



MONTANA TREASURES In the late 19th century, miners received certificates certifying their claims to extract copper, silver, gold, and other precious metals from hardrock mines. These days, Montanans place increasing value on a different but no less valuable natural resource—mountain trout streams.



PRECIOUS METALS PRECIOUS TROUT

Can Montana continue extracting the one without harming the other? **BY TOM DICKSON**

In the Beaverhead-Deerlodge National Forest, about 15 miles west of Butte, runs a sparkling mountain trout stream that looks similar to scores of others like it flowing across western Montana. Known as German Gulch, the creek rises from Beal Mountain and flows north into Silver Bow Creek, a tributary of the Clark Fork River.

Over the past seven years, a short stretch of the stream has been restored by Trout Unlimited volunteers, assisted by state and federal agencies and local landowners, at a cost of more than \$1 million in public grants and private donations.

By the time you read this, their efforts may have been washed away.

Upstream from German Gulch sits the residue of one of the most notorious mines in Montana's recent history. Since the mid-

1990s, the now-abandoned Beal Mountain gold mine has been leaking cyanide and selenium, the latter a sulfur-like chemical element that can cause deformities in developing trout eggs. According to Jim Kuipers, a mining engineer in Butte who consults for conservation organizations, warm rains cascading off snowpack could cause the mine's leaching pond to overflow this spring, sending toxic water into German Gulch. That's not his only concern. "The leach pad sits on a fault line,"

Kuipers says. "We could someday see a massive failure in which the fault line shifts and sends thousands of tons of contaminated material downstream."

It wouldn't be the first time. In 1975, the Mike Horse Dam on the upper Blackfoot River blew out during a spring storm, killing nearly all brook and cutthroat trout for miles downstream and depressing fish numbers throughout the river system for decades. In 1996, after massive ice floes scoured the bed

of the highly contaminated upper Clark Fork River and Milltown Reservoir, an estimated 44,000 tons of reservoir bottom sediment filled with copper and other metals was released with high water through Milltown Dam. The following summer, state biologists found that juvenile trout numbers had declined more than 70 percent from the previous year.

Mining creates jobs and wealth for many people in Montana and elsewhere. But it has

produced mounting problems for trout. Though the state now bans new cyanide heap-leach mines and requires reclamation bonds from mining operations, fisheries managers and trout advocates say the efforts fall short of what's needed to protect trout streams. As rising gold and other metal prices promise to spur mining activity, Montana faces a future where removal of one natural treasure threatens to impair another. "Clean water is a precious resource that we know can be sustained for generations," says Bruce Farling, executive director of Montana Trout Unlimited. "We're concerned that mineral mining regulations and laws—some of them more than a century old—are continuing to put that resource at risk."

STRIKING IT RICH

The Treasure State was built on precious minerals and metals excavated from underground (known as "hardrock" mining, compared with "softrock" mining for coal). The state's seal includes a pickaxe, shovel, and the words *Oro y Plata*, gold and silver. The first territorial capital, Bannack, was the site of a

major gold rush, as was the eventual state capital, Helena. Butte and Anaconda would not exist today but for the rich copper veins in the granite below. Though much of the wealth produced by hardrock mines left Montana, the industry at one time created tens of thousands of union jobs.

Over the past century, more than 6,000 hardrock mines have operated in western Montana, from small streamside gold claims to the world's largest copper mine in Butte. Today, six large mines are in production along with several dozen small placer mines that dredge and wash a streambed or stream bank to expose trace elements of gold. Montana's hardrock mining industry currently employs roughly 2,600 people who extract gold, copper, platinum, palladium, zinc, and other metals used for jewelry, computers, telephones, solar energy cells, air and water quality devices, and medical procedures. According to the National Mining Association, mining operations extracted minerals worth more than \$1.35 billion from beneath Montana in 2008. The state Bureau of Mines and Technology estimates

that Montana mines since statehood have produced more than \$150 billion in today's dollars, two-thirds of that from Butte, once known as "The Richest Hill on Earth."

Those vast riches have come with a price. The Montana Department of Environmental Quality (DEQ) says more than 300 of the state's 6,000 abandoned mining sites pose risks to human safety or health. Regionwide, the federal Environmental Protection Agency (EPA) estimates that 40 percent of headwater streams in the West are contaminated by mine waste. The most severe effects to trout come from "acid mine drainage," caused when sulfide-rich ore containing the mineral pyrite is exposed to oxygen and water. The chemical reaction produces sulfuric acid, which washes downstream from adits (mine tunnel openings) and piles of mined waste such as tailings (the sandlike remains of ore crushed in on-site mills to extract metals). Sulfuric acid in turn makes stream water more acidic, killing vegetation, aquatic insects that fish eat, and trout. Geochemists say a mine's acid drainage, typically visible as the orange-red, iron-rich water oozing from abandoned mines, can continue forever.

