KELTS, continued from Page 1.....

Fish Commission in 1999, in collaboration with the Yakima/Klickitat Fisheries Project. Biologists are conducting research to support the premise that kelt reconditioning could be a tool to rebuild steelhead populations. Reconditioning techniques were initially developed for Atlantic salmon and sea trout.

The Yakima project has investigated a variety of reconditioning and transportation strategies. Initial research established that steelhead kelt reconditioning worked and substantially bolstered the number of repeat spawners in the Yakima River. Kelt rematuration rates of collected fish in captivity have been 21 percent in 2001, 50 percent in 2002, and 85 percent in 2003. Since the project's beginning, 20-30 percent of the total steelhead migration in the Yakima River has been reconditioned. Radio telemetry studies have demonstrated successful upstream migration and spawning by kelts.

Kelt reconditioning research was also conducted in 1998 and 1999 by the Oregon Department of Fish and Wildlife in the Grande Ronde Basin. Various chemical formulations were tried to control bacterial infections and parasites affecting the kelts. Researchers also experimented with different feeding procedures and diet formulations. Although only a small percentage of kelts were successfully reconditioned to spawning condition, researchers concluded that kelt reconditioning could be a viable option for the establishment of an endemic steelhead brood stock in the Grande Ronde River Basin.

The steelhead's unique ability to spawn more than once provides another potential strategy to help rebuild depressed steelhead numbers. Kelt reconditioning is labor intensive and expensive. Although it is not currently being conducted operationally to enhance steelhead runs, ongoing research may develop protocols and methods that will lead to successful implementation in the future.

This newsletter is funded by the Bonneville Power Administration and the Oregon Watershed Enhancement Board

From the Archives

The Origins of Cove, Oregon

Did you know? Cove, Oregon, was first named "Forest Cove," but the name was changed because it was too similar to the town of Forest Grove in the Willamette Valley. The first settlers were Samuel Cowles, his niece and nephew. They arrived in December 1862. Cove grew to its greatest size near the turn of the century. Mt. Fanny was named in honor of Samuel Cowle's niece, Fannie, who was the first woman to climb the mountain, in June 1863. At one time, Cove had several general stores, a grist mill, sawmill, bank and its own local newspaper.

Grande Ronde Model Watershed

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Ripples in the Grande Ronde

Fall 2008

RIVERS UNITING NEIGHBORS · QUARTERLY NEWS FROM THE GRANDE RONDE MODEL WATERSHED

Second time around

Summer steelhead kelts journey to the ocean and back again

by Lyle Kuchenbecker, GRMW

The Snake River summer steelhead run is under way in the lower Grande Ronde River. The run is composed of wild and hatchery origin fish. Anglers are allowed to keep hatchery fish, which have clipped adipose fins. These fish entered the Columbia River from the ocean during the summer. By late summer and early fall some of these fish have migrated up the Grande Ronde River. Others will remain in the Columbia and Snake rivers, and enter the Grande Ronde throughout the late fall and winter. Even though they enter the Grande Ronde over several months, all fish spawn in the Grande Ronde River, Catherine Creek, the Wallowa River and other tributaries at approximately the same time, mid-April into early June. After spawning, the common perception is that adult steelhead die, as do salmon.

But, steelhead are special. They, in fact, do not die immediately after spawning. Steelhead are distinctive from other sea-run (anadromous) fish. They have the ability to spawn more than once. Post-spawn steelhead are called "kelts." After spawning, kelts are in very poor condition, the result of little, if any, feeding since leaving salt water, the rigors of spawning, and their long trip from the ocean. Despite their condition, their natural behavior pattern is to begin moving downstream. In coastal steelhead streams and those streams that enter the lower Columbia River, kelts can be quite successful in returning to the ocean. Monitoring in the 1950s and 1960s, in the Clackamas River for example, indicated kelts made up 50 percent of the following year's upstream run.

