CRITICAL MINERAL MINING ON U.S. PRIVATE LANDS: BIODIVERSITY AND LAND USE

FACT SHEET

FEBRUARY 2026

Without strong regulatory oversight, mining for critical minerals can reduce biodiversity and degrade habitats. Studies suggest that mining activities may reduce native biodiversity. Reported restoration failure rates also differ, with some ecosystems unlikely to fully recover to pre-mining conditions. To address these risks, experts recommend robust biodiversity and land-use protections, including landscape-scale assessments, integration of climate change projections and adaptation strategies into environmental permitting processes, enforceable no-net-loss standards, and support for Indigenous co-management.

What Are Biodiversity and Land Use Protections?

Biodiversity and land use protections are essential to prevent habitat loss, safeguard imperiled species, and maintain ecosystem health during and after mineral extraction. These protections include federal regulations such as the Endangered Species Act (ESA)[i] and Clean Water Act (CWA),[ii] state-level permitting, financial assurances for restoration, and landscape-scale planning that accounts for cumulative impacts beyond individual mine sites. As domestic mining for lithium, copper, rare earths, and other critical minerals expands to support the clean energy transition, strengthening biodiversity protections (including enforceable restoration standards and integration of climate projections into permitting) is essential to achieving genuinely sustainable development.

Why Biodiversity Protections Matter for Private Land Mining

- **Regulatory gaps result in uneven protections.** Mining on private land is not automatically subject to federal environmental review under the National Environmental Policy Act (NEPA). State agencies primarily oversee it, though federal permits (such as Clean Water Act Section 404 permits for wetland impacts) may still apply. In contrast, projects on public land must comply with NEPA.[iii, iv] This leads to inconsistent biodiversity protections depending on land ownership and whether federal permits are triggered.
- **Current restoration methods face challenges.** Some studies report high failure rates for restoration efforts on degraded lands in achieving biodiversity goals, and ecological recovery can take decades.[v, vi] Climate change may further complicate these challenges, with projections indicating a significant portion of species could face unsuitable conditions by 2050.[vii]
- **Mine sites could threaten sensitive habitat.** The U.S. Geological Survey (USGS) has identified more than 800 focus areas for potential critical mineral resources across the United States, including lithium deposits in North Carolina, Arkansas, and the western United States.[viii] These areas can overlap with the habitats of imperiled species and sensitive ecosystems, underscoring the need for strong biodiversity protections.[ix]
- **Biodiversity funding falls short of estimated needs.** Some estimates place current global annual investment in biodiversity at $208 billion, though as much as $1.15 trillion may be needed by 2030.[x] Meanwhile, substantial funding continues to support activities considered harmful to nature, leading to a significant imbalance.

Current Policy and Gaps

Federal Framework

The Endangered Species Act (1973) offers primary federal protections for biodiversity. The ESA prohibits "taking" of protected species on public and private land.[xi] In April 2025, the Trump administration proposed rescinding the regulatory definition of "harm," which, if enacted, would remove "significant habitat modification or degradation" from federal protections.[xii] Combined with the recently reinstated 2017 interpretation of the Migratory Bird Treaty Act, which limits liability to intentional bird deaths.[xiii] These changes could weaken biodiversity safeguards as mining activity increases.

The Clean Water Act safeguards wetlands,[xiv] but the Supreme Court's May 2023 *Sackett* decision significantly narrowed federal jurisdiction by requiring wetlands to have a "continuous surface connection" to traditionally navigable waters.[xv] Following a September 2023 conforming rule, many wetlands near potential mining sites,

particularly isolated wetlands, may no longer qualify for Section 404 permit requirements.[xvi]

State Variations and Private Land Gaps

- **California (stronger protections):** Western Joshua Tree Conservation Act (2023) provides state-level species protection exceeding federal ESA with private land permit processes.[xvii]
- **Montana (stronger protections):** Mandatory sage-grouse habitat consultation and enhanced environmental guarantees.[xviii]
- **Pennsylvania (weaker protections):** Conventional oil and gas well bonds capped at $2,500 per well, far below projected plugging costs of approximately $25,000 per well.[xix]
- **Nevada (weaker protections):** Nevada's Habitat Conservation Framework covers approximately 70.7 million acres of total state land area, but enforcement mechanisms for private lands remain limited despite the state's Conservation Credit System.[xx]

Voluntary Standards

The Initiative for Responsible Mining Assurance (IRMA) includes 82 mining companies engaged as of March 2024, though forest protection gaps remain.[xxi] The Task Force on Nature-related Financial Disclosures released its final recommendations in September 2023 and now has over 500 organizations committed to adopting its framework.[xxii]

Four Critical Policy Gaps

Gap 1: Site-Based Assessments Ignore Cumulative Impacts

- Environmental reviews usually assess projects on a site-by-site basis and do not consider landscape-level impacts such as habitat fragmentation and watershed degradation.
- Mining can reduce native biodiversity through habitat fragmentation, although the magnitude of loss is highly context-dependent. Infrastructure development and population growth can cause additional impacts beyond mine boundaries. Some reports estimate that 8 percent of global metal mining occurs within protected areas,[9] and that a significant proportion of waste facilities are located near protected boundaries.[xxiii]

Gap 2: Climate Adaptation Not Considered

- Traditional five- to ten-year restoration cycles do not account for the accelerating impacts of climate change on species survival and ecosystem recovery.

- Restoration targets based on historical conditions become obsolete as climate change shifts suitable habitat ranges for many native plant species.[7] Restored habitats may not support target species in future climate conditions.[xxiv]

Gap 3: No Enforceable "No Net Loss" Standards

- U.S. regulations do not require *no net loss* of biodiversity on private lands. International best practices require biodiversity gains to offset losses, but these standards are not enforced domestically. Additionally, *no net loss* must include attention to species richness, as well as the species assemblages present in ecosystems prior to mining operations.
- Research indicates that wetland mitigation projects frequently fail to achieve *no net loss* of habitat productivity, with many conservation banks issuing credits before successful restoration is demonstrated.[6] Given documented restoration failure rates, current offset ratios may be insufficient to ensure functional habitat replacement, potentially resulting in net habitat loss.

