VOL. 2 NO. 2 SPRING 2002

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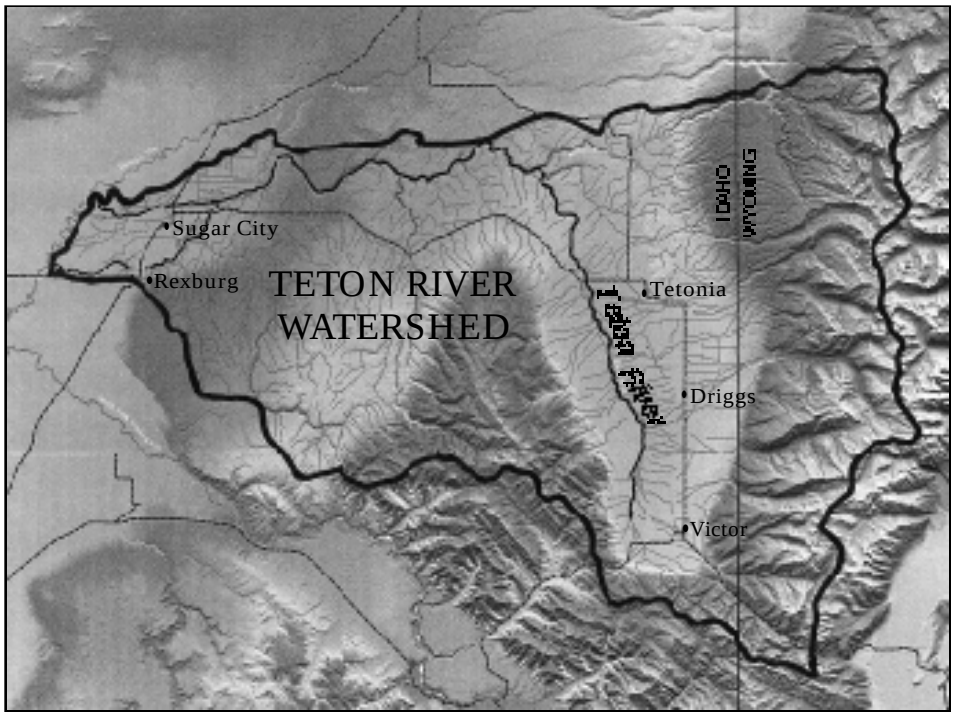
The Friends of the Teton River is dedicated to understanding and improving ground and surface water resources in the Teton Basin, including the Teton River, its tributaries and wetlands. We will further this mission by conducting scientific research about the Teton watershed, effectively communicating this information to the public, and implementing on-the-ground improvement projects. In carrying out this mission we will actively cooperate and collaborate with all other groups, agencies and individuals working for the welfare of the Teton Basin.

Friends of the Teton River

WATER LINES

A QUARTERLY NEWSLETTER PUBLISHED BY FRIENDS OF THE TETON RIVER



A new map of the Teton Watershed created by Jeff Horsburgh at Utah State University's Water Research Laboratory. A large color version of this map is available at the offices of Friends of the Teton River and Teton Valley Trout Unlimited. See page 8 for details.

Winter running into spring

As I watch the rain pouring down out of gray skies I remember how much I love springtime, despite the bad name that it gets in the intermountain west. Friends and colleagues have fled to the south to enjoy beaches and deserts; Tater Tot (my two Australian shepherds) and I have been taking long walks near the Teton River and marveling at the clamor of life that is occurring there. Fields near the river have turned in to small lakes and water is moving everywhere. The snow melted in the valley during the first week in April and we saw a response in the flows on the Teton, which went up to 800 cubic feet per second (cfs) on April 2. In the hydrograph shown on page 8 you can see the high flow that occurred as temperatures warmed in the valley. The strong peaks and troughs that you can see on the page 3 graph show how cold night and warm day temperatures cause large fluctuations in the amount of snowmelt water that reaches the river. By April 11 valley runoff was over and from now on the hydrograph will be driven by higher elevation snowmelt.

