout were identified as a priority species, serving as an indicator of the health of coldwater streams and rivers. Lake Sturgeon are another priority species identified in our strategic plan that rely on coldwater inputs for suitable habitat conditions. We recognize that facilitating natural resilience to the effects of climate change can be an effective strategy to maintain coldwater ecoysystems in the region. Only by fully understanding the distribution and characteristics of coldwater inputs and refugia can we effectively plan management actions to promote resiliency. Currently, a cost-efficient source for thermal imaging data acquisition and processing does not exist in the Great Lakes, creating a barrier to obtaining these valuable datasets. Building the capacity within TU to conduct thermal imaging surveys will provide the USFWS with a new resource in the region, and we would contract with TU to conduct thermal imaging surveys in watersheds of mutual interest to our respective organizations.

The USFWS GBFWCO is encouraged by Trout Unlimited's commitment to pursue habitat protection and enhancement in the Lake Michigan Basin. We look forward to collaboration with TU and other partners, such as the US Forest Service, to use emerging technologies in creating novel thermal imaging datasets that enable more efficient and effective use of funds to support coldwater ecosystems. This effort will leverage the strengths of our respective organizations to benefit coldwater conservation at both the local and regional scale.

Sincerely,

SUSAN WELLS Digitally signed by SUSAN WELLS Date: 2020.07.27 10:16:24 -05'00'

Susan Wells,
Project Leader, Green Bay Fish & Wildlife Conservation Office

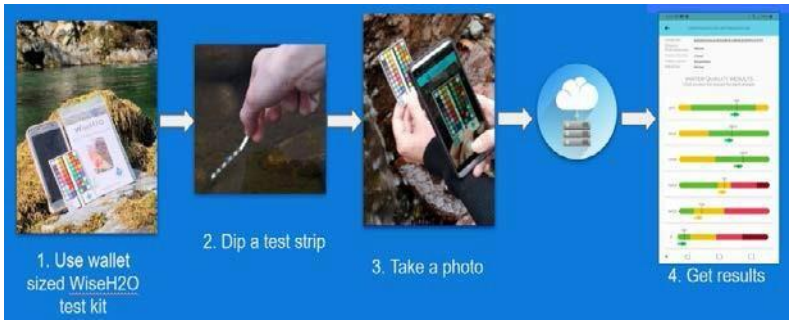
Community Science and Water Quality in the Driftless Area

Project Team: Dan Dauwalter (Science); Jeff Hastings (TU-DARE and Eastern Conservation);

Kent Johnson (Kiap-TU-Wish Chapter)

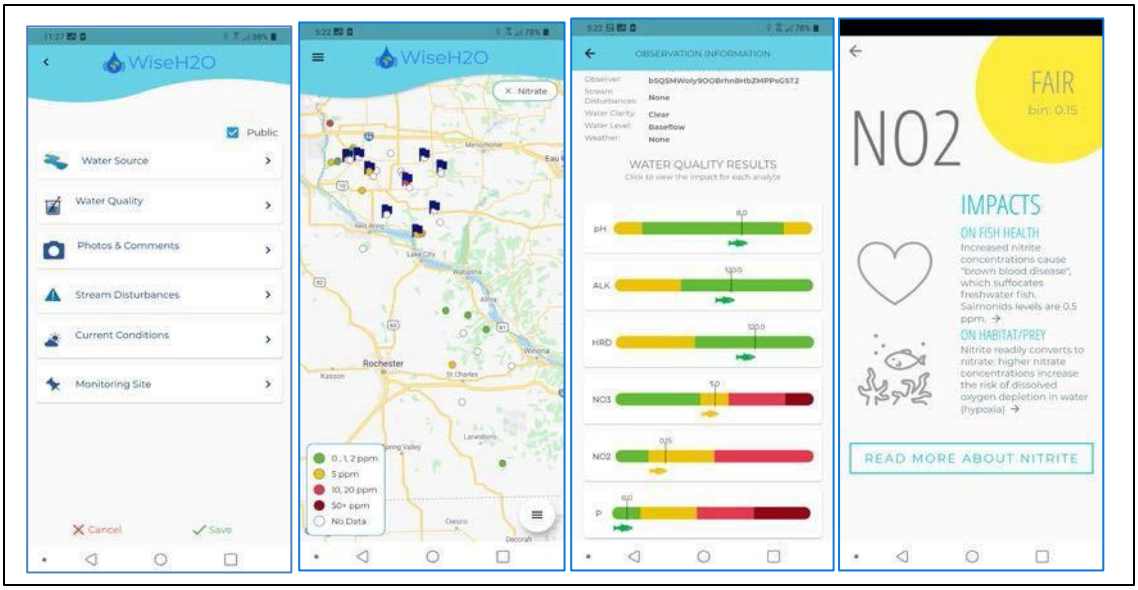
Project Overview

Angler Science has been a focal point in Trout Unlimited's Strategic Plan since 2015. Now re-named 'Community Science,' it is the perfect engagement tool for a science-based organization to empower its 300,000 members and supporters. In 2019, Trout Unlimited-Science worked with partner MobileH2O, LLC to refine its WiseH2O mobile application (WiseH2O App) and pilot a community-science and water-quality monitoring program with the Kiap-TU-Wish Chapter of Trout Unlimited in Pierce County, Wisconsin in the northern Driftless Area. The WiseH2O App enables water-quality monitoring using color-reactive test strips paired with a mobile phone to screen nutrients (nitrogen and phosphorus) and other important water-quality analytes. Importantly, the WiseH2O App is also educational because of real-time reporting and data interpretation, and it enables crowdsourcing of water quality information by a community of anglers and others for use in conservation decision-making. In 2020, we worked to expand the program to all TU Chapters in the Driftless Area. We held a workshop for TU chapters at the 2020 Driftless Areas Symposium in La Crosse, Wisconsin in February (6 chapters attended), but COVID-19 delayed the formal field program launch to late summer. In 2021, we propose to continue to strengthen coordination and stand up an autonomous program by empowering TU Chapters across the Driftless Area to crowdsource water quality data, be program advocates, and help expand and engage the broader Driftless Area community, including natural resource professionals.



Project Description

In 2021 we will continue to strengthen the program across the Driftless Area but with a plan to transition to a self-sustaining program. This includes leveraging TU Chapter volunteers and supporters to engage the broader Driftless Area community, while also securing other regional funding sources. This continued expansion will emphasize engagement of TU Chapters and assist them in monitoring their home waters and regional fisheries resources in two ways: 1) working with interested TU Chapters to develop monitoring plans for their home waters within chapter boundaries; 2) developing a regional monitoring plan that is focused on native brook trout streams that, for example, leverages the Wisconsin DNR's brook trout refuges in their trout management plan but also includes habitat restoration projects.



