RIPPLES in the GRANDE RONDE

SUMMER 2003 | RIVERS UNITING NEIGHBORS | VOLUME 2, ISSUE 3

The Bare Banks of the New Bear Creek Channel

By Mary Estes, GRMWP and Allen Childs, CTUIR

The Confederated Tribes of the Umatilla Indian Reservation (CTUIR), the Oregon Department of Fish and Wildlife (ODFW), the Natural Resources Conservation Service (NRCS), Alta Cunha Ranches, and other partners are implementing a habitat restoration project called the Longley Meadow Restoration Project. The project area encompasses nearly 450 acres of historic wetland meadow and forested riparian habitat and includes about 2 miles of the mainstem Grande Ronde River, 2 miles of Bear Creek, and 1.5 miles of Jordan Creek. The Longley Meadows project is located on the Alta Culhna Ranch, approximately 4 miles upstream from Hilgard State Park, and includes stream channel restoration along the lower reach of Bear Creek, instream habitat enhancement on Upper Bear Creek and Jordan Creek, water developments to assist the landowner with livestock distribution and range management, and establishment of riparian conservation easements. The project is jointly funded by the Grande Ronde Model Watershed Program, Bonneville Power Administration, and the NRCS Conservation Reserve and Enhancement Program (CREP).

In the early 1960s, Bear Creek was channelized to form a straight channel from Highway 244 to the Grande Ronde River. Channelization created an unstable stream with erosive energy, vertical cut banks, loss of riparian vegetation, poor habitat diversity, and seasonal fish passage blockage. Project planning and design was initiated by the landowner and project partners in late 1999. Initial planning efforts involved identification of resource issues, development of goals and objectives, and ultimately a plan to achieve desired conditions. The primary goals of the project are to enhance instream aquatic habitat; restore meadow hydrology; improve wetland, riparian and wildlife habitats, and improve water quality and quantity.

Phase 1 of the project was completed in March 2003 and included constructing a mile long restoration channel for Bear Creek and extensive revegetation activities including the planting of approximately 16,000 sedge/rush plugs and 10,000 live willow whips, transplanting 60 willow shrubs, and the application of about 250 pounds of native/native-like seed. Ongoing development activities include construction of approximately 6 miles of conservation easement boundary fence and installation of a well, pipeline and troughs

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Volunteer Rosemary Guttridge (right) from the USDA Forest Service plants willows along the new Bear Creek channel with assistance from a Training and Employment Consortium crew (April 2003).

The beginnings of the new Bear Creek channel, which aims to restore a natural meander to the creek (March 2003).

IN THIS ISSUE

NOAA Fisheries Funds Grass-Roots Approaches for Salmon Habitat Restoration

By Catherine Broyles, NOAA Fisheries

Through a special program of the National Oceanic and Atmospheric Administration (NOAA) Restoration Center, biologists from the NOAA Fisheries La Grande Field Office have the opportunity to help build partnerships that benefit salmon and assist in watershed restoration. Recognizing the integral role of local citizens in conserving threatened and endangered species, the Restoration Center developed the Community-Based Restoration Program (CBRP). The goal of this program is to facilitate partnerships that will help citizens carry out restoration projects in their own watersheds.

Since its inception in 1996, the CBRP has funded nearly 700 projects nationwide. In 2002, the CBRP provided 1.5 million dollars to support on-the-ground restoration projects in Oregon alone. Living several hundred miles from the Pacific Ocean, area residents in northeast Oregon may wonder what a program such as the CBRP, which serves marine species and their environments, would have to do with them. But as many anglers and conservationists know, rivers and creeks within the Grande Ronde Basin support anadromous salmon and steelhead. These fish spawn and rear in freshwater systems, but spend a large portion of their life in marine environments. Bodies of freshwater such as the Grande Ronde and Snake Rivers are as important to anadromous fish as the estuaries and tidal flats commonly associated with marine environments. Consequently, people living in areas such as the Grande Ronde Basin are eligible to apply for NOAA Restoration Grants to implement projects that benefit salmon and steelhead.

The Adobe Creek Fish Ladder Project is an inspirational example of the type of project that was implemented with the aid of CBRP funds. Ten years ago, an organization of high school students, now known as the United Anglers of Casa Grande in Petaluma, California, identified a stretch of Adobe Creek in their community that had once been inhabited by a robust population of steelhead but had been severely degraded by human influences. The students catalyzed local, state and federal entities to work with them to build a permanent step-pool fish ladder system to provide fish passage over a twelve-foot obstruction in Adobe Creek. Steelhead would then be able to return to their historic spawning grounds. In addition, the United Anglers planted native vegetation, built a fish hatchery to preserve the native steelhead stock, removed large amounts of trash from the area, and continue to maintain both the fish ladder and hatchery.