What does the water supply look like for this spring and summer? Unfortunately the snowpack in the mountains has been greatly reduced by recent rains and warm temperatures. Today (April 15) the snowpack at Pine Creek Pass is 66% of normal, in the whole Upper Henrys Fork wa-

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Lyn Benjamin,
Executive Director
Marge Edwards,
Development Director

65 South Main #7
PO Box 768
Driggs, ID 83422
(208)354-3871
FTR@tetontel.com

LAYOUT & DESIGN BY
MARY LOU HANSEN,
SAGE PRODUCTION &DESIGN

Meet Marge, our Development Director

Marge Edwards' job is to ensure FTR's long-term financial stability

Marge Edwards spent her early childhood in the foothills outside of Golden, Colorado. At age 11 her family moved to Saudi Arabia where she lived for five years until she went to high school in Lugano, Switzerland. She earned a Bachelor's Degree at Colorado State University, majoring in political science with a concentration in international relations and Middle Eastern studies. For three summers she worked in the consular section of the American Consulate General in Jeddah, Saudi Arabia.

In 1996, Marge and her husband Stan moved to Teton Valley. They now have a three-year-old son, Forest, and live in a straw bale house on South Bates road where they enjoy a large garden. Only one mile from the Teton River, they spend many of their summer days canoeing, fishing and swimming on the river.

Since moving to Teton Valley, Marge has worked with Family Safety Network as the Assistant Director and as a founding board member of the Teton Valley Community School. She has written several successful grant proposals and conducted other fund-raising activities for both organizations. She looks forward to working with the community as a representative of FTR.

"In my first four months as Development Director at Friends of the Teton River, I have enjoyed meeting and working with all of the individuals involved with the organization," says Marge. "Additionally, I have learned a great deal about the Teton River and its associated watershed. My work at FTR has reinforced to me the level of community interest in water related issues in the Teton Valley. Friends of the Teton River has accomplished many of its goals this year due to Lyn Benjamin's hard work and the generosity of members. I hope to help maintain this level of success by establishing the long-term financial stability of Friends of the Teton River. I look forward to working with all of you in reaching this goal."

FTR has scheduled several projects and programs for the coming year:

- Habitat Assessment and Restoration Project, FTR's largest stream improvement effort. We will assess trout habitat conditions on the Teton River and design and implement restoration plans for degraded habitat. This is an ambitious project that has received only partial funding, if you would like to sponsor a specific FTR activity this would be a great place to start.
- State of the Upper Teton Watershed Project aims to produce an educational booklet titled "The State of the Upper Teton Watershed" to educate valley residents about issues of water quality, water quantity and the Teton River fishery.
- Tributary Spawning Survey and Restoration Project. Tributary streams and spring creeks are essential spawning grounds for Teton River trout. FTR and Teton Valley Trout Unlimited will evaluate spawning use and stream conditions in order to design and implement restoration projects.
- Water Quality and Quantity Analysis. We have completed the first year of a three-year monitoring program on the Teton River and its tributaries. We will continue this study with your support.
- Elementary School Stream Studies. With the assistance of FTR, two fourth grade classes in Victor and Tetonia will conduct stream studies on Teton and Spring Creeks.
- Public Forums. FTR will continue to sponsor public forums focusing on important water issues. In September we will convene a forum about the Teton River fishery.

All of these projects require assistance from volunteers and friends. Additionally, much of our operating budget comes from donors like you. We look forward to sharing our future successes with you. Please join Friends of the Teton River today and if you are currently a member, please renew you membership.

Thank you, Marge

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tershed is 78%, and in the upper Snake Basin above Palisades is 73%. This is the third consecutive year that snowpacks have been considerably below average in the spring. On the brighter side, spring rains and cooler temperatures mean that irrigation between Rexburg and Twin Falls will start later, less water will be drawn from reservoirs, and more water can stay in streams and rivers.

Friends of the Teton River held two well-attended water quality forums this winter and spring. The first meeting, Jan. 16 drew a crowd of over 200. Six water quality specialists presented information about topics that included septics vs. sewer systems, soil suitability for septics, drinking water quality, nitrates in drinking water, surface water quality, and the Teton County sponsored aquifer study. The second meeting, April 10, allowed members of the public to ask questions of the same panel. The first half of the meeting focused primarily on septic and sewer issues. The second half addressed work by the Teton Soil Conservation District, surface water quality and drinking water. We had excellent questions and discussions on all of these issues. Teton County commissioners Ron Ramirez and Jay Calderwood attended both meetings. Many thanks to them for responding to public needs, to the panel for sharing their expertise, and to all of you that attended and participated.