TU-Science will continue to work with MobileH2O to refine the WiseH2O App using feedback from TU Chapters and 2020 program roll-out to the broader Driftless Area. Strengthening the regional program in 2021 will require annual licensing of the WiseH2O App and purchase of WiseH2O App test kits (test strips and phosphorus kits) for TU Chapters to jump start 2021 monitoring. It will also include multiple training sessions by lead volunteers, staff, and project partners, including another workshop at the 2021 Driftless Area Symposium held annually in February in La Crosse, Wisconsin.

CCF Impact

Coldwater Conservation Funds will continue to strengthen this community science project across the Driftless Area. CCF funds will provide necessary match to leverage further funding by the National Fish Habitat Partnership funding, TU-Driftless Area Restoration Effort (TU-DARE), and the National Fish and Wildlife Foundation. More specifically, it will allow dedicated staff time to expand the water quality monitoring program in the Driftless Area by refining the WiseH2O mobile app, purchasing starter materials and developing training materials for TU Chapters, providing in-person training events, helping to direct monitoring efforts toward resource needs, and improving data management and visualization. This community program will continue to educate anglers and others on water quality in Driftless Area streams and result in a crowd-sourced database of water quality information for use in conservation planning and evaluation of restoration effectiveness across the Driftless Area.

CCF Funding Request: $20,000

- $ 5,000: WiseH2O App water quality test kits for TU Chapters (basic kits [$12/kit] + premium kits [$60/kit] to TU Chapters)
- $ 5,000: Training and resources, including chapter-based and regional monitoring plans (TU staff)
- $ 5,000: Database enhancement and data visualization (TU staff)
- $ 2,500: 2020-2021 report (e.g., Chapter engagement and WQ status of brook trout streams) (TU staff)
- $ 2,500: Travel (TU staff)

Matching Funds: $15,000 (National Fish Habitat Partnership and TU-DARE)

- $ 15,000: Mobile application refinement and licensing (contract with MobileH2O, LLC)

Characterizing Resources Threatened by Changes to the Clean Water Act

Project Overview

The federal Clean Water Act of 1972 is widely considered one of the nation's most successful environmental laws, but a new administrative rule eliminates its protections for an estimated 50% of US streams. TU and partners aim to halt this rollback. CCF support will allow TU Science to analyze public permit databases, demonstrate which waters will lose protection, and deliver sound scientific data to support the overturn of the new rule as well as legislation to resolve longstanding uncertainty regarding the Act's jurisdiction.

The Clean Water Act was enacted with an objective to "restore the chemical, physical, and biological integrity of the Nation's waters" to achieve water quality that is "fishable" and "swimmable." The Act's permitting requirements and grant programs have inarguably improved the quality of thousands of miles of rivers and streams across the country and have protected thousands of acres of wetlands from destruction. Yet, for much of the Act's fifty-year history, determining which streams and wetlands are subject to the Act has been a source of contention.

On January 23, 2020 the US Army Corps of Engineers and Environmental Protection Agency ("the Agencies") announced the Navigable Waters Protection Rule (NWPR), an administrative rule redefining the "Waters of the United States" – those streams and wetlands that fall under the regulatory jurisdiction of the Act. For flowing waters, the largest change is the removal of protections for ephemeral streams, which flow only in direct response to precipitation events. TU Science's research suggests that over six million miles of streams — or *half the total in the United States* — will now be unprotected by the Clean Water Act. More than 42 million acres of wetlands — again, about half the country's total — will no longer be protected because they are not immediately adjacent to larger waters. As TU's Chris Wood noted in an opinion piece in The New York Times: "The rule change will make it easier to pollute streams and fill in wetlands that safeguard our water supplies, reduce flood risks and provide for healthy fish and wildlife habitat. And it will make it harder to provide sensible oversight of oil and gas projects, pipeline construction and major housing development. The impacts will be felt nationwide."

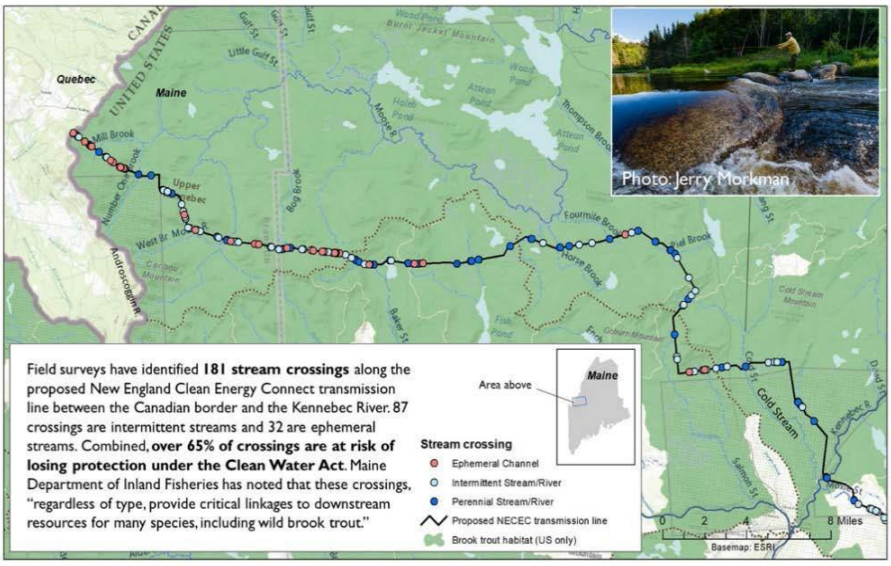
Still, our engagement will be most effective if we translate the Agencies' new Rule into various examples of real impacts that are meaningful to all of us. To help characterize the resources vulnerable to loss of protection under the Clean Water Act and spur changes to this policy, TU's Science program proposes to review projects subject to Clean Water Act §404 permitting during 2017 – 2019. A 404 permit is required for construction activities that will dredge or fill any Waters of the US (normal agricultural and forestry operations are exempt from Clean Water Act jurisdiction). By documenting the types of projects subject to the Clean Water Act, the impacts of these projects on ephemeral streams and wetlands, and the mitigation measures previously implemented to minimize those impacts to downstream resources (i.e., mitigation that is no longer required), we will make the effects of the rule change more tangible to our members and the public, provide information to support litigation to overturn the proposed rule, and bolster TU's advocacy for legislative solutions to resolve the definition of "Waters of the US."

