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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.

WATER LINES

A QUARTERLY NEWSLETTER PUBLISHED BY FRIENDS OF THE TETON RIVER

FTR receives \$270,000 appropriation for Upper Teton Watershed Project

Idaho delegation and Congress recognize importance of Teton Valley and the urgency of addressing potential threats to its water resources

On February 20, Congress and the President finally completed action on eleven outstanding appropriations bills for Fiscal Year 2003. Tucked away on page 1,441 of the 1,500+ page Conference Report for the consolidated appropriations legislation, in the Environmental Protection Agency section, is an appropriation of "\$270,000 to the Friends of the Teton River, Inc. for the Upper Teton Watershed Project."

The Congressional funding is intended to provide roughly half the financial support FTR needs to pursue the watershed project over the next two years. The rest must come from private contributions and grants. The Upper Teton Watershed Project is designed to continue indefinitely.

The project area encompasses lands on the Valley floor and sur-

rounding upslope lands managed by federal agencies which extend from the Snake River Range on the south, and the many tributaries and springs which converge to form the Teton River, northward to the end of the Big Hole mountains and Bitch Creek. Most of the lands are in Teton County, Idaho, with a lesser portion in Teton County, Wyoming.

Teton Valley has been undergoing a very rapid increase in population and land development, and with those changes have come questions about the Valley's ability to maintain its water quality and aquatic habitats.

A recent study ranked Teton Valley as the number one priority watershed within the Greater Yellowstone Ecosystem in terms of resource values and threats to those values. For example, while the upper Teton

-see APPROPRIATION on page 3





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President's Message

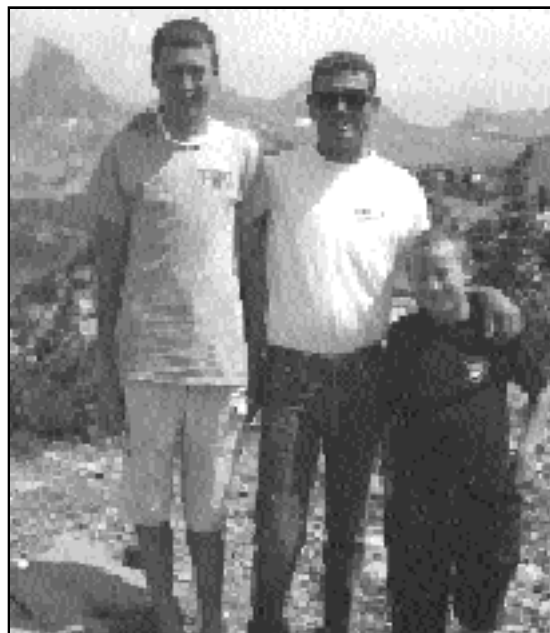
DEAR MEMBERS,

Floating on a lazy afternoon, fishing an evening hatch, feasting on a Dutch oven cookout, working a good bird dog, all bring fulfillment. The Teton River has given me so much in my lifetime. I now wonder, will the Teton be able to share with my two sons Casey and Parker what it has with me?

Friends of the Teton River's mission provides us with a vision that says it can. It's a mission reaching out to all who live in and visit the Teton Valley. FTR seeks answers in good science and sustainable solutions through on-the-ground projects. We work with our community and its private landowners; the Teton County Commissioners; and federal, state and local agencies to develop our projects. All data that we collect is available to the public. We are proud to have these collaborative relationships and will work to strengthen them.

In these times of accelerated change there are water quality and quantity concerns in our surface and ground water. Four years of low snowfall and changes in irrigation practices have contributed to the low flows in the Teton River and wetland springs and dropping well levels.

Idaho Department of Fish and Game's 1999 electrofishing survey indicated wild trout populations have declined by as much as 72 per-



In November Randy Berry, due to family and other commitments, resigned from the Friends of the Teton River's Board of Directors. We would like to thank Randy for his vision, commitment and support in helping to establish FTR. Tom Fenger, who has guided on the Teton River for twenty five years, was elected by the FTR board to replace Randy as Board President. Bill Kelly will remain Vice-President and Sam Pole will assume responsibilities as Secretary/Treasurer.

cent between 1987 and 1999. Rainbow and Brook Trout numbers showed the greatest decline and Yellowstone Cutthroat declined the least; the good news was that the average size was up! Despite lower population numbers, the Teton River remains one of the few watersheds where Yellowstone Cutthroat trout occupy much of their original range.

