

Due Diligence in the Sierra Nevada Gold Country

NEW TOOLS TO REMEDIATE CALIFORNIA'S ABANDONED MINES

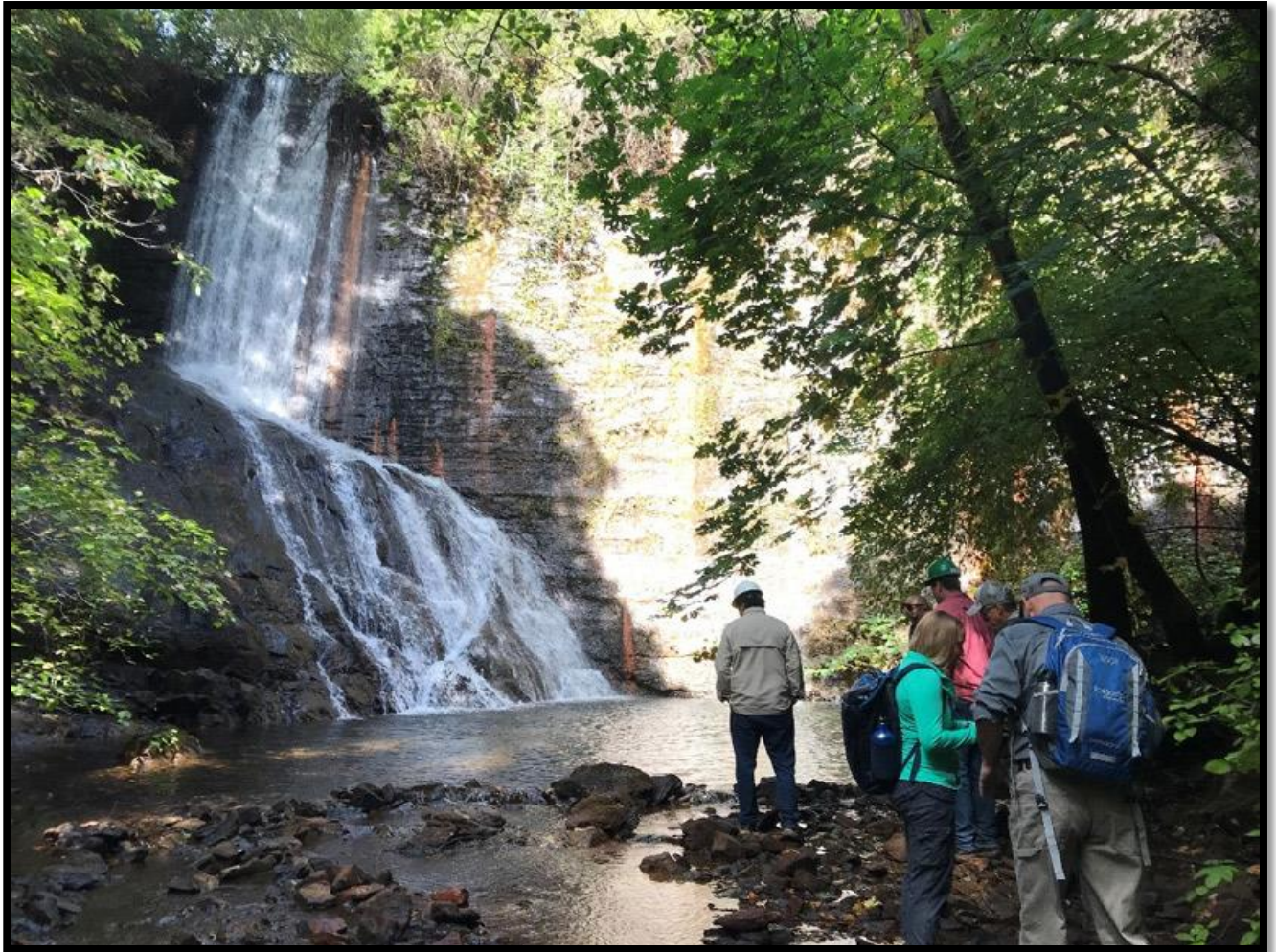


Photo: Deteriorating Willow Creek debris control dam built to hold back mine tailings more than a century ago. The “waterfall” is the creek flowing through the erosion that is undercutting the dam face. Tahoe National Forest, Sierra County.

A Project of The Sierra Fund

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Due Diligence (Definition): *reasonable steps taken by a person in order to satisfy a legal requirement, especially in buying or selling something; or a comprehensive appraisal undertaken by a prospective buyer, especially to establish its assets and liabilities and evaluate its commercial potential.*

Remediation (Definition): *the action of remedying something, in particular of reversing or stopping environmental damage from mining.*

(Oxford Dictionary)



*Historic Jackson High School, built 1913 in
downtown Jackson, California*

*Built directly downstream from the
Argonaut Mine debris control dam*

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*Main stem Yuba River with the “goldfields” in the distance
“Mercury Tour” participants, part of The Sierra Fund “Reclaiming the Sierra” Conference
November 2019*

INTRODUCTION: Transforming the Legacy of the Gold Rush

National and state leaders have called for increasing the pace and scale of abandoned mine remediation, but precisely *how* to do this has been unclear - until now. *Improved due diligence protocols as part of projects on abandoned mine lands will build market and public confidence to invest in these landscapes – and therefore increase public and private investment in cleaning up legacy mines.*

We *can* increase the pace and scale of mine remediation and transform the legacy of the Gold Rush from widespread pollution into economic innovation and restoration of the landscapes and communities of the Sierra Nevada – and the rest of the state. This report outlines practical steps that can be taken immediately to protect public health and restore significant lands, forest, and rivers by stimulating the cleanup of abandoned mine lands (AMLs), a legacy of California's 19th century gold rush. A project of The Sierra Fund's (TSF) Environmentally Healthy Communities and Ecosystem Resiliency Programs, its purpose is to remediate mining hazards so that communities both in the Sierra headwaters and downstream have clean water, soil and air and are healthy places to live, work, and prosper. By improving due diligence on AMLs:

- Appropriate end-use(s) can be identified.
- Remediation actions can be incentivized and pursued.
- Forests and meadows with abandoned mines can be remediated to highest and best uses.
- Liability for chemical and physical hazards can be clarified.
- Tribal organizations can secure and restore important cultural resources.
- Conservation of key landscapes can be facilitated.

The report includes a summary of the dangerous impacts of legacy mining activities on the health and landscapes of today's Gold Country communities. It reviews the current practices of assessment, appraisal, acquisition and project management that must be improved to protect public health and investment by both taxpayers and the private sector. Obstacles to progress are identified, and specific recommendations for action are provided. A new model of due diligence prior to taking action on lands with abandoned mines is presented. Policy recommendations to increase the pace and scale of abandoned mine remediation are described. Case studies underscore the need for improved due diligence for projects on AMLs. (See Figure I: Report Objectives page 2.)

The Sierra Fund directs this report to decision makers with jurisdiction over acquisition or management of AMLs, including local, state, federal and tribal governments; businesses, developers, lenders and investors; and land trusts and other non-profit organizations.