Acidic stream water also unbinds heavy metals such as lead, copper, cadmium, and zinc from organic material in mine tailings and waste rock. According to Montana Fish, Wildlife & Parks senior fisheries biologist Don Skaar, an expert on water pollution's effects on trout, dissolved metals disrupt gill function and make it harder for dissolved oxygen to pass into the bloodstream, causing the fish to suffocate. "In high concentrations, the metals can kill newly hatched trout and aquatic invertebrates in a matter of hours," Skaar says.

Eroding mines, roads, and tailings piles send sediment downstream, where it smothers trout eggs and underwater bugs. Placer mining digs up trout spawning beds and aquatic insect habitat. Skaar says many river systems also contain environmentally harmful levels of mercury that was used in 19th century mines to separate gold from tailings.

In cyanide heap-leach mines (no longer legal in Montana), piles of low-grade ore were doused with a cyanide solution. The liquid passed through the heap, dissolving miniscule traces of gold, eventually draining into a leach pond. There the solution was



PHOTO BY ALAN BERGER, FROM HIS BOOK RECLAIMING THE AMERICAN WEST, PRINCETON ARCHITECTURAL PRESS, NEW YORK, 2002

REVERSE MIDAS TOUCH Beal Mountain Mine (above) near Butte opened in 1988. After extracting 460,000 ounces of gold (worth roughly \$400 million at today's prices) over the next nine years, the company went bankrupt, leaving behind a 70-acre leach pond leaking cyanide and selenium. The pond, which is upstream from a trout stream, German Gulch, also sits on a fault line, making it vulnerable to seismic activity. The company's \$6.3 million reclamation bond has covered only a fraction of the estimated cost to treat the site. Below right: Trout Unlimited volunteers plant willow shoots on the banks of German Gulch as part of a \$1 million restoration project. The scenic mountain stream (below left) contains a struggling but genetically unique population of westslope cutthroat trout (bottom left).

ACID MINE DRAINAGE

At many abandoned mine sites, shaft openings, called adits, appear as inconspicuous holes in a hillside. These mine shafts and piles of mining waste expose pyrite-rich ore to oxygen and water. The chemical reaction produces sulfuric acid, which makes stream water highly acidic, killing aquatic life such as insects and trout. The acidic water also dissolves heavy metals such as lead and cadmium, which by disrupting gill function cause trout and insects to suffocate.

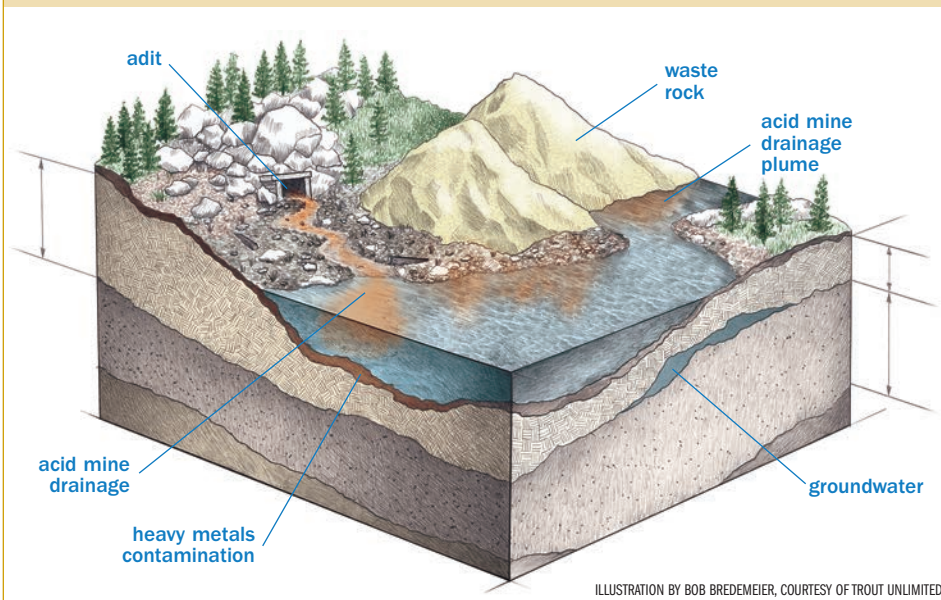


ILLUSTRATION BY BOB BREDEMEIER, COURTESY OF TROUT UNLIMITED



PHOTOS BY PAT MUNDAY

removed and treated to extract the metal. Plastic liners under old leach ponds can leak cyanide, and leftover mountains of crushed rock—50 tons or more to harvest each ounce of gold—can produce sulfuric acid.