Because of your support FTR's projects are addressing many of these concerns. HARP, the Habitat Assessment and Restoration Project, will begin aquatic habitat restoration on the Teton River this summer. We are collaborating with Idaho Department of Fish and Game on a juvenile Yellowstone Cutthroat Study that will determine if and when mortality is occurring in young cutthroat. We will continue spawning and habitat assessments in tributary streams this spring. We plan to refine the recently published aquifer study so it can be used on a more local scale. Finally, we will continue our water quality monitoring programs. You can find more details about these and other projects at on our new web site at www.tetonwater.org.

Thank you in joining us in preserving one our Valley's most prized assets. Your contributions protect not only the water resources of Teton Valley but also the quality of life we share and the hopes of passing it on for generations to come. Together, we can take the steps necessary to find the answers and save this valuable resource.

Tom Fenger

Despite the rapid changes going on in Teton Valley, new FTR president Tom Fenger believes the Teton River watershed can be protected and will continue to provide his sons Casey, left and Parker, right, with fantastic recreational opportunities.

APPROPRIATION from page 1

River is still a blue ribbon trout fishery, fishermen, guides, government resource managers, and researchers have noted some unwelcome signs of deterioration, and EPA now considers portions of the River and its tributaries as "impaired" by factors such as increases in sediment, nutrients, and temperature.

Changes have also been occurring in the Valley's wetlands, which provide crucial habitat for many species of birds and wildfowl, and some of the Valley's human residents have had to dig their wells deeper, while others have concerns about the possibility of water quality problems from the increased density of residential and other development.

FTR's mission is to conduct scientific assessments of surface and groundwater quality, quantity, and dynamics, and communicate that in-

"A recent study ranked Teton Valley as the number one priority watershed within the Greater Yellowstone Ecosystem in terms of resource values and threats to those values."

formation to the public and its elected officials and government agencies, and use it to develop specific project components that will preserve and protect those water resources.

Activities which are already under way range from developing an understanding of the watershed's hydrology and monitoring water quality and quantity in springs, domestic wells, tributaries, and the river; to undertaking on-the-ground projects aimed at improving spawning areas, reducing siltation, and improving groundwater discharge to wetlands and the river.

FTR has made significant progress on many of these project components since its incorporation in early 2000. More information on FTR and its activities can be found on its new website, which is still under development.

People familiar with the Valley have recognized the growing pressures on its water resources for some time, and as a result FTR enjoys wide support from the community and federal, state, and local government officials. Very active collaboration with the many government and private entities with an interest in the Valley has been, and will continue to be, a prominent trait of its work.

Idaho Congressman Mike Simpson was the lead sponsor of the appropriations request when it was originally put in the legislation on the House side in October 2002. Idaho Senator Craig then helped to ensure it stayed in the final legislation during the House-Senate conference. The Idaho delegation as a whole supported the funding request as one of its priorities for the legislation. Many others, such as the Teton County Commissioners, Henry's Fork Watershed Council, federal and state agencies, and private citizens also provided important support.

The appropriation is welcome and needed support for the Valley as a whole, not just FTR, and is a recognition of not only the local, but the regional and national, importance of the Valley and its natural resources.

Great news after a great vacation!

After 34 hours in various jets and airports I was pretty groggy as I glanced around my cabin, greeted the dogs, and noted the transition from a green and blue landscape to a white one. Next to the pile of mail that had accumulated over my two-week visit to my family in South Africa was a brief note that said "check your email."

"Hmmm, well it is probably important if there is a note. Guess I had better do that." My mind was not working particularly quickly. I waded through the 500 or so pieces of junk mail and identified eight interesting-looking messages; among them was one from FTR Board Member Bill Kelly stating that FTR had just received a \$270,000 appropriation from Congress. Incredible!!