“Our mission is nothing less than alchemy: transforming the toxic legacy of the Gold Rush into thriving landscapes and vibrant communities in the Sierra Nevada, with significant downstream benefits.”

Elizabeth “Izzy” Martin, Chief Executive Officer, The Sierra Fund

Figure 1: Due Diligence in the Gold Country Report Goals & Objectives

Goal: Improve due diligence during acquisitions and project permitting on AMLs.

1. Inform *decision-making* for investment of public and private funds for acquisition, conservation easements or development entitlements on AMLs for public benefit projects.
2. Improve land acquisition and project *proposals* by governmental agencies or non-profit organizations investing in AMLs.
3. Reform *appraisal practices* to ensure that detrimental conditions of AMLs are adequately reflected in appraisal values.
4. Alert *public and private investors* regarding potential liability issues and the need for improved due diligence when acquiring or doing projects on AMLs.
5. Design acquisitions, easements and projects on AMLs to *clarify liability* issues.
6. Engage *tribal and native people's leaders* early to protect and restore cultural resources.

Goal: Strengthen public policy to increase pace & scale of AML remediation.

1. Strengthen requirements for environmental review including Informed Assessment on AMLs prior to acquisition, project design, environmental permitting and implementation.
2. Prioritize *protection of public and landscape health* when developing AMLs for conservation and recreational activities.
3. Requires governmental permits to identify, assess and remediate AMLs as needed.
4. Design *multi-benefit projects* on AMLs on public lands to include mine remediation.
5. Increase resources and funding needed to increase pace and scale of AML remediation.

TSF's Elizabeth "Izzy" Martin, CEO
Speaking in front of hydraulically mine-carved cliffs
and pond at Blue Point Mine,
a legacy hydraulic mine in Yuba County.

Reclaiming the Sierra Conference Mercury Tour
November 2019



THE GOLD RUSH: What Happened?

Before the Gold Rush of 1849, the West was home to hundreds of thousands of native people who lived in concert with the landscape for millennia. More than 170 years ago, explorers from around the world began finding gold in what is now known as California, ultimately unleashing an extremely rapid and violent land grab. Over the decades that followed, millions of people from all over the world poured into every corner of the state. Native Californians were forced off the land and almost exterminated to accommodate new settlers and industry.

Entire ecosystems were decimated in the hunt for gold. Every place from north to south and east to west was impacted, but ground zero was the Sierra Nevada. Its forests were cut to timber the mines and build the towns that were home to the gold and silver mines that straddled both sides of the mountains. Rivers were dammed, and hundreds of miles of ditches and canals were dug to convey water that was used to power hydraulic monitors. These “water cannons” washed away mountains to access ancient river deposits containing gold. Toxic substances such as cyanide and mercury were used to process the gold and then left behind in the waterways, mine tunnels and leach heaps. Hard rock mines tunneled hundreds of miles underground through rocks loaded with arsenic, asbestos and other toxic metals that were brought to the surface, crushed and distributed across the landscape. Cities sprang up across the headwaters as immigrants from around the world flooded in to work in the mines and settle the towns.

When the price of gold fell in the early 20th Century and the mines began to close, communities continued to grow on and around these sites of industry. As a result, mine-scarred or abandoned mine lands are found in, around and beneath communities throughout California and Nevada, including the Coast Ranges, the desert, and the Gold Country regions of the Sierra Nevada, Siskiyou and Trinity mountains.

The 20th century brought more change to the region. Residents of these historic mining-towns, steeped in the culture of the Gold Country, literally ignored the presence of the mines as they began building houses, schools and towns. In absence of the ability to visually detect the chemical or physical hazards at legacy mine sites, many AMLs were subdivided and developed for California’s exploding population. Most land transactions, such as the purchase of a house, did not address the problems associated with legacy mines and toxic mine features in even a rudimentary way during escrow. For decades, plumes of yellow and orange sediment flowing in the rivers (from abandoned mine effluent) was considered “normal.”

Current residents of the Gold Country are living on top of and surrounded by abandoned mines. Many are unaware of the hazards that are right under their feet.

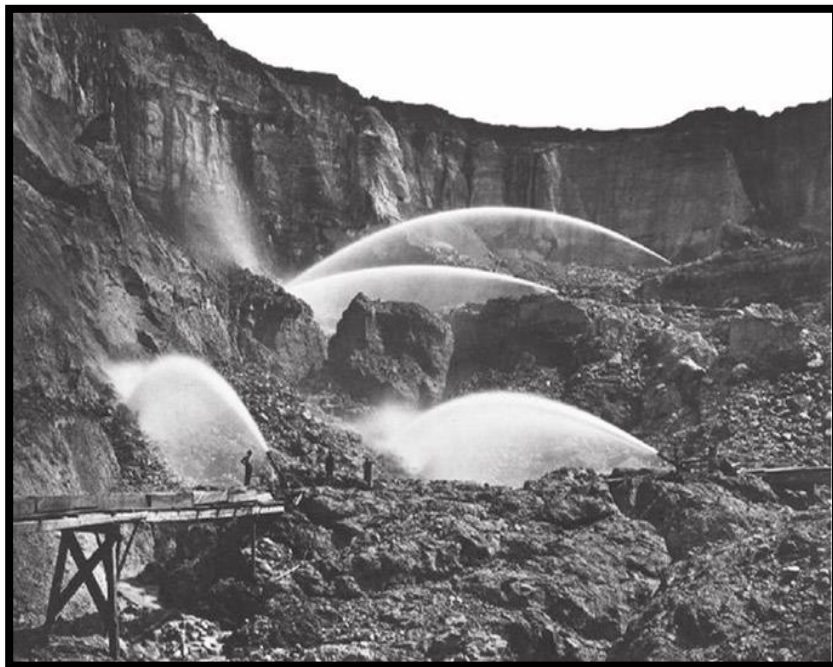
Impact on the People and the Place

The vicious impact of the Gold Mining era on the native *peoples* who lived at ground zero of the Gold Rush has also changed the *place*. Over the last several decades native people have begun to be more public about their traditional methods for tending the forests, meadows and rivers, re-introducing the stewardship practices that enhanced this landscape's resiliency and livability for millennia.

Denying opportunities for native people's cultural practices on the land has led to the creation of unhealthy and dense forests that burden communities with uncontrollable fire risk and unhealthy air; compromised fisheries and meadow ecosystems; and led to other threats to ecological well-being. This lack of inclusion, on top of the brutal history, has created a gulf that can be difficult to cross.