FTR continues its water quality and quantity monitoring program, we will publish those results in our fall newsletter. Cascade Earth Sciences (CES) is making progress on the Teton Basin aquifer study, which should be completed in time to be incorporated into the new county comprehensive plan. We will be undertaking a basin-wide well water sampling and analysis effort with IDEQ and the USGS at the beginning of May, which will be incorporated in the CES model and will provide a picture of groundwater quality in the basin. Idaho Fish and Game provided FTR with a grant to complete a spawning survey of Teton River tributaries with Teton Valley Trout Unlimited. They will also be providing training sessions to volunteers. Thank you very much.

Finally, our sincere thanks also go to Karen Scheid and the Donald C. Brace Foundation for their very generous grant that will enable FTR to start its assessment and restoration work on the Teton River. -Lyn

Many thanks to the following individuals and businesses for their recent support:

Ann Mumford
H. Grant Theis
Reed Coleman
Eugene Weisberg
Jaydell & Judy Buxton
John M. Sanders
Tom Fauntleroy
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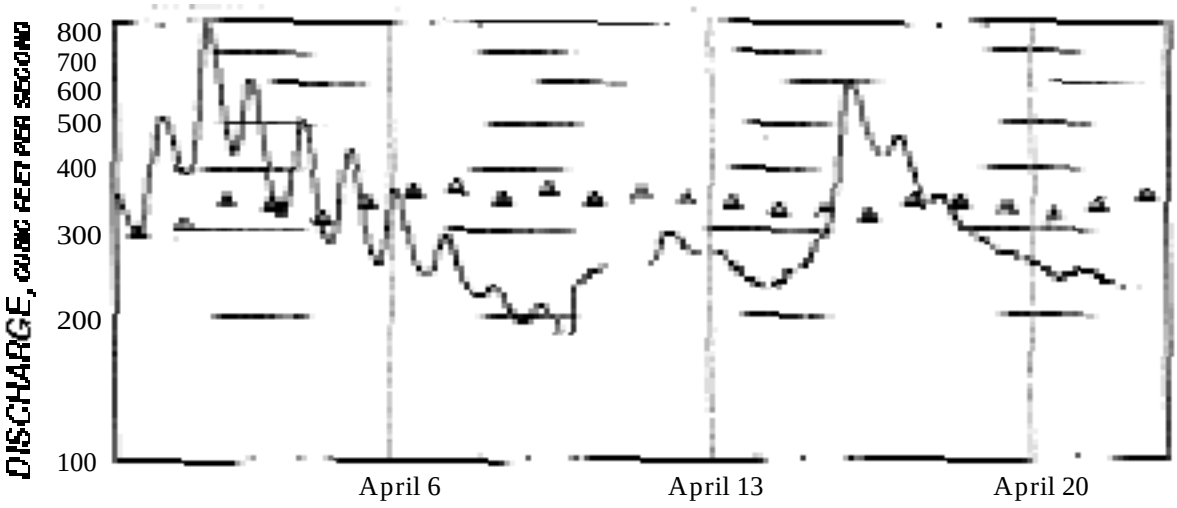
Courtney Liddiard
Rudd & Company
Wayne Ranney
Mark Kelly
Kane Brightman & Deb Brand
Dr. William Walsh
Kenison & Barbara McIntosh
Fred Mugler
James W. Cecil

TETON RIVER FLOW above South Leigh Creek

March 31-April 22, 2002



Geologic history determines hydrology

Teton Valley has been "under construction" for hundreds of millions of years, resulting in a geologic setting that has created our water system

When the mountain men first entered "Pierre's Hole" in the early 19th century, they were seeking beaver and other wildlife that thrived in this well-watered basin. For millennia this beautiful river valley has provided water resources for nomadic Native American tribes and more recently, farming communities. As Friends of the Teton River (FTR) strives to better understand how the hydrology of the Teton Basin works and changes over time, it is worthwhile to know something about how the Teton Basin was created. It is a fantastic story involving landscapes as diverse as warm tropical seas, mountains full of dinosaurs, and ice age glaciers. As far removed from our modern lives as these ancient landscapes may seem, it is precisely these long lost scenes from the past that have created the mountains and valley that sustain our quality of life here.