Over the past week the pace at the FTR office has definitely picked up and we're gradually getting used to the thought that we can proceed with the projects that we have been planning. We're honored, grateful and very excited by the opportunities that have opened up. The article starting on page 1 is the press release that Bill Kelly wrote about the congressional appropriation. I would just like to emphasize, as he does, that these funds are for the Teton Valley as a whole and for a river that we all love. -Lyn Benjamin, FTR Executive Director

The Poop

By Sheryl Hill, A

You probably don't give much thought to the billions of bacteria busily at work in your large intestine until the stomach flu sends you racing for the porcelain throne. Or perhaps you embarrassed yourself during your last workout at the gym and vowed never to eat chili without Beano® again. Perhaps you just heard on the news that

ground beef is being recalled because of some kind of contamination, and you're wishing you'd served hot dogs instead of burgers to the scout troop last night. As with most things in life, we just don't give

enough thought to our intestinal flora until they disappoint us, or until they show up in a place they don't belong.

The tiny critters that comprise our intestinal flora include numerous bacteria, a few fungi and protists, and methanogens, without which we wouldn't have those hilarious flammable flatulence jokes. But *Escherichia coli*, or *E. coli* for short, is the most recognizable bacterium residing in our large intestine, where they thrive on the organic material that passes undigested through our stomach and small intestine.

Every day a few trillion bacteria exit our colon along with any undigested food, and are eventually excreted as feces. In fact, most of the dry weight of our feces consists of intestinal

E. coli is the most recognizable bacterium residing in our large intestine, where they thrive on the organic material that passes undigested through our stomach and small intestine.

naal bacteria. Just one milliliter of feces contains 100 billion microbes, and given an average daily deposit of 100 mL per person, each of us lets loose an average of 10 trillion (10¹³) microbes every day, approximately 10 percent of which are *E. coli*. When we realize that birds and most other animals also excrete large volumes of *E. coli* in their feces, and ponder the size of the average cow pie or horse

apple, we must conclude that *E. coli* is almost as common as dirt.

So what happens to all this bacteria? Most bacteria in the feces of people who live in technological-

ly developed countries are transported to wastewater treatment facilities where they become a feast for other bacteria during secondary sewage treatment. But few wildlife or domesticated animals are toilet trained, and they tend to poop anywhere and everywhere. This generally isn't a problem because there are other bacteria that are al-

ways ready to chow down on this smorgasbord of excreta, but if lots of it gets deposited in a small area, those bugs can't make it disappear fast enough. Rainfall and snowmelt wash it into the ditch that empties to the creek that flows to the river. Or the bacteria seep into the soil and shallow groundwater where they are swept toward your well and a break in the well casing and into your drinking water supply.

So what's wrong with a little *E. coli* and other fecal bacteria in your favorite fishing hole or drinking water well? Although the vast majority of

bacteria are harmless, there are exceptions. It's often a foreign strain of *E. coli* in drinking water that causes you to reach for the Pepto-Bismal® when you're traveling abroad. The pathogen that's made eating medium-rare hamburger or unwashed vegetables a flirtation with death is a strain of *E. coli* known as O157:H7.

And it gets worse. There are a whole slew of pathogenic bacteria, viruses, protozoa, parasites, and other disease-causing cooties excreted in the feces of people who are suffering from illnesses caused by these micro-organisms. Studies have shown that the incidence of illness among people who drink or swim in water contaminated with *E. coli* is correlated with the amount of *E. coli* in the water. By monitoring our drinking

water and surface waters for *E. coli*, we can determine whether the water has been contaminated with feces, which might indicate the presence of

pathogens that might make us sick.

WHO MONITORS FOR E. COLI?

So who monitors our water for *E. coli*? If you live in Driggs or Victor, towns with public drinking water supplies and a regional wastewater treatment system, the good folks who operate those systems do the monitoring. Then they report the results to the Idaho Department of Environmental Quality (IDEQ) and the U.S. Environmental Protection Agency (EPA), and the folks at those agencies review the results to ensure that the folks in Driggs and Victor are on top of their game. And by and large, this system works so well that we're

There are so few people to collect samples, and so little money to analyze them, that it's not likely either DEQ will visit a stream near you anytime soon. And that's why FTR is so important.

on E. coli

QUATIC BIOLOGIST

WHO INTERPRETS THE MONITORING RESULTS?

some of the healthiest and longest-lived people in the world.

