TU Resources and Support for Chapter-based Monitoring and Restoration

March 30, 2019



TU Eastern Angler Science



Engaging Anglers to Drive Conservation Strategies



Trout Unlimited's watershed approach to coldwater fisheries management includes Protect, Reconnect, Restore and Sustain elements, providing an important approach to climate change adaptation and many other complex problems affecting stream systems. Illustration by Bryan Christie Design for TU.





TU's Citizen Science Framework

- TU Grassroots
- Project Staff
- Angler Science Coordinator
- TU Volunteer Operations
- TU Science Team

TU's Science Network

Core Science Team

Introducing TU's core science team and network of scientifically-focused program staff

Embedded Program Staff





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Benefits of Angler Science

Education and Outreach

- Better understanding of our home waters
- Expand and diversify organization activities
- Collaboration between volunteers, TU staff and agencies

Conservation Outcomes

- Early identification and tracking of emerging threats
- Monitor effectiveness of restoration and management
- Project prioritization





Angler Science Opportunities



- 𝒞 Water Quality
- **Water Temperature**
- Flow Monitoring
- Benthic Macroinvertebrate Assessments
 Angler Surveys
- Redd Surveys
- Habitat Assessments
- AOP Barrier Assessments
- Tracking Invasive Species

- Environmental DNA
- Photographic Monitoring
- Snorkel Surveys
- Phenology Documentation
- Real-time Data Collection
- Visual Assessments for Pollution

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Stream Temperature Monitoring

- A great citizen science activity: it is easy, fun and relatively inexpensive
- Track impacts of climate change
- Identify habitat restoration needs (riparian, channel) to decrease temperature
- Helps determine restoration project effectiveness
- Provides good data for educational projects



Tools: Stream Temperature Data Loggers

- Relatively low cost (\$113.05)
- Can record at regular intervals over long periods ~5 years
- Valuable for collecting baseline data, monitoring land use impacts, and climate change trends



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Tools: Methods Manuals and Data Visualization





Tools: Program Management and Training



Measuring Thermal Resiliency: Virginia

- Deployed fine scale network of temperature sensors.
- 91 sensors deployed by 51 volunteers.
- Partnered with USGS









Measuring Thermal Resiliency: Virginia

Current Conditions

MWAT 2017 (Observed)



Groundwater Influence

Groundwater Influence Index



Case Study



Measuring Thermal Resiliency: Virginia

Forecasting Future Conditions



"Low-cost" Real-Time Water Quality Monitoring Stations



EnviroDIY Mayfly Logger Station





"Low-cost" Water Quality Monitoring Stations









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Opportunity: EnviroDIY Sensor Station Training



July 2019: Grand Rapids Michigan



- Programming Mayfly Data Logger
- Sensor Station Deployment
- Managing and Understanding Data
- Site Selection
- Sensor Station Maintenance

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Environmental DNA (eDNA)

• Determine species presence based upon DNA collected from water samples





TROUT

USFS eDNA Atlas





Redd Surveys

- Most salmonids are gravel nest spawners
- Females excavate a nest in gravel substrate, deposit eggs that are externally fertilized by male and cover eggs with gravel. A contiguous series of these nests are called a redd.
- Content of the second stream/watershed
 Content of the second stream/watershed
- Effectiveness of barrier removal/replacement and habitat improvement projects



Redd Surveys – Materials/Methods

- What you need:
 - Group of volunteers
 - Training on redd ID/protocols
 - GPS/datasheet
- Volunteers are assigned a segment of stream to walk or float and record GPS location of each redd observed as well as other data.
- Watersheds are divided into segments
- http://www.tu.org/blog-posts/seeing-reddsvolunteers-survey-brook-trout-spawninghabitat



Redd Surveys – Tools

Redd Survey Data Collection App

Redd Survey Handbook (in development)

Redd Survey Database/Data Visualization (in development)