Gap 4: Indigenous Rights and Knowledge Excluded

- Free, prior, and informed consent is not required for mining activities on private land that affect Indigenous sacred sites or traditional territories. This results in the exclusion of Indigenous voices in projects such as Resolution Copper and Thacker Pass lithium mine. There is also a loss of Traditional Ecological Knowledge, a knowledge source which has resulted in measurable restoration success in Indigenous-led projects.[xxv] Separately, the Jarrah Forest restoration demonstrated that rehabilitated mine sites can achieve species richness equivalent to unmined reference forest.[xxvi]

NWF Policy Recommendations for Responsible Private Land Mining

Recommendation 1: Mandate Landscape-Scale Biodiversity Assessments

- Federal agencies could expand FAST-41 (the Federal Permitting Improvement Steering Council) coordination to require cumulative impact analysis at watershed or ecoregional scales before permitting mining operations on private lands. The Bipartisan Infrastructure Law provided $320 million for mineral mapping that could support landscape biodiversity assessments.[xxvii]
- Assessments should analyze habitat connectivity for species of concern and migratory species, water consumption impacts in water-stressed regions, and climate change projections across multiple scenarios. Oregon's Priority Wildlife Connectivity Areas methodology demonstrates feasible approaches.[xxviii]
- States can require landscape-scale biodiversity assessments as a condition for operations that receive state incentives or permits.

Recommendation 2: Require Climate-Integrated Restoration Planning

- Operations should replace five- to ten-year restoration cycles with adaptive approaches that require at least twenty to thirty years of monitoring where necessary to account for climate change trajectories and species with longer maturation periods.
- Integrate projected climate conditions on relevant timescales into habitat restoration decisions. Update bonding requirements to reflect long-term water treatment obligations and climate uncertainty.
- Employ effective monitoring methods and technologies, which may include use of real-time satellite imagery and automated monitoring systems to track restoration outcomes and support adaptive management.

Recommendation 3: Establish Enforceable "No Net Loss" Standards

- Amend environmental laws to require mining operations to achieve no net loss of biodiversity with third-party verification. State legislatures should enact no net loss requirements following California's Western Joshua Tree Conservation Act model.
- Federal agencies could make critical mineral tax credits contingent on verified biodiversity performance. Conservation banking should shift to a savings bank model, providing credits only after successful restoration is demonstrated.

Recommendation 4: Ensure Indigenous Co-Management and FPIC

- Extend Free, Prior, and Informed Consent (FPIC) requirements to all operations affecting Indigenous sacred sites, traditional territories, or treaty rights regardless of land ownership.
- Follow Canada's model of over 500 formal Indigenous agreements, with some including 1-2 percent life-of-mine revenue sharing.[xxix, xxx]
- Integrate FPIC requirements into FAST-41 coordination for critical mineral projects.
- Support Indigenous-led monitoring teams and integrate Traditional Ecological Knowledge into restoration planning. Provide technical assistance and funding to enable Tribal participation in permitting processes.

Conclusion

Biodiversity and land use protections are necessary to prevent habitat loss, protect imperiled species, and maintain healthy ecosystems. As domestic mining for critical minerals expands to support clean energy and technology, pressures on biodiversity and habitats will increase.[9 xxxi] Current protections on private lands are inadequate, leading to inconsistent safeguards, insufficient restoration, limited climate adaptation, and exclusion of Indigenous perspectives. Strengthening U.S. biodiversity and land use

policy requires landscape-scale biodiversity assessments, climate-integrated resource planning, enforceable no net loss standards, and Indigenous co-management.

This paper was written with the assistance of the 2025 Fellows of the Dow Sustainability Program, University of Michigan. For more information, please contact Dr. Simone H. Stewart, Senior Industrial Policy Specialist StewartS@nwf.org

Cover photo: The New Cornelia mine is an inactive open-pit copper mine in Pima County, Arizona. Steve Proehl/Getty Images

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CRITICAL MINERALS ON U.S. PRIVATE LANDS: CULTURAL HERITAGE AND FREE, PRIOR, & INFORMED CONSENT

FACT SHEET

FEBRUARY 2026

A substantial portion of known U.S. lithium deposits (reserves and resources) are located near Native American reservations, making the clean energy transition inseparable from the interests and rights of Indigenous communities. Under current U.S. law, only consultation is required, generally not consent, allowing mining to proceed even if Tribes object. Free, Prior and Informed Consent (FPIC) gives Indigenous peoples decision-making authority over projects that affect their homelands, as recognized in international frameworks including the UN Declaration on the Rights of Indigenous Peoples. To address these gaps, robust Indigenous rights and cultural heritage protections are recommended, including FPIC requirements, protection for cultural landscapes, funding for Tribal participation, and support for Indigenous co-management.

What Are Indigenous Rights and Cultural Heritage Protections?

Free, Prior and Informed Consent (FPIC) provides Indigenous peoples with the authority to approve or reject projects that affect their lands, territories, resources, or rights. Unlike consultation, which seeks Tribal input but does not guarantee decision-making power, FPIC requires that consent be *free* (voluntary and without coercion), *prior* (secured before any approval and in line with Indigenous timelines), and *informed* (based on complete impact information provided in culturally appropriate ways).[1] Cultural heritage protection goes beyond preserving historic buildings or artifacts. Indigenous cultural heritage is connected to living landscapes where communities

maintain ongoing spiritual, ceremonial, and subsistence relationships. For example, the Western Shoshone see entire watersheds as interconnected cultural systems. For the Ojibwe, wild rice (manoomin) is a relative, a food source, a ceremonial element, and an indicator of ecosystem health. Traditional territories are ancestral homelands where Indigenous peoples maintain cultural, spiritual, and historical connections, regardless of current land ownership.

Why Indigenous Rights and Cultural Heritage Protections Matter for Private Land Mining

- **Regulatory gaps result in uneven protections.** One study found that about 79% of all known U.S. lithium deposits (reserves and resources) are within 35 miles of Native American reservations.[2] Mining on private land typically does not require federal environmental review. If mining takes place entirely on private property without federal permits or funding, there is no federal requirement for Tribal engagement, even if projects impact off-reservation sacred sites, water sources, or traditional use areas.[3]
- **International standards require consent, not just consultation.** The Initiative for Responsible Mining Assurance (IRMA), an independent certification system for mining operations, requires that companies obtain FPIC from affected Indigenous communities before proceeding.[4] IRMA also designates critical cultural heritage sites as "no-go" areas where mining cannot occur. These protections are largely absent from U.S. private land regulation.
- **There are documented cases of limited Tribal engagement.** For example, consultation for the Thacker Pass lithium mine consisted of three rounds of mailings during the COVID-19 pandemic, when Tribal offices were closed.[5] The project was approved over opposition from at least five Tribal governments. Industry research suggests that projects with genuine FPIC tend to have better outcomes, while inadequate consultation often leads to litigation and delays.[6]
- **Collaborative consent processes can support community well-being and project viability.** In August 2025, the Shoshone-Paiute Tribes signed an unprecedented Relationship Agreement with Integra Resources for the DeLamar project in Idaho—the first agreement of its kind in the Lower 48 states.[7] Developed over five years, the agreement establishes a framework for co-management, benefit-sharing, and cultural preservation throughout the mine's operation.