But what if you don't live in town? If your house is connected to a community drinking water supply (one that has 15 connections or serves 25 people at least 60 days a year), the operator of the system does the monitoring and makes the reports to IDEQ.

If you get your drinking water from a private well, you have to do your own monitoring, although the folks at Friends of the Teton River in Driggs, or at IDEQ in Idaho Falls can help you do it. Call or stop in at FTR's office or IDEQ (528-2650, 900 North Skyline) and they will give you a specially treated bottle to collect a water sample, instructions on how to collect the sample, and instructions on how to get the sample to a laboratory for analysis. If you live in Wyoming, call the Wyoming DEQ in Cheyenne at 777-7075 for information on how to test your drinking water for micro-organisms.

So who's keeping track of E. coli in your favorite fishing or swimming spot? Well, IDEQ and Wyoming DEQ are supposed to, but there are so few people to collect samples, and so little money to analyze them, that it's not likely either DEQ will visit a stream near you anytime soon. And that's why FTR is so important. As governmental agencies grow smaller relative to their responsibilities, non-governmental organizations like FTR are stepping up to do the environmental monitoring that state government can't. In a few paragraphs, we'll look at the results of E. coli monitoring FTR has done.

Once we get the results of E. coli analyses of water taken from streams, rivers, and lakes, how do we interpret them? Legally enforceable water quality standards are developed by the state to protect the beneficial uses of surface waters. Standards that pertain to E. coli

Swimming is considered primary contact recreation, which means that most of your body is in contact with the water and you'll probably end up swallowing some of it.

are intended to protect surface waters for the beneficial use of recreation. Swimming is considered primary contact recreation, which means that most of your body is in contact with the water and you'll probably

end up swallowing some of it; wading around fishing is considered secondary contact because very little of your skin contacts the water and you probably won't swallow any of it.

So how much E. coli can you swim around in and still stay healthy? Idaho's water quality standards specify that a sample cannot contain more than 406 E. coli colonies per 100 milliliters (mL) of water, or for secondary contact recreation, no more than 576 E. coli organisms per 100 mL of water.

But simply exceeding these water quality standards does not constitute a violation of water quality standards. You could have collected your sample downstream from where a moose just relieved himself, so the sample isn't necessarily representative. But one sample that

One sample that exceeds the single-sample standard for primary or secondary contact recreation should trigger a series of sampling at that same location.

exceeds the single-sample standard for primary or secondary contact recreation should trigger a series of sampling at that same location. A minimum of five water samples should be collected every three to five days over a period of 30 days. If the geometric mean¹ of these samples exceeds 126 E. coli organisms per 100 mL of water, then a violation of water quality standards has occurred, and it's probable that there's a constant source of E. coli contaminating the water.

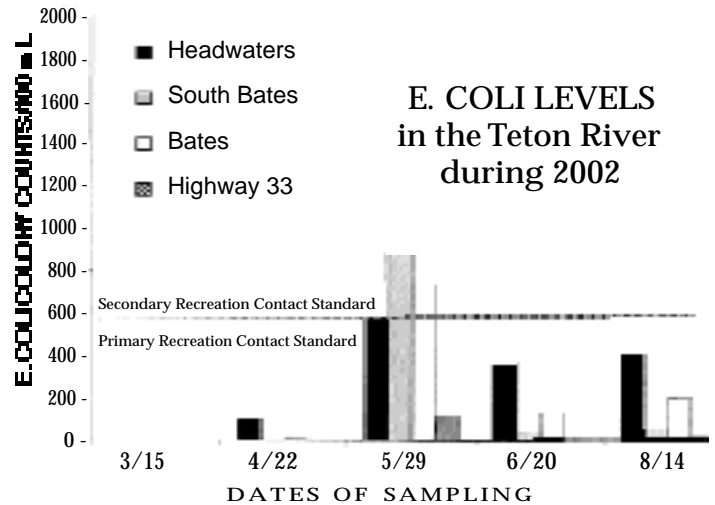
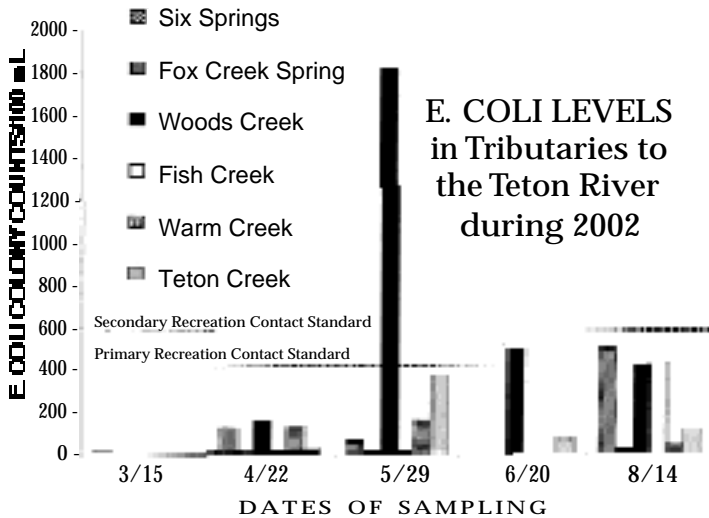
Possible sources in the Teton Valley include dairies, animals corralled or on pasture near a stream, and septic systems that aren't operating properly.