In preparation for our "journey through time" in the Teton Valley, we should first make a very important observation: to understand the Teton River we must also understand the history of the Teton Mountains, for without them there simply would be no river. Mountain and valley were created from the same earth building events and today much of the valley's water comes from rocks within the Teton range. The Big Hole and Snake River mountains play a part in the story too, but it is the Teton Range that takes front and center stage.

All land masses on our planet are built upon ancient foundations which frequently are composed of crystalline rocks such as granite and gneiss (pronounced "nice"). The Teton region is no different and this foundation has been uplifted and spectacularly exposed on the eastern side of the range. When we look at the Grand Teton itself, we are looking at rocks formed almost 20 miles deep within the earth's crust, about 2.8 billion years ago. Although our continent looked vastly different back then, the foundation for the Teton Valley was forming at this great depth!

There is no record for the ensuing 2 billion years of earth history but erosion and earth movement eventually brought the foundation rocks of the Teton Range close to the earth's surface. It was upon this eroded surface that 8,000 to 15,000 feet of sedimentary material was deposited. This chapter of the story began about 540 million years ago when the area was located very close to sea level, near the ancient western edge of North America. West-flowing rivers deposited layers of sand and mud (which would become sandstone and shale), while shallow seas left behind limestone and dolomite.

This was a time when the Teton region looked much like the Bahamas do today, low-lying and featureless, tropical and warm. (Next time the winter cold gets you down, look up to the limestone in the Tetons and recall the warmer environments that once existed here!). Marine species provided the raw material for making limestone; as they died their shells accumulated on the sea floor. This vast depositional basin was actively accumulating sediment for almost 400 million years. During this long time span, life evolved from simple sponges to great dinosaurs. The basin floor was slowly but continuously subsiding so that space was created for the deposition of more sediment. Some of the important rock layers that were deposited during this time have names such as the Flathead Sandstone, the Death Canyon Limestone, and the Madison Limestone.

Most important to the people and wildlife in the valley today is that these sedimentary layers form a critical part of the underground reservoir of water that we use for agriculture and domestic purposes. Sandstone and limestone, which collect snow melt from the mountains and store it for many years, are important aquifers (subterranean rocks which hold water like a sponge). Recent work by FTR has shown that some of the water coming out of the ground in springs today has been stored in the aquifer for 25 years. Note that this water is not stored in giant underground pools but rather in the tiny pore spaces that exist between individual sand grains or the small holes where fossils have solutioned away. If these pore spaces become interconnected, then water can flow through the rocks. Incredible to think that the Bahama-like conditions that existed here 300 or even 500 million years ago are still influencing our lives every day.

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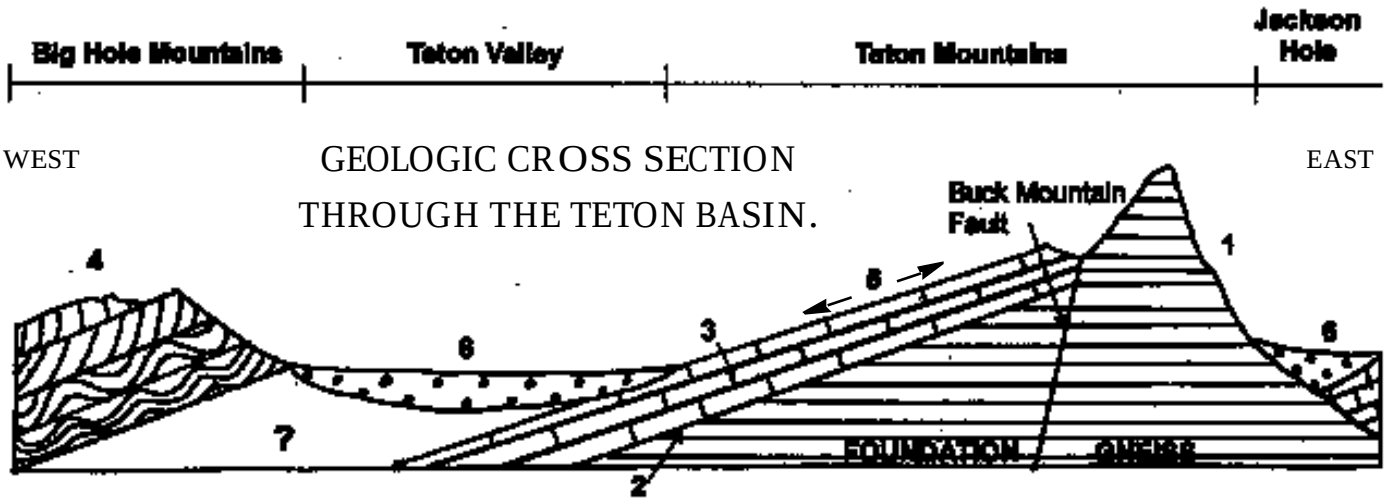