Project Description

The US Army Corps of Engineers and Environmental Protection Agency maintain a database with information on the location and details for the roughly 50,000 §404 dredge and fill permits issued each year. The agencies

determine whether each permit is subject to the Clean Water Act through review of map information and field visits. While most projects are not subject to Clean Water Act jurisdiction, the database provides information for those projects that do impact streams and wetlands that are subject to the Act; because it includes whether the streams have ephemeral flow or the wetlands are isolated from flowing waters, these details will allow us to identify waters that will lose protection under the new rule. The database also provides additional project details that will allow us to cross-reference other project documents, including information on project impacts and mitigation requirements.

As an example of the type of project and associated detail we seek to identify, take the proposed New England Clean Energy Connect transmission line, a 60-mile corridor from the Canadian border to central Maine. The project illustrates the profound impact of eliminating 404 permit requirements for ephemeral streams and isolated wetlands under the new rule. The line will cross numerous freshwater resources along its route, including 25 ephemeral streams and many isolated wetlands (Figure). Vegetation around these waters will be removed and the channels will be subject to regular maintenance in the transmission line's right-of-way, including mowing and herbicide application, all of which will cause warming and potential impairment of 400 miles of downstream receiving waters in the Kennebec River basin. Those waters provide surface water drinking supply to 7,600 downstream Maine residents, support renowned brook trout and Atlantic salmon fisheries, and include approximately 250 miles of Maine Class AA and A waters, the highest-quality surface waters in the state. To offset these impacts, the project proposes mitigation measures including 40,000 acres of conservation land acquisition and $2 million for isolated wetland restoration.



Stream crossings subject to loss of Clean Water Act protection along the New England Clean Energy Connect transmission line

Loss of Clean Water Act protections will decrease the sensible oversight and mitigation efforts of similar projects. By compiling examples like this across the country and characterizing key national information including number and types of projects no longer subject to the Act, downstream resources, and total mitigation funding lost, TU will support ongoing litigation with partners to overturn the new rule. Similarly, the information will help make the case for what is at stake with Clean Water Act permitting and support TU's advocacy for efforts to define legislatively those waters subject to the Act next year when the issue will likely be taken up by Congress.

CCF Funding Request

$15,000 for analysis by Kurt Fesenmyer of TU Science to support policy recommendations from Government Affairs and outreach through Communications.

Research, Resources, and Connections to Characterize and Scale up Benefits of TU's Carbon Sequestration via Riparian Plantings

Project Overview

Each year, Trout Unlimited staff and volunteers plant an unquantified but estimated 20,000-30,000 trees. Currently these efforts are largely targeted toward, and marketed as, improving water quality and fish habitat. What we haven't quantified and publicized, however, is the accompanying benefit we are providing for carbon sequestration: the process by which atmospheric CO_2 is taken up by trees and other plants through photosynthesis and stored as carbon in biomass and soil. TU has a tremendous opportunity in front of us to develop processes and tools to quantify these additional benefits of this work and pivot our communications and outreach to promote the "Natural Climate Solutions" component of our riparian plantings. Quantifying sequestration benefits and providing new guidance and tools will motivate and help chapters increase their efforts; concurrently, reframing how we the advertise these planting projects to emphasize sequestration benefits will attract new, more diverse members (e.g., those interested in conservation if not necessarily fishing), as well as potential funders and partners seeking multiple benefits from their TU commitments. Collectively these actions will allow TU to scale up riparian planting efforts in the future.

Project Description

Recent science shows riparian areas are underappreciated carbon storage power houses. Most previous carbon sequestration studies have not analyzed riparian forests separately from upland forests, even though the more favorable growing conditions in riparian corridors (from greater soil moisture and other factors) may allow for quicker accumulation of carbon. In addition to carbon stored in the vegetation itself this recent work has found, on average, the reestablishment of riparian forests can more than *triple* the carbon stored in the soil compared to baseline conditions, a much higher contribution to soil carbon storage than earlier estimations of forest reestablishment that were limited to reforesting croplands. The upshot? The work TU does every day has disproportionate impacts on sequestration – yet currently we do not quantify or advertise these benefits.

We propose a three-tiered approach to helping TU identify, quantify, market and grow its sequestration benefits:

1) *Collect information about current TU riparian plantings*. Currently, TU does not collect tree planting reports from our grassroots/staff; the above estimate of plantings comes from specific staff with local awareness of or participation in specific projects, or from projects funded annually by our Embrace A Stream program. Working with our Volunteer Operations staff, we will create a survey to query chapters and staff about their plantings over the past 18 months. Information will include location, number of trees planted by species, maintenance activities, and partners/funders.

2) *Collaborate with US Forest Service to account for TU's carbon sequestration.* TU Science was recently contacted by Dr. Grant Domke, a TU member and primary researcher from the USFS Forest Inventory and Analysis (FIA) program. The FIA program analyzes 131,000 study plots across the country to quantify carbon sequestration in our national forests and report progress toward our commitment to the United Nations Framework Convention on Climate Change (currently, our national forests offset 11-12% of US greenhouse gas emissions).

   Dr. Domke has offered in-kind support of a FS post-doctoral researcher to help adapt the Forest Service's national carbon accounting efforts to our specific need for focus on riparian areas/tree species, as well as to explore application of measured protocols to help us identify broader, watershed-scale benefits of our restoration work. One component of this relationship will be to adapt the Forest Service's *iTree Planting* carbon accounting tool to encompass our needs: *iTree* provides an estimation of carbon sequestered by tree planting projects based on project location and tree species planted, but currently does not include estimators for many riparian species (e.g., Coyote willow) commonly used by TU. Applying this collaborative research effort to the above survey information, we will provide the first baseline characterization of the current sequestration footprint of TU (at least regionally, based on known work).

3) *Develop outreach, strategic guidance, and connections for grassroots to improve effectiveness of and scale up riparian plantings.* An important outcome of the above work will be to reframe TU's traditional riparian planting model, now primarily focused on water quality and fisheries benefits, to emphasize the carbon sequestration benefits of this work. We will also create regional/local-based practical guidance to increase the scale and effectiveness of planting efforts. For instance, using the modified *iTree* tool we could determine the optimal mixture of appropriate riparian tree species in a given climatic/soil region for maximizing carbon sequestration; we could also provide regional analysis of trout distribution, soil productivity, and current % riparian cover to help point chapters to areas for planting that might achieve multiple goals. Volunteer Operations staff will work with local chapters to increase their riparian planting efforts and record benefits using *iTree*. Finally, with our FS partners we will work to connect our progress to national efforts and organizations helping to mitigate greenhouse gases via Natural Climate Solutions. We foresee that building this type of practical guidance and networking will not only help our grassroots in implementing successful projects but will attract new funding and partnerships for continued acceleration and scaling of our restoration work.