A group of students with Congresswoman Lynn Woolsey (CA), a supporter of the restoration at Adobe Creek. Photo Credit: NOAA Restoration Center

The CBRP supports projects in two ways: directly and through national and regional partnerships. The direct solicitation, which will be open this fall, will fund individual projects ranging from \$50,000 to \$150,000. Through partnerships with organizations such as the National Fish and Wildlife Foundation, The Nature Conservancy, Trout Unlimited, and the Pacific Salmon Watershed Fund, projects ranging from \$5,000 to \$30,000 are solicited at various times throughout the year. Projects must be on-the-ground and should provide a 1:1 non-federal match, either with a cash or in-kind contribution. Projects are evaluated on their technical merit, level of community involvement, and the benefits they provide for marine or anadromous fish habitat. The staff from the NOAA Fisheries La Grande Field Office is able to offer technical advice and assist in the early planning stages of restoration projects. Biologists at the La Grande Field Office can be reached at (541) 975-1835. CBRP programs and application dates can be tracked on the Restoration Center's website at http://www.nmfs.noaa.gov/habitat/ restoration/. For additional information about the CBRP in Oregon, please contact Megan Callahan Grant, Marine Habitat Resource Specialist, at (503) 231-2213.

Volunteers plant native vegetation along the banks of Adobe Creek (CA). Photo Credit: NOAA Restoration Center

Editor's Note

Welcome to the sixth issue of the *Ripples* newsletter published by the Grande Ronde Model Watershed Program. We at *Ripples* strive to highlight local restoration efforts, volunteer opportunities, and educational tips and activities in Wallowa and Union Counties. We want to bring you an informative and engaging newsletter. Feel free to contact us if you have any questions, concerns or suggestions.

– Kristin Knight, *Ripples* Editor

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E-mail us if you would like to be included on our electronic mailing list!

Electronic versions of this and all past newsletters are available at:

http://www.fs.fed.us/pnw/modelwatershed

Using New Technologies to Manage Livestock & Streamside Vegetation

Tim DelCurto
Eastern Oregon Agricultural Research Center, Union Station
Oregon State University

Managing livestock use of riparian areas is a significant challenge to land managers throughout the western United States. When upland vegetation is green and succulent, cattle will tend to seek out diets composed of grasses and prefer upland areas away from riparian areas. However, when uplands and adjacent grasslands dry out and the vegetation becomes dormant, livestock and wildlife shift diets to shrubs and forbs, which are abundant in riparian areas. Continued use of pastures or range allotments where cattle disproportionately use riparian vegetation may lead to a loss of woody vegetation along the stream (biodiversity) and as a result, a reduction in the stability of the stream itself.

Management needs to be focused on optimal distribution of livestock and, as a result, uniform use of the vegetation. In the late season, some of these strategies may include herding, use of off-stream water sources, supplementation, or fencing to limit access or exclude cattle from the riparian area. While all these strategies are effective in improving cattle distribution and reducing the cattle's use of streamside vegetation, none are effective across a diversity of landscapes and stream systems. As a result, we are continually looking for new tools or approaches to sustainable grazing systems.

One potential tool in the future may include the use of new technologies to manage beef cattle distribution. Specifically, research evaluating fenceless livestock control using radio frequency and global positioning system (GPS) technology suggest potential use in influencing livestock distribution and vegetation use. Both GPS and radio frequency approaches involve developing zones available for grazing and then areas where grazing is discouraged. The GPS collar technology uses satellites to locate animals relative to their desired area of grazing (Anderson and coworkers, 2003). In contrast, research at the Eastern Oregon Agricultural Research Center (Union Station) has focused primarily on radio frequency approaches, using both ear tags and neck collars. In general, directional radio transmitters are set up to create an area of grazing exclusion (Figure 1). When cattle, fitted with radio receivers, move into an exclusion area, their receivers first emit audio warnings which are followed by an electrical shock to encourage movement away from the area.