Current Policy and Gaps

Federal Framework

The 1872 General Mining Law governs most hardrock mining but contains zero Indigenous consultation requirements.[8] The National Historic Preservation Act (NHPA) requires considering cultural resources when federal permits, funding, or other federal actions are involved, focuses on individual sites rather than landscapes, and gives Tribes no veto power.[9] The American Indian Religious Freedom Act remains largely symbolic without enforcement power.[10]

In May 2025, the Supreme Court rejected Apache Stronghold's challenge to the Resolution Copper mine at Oak Flat, Arizona—a site sacred to multiple Tribal Nations, leaving in place lower-court rulings that underscore how current law provides no veto power over projects affecting sacred lands.[11]

In 2023, the Biden Administration's Interagency Working Group on Mining Regulations, Laws, and Permitting issued a report with more than 60 recommendations, but it did not create any enforceable Tribal consent rights.[12] Native Americans make up about 1 percent of the U.S. population but are disproportionately exposed to health and environmental risks associated with mining.[13]

State Variations and Private Land Gaps

- **California (stronger protections):** Assembly Bill 52 requires state agencies to "actively seek agreement" with Tribes on projects subject to environmental review.[14]
- **Minnesota (stronger protections):** The Fond du Lac Band used its Clean Water Act authority to enforce Tribal water quality standards, contributing to the revocation of a key federal wetlands permit for the PolyMet mine when it could not meet downstream Tribal standards.[15]
- **Nevada (weaker protections):** Despite major lithium deposits, there are no state FPIC requirements. Private projects proceed with minimal oversight. Burial sites have felony protections but other sacred sites do not.[16]
- **Arizona (weaker protections):** Allowed Resolution Copper to proceed despite Apache religious freedom concerns. Limited state cultural heritage authority creates "enforcement deserts" where federal jurisdiction does not apply.

Voluntary Standards

Under the Initiative for Responsible Mining Assurance (IRMA) standard, mines are required to conduct cultural heritage screening, assessment, and implement damage mitigation measures.[17] IRMA distinguishes between replicable cultural heritage and

critical cultural heritage, creating no-go zones for the latter. Companies can pursue IRMA certification voluntarily while legislative reforms advance.

Four Critical Policy Gaps

Gap 1: No Consent Authority, Only Advisory Consultation

- U.S. law provides consultation in limited cases but generally does not require Tribal consent for mining projects, leaving Indigenous nations with voice but not veto power.
- Tribes invest resources in consultations only to be ignored. At Thacker Pass, Western Shoshone opposition was documented but dismissed. At Oak Flat, 20 years of Apache engagement have so far failed to stop approval of a mine that would ultimately destroy the sacred site. This exhausts Tribal capacity and leads to litigation that delays projects anyway.

Gap 2: Inadequate Protection for Cultural Landscapes

- Current laws focus on discrete archaeological sites rather than cultural landscapes, watersheds, and territories Indigenous communities identify as sacred.
- At Thacker Pass, the significance of the massacre site and the broader landscape was not fully addressed. For the Ojibwe, wild rice waters have spiritual importance that cannot be replaced. Mining infrastructure can create barriers to ceremonial access, even when companies attempt to avoid specific sites.

Gap 3: No Benefit-Sharing Requirements

- U.S. regulations include no requirements for benefit-sharing or economic partnerships with affected Indigenous communities, unlike international standards.
- Companies extract resources from traditional territories while Indigenous communities experience the impacts without receiving economic benefits. One-time payments do not provide sustainable prosperity or support for long-term monitoring.

Gap 4: Insufficient Tribal Capacity Support

- Meaningful participation requires technical expertise in hydrogeology, toxicology, and law that many Tribal governments cannot access without sustained funding.
- Companies have access to consultant teams, while Tribes may lack resources for independent technical review. Traditional governance processes that require consensus often need more time than typical mining project timelines allow.

NWF Policy Recommendations for Responsible Private Land Mining

Recommendation 1: Pass New Mining Law to Require Tribal Consent

- Pass modern legislation establishing binding FPIC for projects affecting traditional territories, sacred sites, or shared resources regardless of land ownership. Define affected territories beyond reservations, create enforcement mechanisms with penalties for non-compliance, and establish multi-year federal funding for Tribal capacity building including independent technical experts in hydrogeology, toxicology, and environmental law. Constitutional authority exists through the Indian Commerce Clause and Treaty Power.

Recommendation 2: Create Critical Cultural Heritage Designations

- The Interior Department should develop a federal designation framework for sites of outstanding cultural significance that cannot be replaced, similar to Wilderness Area protections. Congress should provide statutory authority through standalone legislation building on the Chaco Cultural Heritage Area Protection Act model.
- Establish Tribal-controlled nomination processes protecting sacred information, with buffer zones recognizing impacts beyond physical boundaries (viewsheds, groundwater, spiritual integrity).

Recommendation 3: Require Impact Benefit Agreements

- Require Impact Benefit Agreements for all projects on or near Indigenous territories including profit-sharing, equity stakes, board representation, employment priorities, and long-term monitoring funding controlled by Tribes.
- Follow Canada's model of over 500 formal Indigenous agreements, with some including revenue-sharing or royalty frameworks over the life of the mine.[18,19]

Recommendation 4: Ensure Indigenous Co-Management and Strengthen State Protections

- Recognize Tribes as co-regulators for water quality. States with mining activity should require meaningful consultation with minimum 12-18 month timelines to accommodate traditional governance processes. Require cultural impact frameworks developed by Tribal experts that evaluate landscapes rather than discrete sites.
- Support Indigenous-led monitoring teams and integrate Traditional Ecological Knowledge into restoration planning. Provide technical assistance and funding to enable Tribal participation in permitting processes.