Native people have been and remain the most vulnerable people in the Sierra. Some

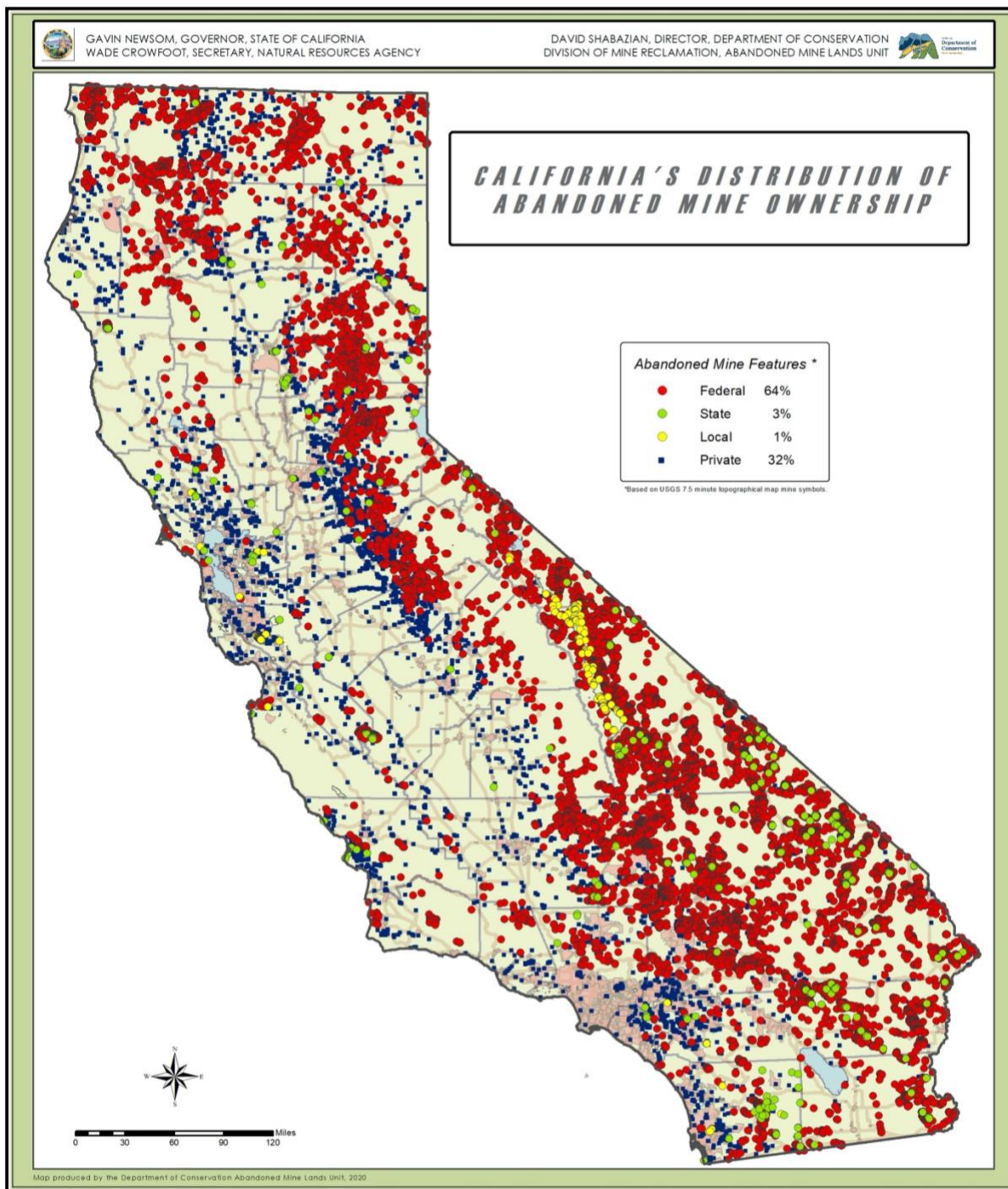
Tribes in the region are federally recognized, which comes with tribally controlled trust land and benefit programs that range from health care to housing. Many other California native people are members of traditional tribes that are not part of the federally recognized system. In most cases these Tribes have no land base where they can practice their own ways.



Historic Mining Methods

Mining and mineral-processing practices of the past were not subject to today's environmental standards. Their destructive methods resulted in extensive contamination to the land and waters of California that have not diminished with time. The California Department of Conservation estimates that there are more than 40,000 abandoned mine features in California.¹ (see Map of Abandoned Mine features, page 5).

Millions of ounces of gold were extracted from the Sierra Nevada "mother lode" during the 19th and 20th centuries using two different techniques: *hydraulic* and *hard-rock* mining. In this report, *abandoned mine lands (AMLs)* refers lands impacted by both hydraulic and hardrock mining sites and features. **Hydraulic Mining** consisted of using large water monitors, or cannons, to wash away hillsides and access ancient riverbed deposits. Hydraulic mining was unregulated from its invention around 1854 until 1884. During this 30-year period of time, an estimated 1.2 billion cubic yards of sediment was washed from the mountainsides into streams and rivers, and millions of pounds of mercury were used to help recover fine-grain gold from the slurry



created by hydraulic monitors. These mercury-contaminated materials were ultimately deposited in the Delta and San Francisco Bay, where they remain today.

Hydraulic mining methods were targeted in 1884 by the “Sawyer Decision” after a lawsuit filed by downstream farmers over damages to their land from floods of mud and debris. Hydraulic mining temporarily ceased. A decade later, the Caminetti Act of 1893 permitted hydraulic

mining to resume under regulations requiring that sediment and mine debris be held back by debris control dams permitted by the California Debris Control Commission. The US Army Corps of Engineers built two large debris control dams to hold back mining debris: Englebright Dam on the Yuba River, and North Fork Dam on the American River, both completed by 1941. Many more small dams were built to control dispersed hydraulic mine debris.

*Today, debris control dams are a common feature of abandoned mine lands in the Gold Country. Antiquated and deteriorating debris control dams are still in place, full of mercury-laden hydraulic mining debris. These long abandoned and modern tailings impoundments pose a special threat. Many were built with logs and are at risk of near-term or imminent collapse. The collapse of even a small debris control dam could release large volumes of sediment and heavy metals into rivers, putting infrastructure, reservoirs, hydroelectric facilities, as well as human lives, in jeopardy. Unmaintained and poorly maintained tailings impoundment dams have failed worldwide, causing loss of life and spectacularly severe environmental damage.*²

In addition to debris control dams built to hold back sediment, many reservoirs that provide valuable uses such as water storage and hydroelectric generation are located downstream from legacy hydraulic mines. These reservoirs continue to fill up with mercury-contaminated gravels and sands flowing downstream from hydraulic mines. Many reservoirs are losing operational and storage capacity and experiencing water quality impacts as a result.³

Hard Rock Mining chased gold-bearing quartz veins deep underground by excavating adits, tunnels, and shafts. Hundreds of miles of tunnels were drilled and blown through rock thousands of feet underground. Miners brought rock, containing gold alongside elevated levels of naturally occurring heavy metals such as arsenic and lead, to the surface. The gold-bearing rock was pulverized by stamp mills so that the fine-grained gold could be removed using mercury or cyanide. The processed material was deposited in tailings piles and impoundments. The contaminated waste rock was sometimes used as construction material. Otherwise, it was left in enormous stacks and piles of loose rock.

Two Types of Hazards

AMLs with legacy hydraulic and hard rock mines often have **physical** and **chemical** hazards that pose a risk to human health and the environment.

