



Critical Minerals Report: A Conservation Perspective

TROUT UNLIMITED | NATIONAL WILDLIFE FEDERATION | BACKCOUNTRY HUNTERS AND ANGLERS



A need for sensible policy

Critical minerals are found extensively in everyday life. They're in the car you drive, the cell phone you scroll through, wind turbines and solar panels generating electricity and the television giving you a weather forecast and the news each morning. They're used in airplanes, precision guided missiles and submarines. Importantly, they are also vital components for renewable energy technologies that can help address climate change and its associated consequences for fish and wildlife habitat. They are, as their name implies, critical to the

national and economic security of the United States. But their extraction and production comes with impacts.

The result of a mine established in the wrong place, or done in the wrong way, can impair fish and wildlife habitat, hunting, fishing and outdoor recreation opportunity, and local businesses dependent on healthy public lands. Irresponsible mining can send poisonous sludge down rivers and pollute lakes and watersheds for centuries, if not longer. It can cost billions

of dollars to clean up. Conversely, a mine in the right place, done responsibly, can minimize its footprint and be an economic and social asset to a rural community.

Critical mineral deposits – the metals and nonmetals buried miles-deep inside ancient geologic seams or lingering near the surface – are found around the globe. Some can be mined as ore rather simply; many are mined with other minerals and then subjected to a series of processing stages to enable their extraction and

isolation. Some of those mineral deposits are in open, dry flatland, away from precious water sources and fragile fish and wildlife. Other deposits are in more sensitive locations, like headwaters that are the source of clean, cold water for fish and wildlife, as well as drinking water for communities.

That's why creating sensible public policy addressing critical minerals is so important. The federal government's [official critical minerals list](#) recognizes 35 critical minerals - two of which are subgroups of metals, adding an additional 23 minerals for a total of 56. They include household names such as titanium, aluminum and helium, and ones as obscure as rhenium, rubidium and strontium. Several minerals on the list, including cobalt and lithium, are crucial to renewable energy development and high-tech industries. As it stands today, the United States (U.S.) is import-reliant for 31 of the 35 minerals,

including places with often unstable governments that lack adequate labor and environmental laws. Further, the U.S. relies completely on places outside its borders for 14 critical minerals. The need for some minerals, such as lithium – a necessary component in electric-vehicle batteries – is so great that manufacturers are vocally concerned about the potential for supply chain disruptions.

In June of 2019, and in response to [Executive Order 13817](#), the Department of Commerce released a [report](#) outlining a “Federal Strategy to Ensure Secure and Reliable Supplies of Critical Minerals.”

Within the report are general recommendations to advance research and development efforts, increase domestic activity across the supply chain, streamline permitting and grow the American critical minerals workforce. The report also assesses ways to develop critical

mineral recycling and reprocessing, analyze options for developing critical minerals through trade with allies, map the nation's critical mineral deposits and recommendations to streamline permitting to develop extraction leases.

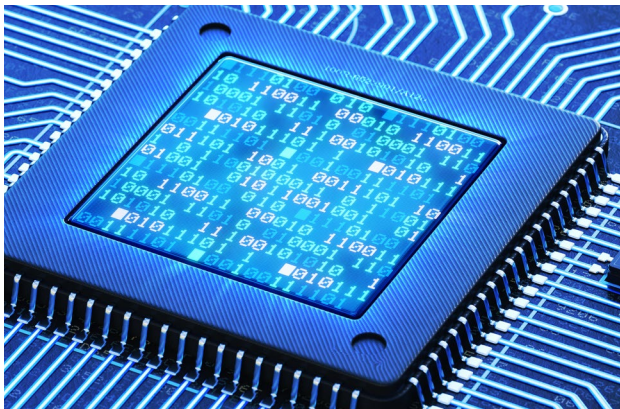
Of specific note to anglers, hunters and outdoor recreationists of all stripes, the report included 61 recommendations, including calls to action affecting public lands and watersheds. These include revising public land planning processes, streamlining environmental reviews, and seeking recommendations to reduce “unnecessary” impacts that protected public lands like wilderness areas and National Monuments have on mining.

This is a complex issue and we need informed, collaborative solutions to chart a responsible path forward – we present this report as a step in that direction.



What are critical minerals?

What are critical minerals and why are they so important? We offer you a basic look at the most common and highly sought of the 56 critical minerals, explaining why they're valuable and why their production comes at a cost if not done responsibly.



COBALT:

What it's for: Cobalt, a mineral known for its bluish tint and found in the Earth's crust, is a critical component for rechargeable lithium-ion batteries found in smartphones, laptops and electric vehicles. Cobalt is also used for alloys in airplane engine parts.

Why it's critical: With only a few known deposits of cobalt in the U.S., American manufacturers are relying almost entirely on imports from places with geo-political concerns and lax labor and environmental laws, such as

China, Russia and the Democratic Republic of Congo.

Where it's found: Almost all the known deposits in the U.S. overlap with high-value fish and wildlife habitat, such as, the Boundary Waters in Minnesota and the Klamath and Rogue Rivers in California and Oregon. However, some optional development locations that may be more suitable for mining cobalt include the Blackbird Mining District west of Salmon, Idaho or the Fredericktown Mining District in Missouri.