Conclusion

Indigenous rights and cultural heritage protections are necessary to ensure that the clean energy transition respects the sovereignty and cultural connections of Native peoples who have served as stewards of these lands since time immemorial. With many lithium reserves located near reservations, respecting Indigenous consent is essential for achieving both climate and conservation goals. Current protections on private lands are inadequate, leading to consultation without consent, insufficient cultural landscape protections, lack of benefit-sharing, and exclusion of Indigenous perspectives. Strengthening U.S. Indigenous rights policy requires establishing FPIC requirements, creating critical cultural heritage designations, mandating benefit-sharing agreements, and ensuring Indigenous co-management. The National Wildlife Federation's mission to protect wildlife and wild places for future generations compels us to advocate for critical mineral development that respects the rights and leadership of Indigenous peoples.

This paper was written with the assistance of the 2025 Fellows of the Dow Sustainability Program, University of Michigan. For more information, please contact Dr. Simone H. Stewart, Senior Industrial Policy Specialist StewartS@nwf.org

Cover page: The remote village of Unalakleet, Alaska, sits along the Unalakleet River, on one side, and the coast of the Bering Sea on the other. The village is about 400 miles northwest of Anchorage. (Photo by Werner Slocum / NREL, from Department of Energy/Flickr)

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CRITICAL MINERAL MINING ON U.S. PRIVATE LANDS:
ENVIRONMENTAL IMPACT ASSESSMENTS

FACT SHEET

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Domestic critical mineral extraction is likely to increase to meet the demands of the clean energy transition and the policy goals of the Trump Administration. Environmental Impact Assessments are a tool to predict and mitigate negative environmental impacts associated with extractive activities such as mining. International standards such as the Initiative for Responsible Mining Assurance (IRMA), which identifies best practices for responsible mining, are far more stringent than U.S. regulations. Further, the National Environmental Protection Act (NEPA), the U.S. Federal law governing Environmental Impact Assessments, has been highly criticized for creating a lengthy and ineffective environmental review process. As such, the Trump Administration and the Supreme Court have taken to modifying NEPA's requirements recently, making it even less stringent.

What Are Environmental Impact Assessments?

Environmental Impact Assessments are a tool to predict and mitigate negative environmental impacts associated with extractive activities such as mining. Frequently, these assessments are understood as a way to require a company or government agency to look at possible environmental impacts before it leaps into a project. These assessments may require consideration of alternative designs and locations, mitigation measures, remediation plans, and social and human health impacts. However, frequent and extensive environmental reviews are administratively burdensome and highly criticized for slowing down development and inviting litigation. Thus, a good

environmental review policy strikes a balance between comprehensive coverage and administrative efficiency and certainty.

Striking this balance is essential in the face of the energy transition. For example, mining operations pose significant environmental risks and social costs. Still, they are necessary to obtain the minerals needed for clean energy technologies, which will have a hugely beneficial impact on the climate. Therefore, an efficient and comprehensive environmental review policy for proposed mining operations is essential for meeting critical mineral demand at the lowest social and ecological cost.[1]

Major stakeholders include federal agencies implementing NEPA, state environmental agencies, mining companies seeking permits, local communities near proposed mining sites, and environmental organizations monitoring compliance and impacts.

Why Environmental Impact Assessments Matter for Private Land Mining

- **Regulatory gaps cause uneven protections.** NEPA requirements are triggered when there is a major federal action or federal nexus, such as mining operations on federal land. Mining on private land can also trigger NEPA if the operator has received federal funds or is subject to other federal permitting requirements. However, mines on purely private land may escape federal environmental review entirely.
- **The Supreme Court recently narrowed the scope of environmental review required by federal law.** On May 29, 2025, the Supreme Court of the United States (SCOTUS) clarified the scope of NEPA review in *Seven County Infrastructure Coalition v. Eagle County, Co.* In this case, the court unanimously held that NEPA does not require agencies to consider environmental impacts of upstream and downstream projects that are separate in time or place from the project under review. This holding majorly limits the extent to which downstream greenhouse gas emissions made possible by a proposed project can be considered in federal environmental assessments.[2]
- **Federal environmental review is a procedural exercise without substantive requirements.** NEPA is understood as procedural and does not require the agency to take the least environmentally damaging actions. Further, while NEPA's implementing regulations used to require consideration of possible mitigation measures, NEPA does not require the implementation of any specific mitigation plan.
- **The regulations implementing federal environmental review are in flux.** NEPA implementation and compliance rules are currently in flux. In February 2025, the Council of Environmental Quality (CEQ) issued an interim final rule revoking all its rules in response to President Trump's EO 14154. This executive order, titled

"Unleashing American Energy," directed CEQ to propose rescinding the NEPA regulations and provide new guidance on NEPA implementation. Now, each federal agency will have to set its own rules for implementing NEPA.

Current Policy and Gaps

Federal Framework

The National Environmental Policy Act (NEPA) requires a full environmental impact statement (EIS) where an action's impacts will be 'significant.' Prior to the second Trump administration, all federal agencies followed a uniform set of rules issued by the Council on Environmental Quality (CEQ) for implementing NEPA. CEQ first issued these rules in 1978 in response to President Carter's EO 11991, and they remained relatively consistent with updates in 1984, 2020, and 2024 by the Reagan, Trump, and Biden Administrations.[3]

However, CEQ's authority to issue rules binding other agencies is not clear from the text of the NEPA statute. In November 2024, the U.S. Court of Appeals for the District of Columbia issued an opinion stating that CEQ did not have the authority to issue such binding regulations. While this opinion was ultimately overturned, shortly after, another federal court in North Dakota invalidated the CEQ rules. Finally, in February 2025, CEQ itself issued an interim final rule revoking all its rules in response to President Trump's EO 14154.[4]

Stakeholder engagement in environmental review varies depending on what major federal action triggers NEPA review. Environmental review in the context of an agency rulemaking is generally subject to the Notice and Comment requirements of the Administrative Procedure Act (APA) § 553. Agencies are only required to respond to material comments. Individual permitting procedures will typically prescribe the minimum stakeholder engagement required under the respective permitting program.[5]

State Variations and Private Land Gaps

Twenty states and local jurisdictions have their own environmental review requirements, often called State Environmental Policy Acts (SEPAs). There is generally a tension between comprehensiveness, predictability, and efficiency. Mines may also straddle different land designations and jurisdictions, creating overlapping environmental review requirements that may be duplicative.[6]