Project Outcomes and CCF Impact

The primary outcomes of this project will be the establishment of a research relationship with the U.S Forest Service's FIA program, refinement of the *iTree* tool to improve its ability to calculate carbon sequestration of riparian plantings, and the development of compelling guidance and marketing tools to scale up and tell TU's sequestration story. For the first time, we will estimate the impact of TU's collective carbon sequestration efforts through riparian plantings and tell that story using various communications products. Additionally, through grassroots and staff engagement we will pursue further funding for riparian projects from supporters focused on sequestration efforts to increase riparian planting efforts on a regional basis. As just one example, our goal in the CT/NY region is for our Volunteer Operations Regional

Coordinator to encourage and support local chapter projects and partnerships to increase riparian plantings by 20%. This effort will increase TU's riparian planting footprint and provide new sources of revenue for these projects in the future.

CCF Funding Request: $41,000

- $15,000: Volunteer Operations Regional Coordinator for grassroots coordination
- $20,000: TU Science (Fesenmyer/Neville) for FS collaboration, analyses and guidance development
- $6,000: TU Communications for digital guide and outreach materials

Project Match

In-kind post-doctoral research support from Forest Service Inventory Analysis + $20k in matching grants from Embrace A Stream program in 2021 for riparian planting projects

A Web Data Portal to Advance TU's Hydrological Science

Project Overview

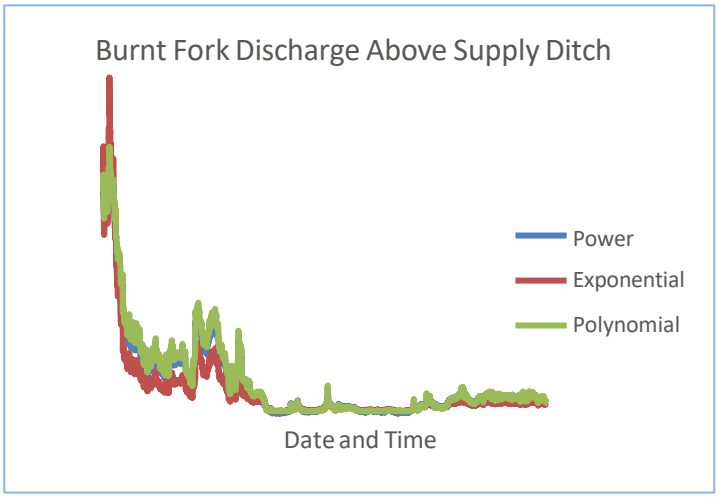
With CCF support, we propose to develop an interactive, web-based data portal for our scientists to analyze streamflow and characterize the quality of these data.

Project Description

TU scientists are charged with monitoring and improving the quality and quantity of the water that sustains the coldwater fisheries of our nation. We work to understand the interactions between streamflow, stream temperature and aquatic habitats; how and why these dynamic stream systems change over time; and how these changes impact fish and their ecosystems. Understanding streamflow regimes is critical to developing meaningful restoration projects and evaluating their effectiveness, meeting monitoring requirements, and communicating with project partners and the public. The primary tools our scientists use to collect these data and understand their relationships are water depth sensors (gages) and hydrographs: plots that show the patterns and cycles of streamflow, minute by minute, and hour by hour.

TU conducts stream measurements at hundreds of sites.

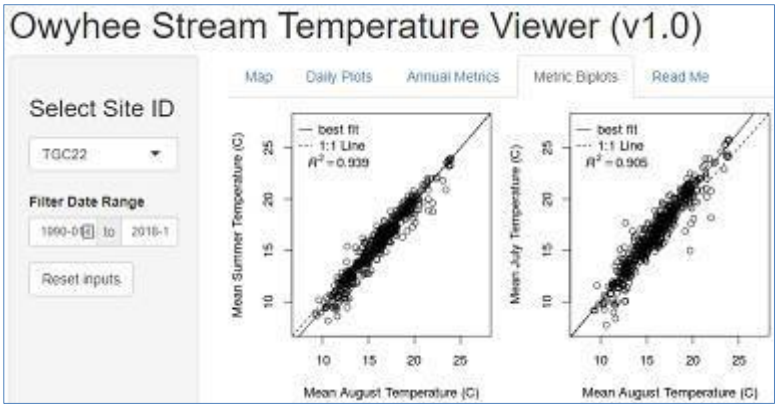
Trout Unlimited maintains hundreds of gaging stations at monitoring sites nationwide. As the budgets and gaging footprint of the USGS and state water quality departments shrink, TU's gage network increasingly augments these gaps. This is especially true in small headwater streams, which are particularly important for trout and salmon yet are under-represented in our nation's water monitoring networks. Each of TU's monitoring sites produces thousands of data points every day, which our staff hydrologists must then examine manually using their professional expertise and insufficient tools like Microsoft Excel to analyze and compare various discharge rating approaches, statistically quantify their quality, and ultimately produce the hydrographs themselves. This is a time-consuming process for our scientists.



Hydrograph created manually by TU staff

We propose to build an interactive, web-based visualization and analysis portal and accompanying database to enable hydrologists to upload stream gage data and plot custom hydrographs for TU's monitoring networks and those of our partners. The tool would feature secure access, allowing our scientists to protect or to share sensitive data as appropriate to each project.

This tool would be built on Shiny and R, the same open-source platforms on which TU developed tools such as the Owyhee Stream Temperature Viewer (at left) -- a platform with which many staff field scientists already have some familiarity and can easily be used by partner agencies and organizations. Adopting this same platform for the proposed Hydrology Data Portal will enable TU to share common tools within the organization and eliminate redundant, time-consuming, and error-prone manual data management, while unifying our workflows and providing visual consistency across the charts produced. This project will be the first step toward our ultimate goal of providing real-time streamflow data from those monitoring stations which have telemetry capability, leading to online data visualization with up-to-the-minute streamflow information.