Physical Hazards: These include dangerous mine openings such as shafts and adits, glory holes, subsidence pits, collapsing walls, hidden shafts, and deteriorating debris control dams, as well as eroding cliffs or unstable piles of mine tailings and waste rock. Hard rock mines site can have underground workings that can cause ground subsidence and collapse for miles around. Other safety hazards include falling rocks, dilapidated buildings and structures, mechanical and electrical equipment, unstable ground, and tram cables. Blasting caps or dynamite left behind can be extremely unstable and may detonate at any time.

The California Department of Conservation estimates that thirty-eight percent of the mines in the state have hazardous opening(s). The leading acute cause of injury and death at abandoned mines is by falling into mine openings. Open shafts pose hazards to children and wildlife, and tailings piles continue to release toxics into dust and to contaminate streams and rivers. At the

The Sierra Fund: New Tools to Remediate California's Abandoned Mines

surface, features may be completely unprotected, hidden by vegetation, or covered by rotting boards. Physical hazards are sometimes discovered by accident - such as when a mine tunnel collapses, on occasion swallowing a home.⁴

Chemical Hazards: About 12% of the abandoned mine features are estimated to have chemical hazards on site. ⁵ At many abandoned hard rock mines, unrecovered minerals and metals in sediment, waste rock, and tailings at hydraulic and hard rock mines continue to be released into the environment, resulting in ongoing chemical hazards. Mine water from adits and shafts and mine pits is often acidic, requiring perpetual and expensive treatment if it is discharging into surface water.

Common chemical hazards associated with AMLs include the following:

Mercury was imported from the coast of California to the Gold Country for use in gold processing. Millions of pounds of mercury remain trapped in sediment from hydraulic mines and mill sands at hard rock mines. Mercury continues to wash off of mines sites into rivers and streams during storm events. Even a small amount of mercury can methylate into a bioavailable form and enter the food web, ultimately contaminating local and ocean fisheries and putting people, birds, and wildlife at risk of exposure.⁶



Humans are exposed to mercury, a developmental neurotoxin, primarily through eating fish. Sensitive populations include women of childbearing age and children as well as groups who consume fish at a higher rate than the general population, such as for cultural or subsistence diets, including homeless people. Mercury is considered one of the most dangerous toxic materials in the world because it bioaccumulates in many living beings including humans, as well as becomes increasingly concentrated as it moves up the food chain. The California's Office of Environmental Health Hazards Assessment (OEHHA) has published fish consumption advisories to limit exposure to mercury.⁷ (Learn more about TSF program to protect public health by posting fish consumption advisories at popular fishing holes [here](#).)

Mine Drainage can devastate watersheds and aquatic life in particular if it is acidic and carries dissolved metals such as copper and zinc in solution (known as acid mine drainage). Mining exposes sulfide minerals to air and water, resulting in sulfide oxidation. Oxidized minerals are highly soluble and may contain toxic metals and metalloids. Water flowing through mine works, *The Sierra Fund: New Tools to Remediate California's Abandoned Mines*

waste rock piles and tailings can dissolve these minerals, becoming metal rich and acidic. Contamination (and associated liability) from mine drainage has been found all the way from the San Francisco Bay/Delta back upstream into the Sierra Nevada Gold Country, headwaters of the state.

Contaminated Dust occurs where rock disturbed by mining contained naturally occurring hazards such as arsenic, asbestos fibers, and lead. Mining operations excavated, crushed, piled, and spread contaminated rock. Ingesting or inhaling the dust during recreational, occupational (forestry, construction, firefighting) and other activities can result in exposure to carcinogens and neurotoxins and cause physical damage to lung tissue.

Hidden Risks, Hidden Liabilities

Many current and hopeful landowners are unaware of the potential dangers that are associated with the purchase of property with abandoned mine hazards. Gold Rush communities celebrate their mining past but are ignorant about its ongoing impacts. The ignorance is widespread:

- *Developers* secure funding to develop on AMLs without disclosing to their investors the existence of the mines on the property being purchased with their money.
- *Banks* loan money for land and development transactions without seeming to care about the existence or potential liability associated with the mining features on it.
- *Government agencies* approve development plans for recreation, housing, water, roads and more without taking into consideration potentially dangerous mining features.

Continued population growth in California will only exacerbate these trends. On top of increasing development pressure across the region, as the demand for public recreational and open spaces grows, the potential for increased public ownership or development on AMLs increases. In some cases, AMLs have already been purchased by or donated to governmental or non-profit organizations so that these landscapes can be managed and used for recreation, habitat or schools.

Lands long owned by a governmental or non-profit organization may have hidden or ignored hazards that pose a real threat to public health and safety. In this report we document a handful of the many hundreds of examples where the current “due diligence” process has not worked to protect buyers – whether public or private – from acquiring or developing on dangerous or contaminated AMLs. It has also not prevented projects from being developed on AMLs that expose the public to danger or fail to remediate the obvious hazards on site.

PROTECTING THE PUBLIC FROM LEGACY MINE HAZARDS

This report provides a guidance framework for government agencies, non-profit groups, and landowners. **It recommends two key actions:**

Action #1: Improve Due Diligence Protocols on Projects on AMLs

The Sierra Fund has developed a new Model of Due Diligence to be used for decision-making PRIOR to land acquisition or project development on AMLs. These protocols rely on:

- A. **Informed Assessment** to identify, assess, prioritize and design any needed remediation activities based on physical and chemical hazards found on the land.
- B. **Accurate appraisal** of property to ensure that an appropriate price is paid for realistic uses of the property.
- C. **Clear and well understand liability** when acquiring and/or developing projects on AMLs.

Action #2: Increase Pace & Scale of Mine Remediation

- A. **Enact New Policies to Incentivize Mine Remediation** at the local, state and federal level by providing funding and resources needed to increase the pace and scale of mine remediation.
- B. **Include AML Assessment & Remediation** as part of permitting publicly funded projects on AMLs, including forest health projects