- **California** - The California Environmental Quality Act (CEQA) has a low threshold for triggering the review process, applying to projects that "may significantly" affect the environment. This results in uncertainty and a high administrative burden but is generally considered very comprehensive.[7]

- **Massachusetts** - The Massachusetts Environmental Protection Act (MEPA) has specific review thresholds for categories of projects based on nature, size, or location. This creates certainty for industry and reduces administrative burden.[8]
- **New York** - The New York State Environmental Quality and Review Act (SEQR) applies legal presumptions to three "types" of actions, creating some certainty while building in flexibility.[9]

<u>**Voluntary Standards**</u>

IRMA's best practice for Environmental and Social Impact Assessments (ESIAs) requires a comprehensive ESIA for all new mines and major changes to existing mines. IRMA also suggests that mine operators analyze all direct, indirect, and cumulative impacts and provide timely and effective stakeholder consultation. IRMA requires mine operators to have a robust risk management system which outlines specific mitigation actions.[10]

Four Critical Policy Gaps

<u>**Gap 1: Narrow Scope of Review**</u>

- The U.S. Supreme Court recently narrowed the scope of NEPA review significantly. Environmental assessment is only required for federal actions 'significantly' affecting the environment.
- NEPA no longer requires analysis of downstream impacts made possible by the activity, thus limiting the cumulative impacts NEPA requires to be considered.

<u>**Gap 2: Lack of Meaningful and Effective Public Engagement**</u>

- NEPA has long been criticized as creating a lengthy review process that does not meaningfully improve environmental outcomes.
- Dissatisfaction with effectiveness of public participation has led to the narrowing of the scope of review required under NEPA.

<u>**Gap 3: Inadequate Long-term Mitigation Requirements**</u>

- NEPA is understood as only procedural and does not have a substantive requirement that the agency take the least environmentally damaging actions.
- Since NEPA has been narrowed to a box checking exercise, it is unlikely that it will be effective at mitigating environmental harms as intended.

<u>**Gap 4: Fragmented Implementation Authority**</u>

- With CEQ's rules revoked, each federal agency will have to set its own rules for implementing NEPA.
- This creates potential for inconsistent environmental review standards across different agencies, complicating compliance for mining operators.

NWF Policy Recommendations for Responsible Private Land Mining

Recommendation 1: Require Single Comprehensive Environmental Assessment

- Congress should mandate a single comprehensive environmental assessment for all new or modified mining operations regardless of location on federal or private lands.
- This would eliminate gaps where private land operations escape federal review and reduce redundancy where mines straddle multiple jurisdictions.
- Establish clear thresholds for when assessments are required based on project size, environmental sensitivity, and cumulative regional impacts.

Recommendation 2: Require Implementation of Specific Mitigation Plans

- Federal agencies should require implementation of specific mitigation plans for environmental and social harms identified in the EIS as a condition of permit approval.
- Establish enforceable mitigation standards with clear metrics for success and penalties for non-compliance.
- Create bonding requirements that reflect the full cost of implementing mitigation measures over the life of the mine.

Recommendation 3: Modernize Community Engagement

- Modernize community engagement to promote efficient and effective environmental review while ensuring meaningful participation.
- Implement digital platforms for public comment that increase accessibility while maintaining substantive review requirements.
- Require responses to all substantive comments, not just material ones, following IRMA's best practices.

Recommendation 4: Establish Uniform Federal Standards

- Congress should clarify CEQ's authority to issue binding NEPA regulations or create a new coordinating body with clear statutory authority.
- Develop uniform standards that align with international best practices like IRMA while addressing U.S.-specific regulatory contexts.
- Create mechanisms for regular updates to environmental assessment requirements based on scientific advances and lessons learned.

Conclusion

America can be a leader in the clean energy transition while responsibly assessing and mitigating the impacts of critical mineral extraction. Comprehensive and expedient environmental assessment is necessary to achieve both these ends. Currently, U.S. law

governing environmental assessments falls short of international best practices for mining. U.S. policy could be improved by requiring a single comprehensive EIS for all new and modified mining projects regardless of location, requiring implementation of specific mitigation plans as a condition of completing an environmental assessment, modernizing the community engagement element to ensure timely and effective environmental review, and establishing uniform federal standards for NEPA implementation.

This paper was written with the assistance of the 2025 Fellows of the Dow Sustainability Program, University of Michigan. For more information, please contact Dr. Simone H. Stewart, Senior Industrial Policy Specialist StewartS@nwf.org

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CRITICAL MINERAL MINING ON U.S. PRIVATE LANDS: LABOR RIGHTS AND WORKING CONDITIONS

FACT SHEET

FEBRUARY 2026

Mining workers and communities near private land operations often face gaps in protections. In some regions, workers may earn wages below local living costs, and contractors sometimes lack basic safeguards. Opportunities for workers to participate in safety decisions can be limited, and communities may not always receive lasting economic benefits from mining. Some studies suggest that mines with strong labor standards have fewer injuries and greater workforce stability. Establishing living wage requirements, equal protections for contractors, worker safety committees, and community benefit agreements are key steps to advancing critical mineral development that protects both people and wildlife.

What Are Labor Rights in Critical Mineral Mining?

Labor rights in mining include essential protections that ensure safe, fair, and dignified jobs. These rights cover the ability to organize, earn a living wage, work in safe conditions, be free from discrimination, and participate in health and safety decisions. As the United States increases mining for lithium, copper, rare earths, and other critical minerals needed for clean energy, protecting worker rights is necessary to build reliable and responsible supply chains.

Critical mineral mining presents specific hazards for workers. Rare earth element extraction often involves toxic chemicals and may generate radioactive waste.[1] Copper mining can result in long-term exposure to silica dust, which is associated with

increased risk of respiratory disease.[2] Addressing these risks is necessary to protect worker health and safety. Key stakeholders include approximately 221,000 U.S. mining workers, many of whom are nearing retirement.[3]

What Are Community Safety Standards in Mineral Mining?

Strong community safety standards and benefit programs are essential for environmental justice in critical mineral development. Communities that host mining operations can face both environmental risks and economic challenges. Although these regions are resource-rich, some local communities report receiving limited lasting benefits and experiencing significant pollution and ecosystem degradation.
Without basic worker and community protections, there is an increased risk of reduced safety measures, lingering pollution, or economic boom-bust cycles that can negatively affect communities after mining ends.