Owyhee Stream Temperature Viewer, developed by TU Staff

Statement of Need

While there are commercial hydrology software packages available (e.g., Aquarius), these tools cost tens of thousands of dollars per license and make it difficult to import legacy data (often collected from sensors manufactured by competing vendors). They also lack the flexibility needed by TU scientists. Similarly, Microsoft Excel and other basic data management programs are extremely time intensive. A custom tool will allow us to use statistical methods to quantify and demonstrate the quality of our data and analyses, and communicate clearly with other professional scientists and project partners – a key aspect of demonstrating restoration need and conveying the impacts of the on-the-ground work accomplished by TU staff and volunteers. If awarded, the labor to develop the data portal will be matched by an estimated additional 100 hours of time for conservation staff to review and test the product, providing feedback during its first year of field use; this field testing will be overseen by Christine Brissette, Hydrologist and Special Projects Manager for TU's Western Water and Habitat Program and Mia van Docto, TU's California Conservation Hydrologist.

When we can better quantify the amount of water in a stream, characterize its seasonality, and identify trends over years or decades we will be best equipped to improve the quality of trout watersheds through habitat restoration, reconnection and smarter, more efficient irrigation practices in partnership with water users and land managers.

CCF Funding Request: $30,000

- $25,000: Salary/benefits for TU Science Team Senior Programmer to lead the project, design, develop, and document the web portal (Matt Barney)
- $4,500: Salary/benefits for TU staff hydrologists (Brissette and van Docto)

Raising the Speed Limit on the Salmon Superhighway

Project Summary

The six major river systems that drain from the Coast Range into Tillamook and Nestucca bays on Oregon's North Coast provide an historic opportunity to reconnect productive habitat, benefiting six species of anadromous (ocean-going) fish to an extent not seen in decades. TU's goal here is an unprecedented scale of fish habitat connectivity, with an optimized conservation return on investment, all completed within 10 years. TU's success over the first 5 years of the program shows this strategy is working. The Salmon SuperHwy partnership is planning for the next 5 years of work by determining what key actions are needed to meet our ambitious 10-year target. Two critical needs are 1) updating the OptiPass model that prioritizes the fish habitat needs and investments, and 2) additional project implementation (staff) capacity in the Tillamook Bay Watershed.

Background and Conservation Need

The Salmon SuperHwy program (www.salmonsuperhwy.org), coordinated by TU, is revolutionizing how we restore fish passage and connectivity to maximize results while minimizing the cost of the work. Hundreds of barriers in streams still create bottlenecks throughout Oregon's coastal watersheds, creating major problems for fish and people. Most are problem culverts at road crossings that contribute to flooding and road damage, along with some small dams and tidegates. Traditionally, much of the work to restore access for salmon and steelhead has been tackled on a project-by-project basis, as opportunity and funding come together. This approach has resulted in significant habitat improvement work, but the value of that work is limited when it is not conducted in a strategic way. The award-winning Salmon SuperHwy program does it differently. It utilizes OptiPass, a fish passage optimization model, to prioritize which barriers are removed based on both the amount and quality of habitat opened, and the cost of removing the barrier. The collaborative then considers other factors like flood risk and health and human safety that are associated with undersized culverts and small dams to develop a program-wide project implementation plans, assuring the best possible return on investment.

The 940 square-mile Tillamook-Nestucca watershed represents some of the richest salmon and steelhead recovery potential anywhere in the lower 48. Starting in 2010, fisheries scientists began assessing habitat

accessibility, ultimately identifying over 260 barriers to fish passage and determining that to fix them all would cost some $140 million and take about 70 years at then current spending levels. The costs of some of the projects on the list simply outweighed the benefit. Using the OptiPass model, the team then determined the precise portfolio of projects to maximize habitat bang-for-the buck: 93 projects that will result in access for 6 species of ocean-going fish to **95% of the habitat**, at a fraction of the cost of a more traditional approach, an estimated $34 million.

Since 2014 the program has made incredible progress: twenty-nine of the barriers have been removed, over 80 miles of habitat opened (which is almost half of the total project goal), and $8.6M of money leverage. Further, this work has created 129 jobs and made the coastal economy more resilient and communities safer by fixing barriers that commonly led to flooding and road closures.

Funding Need and Budget

1. OptiPass Model Update

The collaborative needs to update the OptiPass Model that underlies and directs the collaborative's work to incorporate new barrier and cost information. We will also convert the tool to a more sophisticated GIS-based model and bring this technical capability in-house to Trout Unlimited so that our Science Team can leverage this pilot program to support similar assessments in other geographies, incorporating excellent visualization tools and a more robust analytical approach. Specifically,

- Completion of the first 29 projects has improved our knowledge of actual project costs, and recent changes to regulatory and engineering requirements have increased project expenses.
- In the initial model run many barriers on private agricultural lands, particularly in the Tillamook Bay Watershed, were not included either due to lack of access, privacy concerns, or farm roads not appearing on the in the original road inventory. TU has continued to build trust with the dairy farmers in this region which has led to the Creamery Association sharing their barrier inventory with TU. We can also now incorporate a new inventory of tidegates.
- USFS researchers recently developed a new GIS approach to OptiPass for a pilot study on the Olympic Peninsula. The GIS tool gives greater capacity to the model to assess multiple factors like climate change and stream temperature prediction, as well as the opportunity to provide online access to various visualization tools and "Story Maps" for fundraising and program communications. TU is the ideal organization to fully develop and leverage this new model approach given the geographic breadth of our restoration programs coupled with our science program's GIS expertise.

2. Increase Program Capacity in the Tillamook Bay Watershed

TU's traditional role in the Salmon SuperHwy is to serve as the program coordinator, while relying on local partners to implement the projects. The largest group of remaining projects is in the Tillamook Bay watershed, but progress in this geography has been slower in large part due to the collapse of the local watershed council. TU has stepped in fill the void over the last year, both developing and implementing projects, but the need for full time staff dedicated to this geography is clear. We are working in close collaboration with federal agency partners, the local County Commissioners, and the Creamery Association to build out a more robust program serving the agricultural community of Tillamook Bay while

meeting the Salmon SuperHwy program goals. Substantial funding from state and federal agencies to implement and manage projects will be accessible once we have staff in place, but an infusion of initial private funding is essential for the new hire to have 6-12 months to develop the suite of projects and complete the permitting work. We have already secured some USFS and USFWS funds for the position, but TU is charged with closing the gap to launch this new aspect of our program.

The CCF funding request of $35,000 will provide:

- $5,000: OptiPass GIS tool development and updating modeling, TU Science
- $30,000: Salary/benefits for the Tillamook Bay Project Manager, TU Oregon

Headwaters to Hometowns: Building Resiliency in the Upper Yellowstone Basin

Project Summary

Trout Unlimited seeks $48,000 in seed funding from the Coldwater Conservation Fund to launch a new initiative to build resiliency in the Upper Yellowstone Basin by connecting tributary streams to rivers, rivers to floodplains, and communities to their watershed. This work benefits fish and wildlife, and the local economies that depend upon clean, reliable water supplies. To achieve these goals, Trout Unlimited will leverage start-up funding from the CCF to match a grant from the AMB West Foundation to develop and implement a suite of projects that restore hydrologic function and the natural river processes that maintain aquatic habitat and attenuate the effects of droughts and floods.