TSF staff member Laura Carroll doing field work on Humbug Creek

Case Study: Tailings Dam in Jackson

Historic schools built around dangerous mine features 8

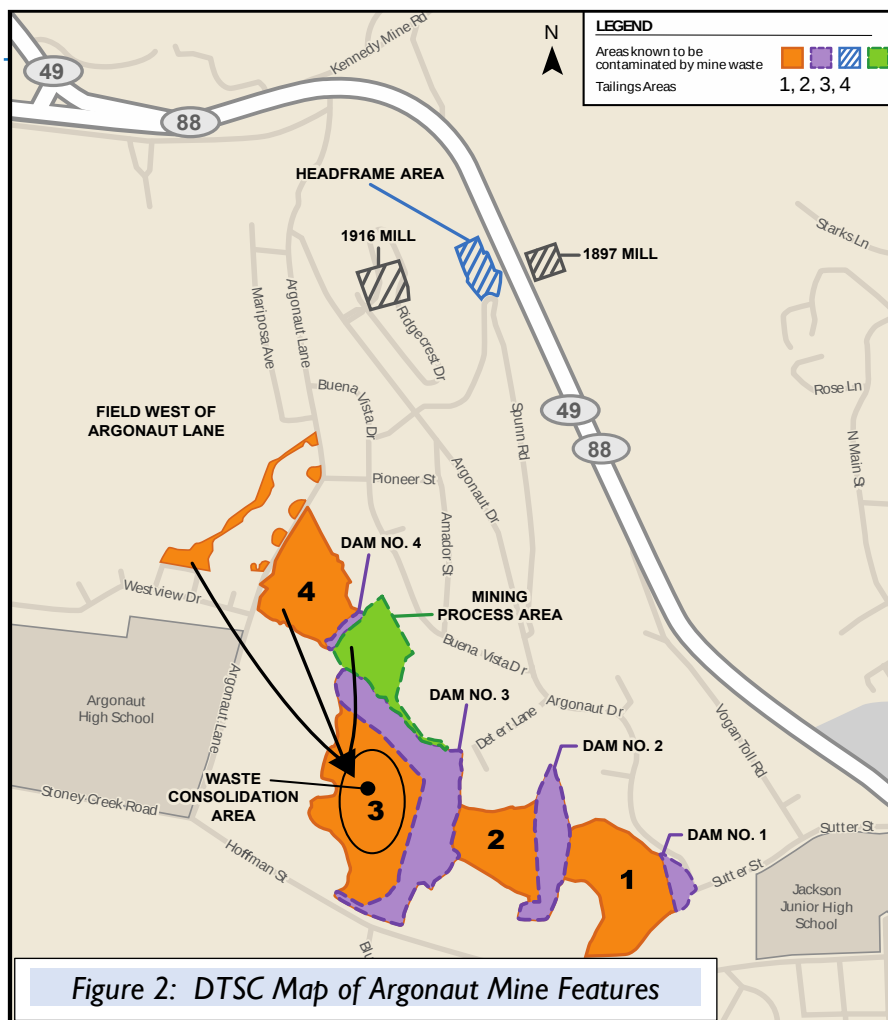


Figure 2: DTSC Map of Argonaut Mine Features

The Argonaut Mine was an historic hard rock gold mine that operated from the 1850s to 1942. It became briefly infamous in 1922 when 47 gold miners died after being trapped underground after an explosion.

The Argonaut Mining Company processed ore and disposed of tailings in a portion of the northwest side of what is present-day Jackson, CA. The mine included a unique tailings dam in the drainage above the town.

This dam was clearly visible in 1913 when Jackson High School was built – directly downstream from the arched concrete tailings dam that was part of the

mine. In 1990 the town planners built the new Argonaut High School above the areas “known to be contaminated with mine waste.” They also built a new Jackson Junior High School built upstream from old Jackson High School and still directly downstream from Dam No. 1 (see new Junior High School, shown on the map at left).

In 2007 the California Department of Toxic Substances (DTSC) began site characterization of the abandoned Argonaut Gold Mine (click [here](#) for their reports). They discovered that portions of the site's soil have high levels of arsenic, lead, mercury, and other metals.⁹ Over the last decade government agencies have examined the mine and its various features. In 2015, the US Army Corps of Engineers determined that the concrete Dam #1 was unstable and had potential for a catastrophic failure that would result in over a \$100 million in damages and possible loss of life. They determined that, if it collapsed, the material behind the dam could have washed down the creek, through the Junior High School and right into downtown Jackson. An emergency action to retrofit the dam was completed in 2018. The EPA is still deliberating between several actions to remediate the site ranging from \$10 - \$70 million.

Action #1: Improve Due Diligence Protocols on AMLs

A. TSF's Informed Assessment Methods for AMLs

Many acquisitions of AMLs by public agencies and non-profit organizations occurred before the impacts associated with legacy mines were well-understood. Even in more recent acquisitions, the potential physical and chemical hazards of mine-impacted lands have passed under the radar of decision makers. As a result, many public and private organizations have purchased (or been given) property without being aware of the potential hazards on the property.

Some examples of AMLs now owned by public agencies in California:

- Englebright Dam (debris control dam on Yuba River) was completed by the California Debris Commission in 1941 and now owned by the US Army Corps of Engineers.
- Bodie State Historic Park (hard rock gold mine) acquired by State Parks in 1962.
- Spenceville Wildlife Refuge (legacy hard rock copper mine) acquired by Department of Fish & Wildlife in 1962.
- Joshua Tree National Park (legacy gold and mineral mines) acquired by the National Park Service in 1994.
- Hirschman's Pond (legacy hydraulic mine feature) acquired by Nevada City in 2003.

Current Assessment Practices

State and federal governments have long required that property be evaluated prior to subdivision or development. Many government grants for public acquisition of land require assessment prior to finalizing grants. If these assessments fail to identify physical and/or chemical hazards that are present, this could create public and ecosystem health and/or liability issues. Incomplete or inadequate assessments leave both public investment and well-being at risk.

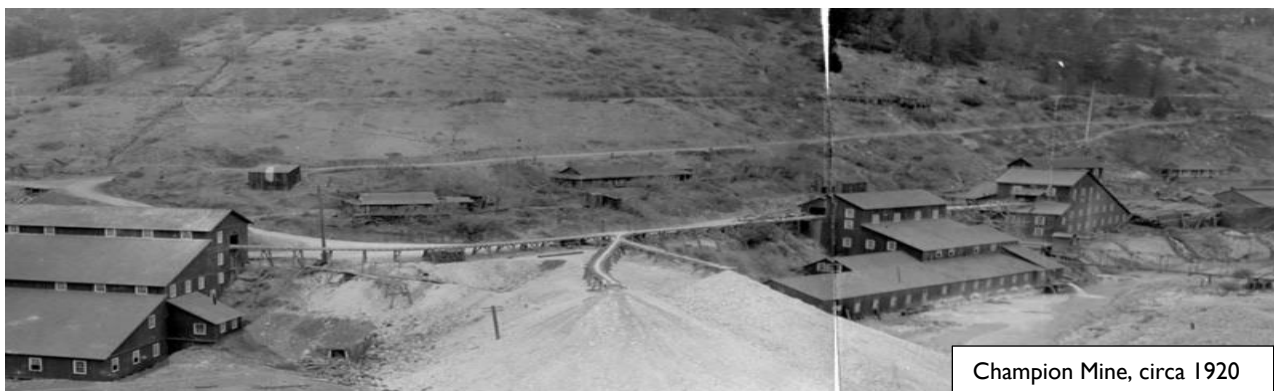
The purpose of an AML assessment is to determine the extent and concentration of potential contaminants of concern as well as potential physical hazards on the site. In California, current assessment protocols have historically relied on review of the deed and title for evidence of mining on the property. Title documents can only reflect what someone has recorded to that title. Currently, the only way legacy mining, or the presence of minerals, can be noted on a title is if someone in title has reserved the minerals or deeded them separate from the fee. This is only an indication that mining may have or could take place. This “paper review” is usually complemented by a physical survey of the property and an interview of the property owner.