COPPER BARREN

Nowhere have Montana trout had it worse than in Silver Bow Creek and the Clark Fork River downstream from the Butte and Anaconda copper mines and smelters. As early as 1891, the U.S. Fish Commission reported it “did not find any fish whatever” when netting the Clark Fork in the Deer Lodge area. A record flood in 1908 washed tons of mining waste contaminated with arsenic, lead, zinc, and copper farther downstream into the reservoir behind Milltown Dam near Missoula. In the early 1980s, the EPA designated four Superfund sites on the Clark Fork River system from the Berkeley Pit in Butte to Milltown Dam due to high levels of arsenic and metals posing risks to human and environmental health.

Another huge abandoned mine plaguing

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trout waters is the Mike Horse, located on Beartrap Creek, which flows into the upper Blackfoot River. The mine opened in the late 1880s and yielded tons of silver, zinc, and lead before closing in 1952. During a heavy June thunderstorm in 1975, the Mike Horse Dam burst and sent an estimated 100,000 tons of accumulated tailings laced with arsenic and other contaminants downstream. The “acute toxic event” killed 80 percent of the westslope cutthroat trout and brook trout in a 10-mile stretch of the Blackfoot. A 1991 investigation found heavy levels of cadmium in stoneflies and trout more than 46 miles downstream. Recently, FWP biologists have found that cutthroat numbers are still roughly 75 percent below those of the early 1970s in two stretches of the upper Blackfoot below the rebuilt dam. A 2005 U.S. Forest Service report warned that the earthen structure is deteriorating and could blow out again at any time, sending 350,000 cubic yards of contaminated tailings into the Blackfoot. “When you talk about leaving heavy metals contamination at the head of a major blue-ribbon trout river system, there’s no bigger threat in Montana than

the Mike Horse Dam,” says Ron Pierce, FWP fisheries biologist in Missoula. Under pressure from Montana officials, mine owner Asarco LLC of Arizona signed a settlement in March 2009 with the state and the federal government in which it agreed to remove the dam and nearby contaminated tailings.

Dozens of smaller trout streams throughout western Montana are also impaired by acid mine drainage and dissolved heavy metals. Some have only minor effects, such as slightly reduced aquatic insect and trout populations. Others have been severely degraded for decades. Belt Creek near Great Falls once attracted a trainload of anglers each weekend during the early 19th century. It grew so polluted from silver and zinc tailings that by the mid-1930s most trout had died and, a local newspaper lamented, “the fishing tribe is no longer evident.”

CITIZENS SNUBBED CYANIDE

Trout in Belt Creek and many other streams are literally breathing easier thanks to Montana environmental regulations and laws, such as the Natural Streambed and Land Preservation Act, that make new min-

ing operations less harmful to streams. Citizens banned the cyanide heap-leach method on new mines in 1998 with a ballot initiative. Today, all mines must obtain state and federal operating and discharge permits before work can begin. The state also requires mines to post reclamation bonds to cover cleanup costs in case the company goes bankrupt. As part of their reclamation requirements, mining companies often must build artificial wetlands and ponds that filter and neutralize toxins. At some sites, expensive water treatment plants that use lime to neutralize toxic discharges are required.

One mining company is going further. Stillwater Mining Company signed a “good neighbor” agreement for its Stillwater and East Boulder mines near Nye, just north of the Absaroka-Beartooth Wilderness. The binding contract gives citizens oversight of mining operations and establishes high water-quality standards for the Stillwater and East Boulder rivers—both prime trout streams. Just as important, says Kuipers, is the area’s geology, which lacks the pyrite that produces acid mine drainage. “No mine in North America better exemplifies how to do things right than the Stillwater,” he says.

Montana has been a national leader in repairing trout waters, including those harmed by mining. Trout Unlimited and state and federal agencies have restored stream stretches by removing contaminated solid wastes, resloping stream banks to their natural contours, and planting willows and other native vegetation to shade and stabilize banks. Some restoration work is as industrial as the mining itself. Restoring 3,000 feet of a trout stream at the Whites Gulch placer mine in the Big Belt Mountains required moving tons of dredge piles to reconnect stream stretches. “We had to practically recreate an entire 17-acre floodplain,” says Ron Spoon, FWP fisheries biologist in Townsend.

