Restoring Rivers: Steps in the Right Direction

This guide was assembled as a product of the Wyoming Water Strategy Stream Restoration and Fish Passage ad hoc working group. The intent is to provide simple advice for interest groups, Trout Unlimited Chapters, community groups and others interested in improving rivers. River "restoration" is defined by the ad hoc group as restoration of at least one of several functions performed by streams including diverse and appropriate bed features, diverse and appropriate vegetation along the banks, minimal bank erosion, floodplains that regularly see water from overbank flooding, water quality, fish communities, and other functions. This definition does not require a return to some historic condition nor does it require that ALL functions exist to achieve restoration. River restoration is an incredibly complex topic with many facets and it intersects many aspects of interest to Wyoming citizens. The ad hoc group's intent is to provide this guide as a starting point for those dipping their toes in river restoration waters.*

What's the problem?

Some river issue has come to your attention. Maybe your property is at risk due to an eroding bank, flooding, or the stream flows to a trickle in the summer. Perhaps you wonder if something could be done to support more fish, ducks, or the river would look nicer if more trees grew along the banks; or a pathway along the river seems like a good idea. Then again a concern could be that there is a lot of junk and debris in the river, or there is a diversion that seems to be blocking fish and is due for an upgrade. Whatever your situation is, every worthwhile river project starts with a problem begging for a solution.

Partner up!

Your first step is to get folks together and ask "who else should be here?" Effort expended to get all the right players together will pay off later. It may take a lot of effort and several meeting attempts and creative scheduling to get people together but this step is vital. Try hard and don't give up. Examples of groups or representatives that may be considered include:

- Your neighbors and all those that will be affected by the stream improvements.
- Conservation District and the Natural Resources Conservation Service (NRCS)
- Forest Service or BLM if they manage land nearby along with irrigation district members or grazing district representatives.
- Conservation organizations like the local Trout Unlimited chapter or the Wyoming Water Project, The Nature Conservancy, Isaac Walton, and other sportsmen groups, such as Ducks Unlimited or Rocky Mountain Elk Foundation
- Wyoming Game and Fish Department (WGFD) aquatic habitat biologist
- City government and/or county government representatives

Who does what?

Decide on a meeting facilitator and someone to record notes and ideas. A facilitator is someone who keeps the meeting moving and makes sure everyone gets a fair chance to contribute to the

conversation. This is a very important role and if no one steps up, find some seed money to hire a facilitator. Trained facilitators can be also found at various agencies like the WGFD or at the University of Wyoming.

There are other roles to take on: who keeps everyone on task? Who or which entity can best handle all or most of the funding and accounting? Who will contract or conduct design? Construction? Monitoring? Outreach? Who brings the meeting snacks and beverages? Talking about these roles will help your meetings flow smoothly.

Identify the problem(s)

Ok, so there is at least one river problem that, initially, has brought people together. Now it is time to see what other ideas people have for the river. At this stage, just focus on the discussions; have everyone talk and lay out their observations and ideas that may need to be addressed.

Try to avoid talking about solutions yet. For now, let the ideas flow without any edits. This stage of project development is just as important as getting the right people. Spend a LOT of time on this!

Look at the big picture

Think big. This means looking beyond the immediate stream reach and thinking about the watershed up and downstream. What is occurring that might be affecting the river? What can we do not only this year or next year, but over the next ten or more years, to have a positive effect. All successful projects must start with a digestible bite. But now is the time, early on, to think about how your local effort could link up more broadly in space and time with other projects or phases to ultimately have a substantial and positive impact. Maybe a watershed plan could be devised. Maybe there already is such a plan – the Wyoming Water Development Commission has watershed plans that contain a wealth of information. Funding sources like Wyoming Wildlife and Natural Resources Trust Fund will demand that project proponents think about the big picture.

Take a tour

Nothing stimulates positive group dynamics and idea generation like a walk along the river. People will spot additional issues and come up with more ideas as they stroll along the banks of the river.

Identify initial constraints

There are many potential constraints or sideboards that limit what actions can be taken in a stream restoration project. For example: floodways must meet FEMA (Federal Emergency Management Agency) specifications. Roads and bridges often cannot be moved. There could be homes in the floodplain and right up against the stream bank that must be protected. Power lines or pipes that cannot be disturbed might cross the river. Perhaps a landowner wants no part of this river nonsense. Or maybe the river is very limited in water supply and does not appear likely to have more. What if there is a big slug of sediment in the river upstream that will cause major havoc if it is sent downstream.

