COMMUNITY SCIENCE

CLARK FORK COALITION

FIELD MANUAL

CONTENTS

ABOUT THE CLARK FORK COALITION

Welcome to the Clark Fork Coalition's volunteer team! Volunteers like you help us improve and safeguard the streams, creeks, and rivers that flow into the Clark Fork—the watershed that sustains the region. Engaging community members in directly protecting and restoring the basin builds a culture of care for the river that can last for generations. Thank you for being part of it!

The Clark Fork Coalition was founded in 1985 by a group of concerned locals to protect and restore the Clark Fork watershed, a 22,000-square-mile area supporting about 350,000 people in western Montana and northern Idaho. Today, our work is conducted by a staff of 14 people and a crew of volunteers. Our main office is based out of Missoula with satellite offices in the Deer Lodge Valley. Our 15-person board of directors guides our work and oversees a $2 million budget. Membership support for our work comes from about 1,000 donors each year.

Bringing together diverse interests, we have led the initiative on several large-scale projects and continue to work on a variety of issues critical to helping the watershed thrive. From the removal of the Milltown Dam to cleanup of mining-contaminated reaches, to water transactions that improve flows and habitat, we work together for healthier waterways.

As climate change and a growing population exacerbate the many challenges the river faces, we use science-based, community driven tools to build resilience, implement restoration, and expand the circle of care for the Clark Fork River.

Our Mission

The Clark Fork Coalition is dedicated to protecting and restoring the Clark Fork watershed.

Our Vision

CFC strives to improve and maintain the Clark Fork River and its tributaries so that they flow with clean, cold, and abundant water, ensuring the people, fish, and wildlife of the region flourish for generations to come. We envision a world where policies and practices fully support this vision and the basin's residents are engaged in active caretaking of their local rivers and streams.

Our Philosophy

We view watershed challenges and opportunities holistically over a large geography and long timescale. Our methods are grounded in science, enriched by diverse viewpoints, geared toward results, and informed by the belief that the health of our waterways and the health of our communities are inextricably linked.

Watershed stewardship generates social cohesion that helps societies prosper economically and develop sustainably. We collaborate with other groups that share our interest in clean water and healthy rivers and help communities in the Clark Fork basin nurture a sense of identity and common purpose around the river we all share.

Where We Work

The Clark Fork watershed is a transcendent natural treasure, a vibrant web of celebrated rivers like the Blackfoot, Bitterroot, and Flathead, and hundreds of creeks and streams that flow into Montana's largest river by volume—the Clark Fork River. These waterways form the eastern headwaters of the Columbia Basin and supply some of the richest and wildest habitat in the lower 48. They are ribbons of life for human communities, too, providing clean drinking water, flood control, crop irrigation, and recreation opportunities. They link our communities and drive our economies.

The Clark Fork Coalition works on the reaches and streams most impacted by an industrial legacy, bringing a hardworking river back into balance and rebuilding resilience for current and future conditions. Large-scale mining and smelting, agriculture, timber, and hydroelectric industries did enormous damage to the river, its tributaries, and the communities these waterways support. Mining waste, dewatering, sediment overload, nutrient pollution, stripped vegetation, and irrigation barriers—along with urbanization and climate change—negatively impact the ecological functions of many creeks and streams in the basin, reducing their ability to contribute to community health, cohesion, and vitality.

We work basin wide with a focus on the Upper Clark Fork, Middle Clark Fork, and Bitterroot where we can most effectively use our core strategies of stream restoration, policy advocacy, and education in areas that need our resources the most.

Map of the Clark Fork River Basin

ABOUT THE VOLUNTEER PROGRAM

History

In 2013, the Clark Fork Coalition established a volunteer program to increase community involvement and get extra helping hands on the river. Today, 200+ annual volunteers, including middle school to college students, retirees, families, local business employees, and everyone in between, work alongside CFC staff and partners to get things done for the river. Whether it's collecting important data, planting trees in riparian areas, or hauling garbage off riverbanks, volunteers use science-based methods to make positive changes across the watershed, year-round!