LITHIUM:

What it's for: As the name lithium-ion suggests, lithium is a critical component in rechargeable batteries, used in everything from smartphones to military technology. The element is also crucial to wind, solar and electric car energy storage. Lithium itself is a chemical element that is both the lightest metal and lightest solid element.

Why it's critical: Lithium's [top producing countries are currently Australia, Chile, Argentina and China](#), while the U.S. is a relatively small producer. In 2018, the U.S. had a net import reliance as a percentage of consumption of more than 50 percent.

Where it's found: Lithium is almost everywhere, but few places have large deposits. Numerous deposits in the U.S. exist outside of coldwater habitat and protected areas, such as the Clayton Valley brine operation in southern Nevada and the Smackover brine area of Arkansas.



RARE EARTH ELEMENTS:

What they're for: There are 17 chemical elements within the overarching “rare earth elements” grouping of the periodic table of elements. Rare earth metals, and alloys that contain them, are used in many devices that people use every day, such as computer memory, DVDs, rechargeable batteries, cell phones, catalytic converters, magnets, fluorescent lighting and much more.

Why they're critical: The U.S. currently imports about 80 percent of its rare earth elements from other countries, predominantly China, making us susceptible to large swings in global pricing and supply.

Where they're found: Rare earth elements, surprisingly, aren't actually rare. They're littered throughout the Earth's crust. However, finding ore in high enough concentration to process is more difficult. The Mountain Pass Mine and processing facility in southern California was the only real producer in the U.S., and at one point was one of the top producers in the world. Federal officials should encourage development of new technologies that could extract rare earth elements from active or abandoned coal mines, from water contaminated with coal ash, and from acid mine drainage at legacy hardrock mines in the western U.S.

URANIUM:

What it's for: Unlike the other critical minerals on this list, uranium isn't used in new technologies like smart phones or renewable energy. It's primarily a fuel source for nuclear reactors producing electricity. Of note, roughly 20 percent of the U.S. output of electricity is produced from nuclear sources. Uranium also has military applications, including nuclear warheads.

Why it's critical: It's not. Critical minerals are defined in three ways: A non-fuel mineral or mineral material essential to the economic and national security of the U.S., the mineral element needs to have threats to its supply chain and/or serve an essential function in the manufacturing of a product, the absence of which would have significant consequences for the U.S. economy or national security.

In 1970 the [U.S. Geologic Survey](#) (USGS) and [Department of the Interior](#) (DOI) classified uranium as a fuel mineral. To be a critical mineral, the element needs to have real threats to its supply chain. Uranium doesn't and should not be on the federal list of critical minerals. Including it undercuts public trust in the process, intent, and need to forge workable critical minerals development policies.

Where it's found: Deposits of uranium ore are across the globe including the U.S., Canada and Australia. The U.S. has strong, positive trading and diplomatic ties with both countries. Furthermore, the U.S. has enough domestically-produced enriched uranium already stockpiled to [meet its military needs until 2060](#). Regrettably, uranium's inclusion on the critical minerals list has been a talking point for proponents of overturning mining bans in places like public lands surrounding the Grand Canyon, where toxic remnants of previous mines still linger.





A path forward

Unfortunately, half of the known critical mineral deposits in the U.S. are within trout and salmon habitat, and one in ten deposits are in protected public land areas like wilderness, Forest Service roadless areas and wilderness study areas. Many other critical mineral deposits overlap with sensitive sage grouse habitat and big game migration corridors. While developing more critical minerals domestically – thus reducing our dependence on vulnerable supply chains – is important to our future, we cannot put at risk some of the country’s most pristine natural areas in the process.

As a nation, we cannot solely mine our way out of supply chain challenges. Meeting those challenges without needlessly sacrificing some of our most precious natural areas requires a responsible, strategic approach. We need to reduce demand, recycle, and mine carefully. Such an approach will allow us to meet our critical mineral needs without compromising fish and wildlife habitat and the billions of dollars of economic activity generated by hunting, fishing, and outdoor recreation. When utilized in technologies that help reduce fossil fuel use, some critical minerals can also help address climate change and associated impacts on fish and wildlife.

By implementing holistic policies that create public transparency in planning processes and incorporate the best available science, we can create stronger natural resource management practices that safeguard sensitive fish and wildlife habitat and ensure the future of our hunting and fishing traditions and the growing outdoor recreation economy. The following tenets for exploration and extraction of critical minerals ensure that these natural resource values are given due consideration when developing policy and evaluating mine proposals.

TENETS FOR RESPONSIBLE CRITICAL MINERAL DEVELOPMENT:

1. Before seeking new sources of raw materials, prioritize and fully utilize alternatives, such as recycling, substitutes to critical minerals, reprocessing old mine waste piles and ash material, and engineering advancements to reduce use and need for new mines.

2. Evaluate critical mineral mine site proposals on public land through transparent, effective and predictable public processes – ones that include public land users, affected communities and indigenous tribes, as well as appropriate state and local governments and other stakeholders.

3. Avoid and minimize critical mineral development impacts to important fish and wildlife habitat, including focusing operations on landscapes that already have established infrastructure.

4. Encourage federal and state policies that support responsible critical minerals mining and avoid impacts to special places, recreational assets and high-quality fish and wildlife habitat. Where impacts are unavoidable, effects must be

mitigated including through the use of compensatory mitigation.