In general, field tests on both technological applications have been successful in changing livestock distribution patterns. The biggest obstacle to using this technology will be the development of reliable prototypes that are both economic and practical on a large-scale basis. Studies are currently ongoing at the Eastern Oregon Agricultural Research Center, Union Station (radio frequency) and the USDA ARS Jornada Experimental Range (GPS Technology) that will further evaluate the usefulness of these technologies and the application to distributional management of livestock on western rangelands. The research at the Union Station is currently evaluating the effectiveness of a new prototype with proposed plans for a large scale project to be conducted on Meadow Creek of the Starkey Experimental Forest during the summer of 2004. If you have any questions about the new technologies or their potential application to management of livestock distribution, feel free to contact the staff at the EOARC Union Station at (541) 562-5129.

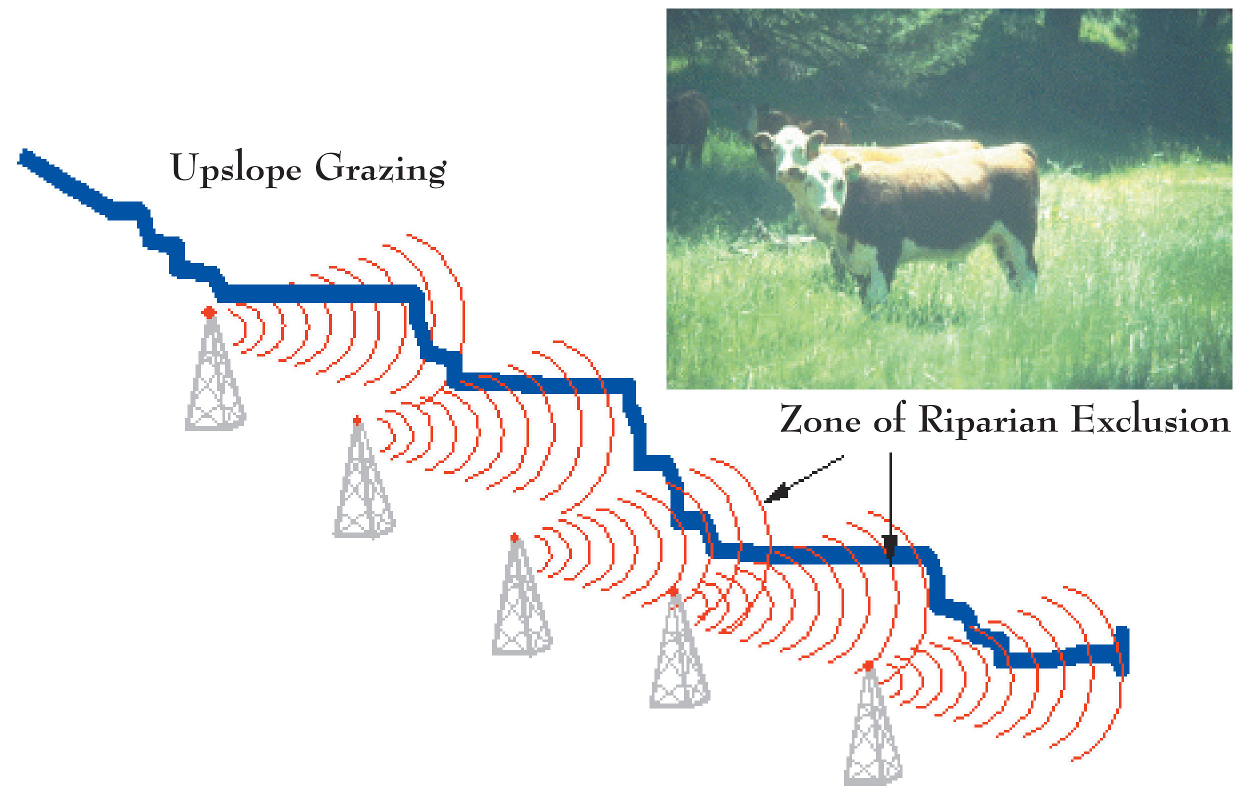

Figure 1. Electronic diversion of livestock involves setting up an exclusion zone established by radio frequency transmitters. Cows are equipped with receivers (eartags or collars) that, when within the zone, will emit audio followed by electrical stimulus that move cattle out of the area and discourage riparian grazing.

BEAR CREEK CONTINUED FROM PAGE 1

to provide upland water sources. In July, approximately 120 whole trees will be strategically placed in Jordan Creek to increase habitat complexity for juvenile anadromous fish. Bear Creek will be then diverted into the restoration channel completed this past spring and the existing channelized segment will be backfilled and reclaimed.