By far the state’s most significant mining waste restoration is on Silver Bow Creek and the upper Clark Fork River. Under a settlement between the state of Montana, the federal government, and Atlantic Richfield Company (ARCO), the company paid the state \$498 million. Much of the money is going to projects directly or indirectly helping trout water. The DEQ has spent



SEBASTIAN CULBRETH/EARTHWORKS

BLEEDING TOXINS Sulfuric acid (above) leaks from the abandoned Mike Horse zinc and silver mine into a tributary of the famous Blackfoot River. Mike Horse Dam (below left) blew out in 1975, sending 100,000 tons of contaminated tailings into the Blackfoot and causing one of the worst trout kills in Montana history. The earthen dam was repaired, but a recent report says it could blow out again anytime. Under pressure from Montana officials, Asarco LLC of Arizona agreed in March 2009 to remove the dam and contaminated mine waste at the site. Below right: An FWP researcher collects aquatic insects on the Blackfoot to analyze for metals. A 1991 investigation found high levels of cadmium in stoneflies and trout more than 46 miles downstream from Mike Horse Dam.



HELENA INDEPENDENT RECORD

MONTANA DEQ

CANADA MINE THREATENS MONTANA TROUT

A proposed coal mine in Canada just north of Glacier National Park poses a threat to trout in the North Fork of the Flathead River system. A recent study by federal and state biologists found that a mine proposed by Cline Mining Corporation in British Columbia could directly destroy or extensively pollute spawning tributaries used by Montana trout. One threat is selenium and other contaminants leaking from the mining site into spawning waters used by bull trout from as far away as Flathead Lake. Another concern is that dump sites would fail and flood North Fork of the Flathead River headwaters with thousands of tons of mining waste. The mine, now moving through the province’s project approval process, would remove an entire mountain as Cline processed two million tons of coal per year over two decades. “We know now, without a doubt, that there is no way they can put in a mine of that scale without seriously damaging Montana’s trout fisheries,” says Mark Deleray, an FWP fisheries biologist in Kalispell who worked on the study. In April 2009, American Rivers placed the North Fork of the Flathead on its list of the nation’s ten most endangered rivers due to environmental threats from the proposed mine.



The North Fork of the Flathead River. A proposed Canada coal mine upstream could wipe out trout spawning beds with mining waste.

TOM PATRICK

\$80 million on removing streamside tailings and other remediation work on 23-mile Silver Bow Creek to reduce human health risks from hazardous mining and smelting substances. Roughly \$140 million of the settlement, which is administered by the Montana Department of Justice's Natural Resources Damage Program, is paying for projects such as removing trout barriers and contaminated sediment, purchasing conservation easements, and restoring tributary streams. Meanwhile, the EPA has overseen the removal of Milltown Dam in 2008 and 2 million tons of contaminated sediment at the dam site. "For the first time in more than a century, we're seeing trout swimming in Silver Bow Creek and migrating upstream past the old Milltown Dam site," says Richard Opper, DEQ director.

A GOOD START, BUT NOT ENOUGH

Despite permit requirements and remediation plans, however, new mines can still end up contaminating trout streams. "The regulatory safeguards are definitely better than they used to be, but we still need to do more to protect trout," says Skaar. "With new mines, there's still no way of knowing what the impacts to streams and other surface water will be 50 or 100 years from now. Even the best remediation plans don't always work out." Farling notes that state and federal agencies rarely deny hardrock mining permits. "And even when a mine is permitted, you still have this major industrial activity occurring on a mountainside," he says.

Another concern is "underbonding." Beal Mountain Mine owner Pegasus Gold Corporation of Canada posted a \$6.3 mil-

lion reclamation bond before going bankrupt in 1997 after nine years of operation. The bond has covered less than half of what the U.S. Forest Service has spent so far treating the polluted mine site. Kuipers estimates long-term treatment could run another \$20 million. "Regulators aren't adequately predicting water contamination at hardrock mines and, as a result, they aren't requiring adequate financial assurances," he says.

Farling and other conservation leaders say the biggest obstacle to more environmentally friendly mining is the General Mining Act of 1872. Signed into law by President Ulysses S. Grant, the law made mining the highest priority use on 270 million acres of federal lands. That's still the case 137 years later. According to Farling, managers of national forests and most other federal lands have little say in the

matter, regardless of the predicted harm to trout streams, endangered species, and other valued natural resources (see sidebar, page 22). "They can prescribe mitigation and some protective measures, but they cannot say 'No, there will be no mine here,'" he says. That might have made sense when pioneers were streaming west, but not in the 21st century, when public values have long since changed.