5. Ensure that environmental safeguards, such as the National Environmental Policy Act and current public land protections, are not circumvented, repealed or weakened for the purposes of developing critical minerals.

6. Utilize the best available science to map critical mineral resources, identify key fish and wildlife habitat, and develop avoidance and mitigation strategies.

7. Where critical minerals are a byproduct of other mining objectives, enforce all applicable laws – including those that govern non-critical minerals – to ensure uniformity of policy.

8. To be considered “critical,” minerals should be subject to import vulnerability, not just import reliance. Supplies from some allies may be part of secure supply chains, even if those minerals are imported.

9. Some places are simply too special or sensitive to mine. Where other values

are deemed more important and risks too high, critical mineral mine proposals should not be approved.

10. Allocate a portion of the revenues generated from mineral development on public lands, including critical minerals, to offset expenses for mitigation and abandoned mine reclamation.

11. Develop new policies in formalized collaboration with all affected stakeholders, including hunters and anglers, tribes, outdoor recreation interests, labor, manufacturers and the mining industry.

12. Seek to build enduring trust, transparency, and partnership with all stakeholders and impacted communities, which should result in more responsible mining projects, and reduced community opposition.

As a country, we need to realize that an analysis of the impacts of mining must look at the entire lifecycle of a mine, from extraction to processing to end-of-life options. Too many parts of the U.S. are polluted by poorly-planned, hastily-built, ultimately-abandoned mines. It is estimated that there are upwards of [500,000 abandoned mines](#) in the western United States and cleanup of these sites could cost taxpayers up to \$54 billion. We cannot let this current demand for critical minerals add to this problem.

We also need to recognize that it would be irresponsible to try and mine our way out of these supply chain concerns and that other options, like recycling, must be considered. At present, we ship most of our collected lithium-ion batteries for recycling to China, South Korea and Europe ([Robert Kang testimony](#) – Senate ENR 9-17-2019). Increasing U.S. processing capacity for recycling will allow better control of these metals earlier in the supply chain. Recycling is but one solution to the supply chain challenge. Priority should be placed on policies designed to stimulate the recycling industry in the U.S.

If implemented, these tenets will help prevent unnecessary environmental, social and economic harm as the nation strives to satisfy its critical minerals needs. To this end, we intend to work with a diverse group of partners to translate these tenets into specific state and federal policy recommendations.







Is your river affected?

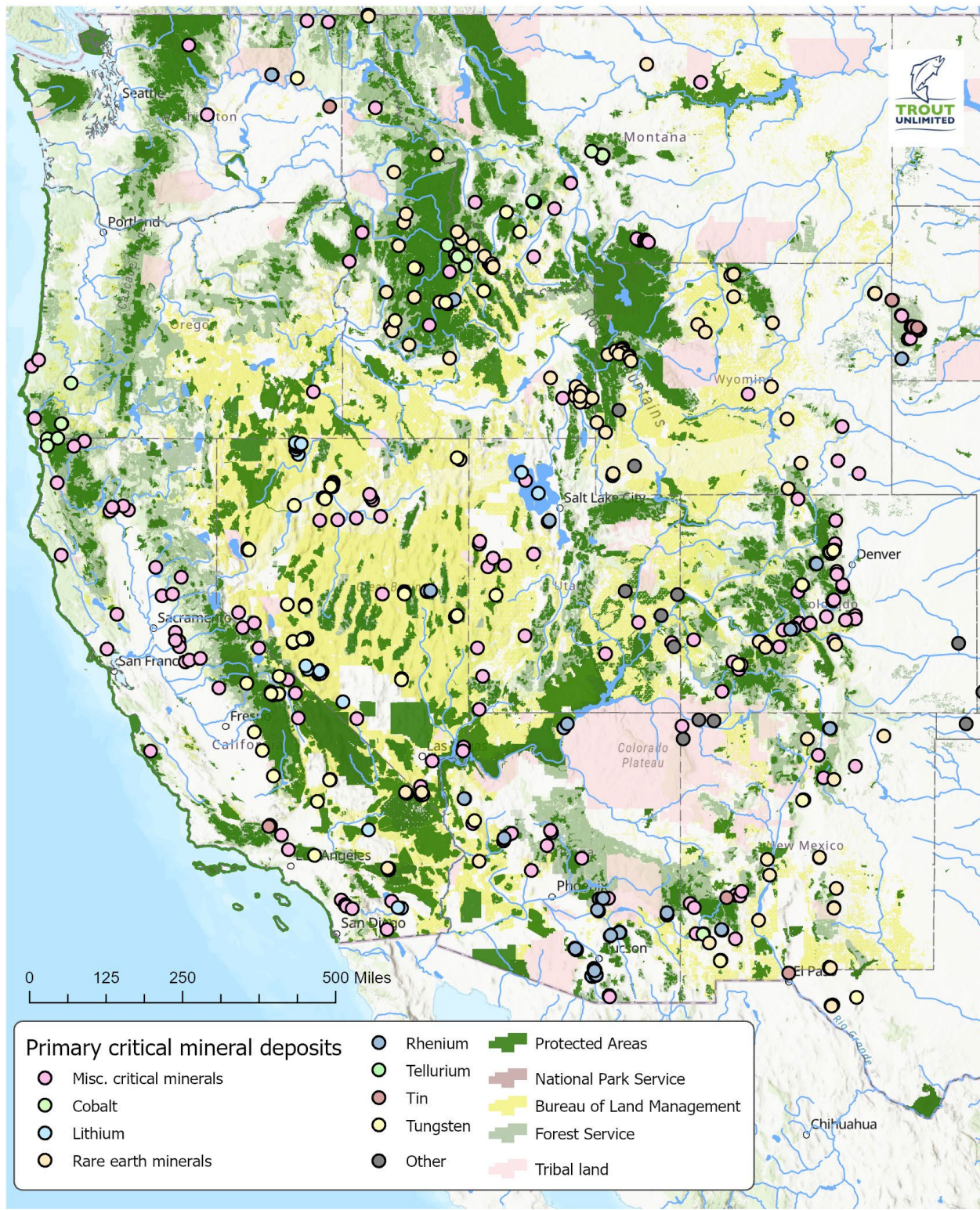
Using the best available science and [U.S. Geologic Survey data](#), a team of spatial analysis experts has mapped and identified areas of critical mineral deposits with a nexus to important fish and wildlife habitats and currently protected public lands. Of the known critical mineral deposits, half are within coldwater trout and salmon habitat, and one in 10 are located in protected public lands, such