As part of the planting efforts, thirty-two volunteers from the public, USDA Forest Service, Training and Employment Consortium, United States Fish and Wildlife Service, OSU Extension Master Gardeners, CTUIR, and the Grande Ronde Model Watershed Program (GRMWP) planted 3,000 willow whips along 3,400 feet of the new Bear Creek channel on April 12, 2003. Additionally, ODFW, CTUIR, and the Powder River Correction Crews planted 13,416 sedge/rush plugs along 4,300 feet of channel in only four days. Throughout the summer and continuing into next spring, we should see the new banks of Bear Creek flourish with vegetation that will provide much-improved fish and wildlife habitat.

If you are interested in future river cleanups and planting activities in either Union or Wallowa Counties, please call Mary Estes, GRMWP, at 541-962-6590 for upcoming activities.

The old channelized Bear Creek, when viewed downstream from Highway 244.

Active Stream Restoration – Is this Appropriate for Your Stream?

Vance McGowan, ODFW

There has been considerable debate among scientists over the last several years regarding the use of active versus passive stream restoration strategies, and which techniques are most effective. At the heart of the issue, we have a pretty good understanding of why some streams have unraveled and become unstable over the years. However, the science of putting streams back together is still fairly new.

Figure 2. Milk Creek, near the confluence into Catherine Creek, 1999. To the untrained eye, this may not appear to be a bad looking stream. However, the stream was an incised roadside ditch, with no vegetation on the right bank, no instream structure or pool habitat, and no meanders. Passive restoration techniques alone would not restore this channel to its historic condition.

Not so many years ago, a typical day in the life of a stream restoration scientist went something like this: A landowner calls you and says "Hey, I saw the work you folks did on my neighbor's place, can you do that on my stream?" Since the landowner is particularly concerned about bank erosion, you schedule an on-site meeting and invite a few other folks from other agencies who can provide more input. The group gathers around an "obvious" erosion problem, an ugly six-foot vertical cut bank that is producing a lot of sediment and not growing a single stick of vegetation. During the ensuing conversation, one person suggests the erosion was caused by the flood of 1997 (1996, 1991, or choose your favorite year), and that the correct solution is to install riprap on all outside bends, interplanted with willows or cottonwoods. Another individual insists the damage is from overgrazing and that constructing a fence will solve the problem. A third person suggests that the erosion is natural, that the stream is simply maintaining a state of dynamic equilibrium, and nothing should be done. Sounds confusing, doesn't it? All of these possible causes and proposed solutions may be based on many years of experience and observations among trained professionals, but often conclusions were made without scientific data collection. Even today, you still often hear people refer to stream restoration as more "art" than science.

PASSIVE

- Grazing or timber management
- Off-site water developments
- Riparian exclosure fences
- Plantings
- Adding large wood instream
- Bank stability structures
- Rock grade control
- Soil bioengineering
- Meander reconstruction
- Whole channel alteration or relocations

ACTIVE

Figure 1. Some examples of commonly practiced passive and active restoration techniques.

Fortunately, the science of stream restoration is evolving rapidly. Today there are rigorous, disciplined approaches that use a combination of hydrology, biology, geomorphology, soil science and engineering to evaluate stream channels and determine restoration options appropriate for a given stream. But first, exactly what do we mean by "active" restoration? Active restoration techniques involve physical manipulations of the stream that will result in direct changes to variables such as width, depth, slope or velocity. "Passive" restoration, on the other hand, usually involves a change in land management, or removing the source of disturbance so that the stream may recover on its own (Figure 1).

In order to determine whether or not active restoration is the right tool for the job, and to avoid the "band-aid" fixes of the past, it is important to:

1. Identify what caused the stream to change and how much is natural versus man-made (Ex: Is the stream a gully due to natural geology, or because it was made that way with a D8 cat?).

2. Understand how the stream responded, and the consequences of that change (Ex: Did the stream deposit bedload and then become wider and shallower? Did this result in no pools for fish and warmer stream temperatures?).

3. Design a remedy for the problem and determine how to prevent its reoccurrence (Keeping in mind that prevention is always much cheaper than restoration).

All streams move sediment and try to maintain a state of dynamic equilibrium, so some lateral erosion is acceptable as long as there is no net aggradation (buildup) or degradation (down cutting) of the channel. But how do you identify the current state or stream condition? Some detective work may be required, but there are many techniques available, including: conducting cross sections, longitudinal profiles, installing bank erosion pins or scour chains; taking pebble counts; measuring variables such as stream flow, gradient, meander lengths and degree of entrenchment; and studying old aerial photographs. On any stream where an active restoration approach is being considered, this type of data should be

