
CONFLUENCE CONSULTING INC.



Statement of Qualifications

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A look at what's in store:



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Confluence's Services

Our goal is to deliver expertise that promotes wise stewardship of our natural environment.

Our love of nature is what inspires us, giving us passion for our work. This makes us naturally inspired people who strive to excel at what we do. When we're not at work, you can often find us out enjoying the natural world.

Our work is underpinned by science, which helps us to understand and solve problems in an objective, unbiased way. Through scientific understanding, we seek and deliver truthful answers to our client's questions.

We know we can only give our best when work life is balanced with time for family, friends, and personal pursuits. While we appreciate hard work, we also take time for the most important things in life.

We are proud of our work and take ownership of everything that we do. We approach our client's projects as if they were our own.

**STREAM RESTORATION AND
CHANNEL DESIGN**

**WATERSHED AND LAND USE
PLANNING**

**WATER RESOURCE
ENGINEERING**

WETLAND RESTORATION

**REVEGETATION AND
RECLAMATION**

**ENVIRONMENTAL AND
ECOLOGICAL SERVICES**

**PERMITTING AND
COMPLIANCE**

**GIS AND DATABASE
MANAGEMENT**

NEPA / T&E SPECIES



STREAM RESTORATION AND CHANNEL DESIGN

Confluence specializes in restoring streams and rivers through natural stream design and bioengineering services. In addition to restoring streams to improve fish and wildlife habitat, we have also designed over a dozen stream remediation, relocation, and stabilization projects involving contaminated stream beds and floodplains. Our stream channel design services include:

- Geomorphic channel design
- Hydrologic and hydraulic modeling
- Sediment transport modeling
- Bank and bed stabilization
- Fish habitat restoration
- Revegetation
- Floodplain and riparian restoration
- Endangered species protection
- Erosion and sediment control

WATERSHED AND LAND USE PLANNING

Confluence provides comprehensive services to address watershed planning and management needs. We offer our services at various levels of involvement, from field sampling and monitoring to complete watershed planning and restoration assistance. Confluence can help:

- Study floodplains and delineate wetlands
- Provide water quality planning and management
- Develop cost-effective best management practices
- Assist with grant writing
- Provide public outreach and education
- Gather field data and prepare analysis and studies to meet EPA mandates

WATER RESOURCE ENGINEERING

Confluence provides a full suite of water resource engineering services, such as:

- Floodplain permitting
- Bridge scour analyses
- Fish passage and barriers
- Incipient motion analysis of stream particles
- Irrigation diversions, head gates, and pin and plank structures
- Culverts
- Hardened livestock crossings

WETLAND RESTORATION

Confluence has in-depth expertise in wetland restoration, *including feasibility assessments, delineations, permitting, and monitoring*. Our wetland staff have worked throughout Montana, the northern Great Plains, and the Rocky Mountains restoring wetland habitat. For example, in 2015 and 2016 Confluence developed a restoration plan, draft and final designs and specifications, a construction cost estimate, and oversaw construction of the Shutts Flats Wetland/Floodplain Restoration Project along the South Tongue River in the Bighorn Mountains of Wyoming. Our staff worked closely with an interagency team of Wyoming Department of Transportation and U.S. Forest Service personnel in the development and implementation of the project. Wetlands included in-channel sedge benches, floodplain wetlands, and a slough feature that provided longitudinal connection to a downstream wetland complex.

REVEGETATION AND RECLAMATION

Confluence provides *revegetation support* on a variety of projects, including wetlands, post-development sites, roadside disturbances, and enhancement of wildlife and waterfowl habitat. We work with Conservation Districts, the NRCS, and/or native plant nurseries to meet our client's site-specific revegetation needs.

- Soil sampling and testing
- Revegetation plans—including salvaged plant material, containerized stock, and native seed mixes tailored for project goals, site conditions, and availability
- Vegetation installation, cuttings, containerized plants, plugs, and transplants
- Weed management plans
- Oversight of construction and planting crews
- Long-term monitoring

ENVIRONMENTAL AND ECOLOGICAL SERVICES

Confluence collects and analyzes relevant field data to evaluate the health of terrestrial and aquatic systems and establish baseline data for future monitoring.

- Data collection and analysis services to evaluate the health of fish communities, macroinvertebrates, periphyton, riparian and wetland vegetation, and stream channel conditions
- Design and implement research and monitoring plans to quantify resource baseline conditions and characterize water quality impairments or project related impacts
- Conduct fish population surveys, wildlife surveys, rare plant surveys, riparian and wetland vegetation assessments, and habitat inventories

PERMITTING AND COMPLIANCE

Confluence works closely with our clients and regulatory agencies to minimize potential conflict and streamline the permitting process. The integrity of our environmental planning and permitting services has earned the respect of regulatory agencies, allowing for as quick as possible approvals to meet client timelines and budgets.

- Wetland delineations
- Wetland mitigation planning and design
- Environmental regulation permitting– Federal, State and local
- Floodplain mapping and permitting
- Sediment and erosion control plans (SWPPP)
- Water quality permits
- Weed management and revegetation plans
- Storm water discharge permits
- Environmental compliance monitoring

GEOGRAPHIC INFORMATION SYSTEMS (GIS) AND DATABASE MANAGEMENT

Our staff has extensive experience in all aspects of Geographic Information Systems (GIS) management.

- Design and construction of large GIS databases
- Preparation of data collection plans and field data collection materials
- Collection of survey-quality GPS data
- Performance of complex spatial analyses (including 2D and 3D dimensional, proximity and overlay analyses, 3D modeling, and geostatistics)
- Preparation of maps, tabular data summaries, and 3D animation
- Development and application of spatial data accuracy standards and metadata documentation
- Providing engineering design support

NATIONAL ENVIRONMENTAL POLICY ACT / THREATENED AND ENDANGERED SPECIES

- Biological assessments and evaluations
- Environmental assessments and studies
- Listed plant and animal surveys
- Categorical exclusions



Get to know the Confluence team.



Since our inception, we have hired an exceptional crew of dedicated ecologists, engineers, and administrative staff to best serve our clients. We pride ourselves on going the extra mile to surpass basic customer satisfaction and exceed our clients' expectations.