Volunteer Policies

Volunteers register for specific events in our online volunteer management system. You can also fill out a volunteer profile that we will use to match you to future opportunities. We communicate with volunteers primarily through email—and you can sign up for our monthly volunteer newsletter for alerts and important volunteer information. You can also reach out directly to CFC's community programs staff at volunteer@clarkfork.org.

Attendance: We count on volunteers to complete projects, and we plan volunteer events based on registration numbers. If you can't attend an event that you registered for, please contact the volunteer coordinator as soon as possible to let them know so they can adjust.

Behavior: CFC volunteers are a great group of people who share the common value of care for the river. Volunteer events are co-operative, fun, and sometimes hard work. We make an effort to build community and connections—even if just for a few hours.

All volunteers and staff are expected to act in a respectful manner. If you experience a problem with another volunteer that needs to be addressed, please set up a meeting with the program coordinator to discuss the problem. If you experience trouble with the volunteer coordinator or feel that volunteer safety or respect is being compromised, please discuss the issue directly with the coordinator or contact CFC's Human Resources Manager to arrange a meeting.

Safety: Many volunteer projects take place near fast flowing water or involve using tools or walking over uneven ground. Special consideration is given to the safety of volunteers at each event and location. Please follow all safety measures according to the volunteer coordinator's instructions. It is up to the discretion of the volunteer coordinator or volunteer group leader to decide if a situation is unsafe for the group. If you have additional safety concerns, please let the leader know immediately.

Volunteers are responsible for their own safety and must sign a waiver when they register to volunteer. You can read the full waiver, medical release, and photo/video release, and sign electronically through our volunteer registration site online.

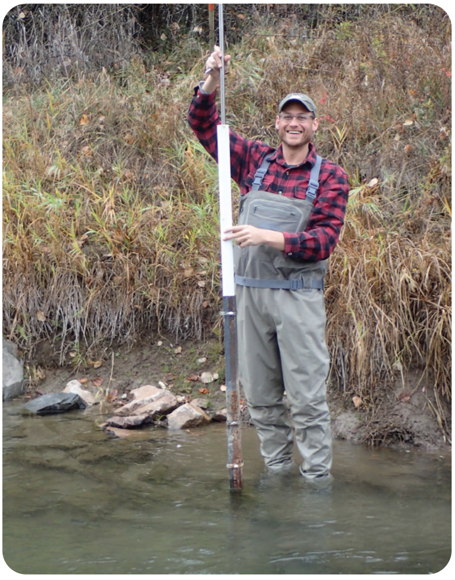
COMMUNITY SCIENCE

Community science is scientific work undertaken by members of the public, often in collaboration with professional scientists. When they work together, scientists can share the significance of their work, while volunteers contribute valuable time to projects about which they feel passionate.

The Clark Fork Coalition uses community science programs to expand our capacity for data-driven restoration projects and engage interested community members in river stewardship. Our community science programs focus on monitoring fish habitat, riparian vegetation, and invasive weeds on tributaries where we work.

We use the collected data to create science-based stories of how our restoration projects change the health of the river over time. This information helps us explain why we do our work. Through hands-on field science, community scientists gain a deeper understanding of stream ecology.

Carefully designed monitoring programs also improve the effectiveness of restoration efforts. The Clark Fork Coalition uses monitoring data to inform project design and site selection, measure progress toward project goals, enhance ongoing project outcomes, measure the effectiveness of our overall restoration program, and further improve the restoration process.



COMMUNITY SCIENCE ON BITTERROOT TRIBUTARIES

Dewatering, habitat destruction, and fish passage barriers impair the Bitterroot River and its tributaries. While the Bitterroot River still supplies food, shelter, and critical movement corridors to an abundance of wildlife and provides a wealth of cultural, economic, and recreational resources, more than a century of logging, roadbuilding, and extensive irrigation has damaged the river system's natural function. Rapid urbanization and climate change further stress the basin's ecological resources.

The Clark Fork Coalition identified several Bitterroot tributaries as priority streams for our restoration work and implemented community science monitoring programs to collect data on our progress.