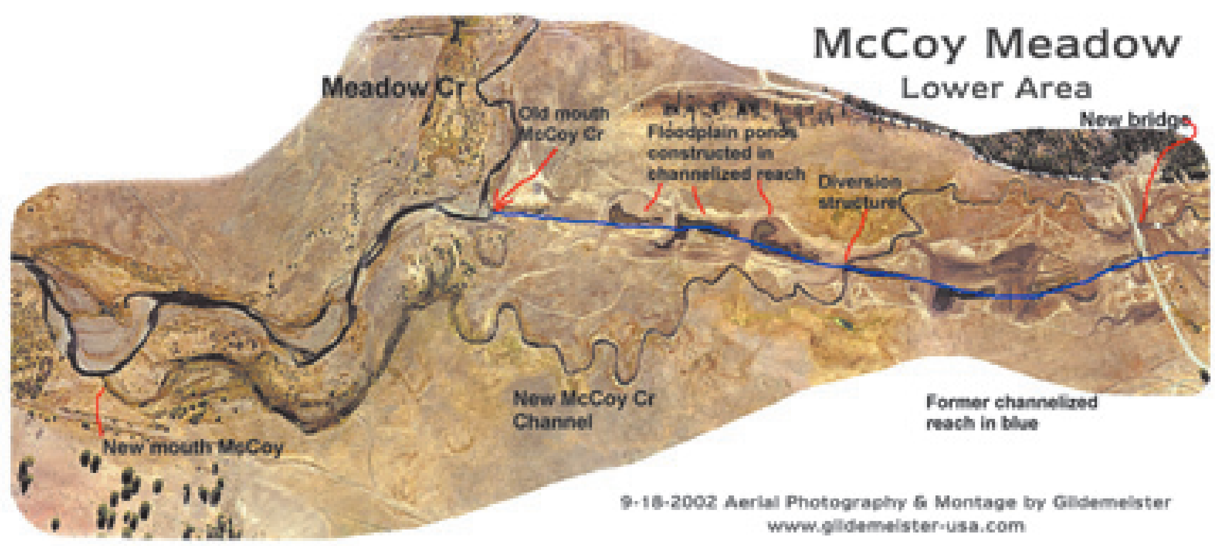

Figure 3. An aerial view of the McCoy Meadows project that was completed in August 2003.

Figure 4. Milk Creek during the construction of the new channel, November 2000.

Figure 5. Milk Creek after restoration in July 2002. Adult steelhead spawned in the new channel in April 2002.

collected and then compared to similar streams that are known to be in a naturally stable condition (these sites are called reference reaches). Streams that are seriously out of balance may exhibit any number of telltale signs such as a lack of riparian vegetation or a floodplain, excessive deposition, head cutting, lateral erosion, a sudden gradient change, riffles where you would expect pools, etc. However, many of these may not be apparent from general observations, thus it's important to collect and analyze the data.

On some streams, dramatic results may be achieved using passive restoration techniques alone. However, if the stream is entrenched (has lost contact with the floodplain), then passive techniques such as riparian fencing may not work (Figure 2). For example, stream channelization was a common practice in the 1960s and 1970s in response to flood damage. Streams were straightened and deepened under the assumption that floodwaters would be quickly moved through the site and cause less damage. But some unanticipated and long-lasting effects included: increasing the stream gradient; increasing shear stress that caused even more down cutting or lateral erosion; and lowering of water tables to the point where riparian vegetation could no longer sink roots deep enough to remain in contact with the water. Some riparian sedge plants may have as much as a mile of root hairs in a cubic foot of soil, providing tremendous bank stability in the largest of flood events. Once these dense rooted plants are gone, bank stability can go downhill in a hurry. To the farmer or rancher, a lower water table usually results in a less productive meadow system.

While it is true that Mother Nature has a tremendous power to heal itself, these severely degraded streams need more serious attention if we are going to see them reach their potential within our lifetimes. The techniques listed at the very active end of the restoration spectrum are appropriate for these streams. In the last few years, we have had the opportunity to work with some landowners willing to take this more aggressive approach to restoration. Whole channel relocations have been completed on McCoy Creek on the Tipperman property, on Milk Creek on the Hall Ranch, and are in progress on Bear Creek on the Cunha ranch.

Figure 3 shows an aerial view of the McCoy Meadows project where 1.2 miles of channelized stream was relocated by constructing a new 2.5-mile long meandering channel. The photograph illustrates how a channelized stream was converted back into a meandering channel. We expect our monitoring to show higher water tables, reduced stream temperatures and improved habitat for salmonids and a host of other riparian and wetland dependent species. Additional work included replacing the existing culverts with a full spanning bridge to help restore the meadow hydrology, and constructing floodplain ponds to provide both erosion control in the old channel and increase wetland habitat.