as wilderness areas and Forest Service roadless areas. This analysis also means that half of the known deposits are not within coldwater habitat, providing an opportunity to consider developing these resources while avoiding high-value locations. Additional analysis shows, of the 822 critical mineral deposits in the western U.S. (excluding Alaska), 55 – or 6.7% – occur within priority big game winter range and migration corridors recently identified

by states in response to the [Department of Interior's Secretarial Order 3362](#). Of those same 822 known deposits, 30 – or 3.6% – occur within [greater sage-grouse Priority Areas](#) of Conservation designated by the U.S. Fish and Wildlife Service. Seven of the deposits are found in the Secretarial Order areas AND sage grouse priority areas of conservation.

FIND YOUR RIVER

Critical Minerals - Western United States





Special places with critical minerals overlap:

The following are some of the country's most unique landscapes that encompass, or exist near, known critical mineral deposits. As you read, please consider our tenets to see how they can avoid and mitigate impacts to irreplaceable natural resources while supporting responsible critical minerals mining.

Boundary Waters, Minnesota

Straddling the border between northern Minnesota and Canada, the Boundary Waters Canoe Area Wilderness is America's most visited wilderness area. It contains 20 percent of the National Forest System's fresh water, welcomes a quarter of a million annual visitors and supports 12,600 regional jobs. It was one of the nation's first designated wilderness areas, and one of the first areas to benefit from a permanent mining ban within its borders.

The region was once covered by massive sheets of glacial ice that advanced and retreated over thousands of years. They receded about 12,000 years ago, scraping away chunks of earth and leaving behind an endlessly complex network of streams, rivers and channels connecting hundreds of lakes. Some of the oldest rocks in North America, [created about 2.7 billion years ago](#), rest near the surface. The native lake trout populations inhabiting the deeper lakes are a unique part of our natural heritage.

One could spend a lifetime navigating and exploring the area's lakes and islands, all the while fishing for record walleye, northern pike, lake trout, muskie and bass, and listening to a wolf howl at dusk and loons mournfully cry in the morning. For a millennia, hunters and anglers have shared the banks of the Boundary Waters with black bears, moose and Canada lynx in a wildness that's becoming increasingly rare.

Just outside the wilderness area, however, the Boundary Waters' watershed is being targeted for a potentially dangerous, sulfide-ore-bearing copper mine that could produce cobalt and platinum group metals – critical minerals. Should the mine be developed, the Boundary Waters – which is located downstream – could be permanently harmed. Therefore, the conclusion is clear. It's simply the wrong mine in the wrong place.