Many properties undergo an “all appropriate inquiry” (AAI) as environmental review under the California Environmental Quality Act (CEQA) prior to acquisition (See Appendix 3) for a more detailed explanation of this process). The AAI process is also a paper review and may record

Case Study: Champion Mine

“TSF pilot project to explore best practices for due diligence”

The **Champion Mine** is a historic hard rock gold mine on Deer Creek just outside of Nevada City, California. At the height of its operation the Champion and Providence mines joined



Champion Mine, circa 1920

underground, under the creek, to become the largest hard rock gold mine in Nevada City. The historic Providence-Champion mine complex operated for upwards of 68 years. Innovative mining techniques, such as the invention of chlorination treatment to improve gold recovery from the ore, were developed at this site. Over the course of five years, The Sierra Fund collaborated with the property owner, a cultural archeologist, contractors from the United States Environmental Protection Agency (EPA), local Tribal leaders and an environmental engineering firm to evaluate the property prior to successful acquisition in 2018. The California

Heritage: Indigenous Research Project (CHIRP), a tribally guided non-profit now owns this property and is engaged in a planning project for restoration of the site using principles of traditional ecological knowledge (TEK).

Many of the ideas presented in this report were developed as a result of this project, including those impacting assessment, appraisal, managing liability during purchase, as well as improving public policy to increase the pace and scale of mine remediation. For a more thorough explanation of this years-long assessment and acquisition project, see Appendix I.

The Sierra Fund and contractor of the United States Environmental Protection Agency Targeted Brownfield Assessment Program sampling at the location of the former Champion Mine, a hard rock mine located just outside of Nevada City, California in 2017.



the start and end date of a mine that was in operation on the site. It does not include on-the-ground identification of physical hazards or environmental sampling and analysis to quantify the level and extent of chemical hazards. The records reviewed are often out of date and may not correctly identify hazards as currently understood. In some cases, where there is visual evidence of mine impacts, the assessment might go a step further to map physical hazards or take soil samples to look for soil contamination from mining activities. Engineering firms in the Gold Country use standard soil and water sampling methods and compare these results to standards outlined by the Agency for Toxic Substances and Disease Registry (ATSDR) and the California Department of Toxic Substances Control (DTSC).

These samples are usually taken “randomly” and not representative of the entire site. Water samples are also typically taken randomly versus “storm event sampling.” There are no criteria establishing that the sampling be representative of the site conditions. The sampling strategy is left up to the discretion of the person doing the assessment.

Not Finding Problems: Using these traditional but outdated sampling protocols has, in many cases, resulted in assessments that have failed to identify, characterize or even understand serious physical and chemical hazards that are present on a site. As a result, while owners of AMLs may be aware that mining occurred on the land, they are often unaware of the potential risks, in particular because levels of contamination associated with chemical hazards can be difficult to assess.

Whether land has already been developed or not, it may contain physical and chemical hazards associated with legacy mines. It is not uncommon in the Gold Country to discover toxic soil or an egregious water quality problem *after acquisition*. Too often, simplified due diligence processes have led public agencies or non-profit organizations to purchase properties with “undiscovered” dangerous features that threaten public health – thereby creating unforeseen or cost prohibitive liabilities for the new owners.

Over many decades environmental laws have been updated to require more rigorous evaluation of land prior to purchase and development, especially for lands with obvious hazards such as former industrial or military sites. However, the physical and chemical hazards associated with AMLs have often been overlooked or considered a less egregious risk.

It is clear that current assessment protocols are inconsistently applied, porous, and completely out of date. The current assessment protocols have allowed many costly and questionable transactions to move legally through the system, resulting in dramatic implications for public treasure, private investors and lenders, public health, and ongoing environmental impacts.

Obstacles to Improved Assessment Practices

- I. Informed Assessment is not currently required:** Acquisitions for habitat or recreation do not usually trigger assessment under CEQA. Many conservation acquisitions and projects are planned and completed without doing Informed Assessment because it is not required by grant makers, bankers or other investors.

2. **Increased Assessment Costs:** In some cases, governmental grants for acquisition severely restrict expenditures for assessment, especially for costs such as cultural evaluation, hazards assessment, and environmental sampling - all components of an Informed Assessment. The cost of environmental sampling and analysis can be high, especially if it involves event-based (storm) sampling and using laboratories certified for trace metals analysis. Grants that fund acquisition transactions often will not pay for these sorts of sampling costs. In contrast, the cost of doing a biological assessment for threatened and endangered species can be included in state-funded conservation grants..
3. **Monitoring** for mercury and other heavy metals is difficult and not required as part of chemical hazards assessment and environmental sampling and analysis prior to acquisition:
 - a. Currently, there is no requirement to conduct event-based trace level sampling for mercury or other metals in discharges. Most of the time if any samples are taken they are taken at baseflow conditions. Thus, they fail to detect the most likely and most serious contamination events which typically occur during storms.
 - b. Event based sampling for mercury or other metals in discharge involves accessing drainage areas during times of runoff when it is raining and can be very difficult in remote locations.

Case Study: Banner Lava Cap Mine
“Developer’s legal responsibility to disclose AMLs to investors”

The Banner Lava Cap Superfund Site¹⁰ started off as a proposed high-end housing development on a large abandoned mine site on the border of Grass Valley, California. This beautiful parcel had some roads, nice flat places, a “pond” and a creek. The CEQA checklist found no problems that couldn’t be mitigated to beneath significance. Environmental engineering firms reported minor concerns that could be easily fixed. Various appraisals were done, and investors raised millions of dollars for the project. A subdivision map of the development was approved by the Nevada County Planning Department. And then:

- the pond’s “dam” - which was actually an old debris control dam - failed in a rainstorm in 1997, sending toxic discharge down the creek. The site came under federal government Superfund regulation.¹¹ The price tag: \$20 million to date and climbing.
- the developers (Gold Country Lenders) discovered that the inadequate assessment of the property and inadequate appraisal resulted in a loan that would not be repaid.
- the investors who loaned the money found out the hard way that the developers had failed to disclose that the property included an old gold mine.
- the investors took the developers to court. Because many of the investors were elderly, the court found that by withholding information that the project was on abandoned mine land, the developers committed elder abuse.¹² Some of the partners of Gold Country Lenders ended up serving time in federal prison.¹³

TSF's NEW MODEL OF INFORMED ASSESSMENT

Informed Assessment practices lead to projects that can significantly contribute to the economic, environmental and public health of their communities. Informed Assessment protocols will improve market confidence and may ultimately galvanize cleanup of abandoned mine lands. By using rigorous and transparent processes early in the process, the public can trust that these lands can be cleaned up and returned to productive, healthy uses.