Background and Conservation Need

The Yellowstone River is the longest free-flowing river in the continental United States and an awe-inspiring symbol of our nation's wild heritage. Flowing 660 miles from its origin in Yellowstone National Park to its confluence with the Missouri River, the Yellowstone rises and falls, rushes and roars, untamed by any dam. The river is the very essence of wildness, yet it courses through towns and working landscapes, and is the lifeblood of several Montana communities. It is a powerful illustration of the interdependence between human economies and wild ecosystems.

As the climate changes and human demands on water resources increase, both the people and the fish and wildlife that depend on the Yellowstone River are threatened. Droughts and floods are more common, resulting in degraded habitat for animals and shortages of water for crop irrigation and municipal demand. These impacts were starkly illustrated in 2016, when severe drought precipitated an outbreak of parasitic disease that killed tens of thousands of fish in the Yellowstone River. Historically low streamflow accompanied by unusually high-water temperatures and poor water quality were responsible for the high-profile fish kill that closed the fishery and cost Park County businesses and citizens millions of dollars.

Project Objectives

Trout Unlimited proposes to develop and implement a suite of flow and habitat restoration projects that will increase climate resiliency and ensure that the robust natural and human communities that depend on the Yellowstone continue to persist and thrive into the future.

TU has been engaged in project work in the Yellowstone Basin for several years, but the 2016 fish kill showed us that we need to do more. Specifically, we are working to increase our on-the-ground capacity to implement projects throughout the Basin. To that end, we seek seed funding to launch a dedicated

Yellowstone Basin Restoration Initiative, with the goal to strategically implement targeted conservation actions to build resiliency against future drought in critical tributaries in the Upper Yellowstone Basin. To accomplish that goal, we have three primary objectives:

- *Protect Instream Flows***:** Secure instream flows in priority streams through water leases, drought planning, and irrigation efficiency projects that benefit agricultural producers and trout.
- *Increase Water Supplies by Restoring Natural Hydrologic Processes*: Restore riparian wetlands, floodplains, and high mountain meadows to store and release clean, cold, water during late summer.
- *Restore Healthy Habitat and Fish Passage***:** Restore functioning, healthy streams to maximize spawning, rearing, and resident trout habitats, and remove artificial barriers that block critical seasonal fish migrations.

Another day in paradise comes to an end.

Naturally functioning streams are the foundation of a healthy watershed, and healthy watersheds support vibrant communities. Streams that meander through riffles and pools and across connected floodplains with healthy riparian habitat provide the best trout habitat and the coldest, cleanest water. These systems are nature's hedges against severe drought and are accessible to aquatic life seeking refuge in hotter times. TU employs a variety of techniques to restore functioning streams and aquatic passage, including reconstructing stream channels and floodplains; restoring streamside vegetation; and removing passage barriers like culverts and dams.

Funding Need and Budget

Trout Unlimited is seeking $48,000 from the CCF to support project development and the addition of a full-time, dedicated Yellowstone River Restoration Project Manager. These funds will provide critical match to leverage an invited proposal to the AMB West Foundation to cover this new position. The Project Manager will identify, develop and implement high-priority habitat and streamflow restoration projects in the upper Yellowstone River Basin. These projects will address the critical need to build resiliency in human and wildlife communities by mitigating the impacts from human land use and climate-induced extreme weather events.

- **$22,000:** Salary/benefits for a dedicated Yellowstone Basin Project Manager to identify and develop new habitat and instream flow restoration projects
- **$26,000:** Contracts to design and implement habitat and flow restoration projects in critical tributaries to the Yellowstone River

Eel River SONAR: Providing Essential Information for Watershed Restoration

Project Summary

We are seeking $20,000 from the CCF board to close a gap in a critical monitoring program on the Eel River in northern California, the third largest river in the state and a TU conservation priority. The project utilizes a Dual Array Identification Sonar (DIDSON) camera to accurately estimate Chinook salmon and steelhead adult returns to the Eel. This data is important to: (1) develop a sound removal plan for Scott Dam in the upper Eel; (2) get accurate baseline information necessary to understand the impacts of dam removal; (3) understand how chinook and steelhead are using the Eel to focus TU's restoration efforts; and (4) establish the efficacy of sonar to obtain real-time adult run size and timing estimates, a prerequisite for responsible fishery management. We have collected two years of data but don't have enough funding to operate the unit during the winter of 2020/21 due to a shortfall in state funding. This is a joint staff-grassroots TU project. CCF funds would be augmented with financial support from TU's Redwood Empire Chapter. Filling this funding gap will also strengthen our relationships with important partners, including California Fish and Wildlife (CDFW) and NOAA Fisheries.

Project Description

A century ago, as many as one million salmon and steelhead may have returned to the Eel annually, making it one of the most productive rivers in California. Today, the Eel's coho salmon, Chinook salmon and steelhead populations are all listed as threatened under the ESA. Despite this, the Eel still holds significant potential for recovery as it is sparsely populated and features significant protections – both as a wild and scenic river and via large swaths of adjacent public lands. The Eel is also one of the few major rivers in California with no hatcheries and is an excellent status indicator for wild fish populations.

The project was initiated in response to PG&E's relicensing of the Potter Valley Project (PVP), a trans-basin water diversion and hydroelectric project comprised of two dams on the upper mainstem Eel River. Pooled funding from TU's Wild Steelhead Initiative, TU chapters, California Department of Fish and Wildlife (CDFW), and PG&E launched the project in 2019. PG&E has since abandoned their relicensing of the project and a local consortium has stepped forward with a plan to take over the PVP. The consortium is comprised of allied NGOs, a Tribe, a county and

two water agencies. The current proposal, which includes removal of Scott Dam to reopen 288 miles of habitat would be a boon for salmon and steelhead.

The past two seasons of DIDSON monitoring have provided the most accurate estimates of the Eel's salmon and steelhead abundance and run timing. Data collected is informing dam removal efforts, including how sediment releases might be timed to protect migrating fish. PG&E's intent to relinquish the project in addition to state budget shortfalls has reduced funding available for the upcoming monitoring season. The consortium that has emerged with a plan to take over and relicense the project is fully supportive of the monitoring effort and will likely be required to continue the monitoring by the Federal Energy Regulatory Commission, the federal licensing agency, starting in the 2021-22 season. Providing the remainder of the funding necessary to monitor adult returns with the DIDSON unit in the upcoming season will enable us to capture return information for a full cohort of juvenile outmigrants and strengthen our partnership with CDFW and NOAA Fisheries, which would position us well for more joint projects.