One of those tributaries, Miller Creek, flows west for 18 miles from the Sapphire Mountains to its confluence with the Bitterroot River near the city of Missoula. The watershed spans 48 square miles and supports a variety of land uses, from silviculture and agriculture to residential subdivisions. The Clark Fork Coalition and partners have implemented restoration projects on Miller Creek that improve natural stream function, enhance fish habitat, increase deciduous riparian woody vegetation cover, reduce fine sediment loads in the channel, increase floodplain connectivity and function, and address high water temperatures.

Community science volunteers help us monitor fish habitat, riparian vegetation, and invasive weeds on Miller Creek pre- and post-project.

FISH HABITAT ASSESSMENT PROTOCOL

During low flows in mid to late summer each year, we assess fish habitat when stream features are most visible. We use the data to compare fine- to broad-scale restoration impacts across the landscape.

Based on US Forest Service R1/R4 Fish Habitat Assessment concepts, our protocol is modified to include the most important and attainable data for assessing our restoration goals. In particular, we define structures (pool, riffle, forming features), patterns (sequence and spacing), and dimensions (length, width, depth, area, volume) of fish habitat. The variables chosen in this protocol are (1) quantitative and repeatable, (2) ecologically relevant to fish, and (3) responsive to changing environments. In addition, community scientists are able to efficiently collect reasonably accurate, consistent data looking at these variables.

Definitions

Pool: A deep area of the stream with a slow current. The force of water falling over or under logs or around boulders typically creates pools as the water carves deeper into the streambed.

Riffle: Short segment of a stream characterized by shallow depths and fast, turbulent water agitated by rocks. The rocky bottom provides protection from predators, food deposition, and shelter. Riffle depths vary depending on stream size but can be as shallow as one inch or deep as three feet. The turbulence and stream velocity increases oxygen concentration.

Run: A stretch downstream of pools and riffles characterized by moderate current, smooth water surface, and depths greater than riffles. The smooth surface allows sunlight to penetrate.

Max pool depth: The depth of the deepest part of the pool.

Tail out: The point at which the pool transitions back to the major fish habitat, such as a riffle.

Residual pool depth: The maximum pool depth minus the tail out depth of the pool.

Bank erosion: The soil surface area exposed to the creek that when disturbed actively sends sediment into the stream.

Large woody debris: A piece of wood in the stream at least 10 feet long and at least 4 inches in diameter. Wood, particulary log jams, is a key element of a healthy stream.

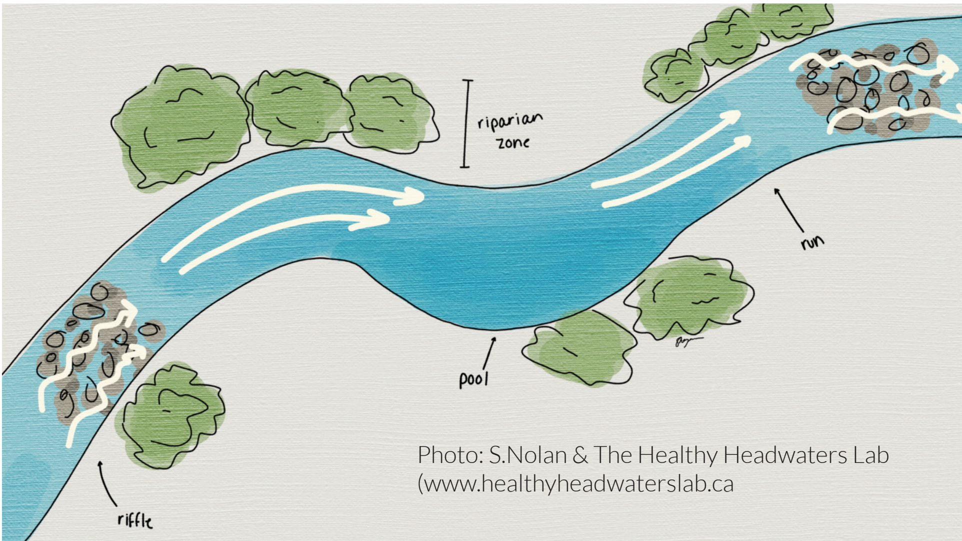


Photo: S.Nolan & The Healthy Headwaters Lab (www.healthyheadwaterslab.ca

Field Kit Supplies

Fish habitat recording worksheets
Pool Type Code list
Nez Perce Vegetation Code Classification list
Rosgen Stream Type list
Tape measure
Pen/pencil