The percentage of kelts successfully outmigrating and returning to spawn again in the tributaries of upper Columbia River system, such as the Grande Ronde River, is and always has been considerably lower than coastal streams. This is due to the distance fish have to travel to return to the ocean and their post-spawn condition. Another contributing factor is higher mortality rates attributed to the Columbia and Snake River mainstem dams, both in getting through the dams and the slow-moving pools above the dams. Fish passage facilities at the dams were never designed for downstream movement of adult steelhead. Large numbers of adult steelhead have been observed in the juvenile bypass systems at the dams, indicating kelts are attempting to return to the ocean.

A strategy to help rebuild depressed steelhead runs and overcome the high mortality at the dams is called "kelt reconditioning." Reconditioning involves collecting post-spawned adults at the dams or in the tributaries, and culturing the fish in a captive environment until they are able to reinitiate feeding, growth and redevelopment of reproductive organs. Reconditioned adults can then be released to complete their migration to the ocean and return to spawn a second time. Research on kelt reconditioning in the Pacific Northwest is ongoing.

The Yakima Steelhead Kelt Reconditioning Project was started by the Columbia River Intertribal

.....Continued on Page 8, KELTS

Wild steelhead spawns in a restored channel of the Wallowa River the first season after water was turned into the new channel. ODFW photo.

The Wallowa River gets help from the

bucket brigade

by Coby Menton, GRMW

Restoration of the Wallowa River on property owned by Doug and Gail McDaniel near Lostine has been ongoing for most of the last five years. The work of re-meandering the channelized and diked channel has been accomplished over two separate projects each consisting of two phases. On August 19 this past summer Phase 2 of Project 2 was completed, resulting in nearly one mile of restored channel over the two projects.

The idea of the restoration method at first glance may sound simple, but rebuilding naturally meandering channel, complete with habitat features as they are expected to naturally occur, is a tall order. Design, permitting, fundraising, and project implementation usually takes between two and three years per project. The effort is well worth the work as improved habitat for fish is nearly immediate upon completion. Given local, state and regional efforts to improve and restore resident and anadromous fish populations, this project will provide a multitude of benefits to those efforts.

Recognized stressors to fish populations include degraded or simplified instream habitat, compromised riparian (near stream) vegetation diversity, and simplified hydrologic function. This project has a variety of objectives addressing those stressors:

1. Improve instream habitat by constructing a channel complete with components much as they would occur in natural conditions. Components include pools, riffles, runs and glides. The previous unrestored channel was a near continuous riffle – shallow, wide and with fast-moving water. Wood and rock structures will improve habitat diversity in the reconstructed channel.

2. Improved hydrologic function and water quality will result from improved channel conditions. A channel that can seasonally occupy its floodplain during high-flow times will deposit sediment above the streambank. Water will then be stored in this floodplain, allowing for the delayed release of cooler and cleaner water back into the river through the soil. Wetlands, once an important part of the riparian function along this river, will again exist.

3. Improved riparian condition and function will result from improved channel and hydrologic conditions. While the current riparian conditions are actually pretty good, water-tolerant plants are anticipated to become more prominent, and displace the current vegetation comprised largely of dryland grasses and shrubs. The post-construction planting plan will give this process a jump start.

Much like Project 1, Project 2 was completed with a diligent implementation team consisting of the Oregon Department of Fish and Wildlife, the Confederated Tribes of the Umatilla Indian Reservation, and the Grande Ronde Model Watershed. With the assistance of CTUIR, ODFW designed the new channel and managed project construction. The Model Watershed administered the project, and was in charge of all contracting and financial obligations. The best management team needs competent skilled help. LD Perry, Inc. of Enterprise started the construction effort in 2007 by

Top: Joe Partney of Partney Construction, Inc. installs the diversion structure on the morning of August 12, 2008. The old channel to be filled in is on the left side of the photo and the new channel is on the right. Once the barriers are installed and sealed, more than 90 percent of the flow is down the new channel. A small amount of flow is necessary in the old channel until all fish have been removed. When all fish have been removed, the old channel is reclaimed. GRMW photo. Right: The bucket brigade! From left to right: Troy Nave (Outdoor School teacher), Ella Shoup, Maddie Hill, Silje Christoffersen, Lars Skovlin (with bucket on head), Erich Roepke, Natalie Ziegler, Landra Skovlin, Kyle Roepke, and Paul Arentsen (Outdoor School teacher). Photo by Penny Arentsen.