It is very useful to understand all the potential constraints that must be worked around. But be careful here – some obstacles that appear to be constraints may end up being doable.

Assemble technical help
River restoration technical specialists include consultants, WGFD aquatic habitat biologists and NRCS engineers. Restoration practitioners are trained in natural channel design principles. Look for someone who is experienced and has training in stream restoration techniques and principles. Training through Wildland Hydrology is the most recognized among stream restoration practitioners; although not the only source for training. You will also want someone who has completed similar work in a similar place.

Gather funding
River work is expensive! Money can be saved by finding close sources of rock and wood. But cash will be needed and can be gathered from a variety of sources. Check out this list of funding sources:
https://wgfd.wyo.gov/WGFD/media/content/PDF/Habitat/Aquatic%20Habitat/Funding_Sources.pdf

Conduct assessments and baseline monitoring
Your technical help will need to conduct a thorough assessment of the existing channel conditions. This will include a survey down the river, a longitudinal profile, where they measure all the stream features, pools, riffles, glides, and runs. The survey will take measurements of other features like meander bends, belt width (width of the stream from one meander bend to the other), pool to pool spacing, etc. Survey work will also measure cross sections, eroding banks, bankfull (the term "bankfull" refers to the stage of the river where it is high enough to just begin to flow out of its banks), and floodplain elevations. A complete assessment will include pebble count measurements and riparian vegetation measurements. Typically, bankfull flow and other hydrologic analyses will be conducted. This assessment will yield numeric values for how the river is out of whack and will allow the development of specific objectives and a specific design.

Get a design
Using the assessment data and problems identified in the initial discussions, the technical specialists need to work together with the project partners to formulate objectives and plans that satisfy the majority of the identified needs. Alternatives are developed and compared for how well they balance risk, reward, and cost. All designs should be evaluated for how well they address your needs and take care of "The Big Four." The Big Four are four parameters that are especially important in healthy streams: lateral stability (no eroding banks), floodplain connectivity (water can flow out of the main channel during high flow events), channel diversity (pools and riffles occur in the right sequence and size), and riparian vegetation (self sustaining, natural and diverse vegetation lining the banks and floodplain).

Get the permits
River work bumps up against several permitting requirements (see
https://wgfd.wyo.gov/WGFD/media/content/PDF/Habitat/Aquatic%20Habitat/RegulatoryResour

ces_DraftFinal.pdf It is smart to contact permit authorities early on to understand what information and permits will be needed. Most likely you will need permits from the Army Corps of Engineers (404 permit) and the Wyoming Department of Environmental Quality (401 certification). There could be timing restrictions to protect spawning fish as identified by the Wyoming Game and Fish Department.

Maintain momentum
Schedule regular meetings. Circulate updates. Maintain contact. Devise interim activities like river cleanups, riparian plantings, fishing, boating, and other activities that get participants outside and working and playing together.

Get' er done
Now it is time to fire up the big equipment. After all the planning, fund raising, endless meetings, permitting, agreements, and untold other obstacles…it's finally time to get in the water and watch all of your efforts come to fruition. This stage is fun but short lived. Most river construction windows in Wyoming are in late summer and through fall and early winter. Plan for at least a couple weeks of activity. Finding skilled river contractors takes some care: be sure to find someone with experience working in rivers because it takes specialized equipment and approaches! You don't want someone new to the game learning on your project. While experienced contractors may appear to be very expensive, they may end up saving you money because they work efficiently and get it done right the first time.

Follow up
Plan for maintenance and monitoring early on to ensure the project is effective for the long haul. Hopefully, some funding has been set aside to pay for monitoring or one of the partner groups is committed to doing monitoring as their contribution. Monitoring is all about determining whether objectives have been met. Monitoring data, ideally, might be collected annually for several years following high flow events; however, costs and time constraints may dictate the monitoring schedule. Monitoring usually consists of longitudinal profiles, cross-sections, pebble counts, vegetation counts, photographs, and a report detailing the findings from all the data.

Gather to talk about what worked and what did not. Share the knowledge! If structures failed, fix them. Use insights and knowledge gained to improve work at the next site.

Follow these steps and you can restore a river and make a difference!

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*People are naturally concerned about flooding and its risk to life and property. Unfortunately today many properties and structures have been constructed in floodplains and are at risk from periodic floods. Stream restoration work may do little to alleviate flooding risk. In fact, if no people or structures are at risk, restoration practitioners usually try to let a river flow out onto its floodplain because this natural pattern is the best way to deal with all the energy and water. Sometimes the best a river restoration project can do is to decrease flood stage a few inches.