GEOLOGIC CROSS SECTION THROUGH THE TETON BASIN.

Highly deformed and faulted sedimentary rocks in the Big Hole Mts.

Gravel and sand deposits, which fill the low-lying valleys.

Undisturbed limestone, shale and sandstone on the west slope of the Teton range.

Granite and gneiss exposed on the Grand Teton and the eastern side of the Teton range.

1. Foundation rocks, gneiss and granite, formed 2.8 billion years ago at about 20 miles depth.
2. Erosion brought these rocks to near surface where they were planed flat.
3. Ancient seas and rivers deposited limestone, sandstone and shale beginning 540 million years ago. Flat-lying deposits were deposited in the Big Hole Mountains until 160 million years ago.
4. Compression of the earth's crust folds and faults sedimentary layers in the Big Hole Mountains, rocks were stacked on top of each other like shuffled cards.
5. Beginning 13 million years ago the Teton Range was uplifted. The east side was lifted up and the west side was tilted down to the west.
6. Erosion in the Teton Range delivers gravel and sand to the Teton Valley and Jackson Hole. Groundwater flows down the dip in the Tetons to the gravel aquifer.

Beginning about 160 million years ago, the area changed from being a quiet depositional basin near sea level to an actively forming mountain front. This time is known as the Jurassic Period and large dinosaurs roamed the area that would become the Teton landscape. As the North American continent split apart from Africa and Europe, its western margin was crumpled and the crust was thrust upward and thickened, just like two decks of cards that are shuffled together. At this time, rocks in the Big Hole Mountains and the Snake River Range took shape in a geologic province now known as the Fold and Thrust Belt. These mountains are riddled with numerous faults, documenting how the once flat-lying rocks were shoved up one on top of the other. Important to our story is that this faulting episode fractured the sedimentary rocks so that the otherwise isolated pore spaces containing groundwater became interconnected throughout the fractured terrain. Water that flows in Packsaddle Creek and Horseshoe Creek originated as snow melt in the Big Holes and eventually moved through the fractured rocks to the surface.

This mountain building event, which lasted over 100 million years, created a compressed and overthickened crust in the area of today's Teton Valley. At this time, the Teton Range was still only a gleam in Mother Nature's eye, meaning that it hadn't even formed yet. However, with much of the crust overthickened by compressional forces, the crust gradually became gravitationally unstable (top heavy). Beginning about 13 million years ago, the crust was stretched and the rocks which make up the Teton Range were rotated such that the whole Teton block was raised on the east, causing it's sedimentary cover to be tilted down towards the west. It was the stretching of the crust that uplifted the Teton Range and created the ever deepening "hole" that would become the Teton Basin. Jackson Hole was formed at this time in the same manner. The more this block was rotated, the higher the Tetons were raised and the deeper the "holes" became. Foundation rocks were eventually exposed by erosion on the uplifted eastern side.

As the Tetons grew in height young streams developed that drained to the west of the Teton crest on the newly formed "ramp" of sedimentary rocks. This is the time when all of the tributaries on the east side of the Teton River were born. They delivered huge amounts