Does it matter whether the source of E. coli is people or animals? Well, yes and no. If the source of E. coli is people, there's a greater probability that the pathogens associated with the E. coli will infect people, whereas if the source of E. coli is bovine, there's a greater probability that the pathogens associated with the E. coli will infect cows.

-see E. COLI on next page

Out of 73 surface water samples collected in the Teton River Watershed during 2001 and 2002, seven samples, or approximately 10 percent, exceeded the state water quality standard of 406 colonies/100 mL for primary contact recreation, and three of these samples also exceeded the standard of 576 colonies/100 mL for secondary contact recreation.

¹ The geometric mean is calculated by multiplying the results of n samples, then taking the nth root of the product. The geometric mean of the concentrations is used instead of the arithmetic mean because the geometric mean minimizes the influence of very high or very low results.



E. COLI from previous page

But then there are zoonoses; diseases like rabies that are transmissible between people and animals. Cryptosporidiosis, an intestinal and respiratory infection affecting calves and people, is believed to be caused by the same organism, *Cryptosporidium parvum*, which is transmitted in feces. In this case, it doesn't matter where the organism originated; calves and people are equally susceptible.

Unless you're trying to distinguish between possible sources of contamination so you can stop the contamination, it really doesn't matter whether the source of E. coli is people or animals.

So how do you differentiate E. coli from the pasture and E. coli from the septic system? Amazingly enough, using a DNA fingerprinting technique known as ribotyping, it's possible to distinguish E. coli excreted by people from E. coli excret-

ed by deer, elk, dogs, rodents, birds, and anything else for which a standard ribotype has been identified. But it's a fairly complicated procedure, so you've got to have a good reason for wanting to do it.

HOW MUCH E. COLI IS IN THE TETON RIVER?

So what's the poop on (or in) the Teton River and its tributaries? In 2001 and 2002, FTR collected and analyzed 73 surface water samples from nine locations on the Teton River upstream of Highway 33, and from seven of its tributary streams. Seven samples, or approximately 10 percent, exceeded the state water quality standard of 406 colonies/100 mL for primary contact recreation, and three of these samples also exceeded the standard of 576 colonies/100 mL for secondary contact recreation.

The highest concentration of E. coli (1,820 colonies/100 mL) was found in Woods Creek near its confluence with the river. The next high-

The highest concentration of E. coli (1,820 colonies/100 mL) was found in Woods Creek near its confluence with the river on May 29, 2002.

est concentrations of E. coli (724 and 884 colonies/100 mL) were found in the upper river above South Bates Bridge. Of the remaining samples, five con-

tained between 300 and 406 colonies/100 mL; six contained between 200 and 300 colonies/100 mL; 15 contained between 100 and 200 colonies/100 mL; and 40 contained less than 100 colonies/100 mL. The results of the sampling conducted by FTR, and shown in the figures, indicate that water quality standards for primary and secondary contact recreation are occasionally exceeded in both the river and its tributaries from May through August. Sampling should be continued, and when water quality standards are exceeded, additional sampling must be performed in cooperation with IDEQ to determine whether water quality standards are being violated. We don't want sick people to be the first indicators of a water quality problem, and FTR is doing what it can to make sure that doesn't happen.