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	Redd ID * Enter the ID number of 6 sequentially for each sur	each redd. Number redds vey date.				
	Redd location * Mark the location of the	redd.				
	43.120°N 85.561°W	/ ± 65 m				
	Redd type * Mark whether a complet O Complete redd	e redd or test redd. ○ Test redd				
	Macrohabitat type Select macrohabitat type O Pool O Riffle	* e with redd. O Run O Other				
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PM Redd Survey



www.macroinvertebrates.org







Water Quality mApp (WiseH2O): Driftless Pilot Study

Agricultural landscape: 30 SECONDS Database: results, locations, metadata Server Dip a test strip Take a photo Get results Database Alkalinity Hardness pН Nitrate-Nitrogen Nitrite-Nitrogen Orthophosphate Nitrates (mg/L



Water Quality mApp (WiseH2O)

Kiap-TU-Wish (Pierce County, WI)

- Target Anglers
- General Anglers







Water Quality mApp (WiseH2O): Driftless Pilot Study

Kiap-TU-Wish (Pierce County, WI)





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WiseH2O v. RIVERS

WiseH2O

- Focus: Water Quality
 - ..but has 'disturbances'
- Area: Driftless Area
- Status: Pilot Study
- Developer: Mobile H2O
- Full Program
 - mApp
 - Training
 - Learning Assessment
 - Performance



RIVERS

- Focus: Disturbances
 - Photo documentation
- Area: National
- Status: Ready
- Developer: TU Science
- Some training
 - Regional meetings
 - Pilot: Rogue River
 - Focus Chapters
 - Webinar:TU grassroots





Keys to success...Good study design

- I. What are your objectives for monitoring?
- 2. How will you use the data you collect?
- 3. What will you monitor?
- 4. How will you monitor?
- 5. Where will you monitor?
- 6. When will you monitor?
- 7. What QAQC practices will you implement?
- 8. How will you manage and present your data?
- 9. What are the necessary tasks and who will do them?



RIVERS app (map problem areas)

River Inventory by Volunteers for Efficient Restoration Strategies (RIVERS)

Anglers Identify Habitat Issues:

- Cows in stream
- Eroding banks
- Point source pollutants
- Barriers

Database:

- Potential projects
- Better react to funding opportunities







General:

- Streambank
- Barrier
- Water Clarity
- Trash
- Nuisance Algae
- Riparian Vegetation
- In Stream/Channel
- Streamflow
- Invasive Species
- Fish Kill

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RIVERS - a mobile		× =							
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What is the general category	General disturbance type *								
general type first to see speci	general type first to see specific disturbance type options.								
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In-stream/Channel	Barrier								
 Streamflow 	Water Clarity								
Point Source	ONUISANCE Alga	e							
Invasive Species	🔵 Trash								
🔿 Fish Kill	Fish Species								
Other	Observation								
Oulei									
Specific disturbance type * Select a more specific type of disturbance. Must select general disturbance type first. Manicured Lawn Minor Clearing Clogged / Cut Down									
🔜 🖉 Road / Parking Lot									
Other									
Water Temperature (F) (Optional) Enter temperature in degrees Fahrenheit (F). Must be between 32 and 120 F.									
Notes									





General:

- Streambank
- Barrier
- Water Clarity
- Trash
- Nuisance Algae
- Riparian Vegetation
- In Stream/Channel
- Streamflow
- Invasive Species
- Fish Kill



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Surface Runoff



General:

- Streambank
- Barrier
- Water Clarity
- Trash
- Nuisance Algae
- Riparian Vegetation
- In Stream/Channel
- Streamflow
- Invasive Species
- Fish Kill



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General:

- Streambank
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RIVERS: Overview