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AS THE DEMOGRAPHICS OF THE WEST CHANGE, IT IS TOO OFTEN THAT THE INTERESTS OF NEWCOMERS ARE PERCEIVED AS BEING AT ODDS WITH THE TRADITIONAL RANCHING COMMUNITY. WATER AND WATER RIGHTS ARE A FREQUENT BATTLEGROUND. THE INCREASING POPULARITY OF FLY FISHING HAS MADE OVERGRAZING IN RIPARIAN CORRIDORS A PUBLIC CONCERN. THIS CONTENTIOUS ISSUE PITS RANCHER VERSUS RECREATIONIST. IN 1996, A NARROWLY DEFEATED BALLOT INITIATIVE IN OREGON THAT WOULD HAVE FORCED RANCHERS TO FENCE STOCK OUT OF ALL STREAMBEDS TOOK ANIMOSITY LEVELS TO AN ALL-TIME HIGH. IN THE FOLLOWING ARTICLE, KATIE SALSBURY, FTR BOARD MEMBER AND CO-OWNER OF INTERMOUNTAIN AQUATICS, INC., EXPLAINS HOW THE INTERESTS OF CATTLEMEN AND ANGLERS AREN'T NECESSARILY AT ODDS, AND, FURTHERMORE, HOW GRAZING CAN BE USED AS A MANAGEMENT TOOL IN FISHERIES ENHANCEMENT.

Flyfishing and cattle ranching in the West

It is possible to balance recreational and grazing demands along streams

Despite public perception, cattle grazing and trout can co-exist. Recent scientific literature shows that using cattle as a vegetation management tool along stream corridors can maintain quality trout habitat. This practice requires planning, implementation, and monitoring; however, a balance can be achieved where the rancher utilizes forage along a stream while causing no negative impacts to the adjacent trout habitat. In some cases, cattle can be used to increase angler access and enhance the sediment trapping capabilities of stream-side vegetation.

It is important to note that stream-side grazing plans must be site specific and that annual and seasonal variation can influence strategic planning. The following is a modified list taken from Guidelines for Managing Cattle Grazing in Riparian Areas to Protect Water Quality: Review of Research and Best Management Practices Policy (Mosely et al. 1997). These guidelines are meant to help livestock producers maintain water quality and therefore, trout habitat, while grazing along streams.

The first step to developing a stream-side grazing plan is to conduct a baseline inventory in order to identify the current condition of the stream banks and adjacent areas. If these areas are in good condition the following recommendations should be followed. If the stream-sides are in poor condition, extended periods (3 to 4 years) of rest from grazing are recommended.

- To protect streambanks from trampling, limit cattle access to surface water when adjacent streambanks and shorelines are overly wet and susceptible to trampling and sloughing. Streambank trampling can often be reduced by capitalizing on the natural foraging behavior of cattle. Cattle generally avoid grazing in excessively wet sites or in cold air pockets. They seek out wind-swept ridges, and graze on upland forage when it is more palatable than forage in riparian areas.
- Schedule cattle grazing to coincide with periods of vegetative growth. Grazing during these periods will actually stimulate vegetative growth and reproduction. Growth stimulation can reduce the transport of nutrients, fecal bacteria, and overland flow of sediment into the watershed.
- When grazing a site more than once per growing season, grazing more often and for shorter periods–3 weeks or less at a time–is preferable to fewer and longer grazing periods. For most sites, allowing a recovery period of at least 60 days, depending on vegetation type, is crucial before re-grazing. This interval can vary depending on moisture and temperature conditions.
- Divide riparian pastures into smaller units with similar features. This allows better control of grazing intensity. Adjusting the timing, frequency, and intensity of grazing in individual pasture units is more important than adopting a formalized grazing system.
- Prevent cattle from congregating near surface waters. This further protects stream banks from trampling and sloughing. Fencing, alternative water sources, supplemental feeding, armoring high use areas with gravel and herding work best. Inappropriate cattle grazing is usually evidenced by disturbance to streambanks and shorelines.
- To reduce impacts from cattle urine and feces, locate salt grounds, water developments, winter feeding grounds and other places where cattle congregate away from surface waters. This allows the filtering of runoff from

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Mark your calendars for the June 29

[redacted]

on the River by the Teton Valley Lodge

GEOLOGY from page 5

of gravel and sand to the valley floor, which helped to offset its deepening. These layers of gravel and sand eventually developed the horizontal surface upon which our communities and farms have been built.