During mining's heydays, prospectors whispered excitedly about gold and silver strikes. These days, anglers and biologists are just as excited discussing genetically pure cut-throat populations and restored bull trout spawning sites. Pristine coldwater streams are becoming Montana's new *Oro y Plata*. Many new businesses cite the scenery, fishing, and clean mountain environment among reasons for relocating to Montana. According to the U.S. Fish and Wildlife Service, tourists to Big Sky Country pay more than \$100 million each year for guided fishing trips, lodging, equipment, meals, and other trout-related expenses.

Hardrock mines definitely produce jobs. But they also require cleanup, and even the most lucrative strikes eventually play out. A cold mountain stream, on the other hand, will produce scenery and trout forever—if allowed to. If Montana wants to sustain both its mineral wealth and its coldwater wealth, it may need to find better ways to prevent the one from degrading the other. 🐻



THE NEW GOLD? Increasingly in Montana and other western states, people are recognizing that clean coldwater streams are as valuable as traditional natural resources. As gold, silver, and copper did 100 years ago, clean streams and healthy wild trout populations attract visitors and new residents from across the United States. The newcomers add wealth in the form of tourism expenditures and new businesses. One big difference between Montana's traditional treasures and its new ones: When kept free of contaminants, mountain streams never play out and never need cleanup.



ANTIQUe MINING LAW FACES REFORM

Congress passed the General Mining Act in 1872 to spur development of the West by making it easier to stake gold, silver, and other hardrock mining claims. Unlike laws regulating coal and other types of mining, however, the 1872 Mining Act today remains relatively unchanged. Under the federal legislation, mining still "takes precedence over all other public land uses, including hunting and fishing," said former U.S. Forest Service chief Mike Dombeck when testifying last year on the 1872 law before the Senate Committee on Energy and Natural Resources. As a result, Dombeck told the committee, "it is nearly impossible to prohibit mining under the current framework of the 1872 mining law, no matter how serious the impacts might be."



President Ulysses S. Grant signed the law that still governs most hardrock mining in the U.S.

The law still allows private companies to not only lease but also own mining claims (called "patenting") on public land for just \$5 an acre and extract gold, platinum, silver, and other valuable minerals. (Though a moratorium was placed on the patenting of mining claims during the Clinton Administration, it can be lifted at any time.) And while companies that extract coal, oil, and gas on public land pay royalties to the government, no royalties are paid for hardrock mining (though mines pay local, state, and federal taxes).

For decades Congress has been unsuccessful in reforming the 1872 Mining Act, but that may change soon. A popular bipartisan bill is now working its way through Congress. Among

its most important provisions that would protect trout streams and the public's pocketbook:

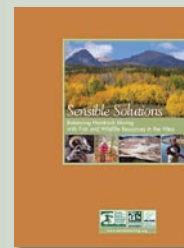
- Permanently end public land sales for hardrock mining (allowing only leases)
- Keep mining farther away from wilderness and other sensitive areas
- Impose royalties of 4 percent on existing mining operations and 8 percent on new ones (70 percent of the royalties would go to states for reclaiming abandoned mines and 30 percent to communities to ease the effects of boom-and-bust mining development)
- Give managers of national forests and other public lands the right to refuse a mine

In January 2009, National Mining Association president Hal Quinn responded to reform legislation by saying that royalty requirements would force some mining companies to move their operations overseas. He said his organization supported "responsible updates" to the General Mining Act of 1872, but that the proposed reforms "would needlessly jeopardize U.S. metals mining, further increasing our dependence on foreign sources."

Many sportsmen think otherwise. More than 400 hunting and angling groups—including the American Sportfishing Institute and the Pope and Young Club—have signed a letter to Congress calling for reform to the 1872 Mining Law. In a 2007 letter to their colleagues in Congress, Representatives Paul Ryan (R-Wisconsin) and Ron Kind (D-Wisconsin), co-chairs of the Congressional Sportsmen's Caucus, wrote, "It is estimated that since the Mining Law of 1872 was enacted, the U.S. government has given away more than \$245 billion of minerals through royalty-free mining and 'patenting,' the forced sales of federal lands. Taxpayers must bear the cost of cleaning up abandoned hardrock mines, which is expected to exceed

LEARN MORE:

Sportsmen United for Sensible Mining (sensiblemining.org) is an alliance of hunting and fishing groups coordinated by the National Wildlife Federation, Theodore Roosevelt Conservation Partnership, and Trout Unlimited.



See the SUSM website for the publication *Sensible Solutions to Hardrock Mining*.

Trout Unlimited (tu.org) has facts about abandoned mines on its website under "Conservation." For a copy of TU's color hardrock mining booklet *Settled, Mined & Left Behind*, contact Elizabeth Russell at (303) 440-2937, ext. 102 or erussell@tu.org.