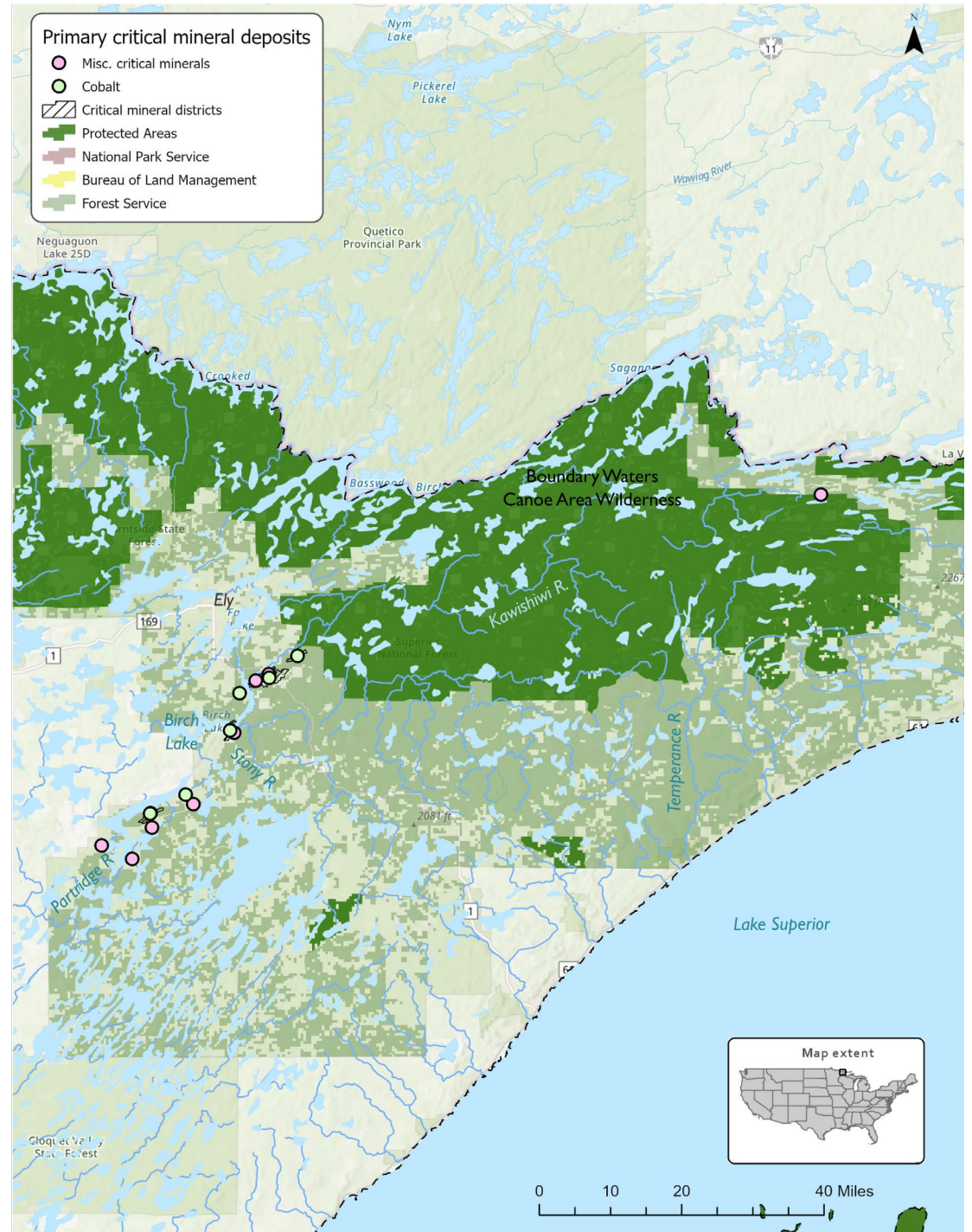


Here's why:

Multiple [science-based studies](#) determined that pollution, including acid mine drainage, from sulfide-ore copper mine runoff is almost certain, and its negative impacts would be intensified because of the area's complex hydrology. The Boundary Waters geology lacks limestone and other pH-buffering rocks that could otherwise help safeguard against the creation of acid mine drainage. Once contaminated, it would be virtually impossible to cleanup and restore the lakes and rivers of the Boundary Waters.

A [Harvard University study](#) from 2018 estimated that between 260-650 temporary mining jobs would be created for the 20-year operating life of the copper mine, while 4,400-6,600 of the existing 12,600 jobs in tourism and outdoor recreation in the watershed could be permanently lost. Additionally, absent a mine, the study predicts the area would add 1,500-4,600 more jobs and up to \$900 million more in personal income over the same 20-year period. Quite simply, by permanently withdrawing the Boundary Waters watershed from potential mining, the region's tourism and outdoor recreation economy will continue to thrive and the resource will exist as it is today for future generations.

In his autobiography published in 1969, resident of Ely and prominent conservationist, Sigurd Olson, spoke of mineral exploration in the area, saying "The world needs metals and men need work, but they also must have wilderness and beauty, and in the years to come will need it even more." These words ring true today and placing a mine immediately upstream of one of the most hydrologically pristine environments on Earth – potentially killing thousands of jobs and an outdoor recreation legacy – is a risk not worth taking. If our tenets were applied, this is one of those exceptional, irreplaceable areas that would be off-limits to new mines.