Steps

1. Fill in all site information in the header of your fish habitat recording worksheets. Fill in Reach # with the survey point that begins the monitoring reach.
2. Start at the top end of the reach. Lay out your measuring tape. Start at 0 feet and move downstream. Break up the tape by 100-foot sections. *Example: 0-100*
3. Identify Rosgen Type. Use Rosgen stream type 'cheat sheet' to define reach. Most monitoring sections are designed to have just one classification code.
4. Identify major and minor types of fish habitat and fill out appropriate columns. The first column is for major fish habitat—the majority of habitat within the reach: high gradient riffle (HGR), low gradient riffle (LGR), run, glide, pool system. The second column is for minor fish habitat: types of pools found within the major fish habitat. Use the Pool Type Code to classify pools.
5. For every major pool, measure the maximum pool depth and pool tail out depth (crest). Calculate residual pool depth.
6. Input bank erosion data as follows: 10ft x 2ft (10 feet along the stream by 2 feet in height is actively eroding). Continue recording as you move down the reach for a cumulative total on each bank.
7. Use tick marks to quantify pieces of large woody debris.
8. Characterize Riparian Community: Use Nez Perce vegetation code to define reach. You may need more than one code. Use the notes section to describe vegetation if needed.

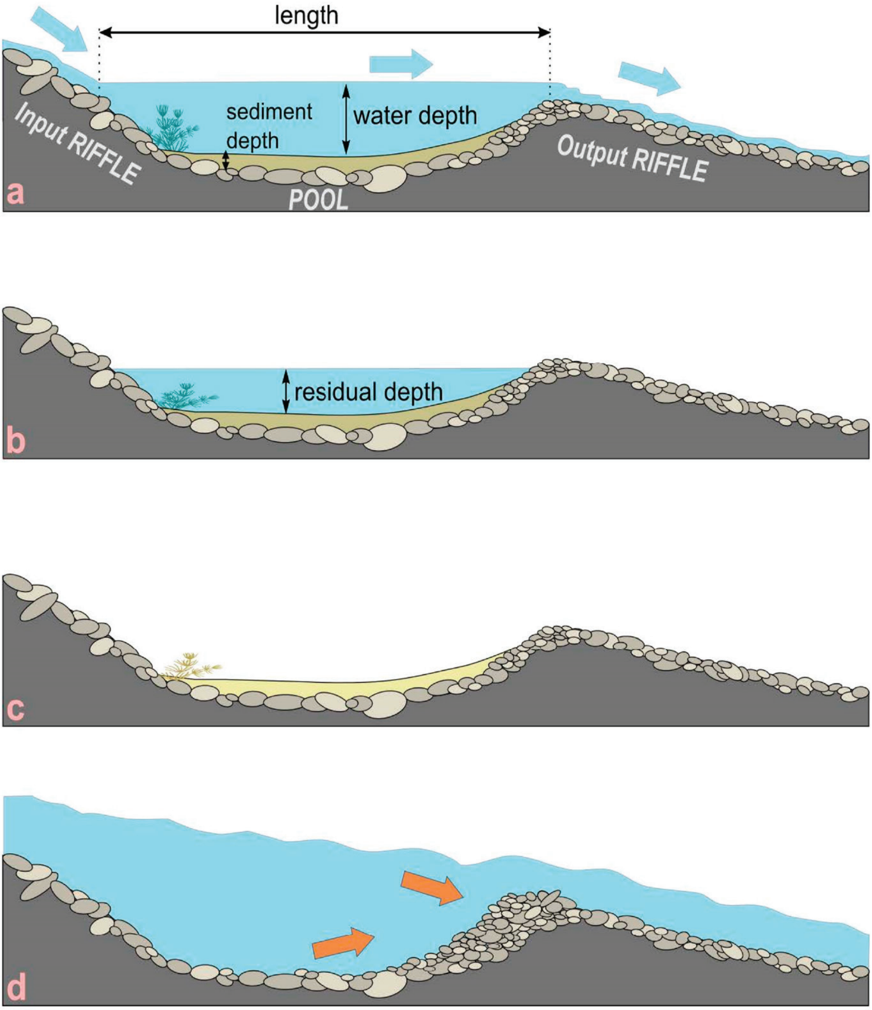


Photo: Bonada, Núria, et al. Conservation and Management of Isolated Pools in Temporary Rivers. *Water*. 2020; 12(10):2870. https://doi.org/10.3390/w12102870

GREENLINE ASSESSMENT PROTOCOL