Stable, well-paid jobs can empower workers to advocate for environmental safeguards and support company accountability for responsible operations and cleanup. The National Wildlife Federation supports mining practices that protect people and wildlife, aiming for a clean energy transition that benefits communities and conserves natural resources.

Why Labor Rights Matter for Private Land Mining

- **Regulatory gaps lead to inconsistent protections.** Mining on private land often does not require federal environmental review and is subject only to state oversight. In contrast, public land projects must comply with the National Environmental Policy Act. As a result, community protections vary by location.
- **Workforce stability supports supply chain security.** Labor disputes, high turnover, and worker shortages disrupt mineral production. The number of mining engineering programs in the U.S. fell from 25 to 14 between 1982 and 2014.[4] When Albemarle cut 300 jobs in Nevada in 2024, the region lost technical skills that require years to rebuild.[5]
- **Worker rights and environmental justice are linked.** Over half of global critical mineral projects impact Indigenous territories, and most U.S. lithium projects affect Tribal lands.[6] Nevada's Thacker Pass project highlights these issues: promises of job creation exist, but ongoing concerns about Tribal consultation, contractor protections, and environmental impacts remain.
- **Strong protections may contribute to competitiveness.** Some reports indicate that union mines have fewer serious injuries and lower fatality rates.[7] Paying living wages can help reduce turnover and support productivity.[8] Countries such

as Australia and Canada are often cited as examples of competitive mining industries with strong labor protections and safety standards.[9]

Current Policy and Gaps

Federal Framework

The National Labor Relations Act (1935) grants basic organizing rights but allows employer practices that are prohibited in other developed countries. The Fair Labor Standards Act establishes a $7.25 federal minimum wage (unchanged since 2009), which is well below the living costs in mining regions.[10] The Mine Safety and Health Act (MSHA) (1977) mandates inspections, but MSHA employs only about 1,800 inspectors nationwide.

State Variations and Private Land Gaps

Nevada, the leading lithium producer, has a minimum wage of $12.00, which is 50 percent below the $23.85 living wage for single adults.[11] Other mining states show similar trends. Arizona's minimum wage is $14.70, but union membership in mining is only 3.7 percent.[12] Minnesota has stronger protections, but private operations may opt out. Private land mines may be exempt from federal environmental reviews, are regulated only by state standards, and often lack requirements for equal treatment of contract workers.

Voluntary Standards

The Initiative for Responsible Mining Assurance (IRMA) is a globally recognized mining standard that sets best practices for environmental stewardship, Indigenous rights, community consent, and worker protections, requirements largely absent from U.S. private land mining regulations. For example, the IRMA Mining Standard requires companies to develop collaborative planning processes for benefit sharing and deliver community benefits. If requested by the community and not already provided by public authorities, IRMA requires that mining companies offer assistance to facilitate effective stakeholder engagement.[13]

Mining operators may also voluntarily negotiate community benefit agreements (CBAs). For example, the Good Neighbor Agreement at the Stillwater and East Boulder Mines in Montana is a unique agreement between the mine and three non-profit citizens groups which has been in place for 25 years. This legally binding agreement protects local watersheds from environmental degradation, mitigates impact of the influx of mine workers, provides local communities with access to information about the operation and sets aside company funding for mining and water experts to advise the local organizations.

Four Critical Policy Gaps

Gap 1: Living Wage Standards

Minimum Wage vs. Living Wage in Key Mining States

State	Minimum Wage	Living Wage (Single Adult)	Gap
Nevada	$12.00	$23.85	50%
Arizona	$14.70	$20.35	28%
Minnesota	$11.13	$19.42	43%

In key mining states, minimum wage falls significantly short of what single adults need to cover basic living costs, leaving workers in resource-rich regions struggling to make ends meet.

Union workers earn about 20 percent more than non-union workers, but private land mining operations are not required to pay wages that meet local living costs.[14] This wage gap forces mining workers to choose between multiple jobs, long commutes from more affordable areas, or inadequate housing, undermining both workforce stability and community well-being. When workers can't afford to live near job sites, companies face higher turnover, training costs, and difficulty recruiting skilled labor, while nearby communities miss out on the economic benefits that stable, well-paid employment brings.

Gap 2: Contractor Protections

Mining operations increasingly rely on contractors for workforce flexibility, which creates gaps in training, benefits, organizing rights, and accountability. The 2024 Department of Labor rule clarifies employee versus contractor status, but enforcement is challenging, especially when contractors work on-site for extended periods without employee protections.[15] These gaps leave contract workers more vulnerable to unsafe conditions and make it harder to hold companies accountable when injuries occur. Without equal protections, contractors often face higher injury rates and lack access to the health monitoring and grievance procedures that could prevent long-term harm—undermining both worker safety and the stability of the mining workforce.

Gap 3: Worker Safety Participation

Workers at private land mines often do not have a meaningful role in safety decisions. MSHA rules do not require worker-elected safety committees, individual authority to stop unsafe work, or worker participation in incident investigations. The International Labour Organization (ILO) establishes global workplace standards through conventions, binding international treaties that set minimum protections for workers. These eight core conventions cover fundamental rights including freedom of association, collective

bargaining, and workplace safety. The United States has ratified only 2 of 8 core ILO conventions, while most developed countries have ratified 6 to 8.

Gap 4: Community Benefit Planning and Coordination

Community opposition to mining operations often takes the form of activism, protests, and sometimes litigation over permitting decisions. While these actions can delay mining projects, they rarely lead to community influence over project design or benefits. As domestic mining expands to meet demand for critical minerals, voluntary collaboration between mining operators and communities will be essential to support community well-being.

NWF Policy Recommendations for Responsible Private Land Mining

Recommendation 1: Establish Living Wage Standards

- Amend the Fair Labor Standards Act to require essential mineral operations to pay wages that meet local living costs, using the MIT Living Wage Calculator as a benchmark, and provide additional compensation for hazardous work. States can adopt prevailing wage requirements for permitted or incentivized projects. Paying living wages reduces turnover and increases productivity, which can offset higher costs.

Recommendation 2: Ensure Equal Treatment of Contract Workers

- MSHA could require mining operations to provide contractors with the same safety training, equipment, grievance procedures, and health monitoring as direct employees. Sites with significant contractor workforces should certify compliance annually. Congress should clarify employee versus contractor classification for workers who spend extended periods on mine sites.