Snapshot of app sequence

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River Inventory by Volunteers for Efficient Restoration Strategies We drawwhere	RIVERS app (River Inventory by Volunteers for Effective Restoration Strategies)	Phone number Enter your phone number.	Disturbance information	General disturbance type * What is the general category of the disturbance? Select general type first to see specific disturbance type	Specific disturbance type * Select a more specific type of disturbance. Must select general disturbance type first.
Created: 3/20/19 Created: 3/20/19 Lat modified: 3/21/19 The RVRES mobile application is a convenient way for Tout Unlimited chapters to collect data on and map disturbances and other impacts on their home waters. This basic information is stored online and can be quered later on a destkop at any time. The information can be used to help provintize conservation projects, such	a a a a a a a a a a a a a a a a a a a	**NOTE: After filling in State, Chapter, and Contact Information, tap the menu at top right to 'save' these answers as favorites to paste into additional surveys on new waterbodies.	Mark the disturbance location by using phone GPS by the location button to br girth (Helwell). You may also the phone map to open it and collect a GPS location, search bry location, or pan the basemap and drop a pin to mark location. Of HONAL: Tap and hold the location button for GPS MMORTANT. If you do not have a GPS anguate at the disturbance location, 1) save the survey locally to your phone and 2) adjust the location by any ong other location basemap BEFORE you submit the survey when back in cell service.	options. Riparian Streambank Vegetation Barrier Stream/Channel Barrier Streamflow Water Clarity Point Source Nusiance Algae Invasive Species Trash Fish Kill Fish Species Observation	Manicured Lawn Minor Clearing Cogged / Cut Down
as having information on potential projects at arms length when funding opportunities arise. The information collected is intended be a broad description of the disturbance or problem with photographic evidence that is geolocated (e.g. GPS location). You can view, filter, and perform simple analyses on contributed data on your phone or desiton here: arcs id/10WXev		Other survey information Waterbody *			Croad / Parking Lot
IMPORTANT: Know the stream access laws for your state, and please be respectful of private lands.		Enter name of waterbody. Start new survey if you enter a new waterbody (e.g., new tributary stream, river, or lake).		Specific disturbance type * Select a more specific type of disturbance. Must select general disturbance type first.	Water Temperature (F) (Optional) Enter temperature in degrees Fahrenheit (F). Must be between 32 and 120 F.
		Waterbody type Select waterbody type. Stream/River			Notes
		Canal/Ditch Pipe/Drain Other	close enough for detail, but capture other features for a sense of scale (e.g., a person). Tap plus icon in lower right to take another photo. Do not take inappropriate photos, and be considerate when on private lands.	Man-Made Dam (eg, rock dam, wood structure)	Enter any notes for the survey as a whole.
	TU chapter * Select your TU chapter (Start typing for autocomplete).	Survey date and time * Enter date and time.	Photo 1 Take a 1st photo.	Large Wood Removal Other	
Collect >	Participant names * Enter your name: Lastname, Firstname (e.g., Appleseed, Johnny).	Sunday, March 24, 2019 · 6:06 PM · · · ·	Photo 2	Other Enter the type of detailed disturbance not shown in list above.	Tap the checkmark at bottom right to complete the current survey for this waterbody. To view,
Sent >		Location *	Take a 2nd photo if needed.	o∵. I	explore, and analyze data visit: <u>arcg.is/10WXev</u>
				• < 0 □	• < 0 □

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RIVERS: Overview

Snapshot of app sequence



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Tip I: Balance amount of detail (how close) with perspective (how far)

GOOD

BAD







Tip 2: Use an object of known size for scale

GOOD









Tip 3: Document source

GOODOKNo SourceImage: Source







Tip 4: Multiple photos with different perspectivesOutletInlet



Downstream



*Still lacks scale and perspective





RIVERS

www.tu.org/conservation/our-conservation-approach/science/angler-science

Resources on tu.org

- Guidance documents
- Weblinks
 - Downloads
 - Web-mapping application







We are going outside! Beulah Park

(arcg.is/IOWXev)





Downloading RIVERS: Two-Step Process

- I. Download Survey 23 for ArcGIS
- iPhone: App Store
- Androir: Google Play
- Scan QR code
- 2. Download RIVERS form
- Safari or Google Chrome: <u>arcg.is/08SIGS</u>
- Scan QR code







River Inventory by Volunteers for Efficient Restoration Strategies

By ddauwalter Created: 3/20/19 Last modified: 3/20/19

The RIVERS mobile application is a convenient way for Trout Unlimited chapters to collect data on and map disturbances and other impacts on their home waters. This basic information is stored online and can be queried later on a desktop at any time. The information can be used to help prioritize conservation projects, such as having information on potential projects at arms length when funding opportunities arise. The information collected is intended be a broad description of the disturbance or problem with photographic evidence that is geolocated (eg, GPS location). You can view, filter, and perform simple analyses on contributed data on your phone or desktop here: arcg.is/0SaTaj

IMPORTANT: Know the stream access laws for your state, and please be respectful of private lands.







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