JAMES A. LOVELL

PRINCIPAL RESTORATION SPECIALIST

Jim Lovell, an international expert in aquatic restoration, is the founder and president of Confluence Consulting, Inc. Jim's technical skills include design and construction of fish habitat projects, restoration for threatened and endangered species, geomorphic assessments of stream channels, and relocation of streams and rivers for fisheries conservation, highway construction, and property development. Jim's passion for nature, personality for innovation, and strong communication skills drive his success. He currently focuses on integrating drought resiliency planning with natural water storage and water quality improvements.

"Working at Confluence allows me to put my love for nature to work, restoring damaged ecosystems for fish and wildlife, leaving the world a better place one project at a time."



MIKE SANCTUARY

STREAM RESTORATION DIVISION MANAGER

Mike combines his knowledge of hydrology, geomorphology, and fisheries in developing several restoration projects throughout the Rockies. After obtaining his master's degree from the University of Montana, Mike focused his career on aquatic habitat and water quality restoration with Confluence. Mike has coordinated several large stream channel and wetland restoration projects, focusing on channel relocation, habitat improvement, bank stabilization, fish screening and passage for native and non-native game fish.

"Leaving a legacy of projects that improve habitat and water quality for the benefit of fish, wildlife, and future generations keeps me motivated and continuously wanting to find new opportunities to work with conservation and restoration partners."



RICH MCELDOWNEY, PWS
SENIOR WETLAND AND
RIPARIAN ECOLOGIST

Rich is a certified professional wetland scientist (#1439) and a returned Peace Corps volunteer (Philippines 1994-1996). He has managed and contributed to riparian, wetland, floodplain, and stream-related projects throughout Montana and the Rocky Mountain West. Rich specializes in ecosystem functional assessment and restoration, particularly as they relate to terrestrial and aquatic habitat, food chains, water quality improvement, and nutrient cycling. He has developed or co-authored three rapid wetland assessment methods for use in different areas of the western U.S. (e.g. Montana Wetland Assessment Method).

“I believe with every fiber in my being that through thoughtful consideration, use, and restoration, natural systems will support the human journey indefinitely.”



MARK STORY
HYDROLOGIST

Mark is a retired U.S. Forest Service hydrologist, serving 38 years with four national forests including the Gallatin National Forest, 1988-2012; San Juan National Forest (Colorado), 1980-1988; Shoshone National Forest (Wyoming), 1976-1980; and Coconino National Forest (Arizona), 1974-1976. In addition to a wide variety of hydrologic assessment and monitoring experience, he has provided Air Quality monitoring services to multiple Forest Service regions and individual Forests. Mark has extensive experience in EIS/NEPA, watershed analysis, air quality analysis, water rights, watershed rehabilitation, and wildfire rehabilitation.



TY TRAXLER, PE
LEAD CIVIL ENGINEER

Ty's experience includes stream and wetland restoration, pond design, storm water analysis/design, irrigation system analysis/design, 1D and 2d hydraulic modeling, environmental and floodplain permitting. His skills are uniquely utilized at Confluence for specialized projects including fish passage design, floodplain studies, and irrigation water management, and construction oversight. He spends his free time in the mountains and on the rivers with his family, or following the noses of his dogs Gus and Betty chasing wild birds.

"I feel fortunate to be able to marry my love for fisheries and the beautiful habitats where they thrive with a job that helps conserve and restore these places."



CAROLINE STANLEY
ENGINEER/SURVEY
TECHNICIAN

Caroline has been involved in multiple stages of restoration including geomorphic and site assessment, grading and erosion and sediment control plan development, hydraulic and hydrologic modeling, permitting, and post-construction monitoring. Her project experience includes the design and implementation of restoration projects in Wyoming, Montana, Maryland, Pennsylvania, Virginia and North Carolina. She's now working on expanding her expertise and acquiring an additional degree in civil engineering at Montana State University.



**RONDA L. BURNS, PE, CFM,
TSP WATER RESOURCES
ENGINEER/HYDROLOGIST**

Ronda Burns, a licensed civil engineer, has 18 years of consulting and agency experience in water resources engineering. She holds an M.S. in Civil Engineering from Colorado State University, where her research focused on a regional rainfall frequency analysis of the Palmer Divide area of Colorado. Ronda specializes in hydrology, hydraulics, geomorphology, and sediment transport modeling. Her experience includes bridge hydraulics and scour, river and stream restoration, floodplain management, and water quality projects.

“I enjoy working in a collaborative environment surrounded by friendly dogs.”



**JIM JOHNSON
GIS AND DATA
QUALITY MANAGER**

Jim Johnson has over 20 years of experience managing large and complex spatial and non-spatial relational databases. Since 1996, he has provided efficient GIS solutions to government and industry through interdisciplinary consulting firms, with mine site and riverine / riparian zone remediation as the focus of his project experience. Jim has performed all aspects of spatial data management and analysis common to the remedial investigation, feasibility study, and remediation design processes, including remedial design of stream channels and their floodplains, and 2-D and 3-D modeling of stream sediment production and delivery.

“I feel fortunate to have built a career that contributes to the proper stewardship of our natural world.”



ROBIN JONES

AQUATIC/PLANT ECOLOGIST

Robin is an aquatic ecologist with experience working in wetlands, rivers, and streams. Much of her technical background is in assessment and monitoring of aquatic and terrestrial ecosystems. Robin also has expertise in water quality, weed control, revegetation, fisheries management, ecological modeling, GIS mapping, and statistical analyses. Robin excels at planning, coordination, and logistics, and has hired, trained, and managed numerous seasonal field crews. Robin has traveled extensively throughout the West and spends as much of her time as possible exploring rivers and mountains.

“I am fortunate to be able to work on projects that allow me to pursue my passions and have a positive impact on the environment.”



RYAN QUIRE

BOTANIST/ECOLOGIST

Ryan is an accomplished botanist, plant ecologist, and wetland scientist with experience working in a wide range of ecosystems. She has led projects assessing rangeland health, conducted ethnobotanical and rare plant surveys for both state and federal agencies, created and implemented revegetation designs and weed management plans, and completed wetland delineations and monitoring projects across the western US. She is proficient in native plant restoration protocols, revegetation design, plant identification and training, GIS mapping and design, technical writing, and environmental permitting.

“I am passionate about preserving and restoring our natural surroundings as well as educating our local communities on the importance of biodiversity and healthy ecosystems.”