Before and after stream restoration projects, we conduct greenline riparian vegetation assessments, measuring species diversity and the amount of woody plants along the banks. By gathering baseline data, we can describe existing riparian vegetation conditions and then measure how plant populations change throughout the restoration process.

Field Kit Supplies

Woody species regeneration recording sheets
Wading rod
Pen/pencil

Steps

1. Fill in site information in the header of the woody species regeneration recording sheets.
2. Start at one end of the reach and, using a wading rod, count every woody plant species 3 feet from the water's edge on the right bank.
3. Repeat on the left bank.
4. Total the cells in the worksheet.

Definitions

Greenline: The first perennial vegetation that forms a lineal grouping on or near the water's edge.

Riparian Zone: Lands along the edges of rivers, streams, lakes, and other water bodies whose soils and vegetation are shaped by the presence of water. Riparian zones provide habitat for a diversity of wildlife, help maintain water quality by removing excess nutrients and sediment from surface runoff, stabilize stream banks and reduce floodwater velocity. Overhanging vegetation shades streams, which reduces water temperatures for fish *(source: National Park Service)*.

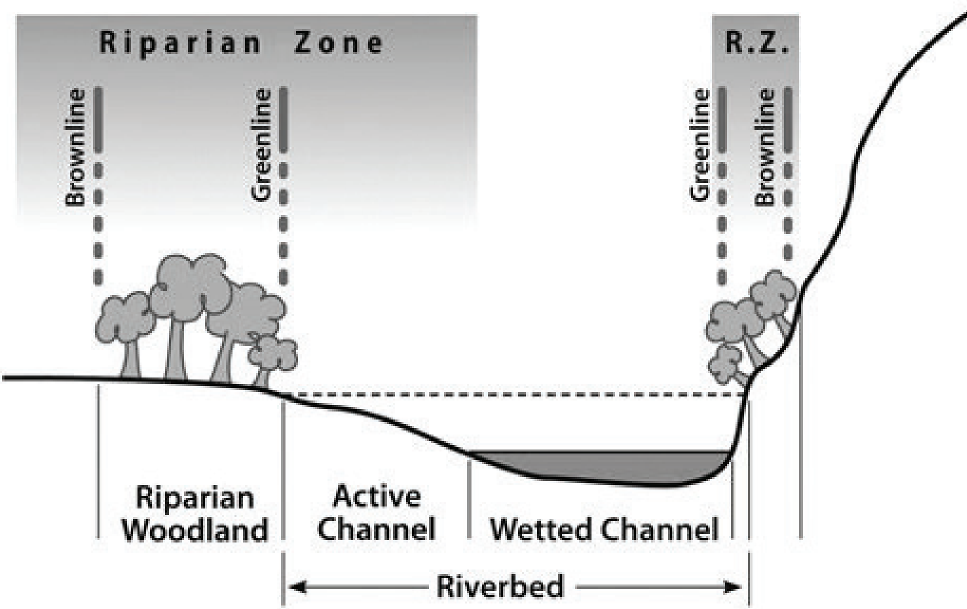


Photo: S. Zogaris & P. Dimopoulos

NOXIOUS WEEDS DATA COLLECTION PROTOCOL

Before and after stream restoration projects, we collect data on which noxious weed species are present and at what density. This baseline data helps us understand how stream restoration projects—which often disturb soil—affect noxious weed problems. The data can help us decide on weed control methods, including pre-treatment to prevent species proliferation, and help us and landowners understand the plant population before and after a project.