Meet the Board

GRANDE RONDE MODEL WATERSHED

Norm Cimon

Although his family's roots are in French-speaking Canada, Norm Cimon has lived in the western United States since a 1972 posting with the U.S. Air Force. He and his wife, Shelley, have lived in La Grande for more than 28 years, where they raised Jessie and Jamie.

Norm's education came in the form of a B.S. degree from University of Nevada Las Vegas and a M.S. degree from Oregon State University, both in mathematics with an emphasis on physics. Norm has worked as a computer programmer and mathematician, a data base designer and developer, and a builder of networked computer systems for UNLV, the Environmental Protection Agency, the U.S. Forest Service, the private sector, and as an independent consultant.

If you didn't know Norm well, you might think his background, education, and work experience qualified him as a "geek," but he's a much broader person than just being technically advanced compared to most of us. As he looks back on those years, he explains that his life experience "was a valuable way to meet and collaborate with a wide range of people working in the social, physical, and ecological sciences, and with the public and the landowners who were our partners." That collaboration included research on aging, air-quality monitoring, water-quality monitoring, nutrient cycling, wildlife habitat management, forest insect dynamics, and forest ecology.

Norm has served on the Grande Ronde Model Watershed board for three years, having previously served as an alternate. Of his reasons for becoming involved with the GRMW, he explains it matter-of-factly. "There's only one resource in the West worth talking about and that's water. It's the reason we're all here, and the starting point for discussing all the other resources we exploit and the values we have."

Norm has never been one to avoid provocative thoughts, and expresses his perception of the region in his style, which we have come to know and appreciate. "The rangelands have not been devastated as they have in drier parts of the West, yet they haven't been able to recover quite as quickly as they do in wetter and more temperate landscapes. The fish are hanging on, barely in some cases, but there are still runs in most of the streams.

"Even more startling, given that this is the Pacific Northwest, is that there are no major dams in the local watersheds. I believe we should be able to recover fish habitat and fish here, and that we will do it. I also believe that the recovery of these magnificent creatures is one of the primary ways we can make a statement about who we are by showing what we care about. Nothing will serve better to tie the generations and the cultures together. That's why I became involved – through the Hells Canyon Preservation Council – with the Grande Ronde Model Watershed."

Fish Online!

www.grmw.org

- Adult salmon counts at the dams
- Snake River Basin streamflows
- Snow and precipitation reports
- Habitat enhancement projects
- Meetings, activities and events
- Past issues of "Ripples" and more!

Grande Ronde Model Watershed

Upcoming Board Meetings

The public is welcome to attend

- Tuesday, January 6, 9 a.m. - 3 p.m.
  Annual Planning Session
  Cove Ascension School Conference Room
- Tuesday, February 24, 6:30 p.m.
  Wallowa Community Center, 2nd St, Wallowa
- Tuesday, April 28, 6:30 p.m.
  Elgin City Hall, 8th St, Elgin
- Tuesday, June 23, 6:30 p.m.
  Wallowa Community Center, 2nd St, Wallowa

Meeting dates are subject to change.
Please call 541-663-0570 to confirm. Thank you!

Aquifer

storage and recovery

by Jeff Oveson, GRMW

Over the next few years, you may be hearing and reading a lot about "aquifer storage and recovery" or ASR. You may also hear mention of "artificial recharge" or AR. ASR and AR are not the same, even though they share some general concepts. Here in the next few issues of the *Ripples*, we will attempt to explain these concepts and enlighten our readers as to how they might be important to the citizens and the resources of Union and Wallowa counties. The Grande Ronde Model Watershed anticipates being involved in this work for several years to come, and will make every effort to keep the public informed.