DEBBIE BARNETT
OFFICE ADMINISTRATOR

Debbie's administrative experience includes human resources, payroll, accounts payable and receivable, scheduling, inventory and supplies, vendor and contractor relations, coordination of special events, and other general office duties. Additionally, she has held the title of assistant project manager for a land developer, serving as a liaison between engineers, architects, county planners, legal counsel, contractors, and governmental agencies. When not out exploring, Debbie enjoys traveling to visit her children and two beautiful granddaughters.

"Working for a group that is passionate about preserving our natural resources is very important to me. Truly proud to be part of the team!"



SARAH WASHKO
**JUNIOR WATER RESOURCES
ENGINEER**

Sarah Washko brings her waders to work. Having also served as a Big Sky Watershed AmeriCorps member, Sarah is committed to serving Montana's Watersheds. With a background in Geology and an M.S in Civil Engineering from Michigan Tech, Sarah has dedicated her career and studies to water. She has a multifaceted background in wetland and stream restoration design, monitoring, hydraulic modeling, and environmental permitting. She loves hiking and being in Montana's wilderness, Sarah spends as much time out in the Big Sky State's rivers and mountains as she can.

"Water has always been a part of my life. When I'm not recreating on a river or lake, I am excited to be working with the Confluence team to develop creative solutions to modern restoration challenges."



Our projects

We understand the importance of protecting our natural resources and preserving recreational and economic opportunities.

We have designed and implemented hundreds of successful environmental restoration projects, working hand-in-hand with ranchers, conservation groups, state and federal agencies, nonprofit groups, and public citizens to promote a healthy environment for the benefit of all.

We aim to restore our natural landscape and preserve our natural heritage, recreation, and quality of life through

delivering expertise in aquatic design and restoration and promoting the wise stewardship of our natural environment.

Confluence strives to design and implement projects based on the ecological and physical processes found in nature. Our reputation for innovation has allowed us to restore rivers, streams, and wetlands in 16 states across the US. These projects not only improve habitat for fish and wildlife but also, improve water quality, increase native plant species diversity, promote environmental health, and preserve land values for future generations.

Poindexter Slough Fisheries Enhancement

THE PROBLEM

The Beaverhead Watershed Committee retained Confluence to survey and develop restoration recommendations for improving fish habitat and water quality along four miles of Poindexter Slough. At one time, Poindexter Slough was a natural side channel of the Beaverhead River, but is currently controlled by a head gate.

OUR SOLUTION

Potential improvements identified by Confluence included:

- Restoring appropriate width-to-depth ratios for riffles and pools
- Restoring or isolating fine sediment deposits from the stream bed
- Encouraging natural recruitment of willows and other woody riparian vegetation

CONSTRUCTION OVERSIGHT

Construction of the Poindexter Slough Fisheries Enhancement Project began in January 2015. Confluence provided

oversight to ensure the project was built according to the specified design. Oversight included staking all project reaches, inspecting elevations of the diversion structures and headgates, and ensuring the proper gradient throughout the re-graded channel segments.

THE OUTCOME

The Beaverhead Watershed Committee extended a second contract with Confluence to produce final designs and construction specifications for the preferred alternative from the Feasibility Study. The final design plans included:

- Re-grading 5,700 feet of the channel to improve pool and riffle habitats and reduce fine sediment accumulation
- Modifying channel width and depth throughout the 4.75 miles of the channel to encourage fine sediment transport and improve angling
- Re-sloping vertical banks and transplanting 130 willows to reduce bank erosion
- Upgrading diversion structures on the Beaverhead River and the Dillon Canal to enable flushing flows, eliminate backwatering, and improve fish passage.

Poindexter Slough Fisheries Enhancement (continued)



BEFORE

Over-wide and eroding channel segments causing slow water and fine sediment accrual prior to construction.



AFTER

Narrowed and stabilized channel segment immediately following construction.

This project ranked in the top five to be funded by the Montana Legislature in 2011. In 2016, Montana Fish, Wildlife, and Parks (MFWP) awarded Confluence with the Award of Excellence for our role in this project!

Spring Creek Fish Habitat Restoration



THE PROBLEM

Confluence conducted a thorough inventory and analysis of stream conditions to determine that the spring creek fishery was grossly under potential due to an excessive fine sediment supply and a lack of spawning habitat and adult trout cover.

OUR SOLUTION

Confluence developed a restoration plan providing complete habitat evaluation,

design, and construction oversight services on the restoration of over three miles of spring creek and a side channel to the Green River in central Wyoming.

THE OUTCOME

Confluence has since converted the spring creek into a trophy fishery supporting trout up to 27 inches.

Upper Missouri Stream, Riparian, and Wetland Mitigation Bank

THE PROBLEM

Confluence was retained to develop a concept plan for stream, riparian, and wetland mitigation banking opportunities along the Beaverhead, Ruby, Big Hole, and Jefferson corridors on the Hamilton Ranch.

OUR SOLUTION

Confluence's wetland scientists observed existing conditions on over 1,000 acres of wetlands on the property to determine mitigation potential and prioritize areas in a phased banking approach.

Identified mitigation banking opportunities included:

- Removing hard bank armor, riprap, and junk from stream banks
- Converting croplands to native riparian vegetation
- Restoring adequate channel dimensions
- Improving riparian vegetation composition within buffer zones
- Removing floodplain berms and levee
- Improving spawning habitat
- Grazing management
- Increasing the elevation of groundwater tables

THE OUTCOME

The final deliverable contained a 250-page concept plan outlining all enhancement and restoration options for each stream, riparian zone, and wetland within the designated study area of the ranch. We generated over 100 maps, illustrating existing conditions for each surveyed reach.

Final data collected for the effort included:

- 150 test pits for the wetland delineation
- 15 surface water flow monitoring sites
- Topographic surveys of channel cross sections and longitudinal profiles
- Culvert invert elevations

Upon completion of the mitigation plan, the U.S. Army Corps of Engineers certified the Upper Missouri Mitigation Bank for credit sales.

Jefferson Slough Eurasian Watermilfoil Management Plan



BEFORE



AFTER

THE PROBLEM

In 2011, a 20-acre infestation of invasive Eurasian watermilfoil (*Myriophyllum spicatum*; EWM), was identified within a 4-mile segment of Jefferson Slough near Whitehall, MT.