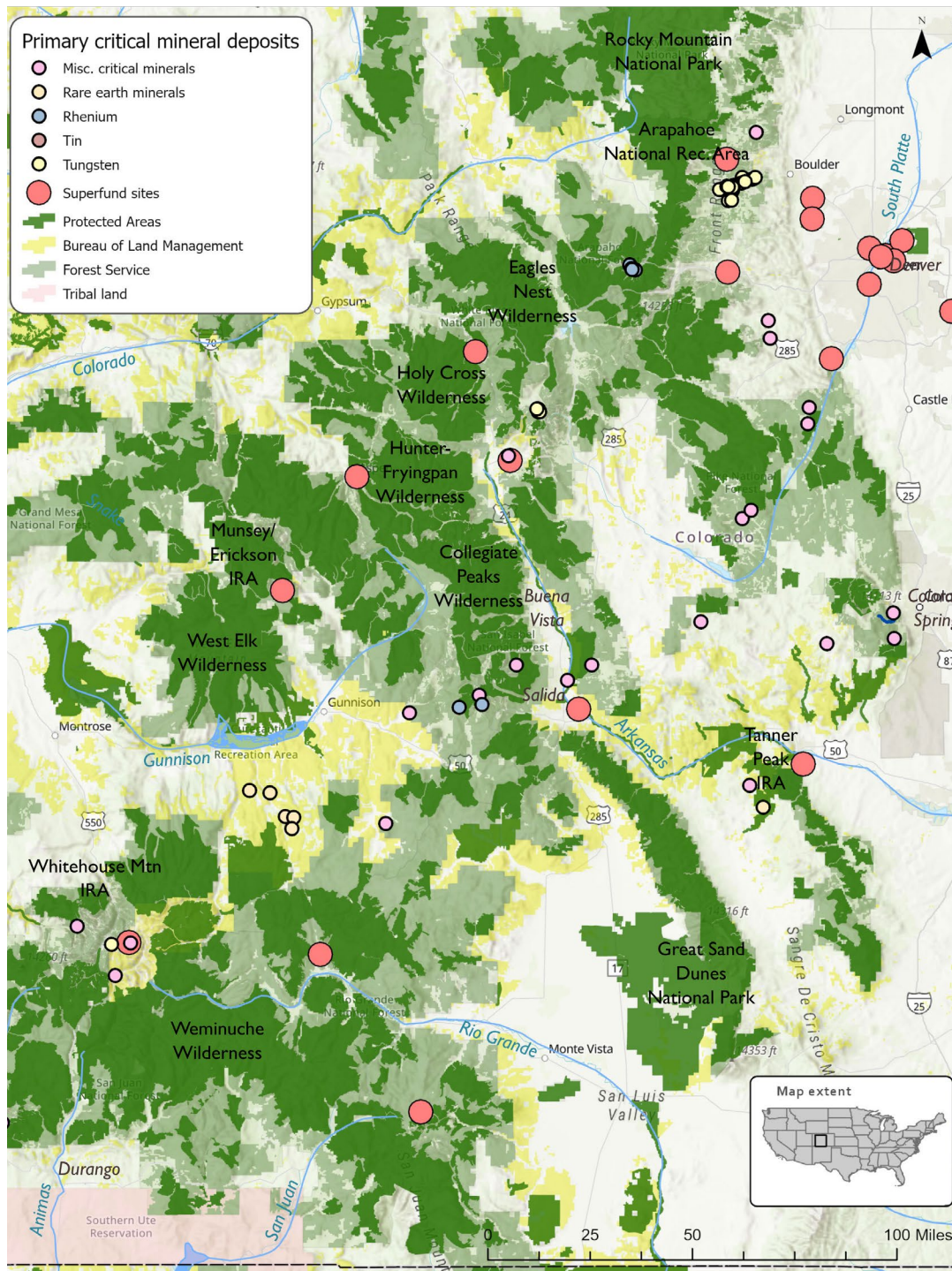
Colorado's mineral belt

Scattered across much of central and southwestern Colorado are extensive mineral deposits. The extraction of gold, silver, copper and iron for a growing nation was responsible for much of Colorado's growth in the late 1800s and early 1900s, and the reason towns like Leadville, Idaho Springs and Durango were established.

But the toxic legacy of this early mining boom is still felt today. It's estimated that over 23,000 abandoned mines exist in Colorado, many of which have significantly and negatively impacted water quality in thousands of miles of streams and rivers. Fisheries have been lost, agriculture and drinking water impaired and lands scarred forever.

To address this ongoing pollution, numerous mining Superfund cleanup sites have been established by the Environmental Protection Agency (EPA) in coordination with the State of Colorado. Some of those sites, such as Summitville in the Rio Grande River watershed, and the California Gulch site in Leadville on the Arkansas River, are finally completed. The remediation took decades and hundreds of millions of dollars. Thankfully, the result of these successful cleanups is much improved water quality. The Arkansas River now enjoys more than 100 miles of Gold Medal-designated trout water and is Colorado's most rafted river. The improved water quality from Summitville flows downstream to New Mexico, through the remarkable landscape of the Rio Grande del Norte National Monument, and on to Texas and Mexico.

Independent of those successes, however, numerous other mining Superfund sites, such as the Bonita Peak site in the upper Animas River basin and the Nelson Tunnel site in Creede on the Rio Grande River, are either in their infancy or awaiting funding and action. Overall, the U.S. has more than 1,300 toxic Superfund sites awaiting attention, unfortunately, with limited



and dwindling funding to complete these projects.

Colorado is a headwaters state supplying water to 17 downstream states and millions of people. These waters flow from the mountains into lowlands, supplying drinking water for Colorado's thirsty Front Range, feeding agricultural fields in Nebraska and Kansas while providing critical wetland habitat for countless wildlife species in other neighboring states. Colorado's water is vital to the nation.

Aside from precious metals, Colorado's mineral belt is home to dozens of critical mineral deposits. About 90 percent of mapped critical mineral deposits in Colorado are in habitat that supports trout fisheries, and of those, 69 percent are within five miles of a stream the EPA lists as already impaired by mining impacts. One of those critical mineral deposits is beryllium, and it lies within the Bear Creek watershed where the endangered – and once thought extinct – greenback cutthroat trout has a stronghold.

The history of Colorado's past should teach us something about how to move forward with mining in the future. If our tenets were applied, mining would be limited to areas outside of high-quality habitat and would be conducted in a manner that avoids or minimizes fish and wildlife impacts. The lesson from successful Superfund cleanups shouldn't be that a mine can be remediated. Instead, the lesson should be how much room there is for improvement towards more responsible mining and how far we have to go to clean-up previous mistakes.