What ASR and AR have in common is this: when excess water is available, it is put into an underground aquifer where it is stored until it is needed either for agricultural or municipal uses when the demands of those uses exceed the available supply. Normally here in our neck of the woods, the excess water is available in winter or spring while the shortage of water occurs in late summer.

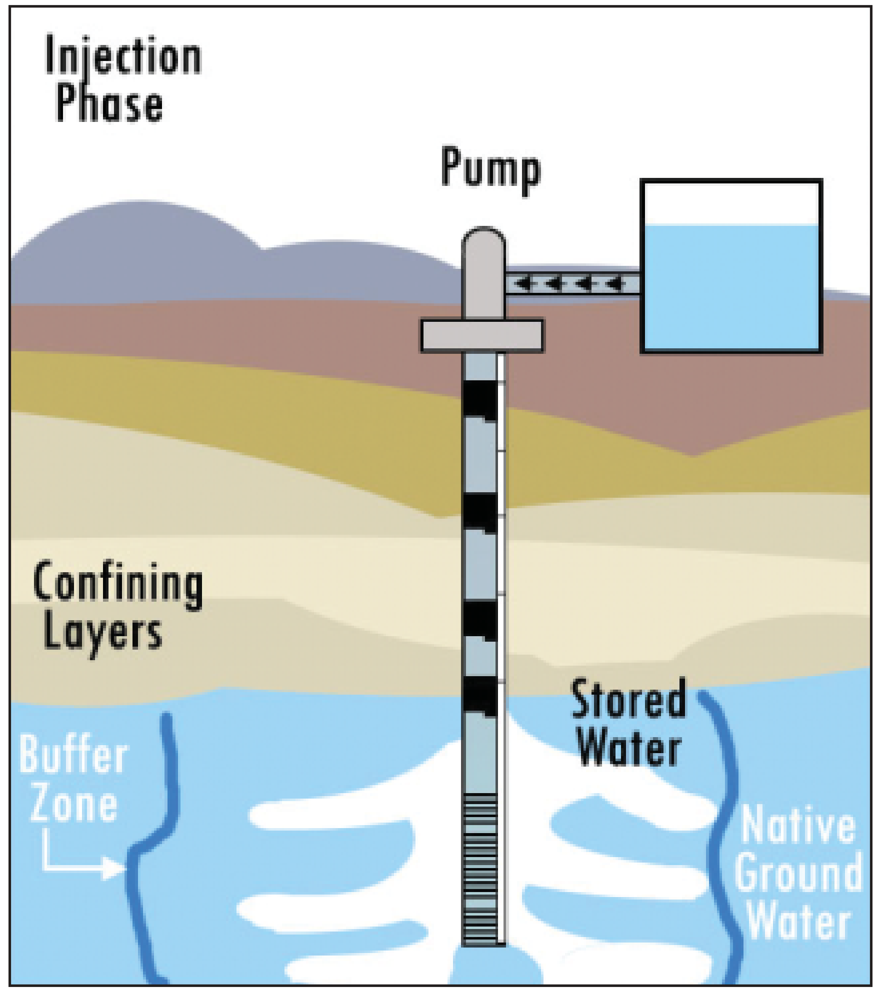
It all sounds simple enough, doesn't it? When rivers are running high with ample water, just take a small percentage off the top, pump it into the ground, and then when water is short, pump it back out. It really is that simple, only not, if you know what I mean. The major differences between ASR and AR are outlined in the box (*at right*).