TSF's Model Informed Assessment Recommendations

Summary: An Informed Assessment of a polluted property prior to acquisition or project development must include two components: A Cultural Evaluation and a Hazards Assessment with environmental sampling. These efforts should be well coordinated; the finding of mine features and understanding of site operations from the cultural evaluation should inform and direct environmental sampling and analysis associated with the hazards assessment. Specifically:

1. **Start Pre-Project:** Discovering hazards early in the process of acquisition or project development is critical. Early discovery enables the identification of appropriate end uses for the property. Identifying realistic end uses is necessary in order to make accurate valuation conclusions in the appraisal (as discussed in more detail later in this report). Early discovery also enables clarification of liability issues and clarifies risk to involved parties (also discussed later in this report).
2. **Identify and Engage Experts:** AMLs are damaged, complex properties. And, they are on the ancestral homelands of native people here before American settlement. This complexity requires a wide range of expertise to fully assess and evaluate these properties.

For these reasons, a truly “Informed Assessment” is a collaborative effort. An Informed Assessment should be the result of an *interdisciplinary approach* between a *cultural archeologist* who specializes in Cultural Evaluation of historic mining practices and pre-settlement native lifeways; an *environmental scientist* familiar Hazard Assessment with soil and water sampling techniques and directive regulatory criteria; and a representative of the local tribe(s) as part of formal consultation at a minimum. In California, the Native American Heritage Commission of the State Historic Information Preservation Office may need to be engaged.

3. **Engage Native People's Representatives Early:** Native peoples' leaders can and must have role in conservation decisions impacting their historic regions. Landscapes or sites that have intact cultural resources should be prioritized and protected.

TSFs model of Due Diligence includes early contact with the native people of the affected area to learn if there are unrecorded cultural resources on the landscape where the project or acquisition is proposed. And, they must be paid respectful fees for their input, commensurate with other professional consultants to the project under review. Tribal representatives need to be invited to share their priorities of what should be protected when AMLs are considered for development or acquisition. Project proponents should look

for creative ways to support Tribal access to land as part of their strategic goals for stewardship. Land trusts in the region should lead the way in opening these opportunities for Tribes. Consultation with the appropriate Tribal Historic Preservation Officer or other official representatives for any federal recognized tribe is highly recommended.

4. **Use Best Management Practices (BMPs) & Best Available Technologies (BATs):** Leveraging the most recent scientific knowledge by utilizing BATs and BMPs is a key component of “Informed Assessment.” *For more detailed description of these Assessment practices, See Appendix I: Champion Mine Case Study, Technical Recommendations to Improve Assessment Practices.*)

The Cultural Evaluation conducted by an archeologist in the initial assessment phase allows the site’s operational history to *inform and direct environmental sampling* in the most targeted and accurate way. This increases the accuracy of chemical and physical hazard detection, and protection of irreplaceable cultural resources, and is thus a *key protocol of “informed assessment.”*

Advancements in scientific understanding need to inform assessment methods and be used to evaluate innovative treatment techniques. New scientific research on bioaccumulation, biomagnification, and bioavailability of toxins has increased the importance of using best available tools and techniques for assessment. Using trace metal detection limits, for example, increases the accuracy of chemical hazard detection. As testing becomes more exact, and can detect very low levels of metals, assessment practices must evolve to reflect current scientific knowledge.

To protect public health the most protective techniques and information must be used. The Champion Mine Case Study (Appendix I) provides detailed information on the soil sampling methods, laboratories used and results from TSF’s assessment of this legacy mining property. Chemical hazards should be analyzed considering the type of mine, the processing methods used, and how human activities may exacerbate exposure to these hazards. Important tips to ensure proper assessment:

- a. **Use the Right Lab:** Certified trace metal laboratories need to be used. Ultra Clean sampling techniques (EPA Method 1669) are essential to effective assessment of mercury at low levels.
- b. **Lidar Revolutionizes Assessment:**¹ Informed Assessment must include a clear understanding of what happened on the land during the mining era. Informed Assessment is tremendously enhanced when the landscape has been mapped using Lidar technology. This technique of imaging the landscape strips away vegetation allowing the

¹ **Lidar** is a method for measuring distances by illuminating the target and measuring the time of reflection the light takes to return to the sensor. Lidar is sometimes called **3-D laser scanning** and is commonly used to make high-resolution maps

landforms to be visible in great detail. Creating new Lidar maps for projects on AMLs is a top priority. **Lidar makes large landscape assessment fast, efficient, and far less expensive – a crucial tool in the desire to increase pace and scale of mine remediation.** TSF has developed methods for using Lidar mapping to identify mining features such as hydraulic mine pits, tunnels, debris control dams and gravel bars.¹⁴ TSF is currently identifying and prioritizing hydraulic mines and features on the Tahoe National Forest (TNF) with the benefit of Lidar maps. (See Case Study on Tahoe National Forest, page 45 or visit TSF's website [here.](#))

All of TSF's research is predicated on working with experts from a wide range of disciplines. *As a result of this multi-disciplinary approach, TSF has articulated BMPs and BATs that can be translated to projects on the ground, replicated, and scaled up.* These new and improved methods of assessment and remediation must become standard when AMLs are being evaluated. TSF has conducted several projects using BMPs and BATs for assessment (See Figure 3, page 18, TSF Pilot Projects). TSF's pilot projects have been useful for learning how to identify and assess AMLs. They have tested remediation techniques on the ground so that their effectiveness can be measured and evaluated.

- c. **Use Judgmental Sampling:** Water sampling must be done during storm events. Soil testing must use judgmental and targeted sampling of areas with mine features identified by the cultural evaluation. These are likely to be areas of possible contamination and/or sources of contamination to nearby waterways. Collect soil samples specifically from locations that were associated with processing areas (such as chlorination or amalgamation rooms) of a mill or from waste rock or mine tailings where contamination could be expected. Compare soil and water sampling results to appropriate safety exposures, such as California Human Health Screening Levels (CHHSLs) when evaluating toxicity. Remember, if the soils that are being sampled may be toxic, special training and licensing is required to ensure correct safety protocols are observed.
- d. **Engineer Solutions:** For any *physical hazards* identified on the property, a physical hazard mitigation strategy should be developed that includes a plan for remediation and treatment with estimates of the costs and timelines for these activities. For any *chemical hazards* identified on the property, a chemical hazards mitigation strategy should be developed that includes a plan for remediation, with estimates of the costs and timelines for these activities. In some cases, civil engineering may be needed to design a comprehensive remediation plan for the site, with cost estimates. This should include the physical and chemical hazards that were identified as part of the assessment. This information will be crucial in project design and/or structuring the acquisition.
- e. **Disclose Findings:** TSF recommends that environmental assessment on a property done with the owner's permission become part of the disclosable record for that property, just like any other disclosure required on properties that may be compromised. For example, pest damage to homes and other structures is required to be disclosed, and deeds must reflect all easements and other significant features of a property. (This topic is discussed in more detail later in this report.) Information developed as part of the Informed Assessment should be reflected on land title(s) to

ensure that future owners understand the dangers and are aware of any remediation that may be required.

Figure 3: TSF Pilot Projects Using Best Practices

- **Grizzly Creek and Tippecanoe on the Tahoe:** Supported by funds from the Sierra Nevada Conservancy and Bella Vista Foundation, TSF is assessing these mined lands on the Tahoe National Forest (TNF) in collaboration with US Forest Service. (USFS). This project used Lidar information to identify the *hydraulic mines on that forested landscape*. (Learn more [here](#).)