Need for CCF Funding

With equipment costs secured for 2020-21, we are seeking $20,000 to hire a local field crew lead to direct CDFW personnel in operation and maintenance of the equipment. CDFW has secured funding to provide a biologist project lead, a field crew, vehicles, fuel and day-to-day project oversight. In addition to CCF funds, if provided, TU's Redwood Empire Chapter will contribute $6,000 to fully cover the local field crew lead cost.

For more information: https://www.redwoodempire-tu.org/eel-river-salmon-monitoring
https://www.redwoodempire-tu.org/eel-river-dams-relicensing

1- Volunteers from RETU and GGTU on site with the power supply trailer they built for the project

Colorado Gold: Conserving Colorado's Best Trout Fisheries

Project Summary

The Gold Medal waters of South Park, Colorado

Colorado's Gold Medal fishing waters are at the tipping point. The state's premier trout fisheries currently lack the protection they need, the support they demand and the conservation champions they deserve. Trout Unlimited's Colorado Gold campaign intends to remedy that. Our goal is to provide the highest levels of protection achievable for the greatest amount of Colorado's high-value fishing habitat possible, making tangible conservation impacts on the state's most important fisheries by:

- Returning deteriorating/de-listed trout waters to their former Gold Medal status;
- Restoring habitat degraded by mining, dams and dewatering on existing Gold Medal waters;
- Expanding Gold Medal protections through focused advocacy, education and organizing;
- Improving access and reducing pressure by increasing Gold Medal river mileage statewide.

A $50,000 contribution from the Coldwater Conservation Fund (CCF) will open the door to multiple public fund matching opportunities required to protect, reconnect and restore declining Gold Medal rivers, and help secure an additional $100,000 from corporate sponsors and foundations needed to jump-start this signature TU campaign.

Background and Conservation Need

Gold Medal waters are supposed to be the cream of the crop, Colorado's "highest quality cold-water habitats." Rivers like the South Platte, Colorado, Arkansas, Animas and Blue are among an elite handful of fisheries managed by Colorado Parks and Wildlife (CPW) to provide the best opportunities to catch "quality" trout in the state. Yet, a 20-mile segment of the Blue River below Dillon Reservoir was recently stripped of its Gold Medal status after failing to meet the required metrics for several years. On the upper Colorado River, Windy Gap Reservoir sits as a silt-choked plug in the heart of the Gold Medal fishery that requires an as-yet unbuilt bypass to reconnect the channel and restore life to the armored riverbed. And the South Platte River in South Park is amid a Bureau of Land Management planning update that needs more advocacy muscle to establish appropriate protections from oil and gas development along its banks.

Similar stories can be told about the imperiled Animas River near Durango, where TU is working to protect Gold Medal status through mine remediation projects, Gore Creek in Vail, where restoration efforts are combatting development impacts on a fragile Gold Medal stream, and even in the Colorado Statehouse, where TU is fighting for protection of Gold Medal fisheries statewide through the current update of Colorado Oil and Gas Conservation Commission rules. As the nexus forging TU's conservation work to Gold Medal water continues to grow, the time has come to build a campaign dedicated to restoring and protecting Colorado's most valuable trout fisheries.

Project Description and Objectives

The Colorado Gold Campaign will include overlapping restoration, advocacy and outreach efforts connected by the common thread of Gold Medal water. Initial restoration work will focus on existing projects TU is engaged in on the Blue, Colorado and Animas Rivers, where we have opportunities to make immediate impacts by funding habitat assessments on impaired reaches of the Blue, taking the Windy Gap dam offline to reconnect the Colorado, and preventing additional catastrophic mine failures like Gold King on the Animas before expanding our reach. Likewise, pressing advocacy efforts to protect more than 150 miles of Gold Medal streams and tributaries along the South Platte and Arkansas rivers will see direct benefits from the campaign that can translate to broader policy wins statewide. Web searches for "Gold Medal Waters" continue to rise, and by tapping into the ever-increasing public interest in fishing them, our audience for outreach will grow daily.

A key component of the campaign will be creation of the Colorado Gold Coalition, an influential alliance of angling and outdoor recreation-related businesses, organizations and individuals working to increase public awareness, raise funds and shape policy by moving decision makers toward conservation-minded Gold Medal water management. The broader objective is to expand the state's Gold Medal fishing policy and capacity by organizing, educating and activating the thousands of trout fishing advocates who rely on these resources while supporting rural economies, respecting local interests and preserving the health of Colorado's highest-quality cold-water habitats. We plan to build a unique digital media platform where anglers absorb tactics and insights into Colorado's Gold Medal fisheries while learning about trout habitat, biology and ecology, important policy issues and ways to engage in TU's ongoing conservation and restoration work. By establishing a direct connection between anglers, the waters they fish and the conservation values necessary to sustain them, TU will usher in a new era of advocacy and volunteer support for existing Gold Medal conservation projects.

In addition to immediate restoration projects on threatened Gold Medal rivers and urgent advocacy efforts to push overdue protections across the finish line both in South Park and the broader state oil and gas rule-making in 2020, Colorado Gold aims to extend those protections to additional areas through the long-term goal of increasing the state's current 322 Gold Medal river miles by 30 percent by 2030. That means doing the rock-rolling work required to revive de-listed rivers, like the Blue, and improving resources to lift others, like the Conejos, over the threshold while completing projects and cementing the protections needed to sustain existing Gold Medal waters like the Colorado, South Platte, Animas and Arkansas Rivers. Fortunately, Colorado Gold already has the full support of TU's Colorado Council, which recognizes it as a campaign that unites local chapters through a statewide initiative that combines river restoration with public lands protection resulting in tangible conservation, recreation and access benefits in the spirit of One TU.

Funding Need and Budget

State and federal budget shortfalls are likely to lead to future neglect of these vital aquatic resources unless there is strong public support for directing public funds toward them. Without a sound strategy, proactive planning, reliable funding and sustained action by the people who care the most about these iconic fisheries, Colorado's Gold standard will soon be facing depression. A $50,000 contribution from the

CCF will provide critical funds to launch the media platform we need to educate, organize and establish the coalition of anglers that will enable Colorado Gold to make immediate conservation and restoration impacts in places like the Colorado River, Blue River, Animas River and South Park. Properly executed, the platform will serve as an advocacy springboard that will enlist additional industry and foundation funders, unify volunteers, attract new members and boost TU's political clout to an unprecedented level in the state of Colorado.