Some of the potential benefits of employing either strategy include:

- Reduced storage development costs. ASR/AR costs are low when compared to other storage alternatives, often reducing by half the storage costs of alternative methods such as surface water storage or storage tanks.
- Limited environmental impact. ASR/AR projects often require only minimal changes to existing distribution and treatment systems, thereby limiting the degree of environmental impacts.
- Improved streamflows. ASR/AR can reduce withdrawals from streams and rivers during the lean summer months when water is scarce, leaving more water to support fish and other water-dependent species. There might even be cases where seepage from a recharged aquifer can add to summer flows.

There are numerous factors to consider when deciding if ASR/AR can help us meet growing water needs in Oregon and particularly here in northeast Oregon. Some of the basics are:

- Water availability. Water from a stream or river must be available for storage during at least part of the year.
- Hydrogeology. A target aquifer (the one you want to store water in) will have to be at least somewhat porous and permeable, and it will need to have some unused storage available.
- Water quality. In the case of ASR projects, the water to be injected for later use must meet drinking water standards, which could mean that it has to be treated before injection. For AR, the water to be stored must not degrade existing ground water quality.

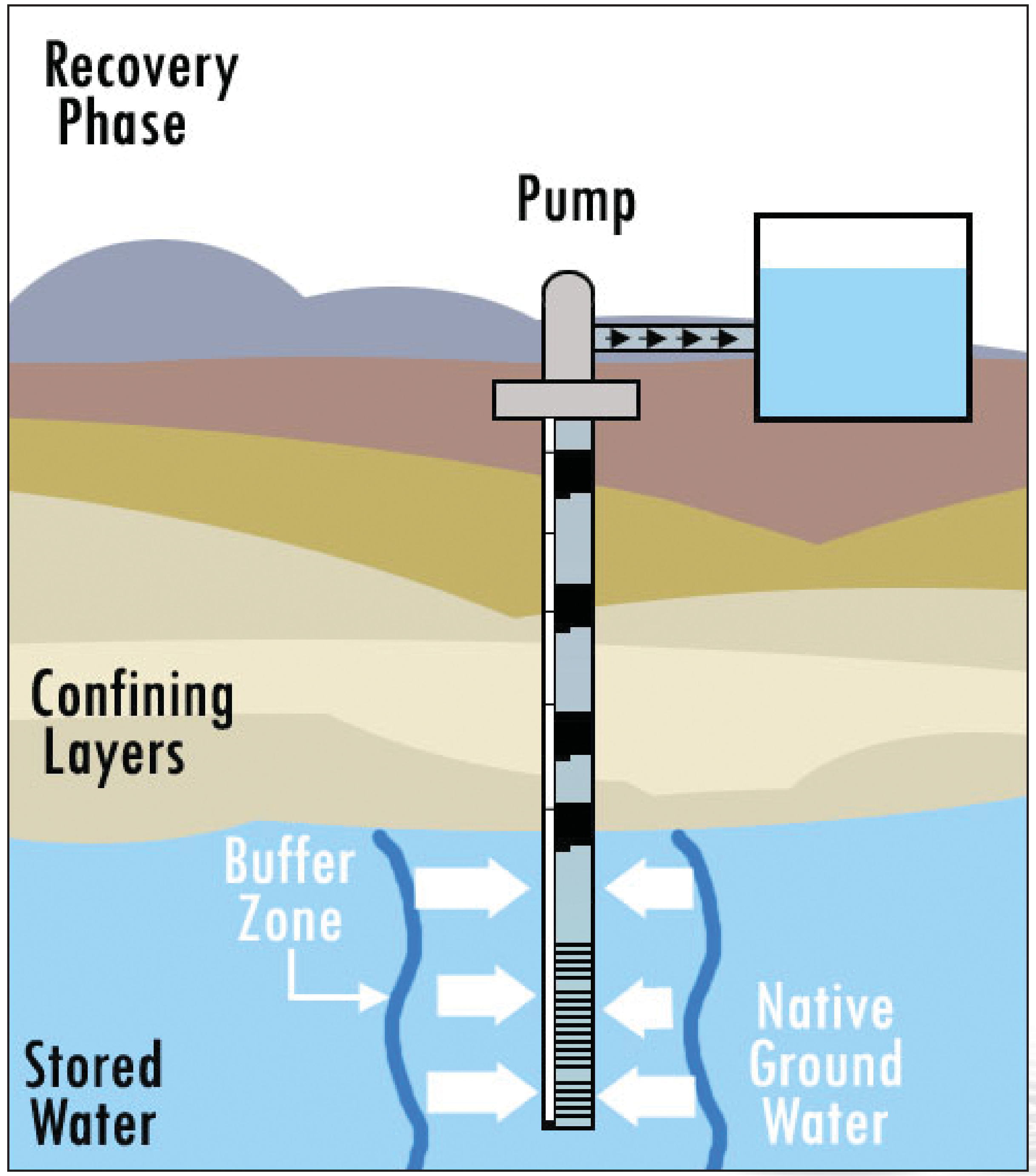


Major Differences of Aquifer Recharge, and Aquifer Storage and Recovery

Category	Aquifer Recharge	Aquifer Storage & Recovery
Typical Water Use	Agriculture, industry, public water supply	Public water supply
Recharge Method	Seepage systems, injection wells	Injection wells only
Water Quality	Recharge water cannot impair or degrade ground water quality	Recharge water must meet drinking water standards
Water Rights	Permits required to appropriate source water and to pump recharged ground water	Can use existing rights to store and recover water

It is difficult to discuss ASR/AR without raising some flags, at least caution yellow if not bright red. You will not see either ASR or AR happening in these parts for some time. I'm sure that at some time you have heard the term "hoops to jump through" in reference to regulatory or financial roadblocks that seem to make a project take forever. There is no shortage of them in this case, and the vast majority of them exist out of concern for the rights and safety of landowners and municipalities alike.