OUR SOLUTION

- Work with a technical advisory committee to develop and implement a detailed management plan
- Apply aquatic herbicide to the infested segment of the Slough
- Relocate the Slough through a newly constructed and narrower channel adjacent to the existing channel and backfill any remaining EWM in the abandoned channel
- Modify irrigation infrastructure along the Slough to enable periodic flushing flows and reduce the accumulation of fine sediments
- Implement riparian and stream restoration practices that effectively reduce sediment delivery to the Slough
- Install a sediment trap on Sheep Rock Creek to eliminate large sediment pulses during intermittent flows

THE OUTCOME

Monitoring efforts from 2016 to 2018 have indicated success in eliminating EWM.

Thompson Creek Stream/Wetland Restoration and Fisheries



BEFORE



AFTER

THE PROBLEM

The Thompson Creek stream and fishery near Belgrade, MT, has been significantly affected by erosion, overgrazing, fine sediment covering the stream bed, high summer temperatures, and a lack of spawning and deep pool habitat.

OUR SOLUTION

Confluence coordinated with private landowners, provided consultation, surveying, design, permitting, and construction oversight services to:

- Reduce channel widths
- Isolate and stabilize over 35,000 cubic yards of fine sediment, reducing sediment transport to the East Gallatin River
- Install bioengineered bank stabilization treatments, new culverts, and livestock crossings
- Increase deep pool, rearing, and spawning habitat for trout
- Stabilize seasonal water temperatures
- Expansion of floodplain and wetland habitat
- Restore and revegetate adjacent wetlands with native sod and seed
- Improve aesthetics and wildlife habitat features

Jarbridge River Emergency Bull Trout Habitat Reconstruction



BEFORE



AFTER

THE PROBLEM

Following a major flood event and unauthorized river reconstruction, the resident population of bull trout in the Jarbridge River declined to the point of being listed as endangered under the emergency provisions section of the Endangered Species Act.

OUR SOLUTION

- Divert the entire Jarbridge River flow around the project site in a lined diversion ditch
- Intercept groundwater in a series of dewatering trenches and sumps upstream of construction activities
- Pump turbid water onto the floodplain to allow it to filter through vegetation and infiltrate into the ground
- Install nearly 3,000 feet of silt fence along haul roads, the diversion ditch, and other construction areas
- Schedule construction so that multiple activities with the potential to produce sediment would not occur simultaneously

THE OUTCOME

Confluence restored over 2,000 feet of bull trout habitat and the adjacent floodplain, and completed the work within 2.5 months of contract execution.

Goose Creek Restoration and Westslope Cutthroat Trout Conservation

THE PROBLEM

During the 1950s, Goose Creek, a tributary of the West Branch of the Priest River in the Idaho Panhandle, was channelized to maximize agricultural land use and drain adjacent wetland meadows. The Kalispell Tribe of Indians retained Confluence stream restoration specialists and water resource engineers to develop conceptual plans and restore four miles of Goose Creek and several hundred acres of adjacent wetlands.

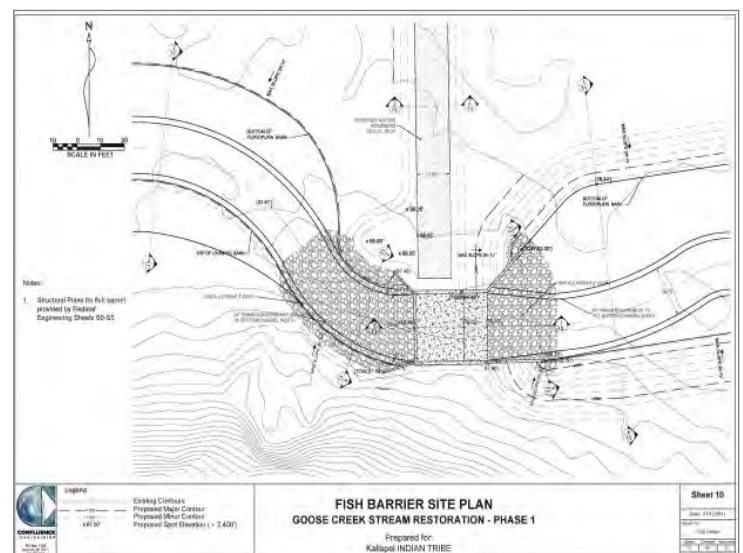
OUR SOLUTION

In support of the restoration design, Confluence Consulting, Inc. completed a 600-acre wetland delineation and a geotechnical analysis. The design featured a structural design for a fish barrier, and the initial 3,400 feet of channel relocation. The fish barrier and associated floodplain dike were constructed in 2011, while the first phase of channel relocation was constructed in 2012. The fish barrier was designed to pass a 100-year flood event (770 cfs) and prevents upstream migration of non-native fish by feet vertical concrete wall. Confluence Consulting, Inc. excavated several test pits to determine soil engineering properties and groundwater depth in the vicinity of the barrier, dropping over five feet.

Results of these geotechnical investigations necessitated moving the structure to the south end of the meadow to allow it to tie into bedrock formations 12 feet underground. Confluence Consulting, Inc. then installed helical piers where bedrock formations were too deep, providing a sound foundation to construct the concrete footers.

THE OUTCOME

Confluence finalized designs for Phase 2 of the project, which entailed relocating an additional 4,500 feet of channel and establishment of 2.8 acres of wetlands. The Kalispell Tribe of Indians expressed great satisfaction with the results and hopes to build on the success of this projects with new projects in the area.



MDT Stream Mitigation Monitoring

Since 2013, the Montana Department of Transportation (MDT) has contracted Confluence to conduct annual, statewide monitoring of MDT's stream mitigation sites. The US Army Corps of Engineers (USACE) requires MDT to conduct mitigation actions to offset any permanent impacts to streams and riparian corridors resulting from highway construction projects.

Confluence is responsible for collecting and interpreting data as specified in monitoring plans prepared by MDT as well as preparing annual monitoring reports for each mitigation site. Confluence summarized the results of statewide annual monitoring from 2013 to 2019 into technical reports documenting conditions at each site in accordance with MDT and USACE monitoring requirements.

MDT Wetland Mitigation Monitoring

The Montana Department of Transportation (MDT) retained Confluence to complete two consecutive three-year monitoring term contracts involving a comprehensive environmental monitoring program for 29 mitigation wetland projects.

Monitoring activities included: soil and water sampling, wetland delineation per US Army Corp of Engineer's (USACE) guidance, functional assessment of wetland condition per the Montana Wetland Assessment Method, vegetation community mapping, bird and other wildlife observations, groundwater monitoring, stream channel measurements and assessment, weed infestation inventory, and infrastructure maintenance assessment.