Recommendation 3: Expand Worker Safety Participation

- Operations should establish joint labor-management committees with elected worker representatives who have authority to address immediate dangers. Protect whistleblowers with financial rewards for reporting serious hazards and implement tougher anti-retaliation rules. Involve workers in accident investigations with access to independent experts.

Recommendation 4: Voluntarily Negotiated Community Benefit Agreements (CBAs)

- Mining operators and community groups should negotiate community benefit agreements to support community well-being while longer-term policy changes are developed. Although CBAs do not replace policy reform, they can be legally binding and include provisions for environmental protections, local hiring, and dispute resolution.

Conclusion

Labor rights, safe working conditions, and community health protections are essential for sustainable domestic critical mineral development. Mining has often left communities with environmental damage and economic hardship. Prioritizing strong labor standards can help build reliable supply chains and protect people and wildlife. Mines that provide fair wages, equal protections for contract workers, robust safety standards, and meaningful community benefit agreements support a just and beneficial clean energy transition. Achieving these goals will require action at the federal, state, and local levels, as well as voluntary adoption of best practices. The future of clean energy depends on mining that strengthens communities and natural environments.

This paper was written with the assistance of the 2025 Fellows of the Dow Sustainability Program, University of Michigan. For more information, please contact Dr. Simone H. Stewart, Senior Industrial Policy Specialist StewartS@nwf.org

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CRITICAL MINERAL MINING ON U.S. PRIVATE LANDS: WATER POLLUTION CONTROL AND WASTE MANAGEMENT

FACT SHEET

FEBRUARY 2026

One major environmental hazard associated with mining for critical minerals is the massive amounts of waste created and the creation of water pollution from that waste. Mining operations have generated vast quantities of waste (i.e. tailings, sludges, and residues) that contain toxic contaminants such as arsenic, mercury, and iron sulfide. These materials pose long-term risks to water resources through acid mine drainage and leaching, especially where legacy waste remains unmanaged. Currently, the US lacks a comprehensive framework for managing mine waste and the resulting water pollution. Instead, mine waste is largely exempt from the federal toxic substance control statutes. This leaves a patchwork of water pollution control laws and state specific mining permitting schemes to manage waste and water pollution.

What Are Water Pollution Control and Waste Management Standards?

Water pollution is one of the biggest problems mine waste creates. Mine wastes contain toxic contaminants like arsenic, mercury, and iron sulfide which interact with air, water, and microbes to create acid drainage that can leach into soil and waterways. Mine waste management and water pollution controls are two ways of managing the issue of acid mine drainage and the resulting water pollution. Waste management policies seek to regulate the disposal and storage of mine waste to prevent the release of hazardous materials from the waste. In contrast, water pollution controls seek to regulate the amount of pollutants entering waters by setting limits on the discharge of pollutants. Thus mine waste management regulations and water

pollution control policies can prevent acid mine drainage from contaminating drinking water and aquatic ecosystems.

Why Water Pollution and Waste Management Matter for Private Land Mining

- **Regulatory exemptions create protection gaps.** Congress exempted mine wastes from U.S. federal law that governs the creation and disposal of hazardous wastes until the Environmental Protection Agency (EPA) could assess the issue further. EPA later found most mine wastes do not constitute hazardous wastes and were thus not covered by the Act. Instead, acid mine drainage may be managed through water pollution discharge permits and a patchwork of state mining permitting schemes.
- **Historic mine waste sites are pollution hazards and are a missed opportunity for sustainable mineral recovery.** Legacy mine waste dating back over 200 years still lingers on the landscape unmanaged and unmonitored. This waste can contain valuable critical minerals that at the time of creation were uneconomical or technologically infeasible to recover. The U.S. is currently lacking but could be a leader in sustainable critical mineral sourcing by repurposing legacy mine wastes for critical mineral production.[1]
- **The Clean Water Act's (CWA) National Pollution Discharge Elimination System (NPDES) prevents some water pollution from mine waste but is insufficient to prevent acid mine drainage from occurring.** This issue is only exacerbated with recent rollbacks in the scope of the Clean Water Act, exposing millions of miles of streams and over 80 percent of wetlands to pollution without any federal discharge permit or oversight.

Current Policy and Gaps

Federal Framework

The Resource Conservation and Recovery Act (RCRA) is the primary federal statute that governs hazardous waste from creation to disposal. However, the Bevill Amendment exempted mine wastes from RCRA pending a determination by EPA that mine wastes should be regulated as hazardous wastes under the Act. EPA subsequently studied the issue and determined that 18 of the 20 types of mine waste studied were not hazardous and thus would not be regulated under the hazardous waste provision, Subtitle C, of RCRA. While mine wastes are excluded from regulation under RCRA, the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) may impose liability on mine operators for contamination cleanup if there is a release or threatened release of a covered substance. This scheme imposes post contamination liability and does nothing to regulate the creation of the contamination.

Historic mine sites that are contaminated are good candidates for clean up under CERCLA and other mine reclamation programs such as the Abandoned Hardrock Mine Reclamation (AHMR) program.[2]

Instead, water pollution from mine waste may be controlled through the NPDES permitting scheme. This scheme created by the CWA controls the discharge of pollution from point sources by setting effluent limitations for certain categories of pollutants and requiring that discharges of pollutants don't lead to the violation of those limitations. However, this system for controlling water pollution from mine waste is insufficient because it assumes some level of pollution discharge instead of requiring specific measures to ensure mine drainage is not created in the first place. Further, the NPDES program only applies to discharges into 'Waters of the United States' (WOTUS). WOTUS is a legal term of art in the CWA, the definition of which has been significantly narrowed over the last decade and the extent of which is currently subject to additional rulemaking expected to eliminate protection for even more streams. Since fewer waters are covered by the act than previously, mining operations may escape regulation if they are not near covered waters.[3]

State Variations and Private Land Gaps

While federal law largely fails to manage mine waste management, some states have stepped in to fill the gap. Siting of disposal sites on private lands may be subject to state permitting schemes and local land use laws. Some states may also have their own mine site reclamation programs.[4]