It's not as if we know exactly what the aquifer(s) under us look like, but we need to have a pretty good idea before we can seriously consider moving ahead with underground storage of water. We do know that the aquifer to the north end of the Grande Ronde Valley is unlike that to the south. We suspect, but do not know, that any aquifer near the Lostine River is alluvial in nature, yet we would need to know before we could consider the likelihood of successfully storing water there for subsequent use.



It is only honest to let our readers know that for the Grande Ronde Model Watershed to be involved, one of the primary objectives has to be that there is a benefit to watershed health, such as added instream flows. If a project can benefit agriculture or municipalities, so much the better, and the chances of a mutual benefit are reasonably high. If an irrigator is using AR for late season irrigation, that water is not being taken from an area stream. If a city is using ASR, it means it is not depleting a natural aquifer or drawing water from a stream.

The GRMW has taken some preliminary steps toward making ASR/AR a reality locally. The board of directors has committed $50,000 and, in cooperation with Anderson-Perry Associates, has applied for funding through the Oregon Department of Water Resources to conduct the earliest phases of analysis and feasibility. The application has been recommended for funding at around the $50,000 level, with a final decision expected by the time this article goes to print. The GRMW is searching for more funding of the same type to support analysis and feasibility studies on a broader scale.

At first glance, the prospect is exciting. Look a little more closely, and you might see nothing but obstacles in the way and lose sight of the potential benefits to you, your neighbors, and to the natural resources. Let me suggest that if you are curious, learn what you can, follow along on the progress, and feel free to give us a call for information. As time passes, we will continue to provide information about ASR/AR and will provide updates on any progress we make.

If you're completely discouraged or only slightly optimistic, it might buoy your outlook to know that the cities of Pendleton and Baker City are both successfully using ASR to provide part of their municipal water needs. It might also cheer you up to know that two large farms just across the Blue Mountains are using AR to provide irrigation water during late summer. ■

In the Injection Phase, surface water is pumped down a well into the aquifer when streamflows are high during the late winter and spring. In the Recovery Phase, stored water is pumped back to the surface when streamflows are low during the summer and early fall.