Quantitative monitoring methods included GPS and aerial photogrammetry-based vegetation community mapping, and permanent vegetation transects. Confluence prepared an annual monitoring report for each mitigation site monitored in a year. These reports documented mitigation wetland performance and earned mitigation credit approval from USACE.

The project included a team of 13 specialists monitoring 29 mitigation sites throughout Montana. Confluence completed wetland reporting for MDT in compliance with USACE standards.

Shutts Flats Aquatic Resource Mitigation

THE PROBLEM

The Wyoming Department of Transportation required 15 functional unit mitigation credits for proposed roadway improvements on U.S. Highway 14 south of Burgess Junction in the Bighorn Mountains of north-central Wyoming. The U.S. Forest Service had identified a wetland mitigation site located in the floodplain of the South Tongue River. Shutts Flats consists of interspersed dry and wet meadow along the South Fork Tongue River. Previous impacts to the system from tie-hacking for the railroad had changed the floodplain elevation, disconnecting it from the river.

OUR SOLUTION

The four main project elements included low-flow sedge benches, floodplain reconstruction, development of a wetland swale, and increased habitat diversity. In addition to conceptual designs and a full

PS&E package (in hardcopy and Microstation and GeoPak formats), Confluence developed 1D and 2D hydraulic models of the mitigation site using HEC-RAS and a mitigation master plan that included restoration goals and objectives, performance metrics, and a monitoring plan.

THE OUTCOME

Within seven months, our staff had permits in hand and completed conceptual to full design through a process of multiple review cycles by the Interagency Technical Team.

To ensure the proper construction, Confluence staff directly oversaw the project, restoring/creating approximately 2.5 acres of wetland habitat. Additionally, Confluence restored hydrology to 3 more acres of decadent scrub-shrub wetland habitat at the north end of the Flats.

The project also improved the aquatic bed habitat for use by the Columbia spotted frog, a USFS Sensitive Species.



Beartooth Highway Project

Confluence provides the Federal Highway Administration - Central Federal Lands Highway Division (FHWA-CFLHD) permitting support, construction oversight of wetland mitigation sites, annual wetland mitigation site monitoring, and revegetation design/implementation of wetland mitigation sites and adjacent roadside habitat at high

elevation sites on the Beartooth Highway in the Shoshone National Forest in Park County, Wyoming.

Confluence continues to service this ongoing project, with support for wetland mitigation sites and for new mitigation sites constructed in the summer of 2018.

Stone Creek North Project

Confluence completed a Biological Resources Report (BRR)/Aquatic Resource Delineation for the Montana Department of Transportation (MDT) to analyze potential impacts to existing biological resources associated with proposed improvements to MT Hwy 41. The MDT proposed the reconstruction of roughly 7.2 miles of MT Hwy 41 near Beaverhead Rock between Twin Bridges and Dillon, Montana.

Confluence evaluated the existing conditions and the project's potential impacts on terrestrial and aquatic plants and animals, wetlands, species of concern (SOC), and threatened and endangered (T&E) species. Confluence prepared the Biological Resources Report (BRR) and delineation in compliance with MDT's guidance and environmental review process

From 2015 to 2017, MDT requested that Confluence verify the wetland delineation

performed by its wetland scientists in 2013 and extend the wetland delineation to encompass a larger project area. The project extension included an in-depth survey and report for state and federally listed plant species, as well as an in-depth evaluation and mapping of a fen associated with a warm spring. The methods and approach used by Confluence will be used by MDT biologists and engineers to address fen-related issues encountered on future projects throughout the state.



WETLAND DELINEATION, PERMITTING,
AND MITIGATION

Green Mountain Wetland Project

Confluence provided wetland delineation and permitting services for a 320-acre land development project located in the Bangtail Mountains near Bozeman, Montana.

Due to the size of the project and the rugged terrain, we took an innovative approach by combining on-the-ground, site-specific delineation and detailed aerial photography. This method allowed us to complete the work in a timely manner which met the client's budget and schedule.

The developer used our delineation maps, along with wildlife studies, to produce a site plan that minimized wetland impacts and preserved critical wildlife habitat.

Confluence designed, constructed, and monitored the creation of 1.7 acres of mitigation wetlands. The newly created wetland satisfied requirements of the U.S. Army Corps of Engineers 404 permit and provided attractive wildlife habitat within an extensive open space, complete with nature trails and interpretive signage.

Confluence took an innovative approach to the wetland permitting process that incorporated the developer's project vision and budget constraints while exceeding regulatory requirements.



Valley West Subdivision

Confluence developed final designs and provided construction oversight for 38 acres of mitigation wetlands for the Valley West subdivision complex. Wetland features included three lakes totaling 12.5 acres and an additional 25.5 acres of emergent wetlands. Wetland design tasks included groundwater monitoring, soils and subsurface investigations, developing final grading plans, and coordinating with civil and architecture project team members. Tasks associated with lakes included developing grading plans, designing screened inlet and outlet devices,

designing water control structures, and overseeing all construction phases. All plans were developed to maximize waterfowl production and nesting sites, while providing recreational features for the public. Confluence's detailed mitigation plans included over-excavating the lake and wetland areas, then placing 6 to 12 inches of topsoil for wetland vegetation establishment. Confluence worked on a team that included landscape architects, engineers, and development specialists.

Stanley Idaho Wetland Mapping and Delineation

Bisected by the Salmon River, the City of Stanley, Idaho is surrounded by floodplains. As the town expanded outward, the City drafted a wetland protection ordinance in May, 2008. The ordinance called for landowners to utilize wetland maps during project planning to maintain a 50 to 75 foot setback from wetland boundaries, and to seek a permit for any development that

would affect wetlands. Confluence's wetland scientists delineated nearly 250 acres within the city limits, verified previous wetland delineations, surveyed ephemeral and intermittent streams, and mapped aquatic resources. Confluence worked closely with local landowners, the City of Stanley, and the U.S. Environmental Protection Agency to complete the project.

O'Dell Creek Wetland Monitoring

O'Dell Creek, one of Montana's most famous trout streams, rises from the Madison River floodplain near Ennis, MT. The Granger Ranch encompasses much of the headwaters of O'Dell Creek and over 1,000 acres of adjacent wetlands. Partially drained by ditching decades ago, the wetland complex was recently restored by plugging drain ditches and elevating the groundwater table, resulting in ecological benefits to the immediate area and the entire Madison River

ecosystem. Confluence was retained by Montana Fish, Wildlife, and Parks (MFWP) to monitor the restored wetlands, documenting their functional recovery over three years. Confluence staff completed wetland, open water, and vegetation mapping in addition to gathering soils data. All of our work was completed following US Army Corps of Engineers' mitigation monitoring requirements.