- **Michigan** - Michigan requires permits for non-ferrous and metallic mining. Part 632 of Michigan's Natural Resources and Environmental Protection Act (NREPA) requires nonferrous mining permit applicants to submit a detailed plan for mining and reclamation that will minimize the impacts of the operation with a special emphasis on preventing and controlling acid-mine drainage.[5]
- **Wisconsin** - Similar to Michigan, Wisconsin requires non-ferrous and metallic mining permits. Applications for these permits require the proposed operator to submit plans for the operation of mining waste facilities and reclamation plans.[6]
- **Nevada** - Nevada law focuses on water pollution control by requiring a zero discharge performance standard for any facility using chemicals for processing. Any operator of a mining, milling, or other beneficiation process must receive a Water Pollution Control Permit (WPCP) prior to construction whether or not a discharge of pollution is intended or not.[7]

Voluntary Standards

The Initiative for Responsible Mining Assurance (IRMA) is a globally focused non-profit that promotes environmentally responsible mining practices. IRMA's voluntary

standards require mitigation of identified risks from mine waste and requires management practices to be consistent with best available control technologies (BAT) and best available or applicable practices (BAP). Mitigation of risks shall align with the following hierarchy: First, priority should be given to source control measures that prevent generation of contaminants. Second, where source control is not practicable, mitigation control measures should be implemented to prevent or minimize movement of contaminants. IRMA also requires independent review of siting, design, or re-design of tailings storage facilities and other relevant mine waste facilities. IRMA requires that waters affected by mining projects be maintained at a quality enabling safe use for current purposes and potential future uses identified with stakeholders. IRMA recommends comprehensive monitoring and management during operations to identify contamination, adapt operations, and share performance data publicly.[8]

Four Critical Policy Gaps

Gap 1: No Comprehensive Cradle-to-Grave Regulation

- U.S. policy lacks a comprehensive scheme regulating the generation and disposal of mine wastes from cradle to grave. Mine wastes are excluded from regulation under RCRA through the Bevill Amendment.
- Mine waste containing toxic contaminants like arsenic, mercury, and iron sulfide can react with air, water, and microbes to create acid drainage that can leach into soil and waterways. Legacy mine waste dating back over 200 years still lingers on the landscape unmanaged and unmonitored.

Gap 2: Shrinking Number of Waters Covered by Federal CWA Requirements

- The CWA's extensive point source pollution regulation only applies to 'Waters of the United States' (WOTUS), which is a legal term of art, the definition of which has been significantly narrowed in recent years.
- With fewer waterbodies covered by the CWA, the potential for unregulated discharges of pollution from mines increases. Since the water cycle is complex and interconnected, pollution in non-jurisdictional waters will lead to degradation of other waters.

Gap 3: Missed Opportunities for Critical Mineral Recovery

- While comparison of U.S. law to IRMA best practices largely highlights the insufficiency of management of mine waste in the U.S., it does not highlight how mine waste can also be a valuable source of critical minerals.
- Legacy mine waste containing valuable critical minerals that were uneconomical or technologically infeasible to recover at the time of creation remains unutilized. The U.S. is missing an opportunity to be a leader in sustainable critical

mineral sourcing by repurposing legacy mine wastes for critical mineral production.

Gap 4: No Independent Review of Waste Facilities

- There is no overarching federal requirement for independent review of siting, design, or redesign of tailings and mine waste storage facilities on private and working lands.
- Without independent review, waste facilities may be inadequately designed or sited, increasing the risk of catastrophic failures. The lack of third-party verification creates potential conflicts of interest in facility design and safety assessments.

NWF Policy Recommendations for Responsible Private Land Mining

Recommendation 1: Regulate Mine Waste Under RCRA

- While the Bevill amendment excluded mine wastes from regulation under RCRA pending study and final regulatory decision by EPA, the act does not preclude EPA from regulating mine wastes under RCRA. EPA could, in theory, conduct a new study and regulate mine wastes if it found that such wastes were a risk to human health and the environment.
- Congress should clarify EPA's authority to regulate mine waste or pass legislation specifically addressing mine waste management with clear standards for characterization, handling, and disposal.
- Establish specific requirements for waste characterization that consider both disposal location and source material to determine potential for acid rock drainage or metals leaching.

Recommendation 2: Prevent Further Erosion of the CWA's Reach

- Address the shrinking definition of WOTUS by commenting on the EPA's proposed rule revising the definition of "waters of the United States."
- Lay groundwork to prevent and reverse the narrowing of the CWA's regulatory jurisdiction by advocating for a congressional amendment to the CWA defining WOTUS at the statutory level.
- Recognize that the water cycle is complex and interconnected, and pollution in or loss of non-jurisdictional waters may lead to degradation of other waters.
- Support state and Tribal efforts to enact or strengthen protections for waters, including through increasing funding for key federal wetland conservation programs, including EPA's Wetland Program Development Grants Program.
- Support states that already regulate more waters than the federal standard and encourage other states to follow.

Recommendation 3: Incentivize Critical Mineral Extraction from Mine Wastes

- A federal policy promoting R&D of technologies for extracting critical minerals from mine wastes and incentivizing deployment of these technologies would be both environmentally sustainable and politically feasible.
- Extracting critical minerals from domestic mine wastes would align with the Trump administration's goals of shoring up domestic critical mineral production to enhance the US economy and provide for national security.
- Create tax incentives and grants for companies developing and deploying technologies to extract critical minerals from legacy waste sites.

Recommendation 4: Establish Independent Review Requirements

- Mandate independent third-party review of siting, design, or re-design of tailings storage facilities and other relevant mine waste facilities, following IRMA best practices.
- Create certification requirements for independent reviewers with specific expertise in geotechnical engineering and waste facility design.
- Implement ongoing independent monitoring and inspection requirements throughout the life of waste facilities.

Conclusion

In sum, mine waste presents a significant problem for water resources by creating acid mine drainage. Acid mine drainage is not fully managed by waste management laws or water pollution control laws. As the U.S. looks to become a leader in the production of critical minerals it is imperative that policy is strengthened to manage mine drainage before more is created. Further, historic mine sites need to be managed to prevent further environmental degradation and can be leveraged as an asset with new technologies designed to extract critical minerals that are left behind in mine waste.

This paper was written with the assistance of the 2025 Fellows of the Dow Sustainability Program, University of Michigan. For more information, please contact Dr. Simone H. Stewart, Senior Industrial Policy Specialist StewartS@nwf.org

Cover page: Berkeley Pit in Butte Montana is a former copper and rare earths mine polluted with arsenic, cadmium, and acid. AP Photo/Matt Volz, File

Endnotes

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