Sheryl Hill is a freelance aquatic biologist living in Idaho Falls. You can contact her at sherylhill@cablone.net.

The results of the sampling conducted by FTR indicate that water quality standards for primary and secondary contact recreation are occasionally exceeded in both the river and its tributaries from May through August.

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For two years, Intermountain Aquatics has studied wetland revegetation methods to determine the most cost-effective techniques. The photos above show (from left to right) a wetland site before, during and after revegetation.

Wetland Revegetation ...

What are the most effective techniques?

By Jeffrey Klausmann,
Restoration Ecologist

INTERMOUNTAIN AQUATICS INC.

Intermountain Aquatics (IMA) recently released findings from a two-year study for Teton County, Wyoming evaluating the cost-effectiveness of wetland revegetation techniques. Efforts were motivated by accelerated wetland impacts from gravel mining and pond development and a need to develop better techniques to mitigate for these impacts.

Teton County, Wyoming is not alone when it comes to development pressure and growth. Aquatic degradation from land development is ubiquitous in the western U.S. Unfortunately the enthusiasm and motivation to restore degraded water bodies often runs ahead of the science leading to poor decisions and wasted resources. Our research goal was simple: Can we effectively revegetate wetlands and riparian areas and, if so, what is the most cost-effective method? The Environmental Protection Agency funded this research under a Region 8 Wetlands

Protection Grant; Teton County provided cost-share assistance.

IMA studied seven revegetation methods at two different planting densities for three locally common, native wetland species. Nebraska sedge, beaked sedge and hardstem bulrush were the species evaluated. Revegetation methods ranged from low to high cost and effort.

Low cost methods typically rely on plant establishment from seed (non-vegetative) whereas higher cost methods use vegetative propagules (e.g. whole plants, rhizomes etc.). Revegetation methods included: passive revegetation (an unplanted control); broadcast seeding; salvaged marsh surface (SMS), which is a wetland topsoil; greenhouse-propagated bareroot plants; greenhouse-propagated containerized plants ("tubelings"); wild-collected transplants; and pre-vegetated, nursery-grown Wetland Sod mats. Wetland Sod is pre-vegetated coconut fiber matting.

Relative success generally increased with the cost or effort invested but performance was heavily dependent on revegetation method and planting density. The most consistent differences were between non-vegetative and vegetative methods.

Passive revegetation, broadcast seeding, and SMS were relatively in-

expensive but wholly ineffective. None of these non-vegetative methods effectively established the three target species; controls and seeded plots were especially vulnerable to weed invasion. Comparisons among the vegetative methods showed that bareroot, tubeling, and wild-collected transplants and Wetland Sod mats were all successful. Wetland Sod was uniquely effective in suppressing weeds and had very high rates of spread.

Based on our findings we recommend the use of vegetative methods at relatively high planting densities to effectively revegetate sedge-dominated wetlands in the intermountain western U.S. Wetland Sod is recommended for erosion-prone areas like streambanks and shorelines with the potential for high wave energy. Other factors to consider when selecting a revegetation strategy are susceptibility to weed invasion, wildlife and livestock herbivory and desired time-frame for achieving revegetation success. The hidden costs associated with the lower cost methods usually include protracted regulatory monitoring, noxious weed control and multiple revegetation attempts. We realize, however, that planting method and density will ultimately be dictated by project size, site conditions and the risks associated with failure. Interested people can contact Teton County Wyoming (307) 733-3959 for a copy of the full report.

Your support vital to FTR programs

We are in the midst of planning for summer projects here at Friends of the Teton River and are pleased to announce that we have received partial funding for several of our projects from federal and private sources.

The Yellowstone Cutthroat Trout Habitat Restoration Project, our largest to date, provides the first opportunity to conduct on-the-ground restoration in the watershed and will serve as a model for other landowners to pursue similar projects on their respective river or stream-front properties. Please consider adopting a site or making a contribution to co-sponsor restoration and habitat improvement on a site of the river.

Additionally, your support of our operating budget will guarantee the financial strength of FTR as it accomplishes this and other important projects. Your contribution will help assure the long-term health of the Teton River for future generations to enjoy.

Please indicate the category you wish to support and become a part of the protection of the Teton River today!

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