1001 Oaks Stream Restoration and Wetland Mitigation Project

Confluence conducted jurisdictional wetland delineation for an innovative office and retail development in a commercially zoned district in Bozeman, Montana. The delineation aided an overall effort to enhance the functions and values of a highly impacted creek, and to ease the planning and permitting process for office and retail building sites.

Confluence worked closely with the client, the project landscape architect, local

landscaping services, and regulatory representatives to develop an attractive pedestrian/recreational corridor surrounding a healthy, perennial stream.

This project received a City of Bozeman Beautification Award.

Private Pond near Big Sky, MT

Confluence provided survey, design, construction management, and oversight services for the construction of a half acre pond near Big Sky. This challenging project included preparation of a grading plan for the expansion of two small, shallow marshes into one large deep pond with

surrounding wetlands. The pond design included connection to intermittent inlet and outlet channels, a liner with a subsurface drainage system, and piping for the possible future addition of a re-circulating pump.

East Duck Creek Restoration

The MacMillan Ranch, located on the southern end of the Crazy Mountains, retained Confluence to improve fishing opportunities throughout the ranch. A segment of Duck Creek was not exhibiting pools capable of supporting over-wintering trout, limiting the fishery's production and population of catchable sized trout. Efforts to improve fish habitat included a full inventory of aquatic resources followed by the restoration of pool habitat to benefit native

Yellowstone cutthroat trout in approximately one mile of East Duck Creek. Some of the stream restoration involved the construction of boulder step-pools through a high-gradient canyon section of the stream. In addition, we created a small but very fishable and aesthetic streamside pond that was stocked with Yellowstone cutthroat trout. The project has experienced a 100-year flood and has maintained its pool morphology and sediment transport characteristics.



Diamond O Ranch Aquatic Resource Enhancement

The Diamond O Ranch, located near Dillon, MT, retained Confluence to evaluate the potential for habitat restoration and improvement on this 516 acre property. Confluence:

- Constructed a new channel to provide high quality trout habitat, convey design discharge, and meet hydraulic design criteria for trout spawning and sediment transport through the system
- Optimized water quality by installing an infiltration system along the channel to increase groundwater flows into the Larsen Drain Ditch
- Relocated existing irrigation infrastructure to isolate groundwater in the new channel from warm turbid surface irrigation water
- Constructed a pond to provide gravel for stream construction and to filter surface irrigation water through, supplying additional water to the new channel
- Expanded an existing pond and creation of wetland habitat beneficial for waterfowl migrations and use by other wildlife species

Prior to site construction, Confluence identified a population of the Federally threatened Ute ladies'-tresses orchid (*Spiranthes diluvialis*). The orchid is being monitored to determine if any of the habitat enhancements are having an effect on the local population.

Big Hole River

Confluence worked with Montana Fish, Wildlife and Parks, the U.S. Fish and Wildlife Service, local ranchers, the Big Hole Watershed Committee, and Montana DEQ to develop a water quality plan for streams in the upper Big Hole River watershed in Southwest Montana. In addition, Confluence completed dozens of projects with the Arctic Grayling Recovery Program to restore habitat critical to the survival of arctic grayling in Montana. These projects have included large channel restoration and revegetation projects, upgrades to irrigation infrastructure, installing fish passage devices, and reconnecting tributary streams to the Big Hole River to improve habitat connectivity.

Silver Bow Creek

Confluence worked with Montana Department of Environmental Quality, the Montana Department of Justice Natural Resource Damage Program, and other consultants to monitor the efficiency of remediation and restoration activities on Silver Bow Creek. Monitoring parameters included surface water quality, metals in stream bed substrate, groundwater sampling, biological communities, and geomorphic adjustments of the reconstructed segments of Silver Bow Creek.

The results of water quality and biological monitoring show a significant improvement in the highly toxic waters of Silver Bow Creek. Today it is a meandering stream that has the potential to become excellent habitat for trout and other aquatic life, revitalizing recreational and economic factors in Butte and Silver Bow County.

Clark Fork River

Confluence assisted the Montana Department of Justice Natural Resource Damage Program in developing its restoration plan for the Clark Fork River. This work included developing alternative bank stabilization concepts, evaluating floodplain stability and revegetation needs, and considering various fish habitat restoration opportunities.

In addition, Confluence staff created and managed large GIS databases for the Milltown Dam and Clark Fork River Operable Units, and participated in the remedial design for the Milltown Dam removal, including remediation stream channel design and sediment transport modeling.

The remediation and restoration of the Clark Fork River will bolster the ecological and economical conditions of southwest Montana, including a drastically improved fishery, more stable wildlife habitat, and increased land values. Confluence is proud to be a part of the restoration planning effort of this magnificent resource to Montana.

Bear Creek Habitat Restoration

THE PROBLEM

Several decades of poor land management led to a degraded segment of Bear Creek, which exhibited significant bank erosion and poor habitat for adult trout. An aquatic habitat assessment identified only four pools in over 4,200 feet of stream channel. Previous overgrazing and woody vegetation removal efforts had also depleted the riparian corridor of nearly all woody plant species.

These land use practices caused the stream to widen considerably, covered it with fine sediment, and eliminated many of the habitat features essential to a healthy trout population.

OUR SOLUTION

Confluence restored Bear Creek by constructing over 40 pools and runs, creating spawning beds, adding woody debris for cover, and restoring the riparian corridor with 600 native shrubs and trees.

THE OUTCOME

Bear Creek has a rapidly recovering riparian corridor and a growing brown trout fishery. It has become a significant spawning tributary to the Madison River, a world renowned trout fishery.



Private Fisheries Assessment

Confluence provided fisheries expertise to a private ski resort to develop a high quality recreational fishery in a constructed lake. Confluence developed stocking and feeding rates to promote excellent growth and vigor of fish, while protecting against development of nuisance algal blooms, which reduce aesthetic values and clog intakes and outlets. Confluence also developed additional measures to prevent algal growth through the use of non-toxic algae controls.