Figure 4 shows the final shape of the raw constructed Milk Creek channel, before plantings or any water was diverted. The new meandering channel was built with a series of riffles and pools, based on reference reach data. While the initial construction phase of these projects may seem harsh on the landscape, our results indicate we can quickly achieve a naturally stable stream channel that will not need the constant maintenance that is sometimes needed on other streams.

Figure 5 illustrates the rapid growth of vegetation after only two growing seasons, when the stream is provided a wider floodplain area. Large wood was also installed to provide complex habitat for chinook salmon and steelhead.

If well planned out, the costs of this type of restoration are very reasonable. The Milk Creek channel was constructed and planted for about $13/linear foot, while soil bioengineering and other hard bank stability structures often cost $75-100/foot, while treating only one side of the stream.

When considering an active channel restoration approach, monitoring must be an important component of these projects. While we are making great progress, the science of restoring streams is still in its infancy compared to flying a rocket to the moon. As of yet there are no cookbook solutions, so we must take every opportunity to learn from both our successes and our failures.

Figure 6. GRMWP employees Mary Estes and Lyle Kuchenbecker planting willows along the new Bear Creek channel.

Part Two of Three
Stream Temperature Series

Efforts and Policies to Reduce Stream Temperature

By R. Coby Menton, GRMWP

Introduction

The first article in this series discussed the physical factors affecting stream temperature including heat transfer and environmental variables. Heat transfer includes six physical processes: solar energy, longwave radiation, evaporation, convection, bed conduction, and groundwater interaction. All six act to either heat or cool the stream. Environmental variables, such as riparian vegetation, channel characteristics, and flow, interact with the heat transfer processes and regulate the rate of heat transfer. Refer to Spring 2003 volume 2, issue 2 of the *Ripples* newsletter for more details.

The focus of this article is to discuss the efforts and policies to reduce abnormally high stream temperature. Current efforts and policies do not solely address stream temperature, but include all water quality parameters that may negatively affect designated beneficial uses. Other water quality parameters include water chemistry, nutrient levels, sedimentation, and bacteria.

Water quality parameters are interrelated and the successful management of one will very likely have an effect on several others. For example, controlling instream temperatures may also have a positive effect on pH. However, elevated stream temperature is often the limiting factor that keeps other water quality parameters from meeting acceptable standards.

Water Quality Management Plans

Federal law requires that streams, rivers, lakes and estuaries named on the 303(d) list be managed to meet state water quality standards. The process for establishing a plan to improve water quality begins when the waterbody appears on Oregon Department of Environmental Quality's (DEQ) 303(d) list, which lists waterbodies that do not meet water quality standards. In most cases, rivers and streams receive discharges from both point (runoff and /or discharge from municipalities and industry) and nonpoint (diffuse runoff from both rural and urban areas) sources of pollution. As a result, we need a comprehensive watershed approach to solving pollution problems. To solve water quality problems in a stream, river, lake or estuary, the cumulative impact from all upstream sources including groundwater needs to be considered.

Under this comprehensive strategy to address water quality problems, DEQ uses a big picture approach and looks at the water quality of the entire river and watershed. DEQ calculates pollution load limits, known as **Total Maximum Daily Loads (TMDLs),** for each pollutant entering a body of water. TMDLs describe the amount of each pollutant a waterway can receive and still not violate water quality standards. TMDLs take into account the pollution from all sources, including discharges from industry and sewage treatment facilities; runoff from farms, forests and urban areas; and natural sources such as decaying organic matter or nutrients in soil. TMDLs include a safety margin for uncertainty and growth that allows for future discharges to a river or stream without exceeding water quality standards.

When establishing TMDL limits for a basin, DEQ works with local, state and federal agencies and the watershed council for the basin. Load limits are determined by analyzing existing water quality data and computer modeling. Privately owned agricultural land develops water quality management plans through the Senate Bill 1010 process under the guidance of the Oregon Department of Agriculture. Privately owned forested land is managed under the Oregon Forest Practices Act and implemented by the Oregon Department of Forestry. Water quality management plans developed for federal lands are the responsibility of the land management agency. All of the individual plans are compiled by DEQ into an overall water quality management plan for the basin complete with TMDLs and then submitted to the Environmental Protection Agency (EPA) for approval.