The CCF's investment will be used as vital seed funding needed to leverage additional support from potential foundation funders and to secure hundreds of thousands of dollars in public funds available through matching grants from Great Outdoors Colorado (up to $1MM annually), CPW's Fishing is Fun program ($650M annually), the Land and Water Conservation Fund, National Fish and Wildlife Foundation and other state and federal programs that finance habitat and access improvements on Colorado's public lands and waters. Committed corporate partners like Fishpond USA and RepYourWater will further multiply the investment through brand marketing and merchandising.

Funding from the CCF for Colorado Gold will cover:

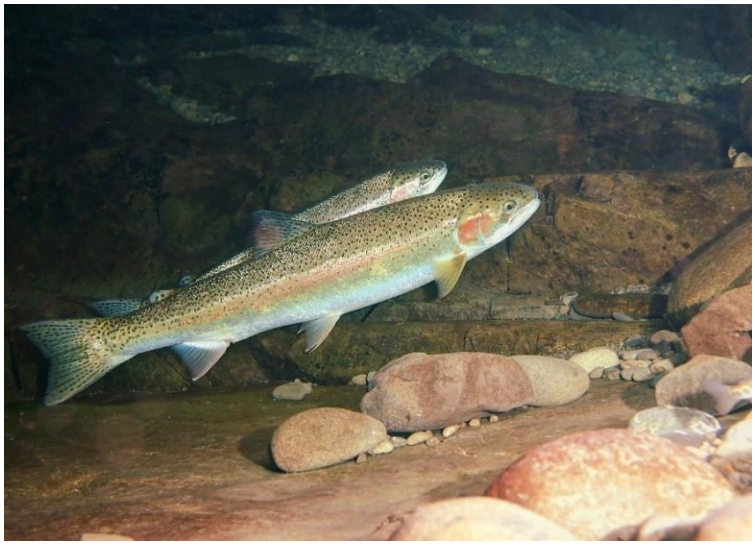
- $25,000: salary/benefits for TU staff to build the Colorado Gold brand, build and maintain the website and populate social media channels, recruit additional coalition members and coordinate advocacy (i.e., Colorado Gold Coalition).
- $25,000: Restoration projects, specifically, securing state and federal matching funds required to finish the lingering Windy Gap bypass and Blue River habitat assessment projects, highlighting their importance and pushing for completion that may not otherwise occur.

Total: $50,000

Fueling Hatchery Reform with Powerful Science

Project Summary

We are seeking a CCF investment of $27,000 to advance our effort to reform the use of hatcheries so that they do not undermine TU's conservation mission. Specifically, with CCF support we will produce a comprehensive database of all peer-reviewed studies regarding the effect of hatchery fish on wild (i.e., naturally produced) trout and salmon, and a synthesis capturing what this extensive body of research reveals. We will engage well-respected external scientists to review the products and validate the effort. The first phase of the project has been completed with the collection of 104 studies, 80% of which show a negative impact on wild fish with most of the remainder showing no effect. Formalizing and augmenting this work will position TU to more effectively advocate for much needed hatchery reforms, which are needed to realize returns on our many investments in habitat restoration and to provide sustainable fishing opportunity consistent with our conservation mission.



Project Description and Conservation Need

One of the most contentious issues in salmon and steelhead conservation is the use of hatcheries. The public demand for fisheries and the quest for a "quick fix" to meet that demand without addressing the root problems causing the loss of wild fish, including habitat loss and degradation, has generated a deep hatchery culture and practice. But the evidence strong that, not only are hatcheries failing to provide consistent fishing opportunity, they are harming wild fish. In 2015 the Hatchery Scientific Review Group, a Congressionally established group of independent scientists charged with reviewing hatchery programs in the Pacific Northwest stated in its report to Congress:

> "…the traditional mitigation policy of replacing wild populations with hatchery fish is not consistent with today's conservation goals, environmental values, and prevailing science. Hatcheries cannot replace lost habitat and the natural populations that rely on it. It is now clear that the widespread use of traditional hatchery programs has actually contributed to the overall decline of wild populations."

Still, the debate rages on, with hatchery proponents able to trot out a few studies that they claim show that hatcheries do not harm wild fish they have managed to stave off needed reform. To make progress, we need to bring the best available science to bear so that federal and state fish managers can't duck the issue. A robust, comprehensive review of the literature that transcends species, geographies and management jurisdictions would be a powerful advocacy tool to achieve that purpose.

We have already completed initial work on this project, and our findings are auspicious. In 2018 TU retained Brian Morrison, a well-respected Canadian fish biologist, to identify peer-reviewed studies evaluating how hatchery fish affect wild fish; a coarse analysis of the 104 studies Brian reviewed suggested the *vast majority* (80%) demonstrated a negative effect, with the remainder showing no effect and a small fraction revealing a positive effect. Our initial assessment clearly indicates a formal, comprehensive study and synthesis of the results culminating in a peer-reviewed scientific journal publication would have tremendous benefit for our conservation work. TU scientists with deep expertise in the issue, John McMillan and Helen Neville, will lead this effort and to add gravitas and validity to the effort we will enlist the help of a handful of highly respected and renowned scientists, who will review our work and results.

This effort will have several direct and tangible benefits for TU and our mission. First, the database will be the first to house research from across the world, including not only Pacific salmon but diverse cultivated species such as Atlantic salmon, rainbow trout, brown trout, brook trout, and arctic char. It will be publicly available for use by advocates across the country (and the world) seeking to align hatcheries with sound conservation science. Second, the database and synthesis will strengthen TU's conservation work on many fronts including our Wild Steelhead Initiative, Klamath and Snake River dam removal campaigns, and our habitat restoration work across the range of salmon and steelhead. If hatchery salmon and steelhead continue to be released at their current levels (over 30 *million* are released in the Snake River annually!), the potential return on our reconnection and restoration investments will not be fully realized. Lastly, this work will strengthen TU's reputation as a leader in conservation science.

CCF Funding Need and Budget

A CCF investment would enable TU to dedicate the staff time and hire a contract scientist to complete the database and synthesis, engage outside scientists, and submit a paper to a peer-reviewed scientific journal.

- $15,000: Contract scientist(s) to develop a complete database of peer-reviewed studies
- $10,000: TU staff time
- $2,000: Publication costs for peer-reviewed journal

Total Budget: $27,000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