BLM Mountain Streams Study

Confluence collected, processed, analyzed stream data to develop a baseline report on the existing conditions of select mountain streams within Fergus, Judith Basin, Cascade, Teton, Lewis and Clark, Pondera, and Meagher counties of Central Montana. Confluence surveyed 28 sites on 15 streams. GIS maps were completed for each site and used in accordance with biologic, geomorphic, and anthropomorphic data to evaluate relative stability and trends within the

functional conditions of these systems. Aquatic habitat monitoring, stream survey, and lotic survey data were completed at each study site. Results of the study are being used by the BLM to determine suitability for conserving native Westslope cutthroat trout populations.

Yellowstone Club Water Quality Monitoring

The Yellowstone Club retained Confluence to conduct water quality sampling and stream flow measurement at sites on Second Yellow Mule Creek, the South Fork of the West Fork of the Gallatin River, the West Fork of the Gallatin River, and the main stem of the Gallatin River to assess potential ongoing water quality impacts that may have resulted from the Yellowstone Club reclaimed water storage facility spill into Second Yellow Mule Creek in 2016. Monitoring activities included assessment of four parameters: field turbidity, laboratory total suspended solids (TSS), water temperature, and stream discharge. Follow-on monitoring included fish monitoring using backpack electro-shockers and aquatic habitat assessments to determine if sediment delivery to the system had discernible impacts.

The resulting data were compiled into a report compliant with the Montana DEQ's monitoring requirements and used to develop natural resource management recommendations.

Livingston South Project

Confluence completed a Biological Resources Report/Biological Assessment for the Montana Department of Transportation (MDT) to evaluate potential impacts to biological resources that may result from the reconstruction of United States Highway 89 South (US 89S) south of Livingston, Montana. The report included an evaluation and assessment of the proposed project's effects on the fish, wildlife, critical habitats, rare and/or sensitive plants, threatened and endangered species (T&E), species of

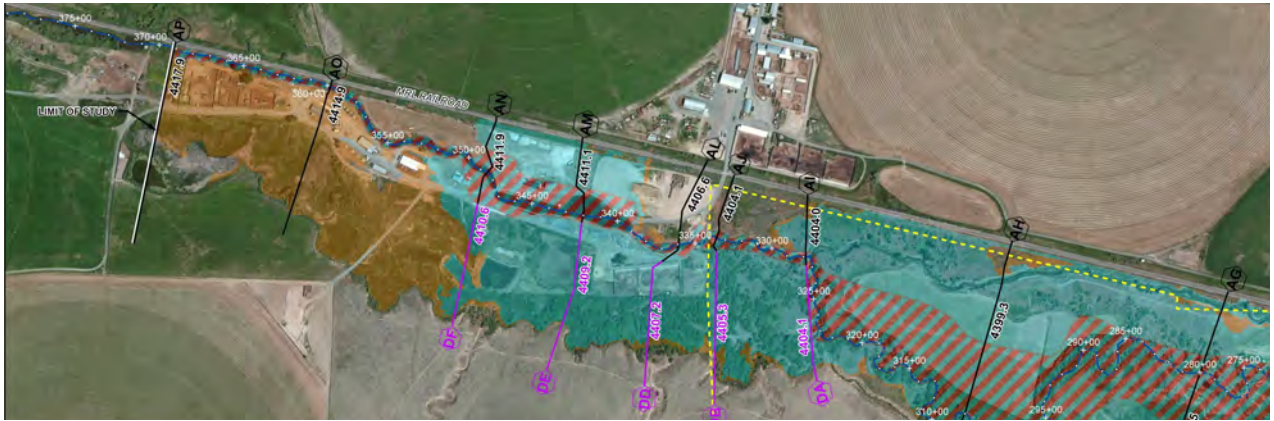
concern (SOC), wetlands, streams and other water resources located along the project corridor. Conservation measures and other relevant mitigation to avoid/minimize or compensate for adverse impacts to potentially affected natural resources were also included in the report. Confluence also completed an animal detection systems feasibility analysis due to a disproportionate number of vehicle collisions identified for the project area.

Arrington Ranch Wetland and Waterfowl Habitat Enhancement

Confluence conducted a wetland delineation and survey for Ute ladies'-tresses (*Spiranthes diluvialis*), and provided survey, design, hydrologic/hydraulic analyses, reporting, permitting, and construction oversight for this wetland and waterfowl enhancement project on the Arrington Ranch, adjacent to the Beaverhead River near Twin Bridges, MT.

The waterfowl habitat design plans included:

- Inlet and outlet structures for the oxbow reactivation
- Grading plans for to enhance waterfowl habitat
- Revegetation design customized to include native species beneficial for waterfowl



GNP Floodplain Study

Confluence assisted in the development of a flood-plain study near Glacier National Park. The National Park Service commissioned the study to determine whether existing housing units should be replaced or relocated.

Confluence identified appropriate cross-section locations for the development of a hydraulic model and 100-year flood map for the project area. In addition, general observations regarding stream corridor condition, evidence of active geomorphic processes, and ongoing

management efforts in the river corridor and adjacent floodplain areas were made.

Confluence reviewed existing flood studies by the US Army Corps of Engineers and the National Park Service in addition to other relevant studies to gain an understanding of the results and conclusions of those efforts. Confluence reviewed recent published literature on alluvial fan formation, sediment transport, stability, and flooding. Confluence also explored channel relocation as an option to lessen effects on property.

Pipestone Floodplain Re-mapping

Confluence assisted Jefferson County to prepare designs for restoring a 12,300 foot segment of Pipestone Creek to its historic alignment to reduce chronic bank erosion and sediment delivery downstream. Pipestone Creek runs through a detailed, FEMA-mapped floodplain, which required Confluence to re-map the new floodplain boundaries resulting from the restoration project. Our project engineers conducted additional surveying,

HEC-RAS modeling, and GIS mapping to re-map extents of the predicted 100-year and 500-year floods. The results of this analysis were submitted with a CLOMR (Conditional Letter of Map Revision) application to FEMA and the Montana DNRC for review prior to initiation of the project. FEMA approved the re-mapped floodplain and issued a Letter of Map Revision.