Definitions

Noxious weed: A plant that causes harm to agricultural or horticultural crops and natural ecosystems.

Transect: A line that runs through the sampling area.

Quadrat: A square frame used in scientific surveys to isolate small plots of land and assess distribution of species or artifacts.

Field Kit Supplies

Noxious weeds recording worksheet
Montana Noxious Weed Field Guide
Plant cover resolution reference
Measuring tape
Quadrat frame
Pen/pencil

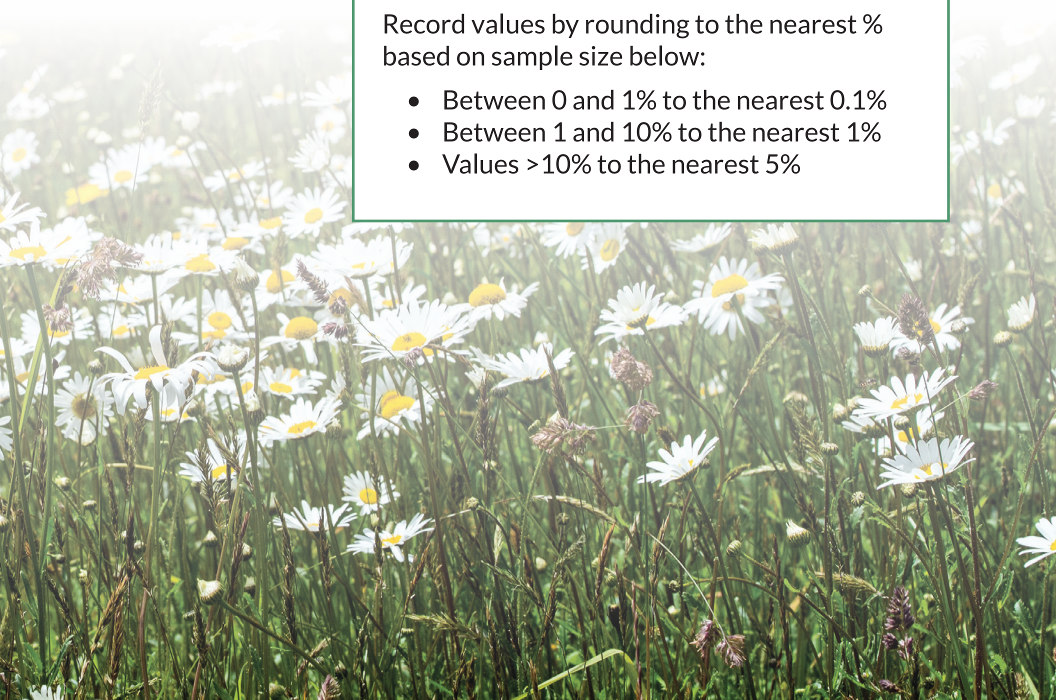
Steps

1. Fill in site information in the header of the noxious weeds worksheet
2. Start at one end of the reach and lay out 30 feet of the measuring tape perpendicular to the stream to create a transect.
3. Place the quadrat at the beginning of the tape (0 feet) and record each noxious weed species and the percent of ground it covers within the quadrat. Estimate ground cover from directly above rather than from a side view. Refer to the noxious weed field guide in your kit for species identification. Common species are marked.
4. Repeat the measurements at 10 feet, 20 feet, and 30 feet from the streambank along the transect.
5. Cross the stream and repeat steps 2 through 4 on the opposite streambank.
6. Repeat the entire process every 100 feet for the length of the reach. Flags mark each interval.

PLANT COVER RESOLUTION

Record values by rounding to the nearest % based on sample size below:

- Between 0 and 1% to the nearest 0.1%
- Between 1 and 10% to the nearest 1%
- Values >10% to the nearest 5%



CLARK FORK COALITION

www.clarkfork.org
140 South Fourth Street West
Missoula, Montana 59801
info@clarkfork.org
(406) 542-0539