Conservation Practices

Conservation practices are the means to address elevated stream temperatures and require specific cooperation in design, implementation, funding, and subsequent monitoring. Local, state, federal, tribal and private land managers in the Grande Ronde Basin participate in water quality management and conservation through projects such as:

1. Riparian fencing and off-stream stock watering. These projects keep livestock out of the riparian areas so that young vegetation can become established and provide shade to the stream, as well as contribute to the complexity of the riparian ecology. Off-stream stock watering facilities are often part of these projects and provide out of stream water for livestock.

2. Stream channel modification. These projects are primarily intended to improve fish habitat but will over time provide a cooling effect to the stream. Rock placement, large woody material, and channel reconfiguration provide complexity to the stream channel by creating pools and reducing width to depth ratios.

3. Irrigation diversion and water management improvement. Irrigation water management, which includes flood to sprinkler conversions, open channel to pipe conveyance, and improved stream diversion control, has a direct impact on stream temperature as with improved management more water is left in the stream.

4. Altered grazing and logging practices. Grazing and logging are vegetation management practices that provide direct economic benefits to communities in the Grande Ronde Basin. Both private and public land managers are implementing practices designed to improve existing riparian vegetation. Timber harvest occurs in the riparian corridor only on a very limited basis and when it does occur, specific objectives include large tree recruitment to the stream channel, shade through large tree growth, the release of small-suppressed conifers for large tree recruitment, and the promotion of deciduous vegetation that will produce shade.

   Through fencing and off-stream watering, many streams are protected from livestock but on those streams that are not fenced, livestock managers are altering the timing of grazing in the riparian zone to produce beneficial results. Spring and fall grazing of the riparian zone has been shown to enhance riparian vegetation communities, which provide shade and stability to the stream channel.

Conservation practice implementation requires cooperation and planning between land managers, engineering and design people, and funding sources. Many land managers in the Grande Ronde Basin are cooperatively and enthusiastically implementing projects on their land. Design and engineering services are readily available from various public entities including the Bureau of Reclamation (BOR), Oregon Department of Forestry (ODF), and the Natural Resources Conservation Service (NRCS). Very few projects are paid in full by only one funding source. In general, all projects have two funding sources including the land manager and a public entity and often times three or more other funding partners. Funding sources can include local, state, federal, tribal and foundation funds. In the Grande Ronde Basin, the Union Soil and Water Conservation District, Wallowa Soil and Water Conservation District, and Wallowa Resources generally administer projects on private land.

Conclusion

The stream temperature standard was created to protect critical beneficial uses, namely the aquatic species, and secondly, to base temperature criteria on available science that addresses those needs. The goal of the TMDL plan is to reduce stream warming and to meet the criteria, but where this is not possible, there is a provision in the standard to allow adoption of stream-specific criteria. The temperatures achieved

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Urban Update: Tips to Conserve Water

By Kristin Knight, GRMWP

Water conservation is appropriate for all times of the year, but becomes especially important during the dry and hot summer months. During the summer, there are higher demands on water, especially from recreation, agriculture, and yard care. We can all make small changes that can reduce the amount of water we use, lowering our water bills, and leave more water for our watershed and communities as a whole.

Indoors, there are simple changes that can lower water use. Leaks can be a hidden use of water that goes unnoticed. An easy way to check this is to watch your water meter or your well pump when you believe all sources of water are turned off. Turn off the faucet when shaving, brushing your teeth, or doing anything else when you don't immediately need water. When choosing between a shower and a bath, a quick shower is usually the more efficient way to use water. And while you are waiting for the water to heat up in the shower, place a bucket under the faucet to collect the unused cold water. After your shower, simply take the bucket and water your indoor or outdoor plants.

There are other areas of the house where you can minimize water use. In the kitchen, try to wash a full loads of dishes, whether in the dishwasher or in the sink. Again, leaving the faucet running in the kitchen is like throwing pennies down the drain. Another way to avoid turning on the faucet unnecessarily is to keep a pitcher of water in the refrigerator, which provides you with a cool glass of water without waiting for the faucet water to reach the right temperature. In the utility room, run only full loads in the washing machine so that you get the maximum benefit from your water.

Even outdoors, there are many easy changes to implement that will conserve water. Try pulling out the broom instead of the hose to sweep off the sidewalk or driveway. This can provide a quick workout as well as save your water bill. When washing your car, consider using just a bucket and sponge to soap up the car and then give the whole car a quick rinse at the end. Or use a car wash that recycles their water. During water shortages, try to keep your car washes to a minimum.

In the backyard, try to utilize the water from indoors to water plants. In addition, aim to water plants during the cooler parts of the day, which will minimize the amount of water that evaporates and will allow more moisture to soak into the plant roots. When watering plants, do so as sparingly as possible.