Effects of Climate Change on Fish

Confluence provided GIS and relational database management expertise to a multi-agency, multi-disciplinary group modeling the potential effects of anticipated climate change on Montana's prairie stream fisheries. Confluence's tasks included:

- Creation of a GIS enabled relational database of over 300,000 fish observations collected at more than 2,700 discrete sampling locations in eastern Montana streams for each sample location
- Delineation of contributory watersheds
- Compilation of fish assemblage characteristics
- Parameterization and calculation of Index of Biological Integrity (IBI) scores
- Production of a statewide stream network topology correcting stream density errors in the National Hydrography Dataset
- Derivation and computation of Bramblett's Connectivity Index, Strahler Stream Order and other topology based metrics for analysis and modeling

WY River Basin Planning

The Wyoming Water Development Commission (WWDC) retained Confluence to compile and develop statewide water infrastructure GIS data. Through this project and the development of water infrastructure data for all of Wyoming, the state will ensure its consistency and accuracy, create cost savings for future projects, and modernize the program to align with requirements set by other state agencies. Confluence's tasks included:

- Water structure mapping (diversions and wells)
- Conveyance mapping (water transmission including ditches, canals, and pipelines)
- Reservoir mapping (raw water reservoirs mapped and attributed)
- Data verification and cross-checking

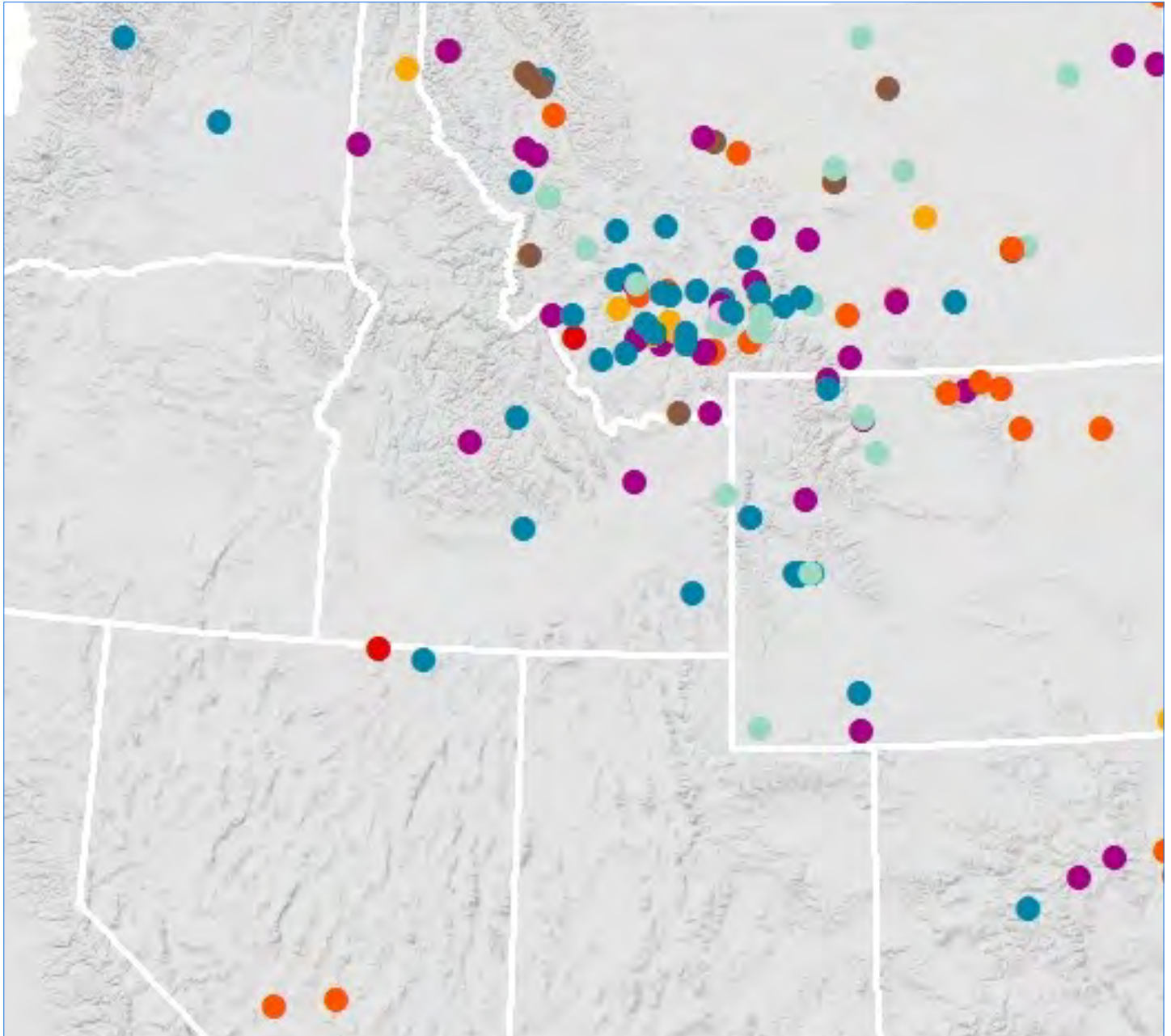


Ribbon cutting at the inauguration of the re-meandering of Bozeman Creek in Bogert Park, Bozeman, MT.

Our regional impact

While commonly used to define the meeting of two streams, we also believe the term “confluence” best describes the manner in which we provide our clients with superior, cost-effective solutions. We work closely with our clients to ensure their finished projects reflect a confluence of creative ideas, thoughtful planning, effective communication, and quality implementation. Using this method, we have directly impacted the environment for the better, completing over 500 projects since our founding.

Take a look at our projects on the following pages and the impact we are having in our region.



- | | |
|---|--|
| ● Stream Restoration and Channel Design | ● Ponds |
| ● Environmental and Ecological Services | ● Permitting and Compliance Services |
| ● Water Resource Engineering | ● Geographic Information Systems (GIS) and Database Management |
| ● Wetlands | ● Watershed and Land Use Planning |

Thousands of Acres and Linear Feet Restored

In our home state of Montana, land has always been a treasured resource. We believe the same at Confluence, which is why we aim to bring the land back to its most natural and efficient state through our variety of services.

While we consider land to be a treasured resource, we consider water to be its lifeblood. Each linear foot of restored water means more fish, greater efficiency, and healthier ecosystems, improving the environment of the entire region .

6+ States Impacted

We are proud to call the Rocky Mountain Region home. Based out of Bozeman, MT, we have directly shaped the region through our variety of environmental consulting services. Through the impact of our services, we have bettered the habitat for local species, including for our clients and their communities.

500+ Projects Completed

Since our founding in 1997, we have successfully completed over 500 projects across the United States and Belgium.