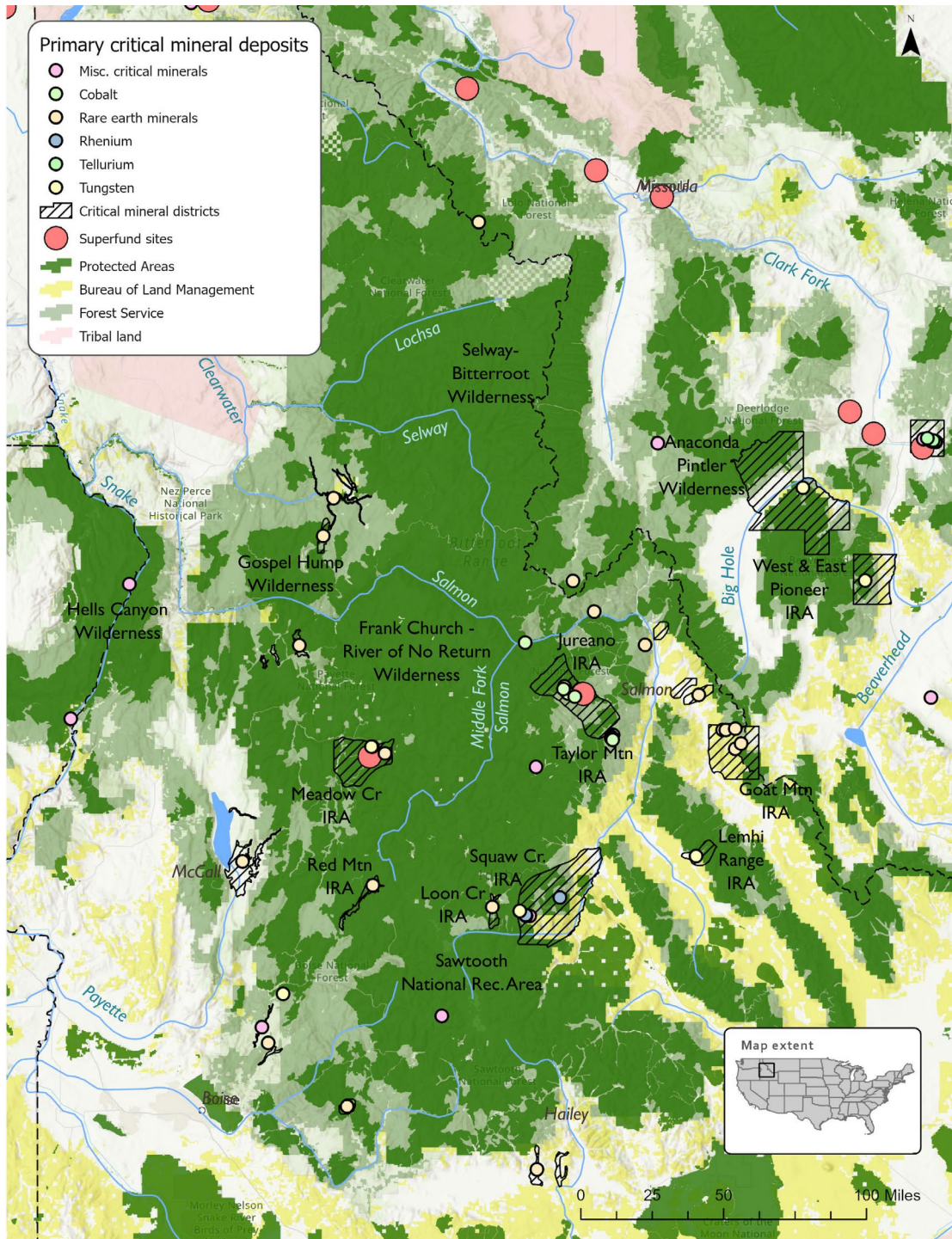
Central Idaho

One of the longest salmon runs in the world starts here, near Stanley, Idaho. It travels through the aptly named Salmon River, meandering through lowlands before plunging into the Frank Church-River of No Return Wilderness, the largest contiguous wilderness area in the Lower 48, with jagged, high mountain peaks and rugged, free-flowing rivers.

Along the way, through central Idaho, are a dozen critical mineral deposits including cobalt, rare earth elements, tungsten and rhenium. There may be no other location in the U.S. where such a cluster of deposits exist. However, of the 90 currently-mapped critical mineral deposits in Idaho, all except one occur in native trout, salmon, or steelhead watersheds, 14 are in currently-protected public lands, and 26 are within five miles of a stream that is currently impaired by previous mining.

These are rugged, remote places. The deposits occur in well-known backcountry areas like the Sawtooth Range with their sheer cliffs and deep glacial valleys. They're in watersheds protected as Wild and Scenic Rivers, and other areas under special protections for anadromous spawning areas. Chinook, sockeye, steelhead, bull trout and westslope cutthroat trout all call central Idaho home. This region of Idaho has a unique diversity of wildlife species with robust herds of bighorn sheep, mountain goats, elk and mule deer. This landscape supports important migratory corridors that enable big game species to roam between the foothills in the winter and the timbered high country in the summer.

While this region of Idaho has a history of past mining activity – including current or proposed Superfund sites – much of it is protected, unique and too valuable to risk polluting. Applying tenets to this area, Congressionally-designated public lands would remain protected, mining would avoid sensitive fish and wildlife habitat, and new developments would be sited



where infrastructure already exists.