Of rock *and* water

How geology impacts water availability in the Grande Ronde Valley

by Coby Menton, GRMW

Geology has a profound effect on ground and surface waters available for human consumption. Rock type, extent, texture, structure and layering are all determining factors in the equation of water availability. Volcanic rocks are not good producers of available water if their texture is characterized by low porosity and poor transmissivity. On the other hand, these rocks can yield water in usable amounts if their structures exhibit joints or fractures, allowing pathways for water to travel and store in layers between the volcanics or adjacent porous formations.

Sedimentary rocks, whether consolidated into rocks or loose sedimentary formations, often produce our best aquifers. These formations tend to be more porous and are able to transmit water through interconnected pathways between pores. Once again, extent, texture, structure and layering play an important role in aquifer capacity for sedimentary rocks.

A useful analogy can be made by comparing a bucket filled with hot wax and allowed to cool, to a bucket filled with gravel from a typical driveway. The bucket of wax, in this example representing volcanic rock, will not be very porous, will not transmit water, and certainly not hold any water pored over the top of it. If we modify the structure of the wax by compressing the bucket, joints and cracks will form passages and, to a small extent, storage pockets. The bucket of gravel, obviously the sedimentary rock, will be very porous, will easily transmit water, and will accept a large amount of water poured over it.

To get some understanding of water and aquifers in the Grande Ronde Valley, we consulted Mark Ferns of the Oregon Department of Geology and Mineral Industries in Baker City, Oregon.

Q. In the Grande Ronde Valley, how does the geology store, yield or transport water for municipal, domestic and agricultural uses?

A. The volcanic and sedimentary rocks within the valley can be divided into four basic packages that define individual aquifers. The uppermost package is made up of young sediments that are coarse-grained at the valley margins and finer-grained along the axis of the valley. This aquifer is connected to the surface. Effects of overuse will be manifested by dropping summer streamflows, drying up of springs and shallow water wells.

There is an older package of sedimentary rocks that are generally finer-grained that persist to a depth of 3,000 feet below ground surface in the deepest part of the valley. We are not sure, but water-bearing zones within this package may or may not be connected through to the surface.

There is a still older package of volcanic rocks that contain some interbedded sedimentary rocks. The upper part of this volcanic section (the Powder River Volcanic Field) is tight and generally makes for a poor aquifer. In places, more than 1,000 feet of barren volcanic rocks had to be drilled through before the underlying productive aquifer was reached.

And then there is the Columbia River Basalt. It is the Grande Ronde part of this unit that hosts the high flow artesian aquifers that some of the farmers are using. In the Grande Ronde Valley, water temperatures from this unit are as much as 105 degrees Fahrenheit. It's possible that you could have some water quality issues; domestic water wells are often smelly.

Q. What are the effects of wells on our local aquifers, and what data is available on the current usage and longevity of our aquifers given current consumption?

A. Although we do not currently have any good numbers on how (or even if) the Columbia River Basalt aquifer is declining in the Grande Ronde Valley, similar Columbia River Basalt aquifers elsewhere in the state typically suffer declines through overuse.

The manner in which geology influences the aquifers in the upper Grande Ronde Basin is now pretty well understood. The overall water budget for the basin is not known. The rates at which groundwater can be sustainably extracted from the aquifers make for a big unknown. ■

Geologic Terms

Volcanic rock Rock characteristic of, pertaining to, situated in or upon, formed in, or derived from volcanoes.

Sedimentary rock Rock formed from accumulations of sediment, which may consist of rock fragments of various sizes, remains or products of animals or plants, products of chemical action or of evaporation, or mixtures of these. Stratification is single most characteristic feature of sedimentary rocks, which cover about 75 percent of land area

Aquifer An underground stratum that will yield water in sufficient quantity to be of value as a source of supply.

Basalt A fine-grained volcanic rock dominated by dark-colored minerals with high magnesium and iron content. Basalts and andesites represent about 98 percent of all extrusive volcanic rocks.

Artesian Of, being, or concerning an aquifer in which water rises to the surface due to pressure from overlying water.