Besides changing your personal water use, there are also several technical ways to help conserve water. Efficient showerheads and faucet heads can aerate water, reducing the amount of water used, but without the loss of pressure. For a larger investment, consider water efficient models of toilets, dishwashers, and washing machines. An older toilet can use as much as 4-6 gallons per flush while a new, more efficient toilet can reduce that amount to 1.6 gallons.

By working to conserve water, we can help protect our own personal finances, but we can also keep enough water to support healthy watersheds and communities. If you have a water-efficient tip to share, please let us know at ripple@eou.edu

WATER TEMP. CONTINUED FROM PAGE 6

when all feasible steps are taken become the criterion for a specific segment or subbasin, as long as beneficial uses are not being adversely impacted.

When the temperature criteria are attained, the stream segment is removed from the 303(d) list. If the criteria are not met but DEQ determines that all feasible steps have been taken and the beneficial uses are not being adversely affected, the attainable temperature becomes the standard for the segment and it is removed from the 303(d) list. Once the stream meets the standard, the management practices that led to the achievement must be maintained or the stream will again begin to warm and the criteria will be exceeded, forcing the process to start all over again.

Land managers are expected to follow the water quality management plan for their subbasin. If the plan is being implemented and appropriate land management practices, measures or controls are in place, the individual landowner or manager will be considered to be in compliance with the water quality rules for temperature, even if the stream flowing through or adjacent to their property exceeds the criteria.

The final article in this series will focus on specific projects in the Grande Ronde Basin that have had a positive impact on elevated stream temperature.

Teacher Tips and Liquid Links

By Kristin Knight, GRMWP

The summer months are a time for students and teachers alike to relax from the rigors of the classroom. But there are many websites that offer fun and creative ways to explore salmon, water quality and watershed health. These pages can spark creativity in teachers for the upcoming school year or provide kids with a enjoyable yet educational activity.

One interactive site is "The Life of Salmon", which discusses the life cycle of salmon in the Pacific Northwest and even has a virtual dissection of a salmon, done by a classroom in Washington.
http://www.wavcc.org/wvc/cadre/WaterQuality/life_cycle_of_salmon.htm

This next site follows salmon as they travel to the ocean. There is a wealth of online activities and games, which tests your knowledge of salmon and their ecosystem. It also provides a look at the food web of the salmon within the ocean.
http://schoolcentral.com/Discussion/PacificSalmon/PS-Title.htm

The Enchanted Learning site, besides having many other print-outs for teachers, also has a section on salmon, including a labeled picture of the salmon life cycle.
http://www.enchantedlearning.com/subjects/fish/printouts/Salmon.shtml

On a larger scale, the "Watershed Game" site allows the user to test their knowledge on different types of environments within a watershed, such as the city, a neighborhood, or a farm. There is both a beginner and advanced level.
http://www.bellmuseum.org/distancelearning/watershed/watershed2.html

Once again, the Environmental Protection Agency (EPA) offers many different online activities for kids. At one site, they provide a picture of a neighborhood and kids need to say where pollution is occurring. Then they can click on the image for an explanation.
http://www.epa.gov/OWOW/NPS/kids/whatwrng.htm

Or go to another EPA site, where they have several mini-experiments that explore the properties of water and pollution. These experiments are designed for kids to do on their own or within a short timeframe.
http://www.epa.gov/OWOW/NPS/kids/DARBY.HTM

These sites are just some of the many educational websites out there that explore watershed health in a way that is both fun and informative.

YOU ARE INVITED TO THE

3rd Annual Wallowa County River Clean-up

Mission: *To protect and enhance the riparian area of the Wallowa and Minam Rivers by removing debris from and around the rivers. This will create a safer, cleaner environment for the wildlife, fish and humans that live in or visit this area.*

When:
Saturday, July 19, 2003, 9:00 a.m. to 1:00 p.m.
Meet at the Minam Store at 8:45 am

Where:
Wallowa River from Rock Creek to Minam State Park

Items to bring:
Water, Sunscreen, Hat, and Gloves
Please wear proper clothing and no sandals
Be prepared to get wet!

Items provided:
Transportation
Lunch following the clean-up
Free T-shirts for all!

If you are interested in participating please call: Mary Estes or Kristin Knight at 541/962-6590; Coby Menton at 541/426-5551.

Hosted by: Grande Ronde Model Watershed Program, Oregon Department of Fish and Wildlife, Wallowa SWCD, Resource Assistance for Rural Environments, and SOLV