Some sites, like the Idaho Cobalt Project, may be able to responsibly produce at a defunct mine site, even cleaning up some of the area's previous impacts in the process. We should focus on development in places with existing infrastructure before opening new lands, fragmenting wildlife habitat and migratory corridors and polluting lands and waters that could be difficult, if not impossible, to restore or reclaim.



An aerial photograph of the Grand Canyon, showing the deep, layered rock formations and the Colorado River winding through the bottom. The sky is hazy and blue.

Best practices for Responsible Mining

We recognize that critical minerals mining will be necessary, but it should be done in a manner that avoids or minimizes harm to fish and wildlife and the habitat they depend on. This requires smart planning, stakeholder collaboration and careful execution. History provides a powerful lesson on what happens when those attributes are absent.



Spurred by the General Mining Act of 1872, anyone with a claim was able to pollute waterways, strip a mountainside or dynamite a hill with little regard to health, safety or environmental impacts. The impacts of those historic mines are still felt today on rivers like the Animas in Colorado and the Clark Fork in Montana. Fast forward to the 21st century and we can see how some of the strongest environmental regulations in the world have stemmed some of the worst effects. However, we must continue to learn, adapt and improve to provide the necessary protections for our land, air and waters.

Mining can be done with a focus on achieving more environmentally and socially-responsible operations. There are examples across the globe of responsible mining practices, and from them we can draw some lessons. We can see how responsible mining means avoiding damage to

key fish and wildlife resources, and how rolling back current environmental laws or removing existing protections on public lands would be a step backward. We can apply these lessons to the mines of the future and ensure policies provide a balance between mining and the protection of our environment.

Collecting and sharing data each step of the way is a proven strategy for successful collaboration among mining companies, community stakeholders and agencies. That means providing data on environmental performance and complying with independent reviews. It means providing site-level reporting of performance and monitoring water quality. It also means disclosing environmental incidents so they can be addressed quickly and efficiently.

Responsible mining and the conservation of fish and wildlife means going beyond protections

required by the government. This includes working with neighbors to ensure mines protect adjacent private and public land, water and environmental resources. Regular community meetings with company representatives allow interested people to talk about concerns and prevent problems related to mining impacts, reclamation, wildlife and other issues. These open communications can also curb some of the mystery around mines and build trust between stakeholders.

We encourage responsible mines to take extra steps to provide for third-party environmental audits. This can include groundwater monitoring, consistent sampling of surface water and regular assessments of the area's biologic health. Beyond monitoring, mines can source supplies from responsible companies, locally, when possible. Some mining companies will even take actions that may not make

the most fiscal sense, but that are in the best interests of local communities. It builds an abundance of good will and authenticity and doesn't need to be overly onerous or costly.

It is also important to recognize that some places are simply too sensitive to be mined responsibly. The only acceptable risk is zero risk where irreplaceable fish and wildlife habitat and special landscapes could be jeopardized.

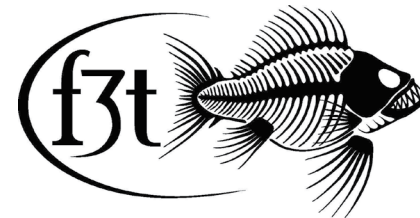
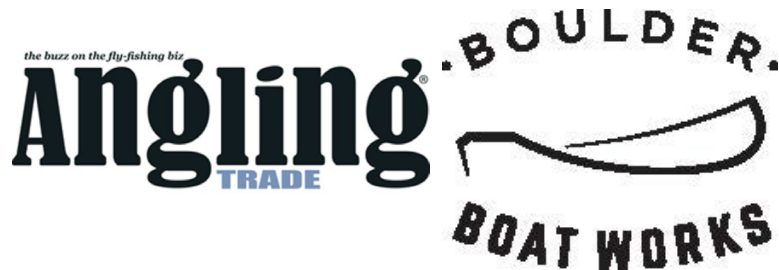
Lastly, notable mining companies have used their engineering expertise to create inventive and innovative solutions to mining problems, leading to more responsible operations and fewer impacts. Engineers are trained to solve complex problems, like figuring out better access to clean water, a vital resource to mines and communities. Companies have also stepped up with resources and funding to help clean up abandoned mines they had no role in developing.

Irresponsible mining operations that create environmental pollution or that shut out public concerns give the industry a "black-eye" and undercut public trust that new mining projects can be done responsibly. Mining in the U.S. has come far over the past century and a half, and our society is increasingly reliant upon a wide array of minerals that come from the ground. Mining isn't suitable in all locations, but where mining can be done responsibly, we have the ability to build safer mines with more regard for the surrounding environment and social impacts. Applying the tenets for responsible critical mineral development can help keep us moving in this positive direction.



This report is endorsed by:

Trout Unlimited, National Wildlife Federation and Backcountry Hunters and Anglers would like to thank the following for their support of responsible mining practices:





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AMERICAN FLY FISHING TRADE ASSOCIATION

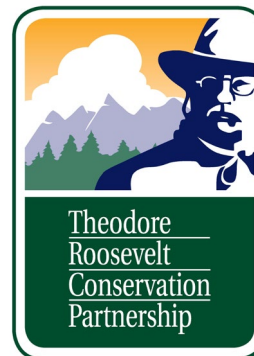


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