This gravel and sand "fill" that was eroded from the Tetons, is hundreds of feet thick and contains plentiful pore spaces between the pebbles and sand grains. It is like a gigantic sponge and as groundwater flows down through the tilted sedimentary layers in the mountains, it eventually finds a place to reside in the valley gravel deposits. Groundwater resides for a time in the west dipping sedimentary layers, then is further stored underground in the gravel. As this gravel body became more saturated with water, some of it "leaked" out to the surface. This is how the Teton River was created and is now sustained. The various springs which feed the river are places where the gravel is saturated and the water table intersects with the topographic surface.

The fact that the Teton River is fed by such a large amount of groundwater makes it a very unique system in the western U.S.A. where most rivers are fed primarily by snow melt runoff. The June through July peak flows that we see in the Teton River result from melting snow, but during the rest of the year the river is fed by groundwater. Consistent winter flows and relatively warm winter water temperatures both are a result of large groundwater inputs to the river and contribute to the unique ecological features of the Teton River.

Consistent winter flows and relatively warm winter water temperatures both are a result of large groundwater inputs to the river and contribute to the unique ecological features of the Teton River.

During the last 2 million years, the Tetons have experienced numerous ice age conditions. Glaciers spilled from the Teton crest down to the valley floor, carving deep canyons along the tributary streams. Terminal moraines (piles of rubble that were deposited at the front end of the ice) tell us that the last glacial episode brought ice down as far as the valley floor. These glacial episodes have brought even more gravel to the valley floor. The glaciers were here only 10,000 years ago and evidence suggests that within the next 5,000 to 10,000 years, we will experience ice age conditions again.

And so this is how the Teton Valley was formed: ancient gneiss was planned flat by erosion and inundated with as much as three miles of flat lying sediment. Crustal movements squeezed the layered rocks in the Big Hole and Snake River ranges, overthickening and fracturing them. A period of crustal thinning elevated the Teton Range, which then supplied huge quantities of gravel and sand into the subsiding Teton Basin. Our heavy winter snowfall eventually makes it's way through the fractured rocks, only to surface again in leaks at the top of the water table.

This story makes it clear that the Teton Valley has been "under construction" for hundreds of millions of years. It is to our advantage to understand how it works. All of us who live in this beautiful valley are dependent upon the geologic constraints that have created our water system. An understanding of these constraints will help us to maintain water quality and use water resources wisely.

Written by Wayne Ranney, a geologist and educator who specializes in making the geologic past come alive. He is an instructor at Yavapai College in Arizona and frequently guides geologic tours in Grand Teton and Yellowstone National Parks. He is the author of three books, the most recent of which is entitled *Sedona Through Time* (available at Dark Horse Bookstore).

FLYFISHING & RANCHING -continued from previous page

heavy manure accumulation areas through vegetation before the runoff enters surface waters.

Allow cattle to graze less than 65% of the vegetation cover. It is important to monitor how much of the vegetation available for grazing is being consumed. A good rule of thumb for riparian vegetation is to allow cattle to consume no more than 50% of the available vegetation.

Ranch managers can use cattle to stimulate vegetative growth and prevent the development of decadent stands of woody vegetation. Both of these can benefit the angler by maintaining access and trout by increasing the sediment trapping capabilities of stream-side vegetation. Grazing streamsides while maintaining trout habitat is a realistic goal, however, continuous monitoring is necessary to determine which strategies produce the least amount of impacts while providing a suitable forage base for the herd.

If you would like more information on this topic, please contact the author, Katie Salsbury, Intermountain Aquatics, P.O. Box 1115 Driggs, ID 83422, ima@pdt.net, or call (208)354.3690.

Please join us for any or all of the FOLLOWING activities

☞Spawning survey of tributaries on the east side of the Teton River. Each Saturday in May and June we'll walk the length of streams that feed the Teton River to locate trout spawning redds and assess stream habitat. We'll use this information to identify sites for restoration and stream improvement projects. Join us and see some of the most beautiful streams in the Teton Basin and learn about trout spawning. Sign up to join us at the Victor Emporium.

☞Water Quantity and Quality Monitoring. Once a month through the spring and summer FTR will be collecting water quality samples from the Teton River and its tributaries and measuring streamflow. If you would like to learn how to take streamflow measurements or water quality samples call FTR at 354-3871 and we'll take you out.

TETON RIVER WATERSHED MAP

$12 +postage (Free with $50 membership)

Contact Friends of the Teton River at 354-3871 or Teton Valley Trout Unlimited at 787-2221.

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