Definitions obtained from http://www.webref.org/geology/geology.htm

digging most of the new channel, installing many structural components, and staging excavated material for Phase 2 filling-in of the old channel. All of the work done by LD Perry, Inc. was "in the dry," meaning out of flowing water. Phase 2, the connection phase, was completed by Partney Construction, Inc. of La Grande. This 2008 work consisted of installing several structural features, linking the new channel to the old, and backfilling the old channel with material excavated in 2007. Other contractors included Henderson Logging of Wallowa, who provided logs for rootwad habitat features; Jones Excavating of Lostine, who delivered boulders for channel grade control structures; and Farm Supply of Enterprise, who was contracted for trucking services.

One of the more rewarding aspects of restoration is the amount of volunteer efforts realized. This was no more apparent than on the two fish salvage days. "Fish salvage" is a term that needs explanation. Before the old channel can be dewatered and filled in, all fish must be captured, counted, and released back to the river out of harm's way. This is done by slowly dewatering the old channel to a very low, manageable flow. Dewatering is accomplished by slowly diverting water to the new channel. Many of the fish will leave the old channel as flow recedes, either upstream or downstream, seeking normal flow conditions. Those fish that do not leave are captured with electro-shockers that temporarily stun the fish and dip nets. After capture, all fish are transported from the stream in buckets to water-filled coolers mounted on all-terrain vehicles and then driven to the processing area. All fish are then identified, counted, measured and released back to the live-flowing new channel. Each end of the area to be filled in is "block netted" to prevent fish from swimming back in. The process of removing fish from the part of the river that will be reclaimed is fish salvage, and on August 12 and 13 the following species and numbers were salvaged.

- Mountain whitefish, 413
- Juvenile steelhead/rainbow trout, 621. Distinguishing juvenile steelhead from rainbow trout is very difficult and beyond the scope of this salvage effort.
- Juvenile hatchery steelhead, 6. These fish are offspring from adult steelhead processed at the Wallowa Fish Hatchery in Enterprise and marked by a clipped adipose fin.
- Juvenile chinook, 156
- Longnose dace, 1,085
- Umatilla dace, 60
- Bridgelip sucker, 53
- Northern pikeminnow, 3
- Sculpin, 361

Top: Upstream end of project where most of the flow has been diverted to the new channel on the right. The old channel was slowly dewatered over one day and then salvage efforts began. The Confederated Tribes of the Umatilla Indian Reservation crew is running fish shockers in old channel while the Oregon Department of Fish and Wildlife and volunteers are shuttling fish in buckets from the old channel to the transport cooler on the ATV.

Above left: Vance McGowan, ODFW habitat biologist and McDaniel project lead, discusses salvage techniques and habitat restoration with Outdoor School students. Above right: Members of the CTUIR salvage crew with Jeff Oveson (second from right), GRMW Executive Director. Photos by Penny Arentsen.

The capture, processing and release of 2,758 fish over five fishing passes of the old channel over two days required a lot of people. CTUIR personnel led the fishing effort by running the electro-shockers and coordinating fish transport. ODFW took care of all the species identification, counting and record keeping. In between capture and release is a lot of high-paced, bucket-brigade work taken care of by a small army of volunteers. A very energetic group of youngsters from Wallowa County led by Penny Arentsen of Wallowa Resources took care of the bucket work. These Wallowa Resources Outdoor School students meaningfully participated in an active restoration project, learned about fish in their county, and appeared to have a great time.

The Grande Ronde Model Watershed would like to take this opportunity to thank all of those organizations who have made the Wallowa River/McDaniel Habitat Restoration projects possible. Without the generous funding support of the Oregon Watershed Enhancement Board, the Bonneville Power Administration, and the U.S. Fish and Wildlife Service; the dedicated production team of ODFW and CTUIR; the willing landowners Doug and Gail McDaniel; and the diverse group of volunteers, this project would not have been possible. ■