- **Champion Mine Assessment pilot project** at a legacy hard rock mine (see Appendix I for a summary or [click here](#) for the full report): TSF conducted an Informed Assessment testing for *physical hazards and soil contamination*. This work was supported by a Targeted Brownfields Assessment grant from the EPA.

- **Humbug Creek Assessment at Malakoff Diggins State Historic Park**¹⁵ This pilot project assessed *physical and chemical hazards* associated with this famous hydraulic mine pit. Supported by funds from the Sierra Nevada Conservancy (SNC) and the California Department of Water Resources (DWR), TSF worked with experts at the United States Geological Survey (USGS) to create a testing protocol for the discharge of *particulate bound mercury* and used these methods to evaluate mercury discharge from the pit of this historic hydraulic mine in order to create an effective remediation project at the site. (Learn more [here](#).)

- **Combie Reservoir pilot project:** This partnership between TSF and Nevada Irrigation District (NID) was funded by SNC and DWR. The project tested the most effective methods to reduce mercury discharge when excavating gravels and sediment known to be contaminated by mercury from their reservoir on the Bear River. These materials were impacting operations, reducing water storage, and lowering water quality. (Learn more [here](#).)



TSF Program Director, Carrie Monohan Ph.D.
Examining sediment in NID's Rollins Reservoir

B. Informed Assessment: Impact on Appraisal of AMLs

Land and property are almost always appraised prior to any purchase. Conservation acquisitions funded by California state agencies require an appraisal conducted by an expert selected by the organization doing the acquisition and then approved by and paid for by the state. The appraisal is reviewed by the state's Department of General Services (DGS) to make sure it meets state standards.

Every seller in a land transaction is rightfully concerned that the revelation of mining hazards on the property will negatively affect the value of the property. However, developers are required to disclose what they know about any project to their investors. As noted in the case study on the Banner Lava Cap Superfund site (page 14), the simple act of failing to disclose to investors that the property being purchased was mine-scarred was enough to put real estate entrepreneurs in prison for fraud. *The existence of chemical and physical hazards on AMLs can no longer be ignored or assumed away.*

Current appraisal practices take a variety of approaches to appraisal of AMLs. Some appraisers acknowledge that there may be mining hazards but will note these are “assumed” to not have a significant impact on the value of the property. Some appraisers include general assumptions and limiting clauses that state they are not qualified to evaluate hazards and their impact on value. They may recommend that their client retain an expert.

It is a widespread practice among appraisers in the Gold Country to simply assume a property is free and clear of hazards from mining. This practice avoids the issue of site remediation and associated costs, and it creates an inaccurate and misleading conclusion of value for AML lands. It is easy to demonstrate that this practice produces appraisals that do reflect the actual value of the subject property as it actually exists, but rather reflect the value of a theoretical “clean” property without legacy mine impacts.

These appraisal practices lead to inaccurate and misleading estimates of market value and consequent over-valuation and over-payment for real property with abandoned mines. Grant-makers, investors and lenders contemplating the purchase of property have a lot to lose from an appraisal that does not reflect the actual hazards and potential liability and remediation costs associated with AMLs. *This decrease in value is effectively sidestepped under current appraisal practices, especially for conservation acquisitions where CEQA does not require assessment.*

Obstacles to Improving Appraisals

1. **Non-Existent Standards for AML appraisal:** Adequate appraisal standards for AMLs do not currently exist. Techniques for preparing an appraisal of AMLs are not currently described in the appraisal literature or addressed in normal practice.
2. **Increased Cost:** Complex abandoned mine situations often require extensive “highest and best use” studies, which may increase the cost of the appraisal.

3. **Appraiser Expertise:** The development of complex highest and best use studies and scenario development and the resulting appraisal work may be beyond the expertise of many appraisers.
4. **Lack of Relevant Appraisal Data:** Appraisals require the use of comps of similar properties to measure the value of subject properties. Until now, most of the sales of AMLs have occurred without considering the cost remediation.

Assume two properties have sold and are being used as “comps” for the subject property. The sales price of Property A was diminished to reflect remediation costs, while the sale price of Property B was not adjusted to reflect remediation costs. Property A may therefore be considered relevant to the valuation of the subject; Property B will not be a relevant indicator for the subject unless it’s sales price can be adjusted downward by the cost to remediate.

This example illustrates a basic assumption of the appraisal process - that market participants effectively utilize all the available data to make well-informed judgements about value and price. This report clarifies that this assumption, while valid for some other influencers of value such as location, zoning, etc., is not valid for sales comps of AMLs.

Therefore, many past sales of AMLs are not relevant valuation indicators for the subject. This means that the comps currently available to appraisers reflect old and speculative valuation methods. These speculative methods often lead to over-valued appraisal conclusions. The use of such comps will result in artificially inflated value conclusions for new appraisals. This problem will diminish with time as newer and more realistic comps are available. *In the meantime, in the period of transition to better protocols, the lack of meaningful comps will make new appraisals difficult.*

IMPROVING APPRAISAL PRACTICES ON ABANDONED MINE LANDS

Informed Assessment must be part of the appraisal process on AMLs and the appraisal must reflect its findings. If the Informed Assessment discovers legacy chemical or physical mine hazards in need of remediation, this must be reflected in calculation of the value of the property.

Recommendations to Improve Appraisal Practices

Summary: The appraisal must rely on Informed Assessment and study both possible future use, as well as the remediation costs for each proposed use, to measure the highest economic value of the property. The appraisal of AMLs must incorporate the cost to remediate the chemical and physical hazards into the valuation conclusions. In addition, to understand the highest and best use of the property, and therefore identify appropriate comparable sales for appraising the value of the property, new appraisal standards are required.

1. **Hire the Right Appraiser:** Hire an appraiser with experience in evaluating mine impacted properties. Better appraisal practices need to reflect the unique aspects of

AMLs. It is important that an appraiser for AML properties has the appropriate qualifications and experience required for complex properties. Appraisals must of course be prepared in accordance with appropriate rules (USPAP AO-9)¹⁶. In addition, appraisers must be able to work with engineers to develop different potential scenarios for development and estimate the costs for development.

The development of complex highest and best use studies and scenario development and the resulting appraisal work may be beyond the expertise of many appraisers. New certification requirements may be needed to ensure that property appraisers have the appropriate and relevant knowledge and experience to conduct an appraisal on AMLs.

- 2. Highest and Best Use Studies May Be Required:** Determining the “highest and best use” of the property is necessary to determine appropriate comparable property sales (aka “comps”) from which the conclusion of value will be measured. The tie between use and value is clear. AMLs are damaged properties with diminished development possibilities. A realistic appraisal *reflects this diminished potential*.

Develop a variety of scenarios for how the property could be developed for its highest and best use, based on the Informed Assessment of the land and its development potential. The need to identify realistic end uses of AML property results from the impacted nature of the property. Different possible uses require different remediation techniques. Each use scenario under consideration must determine what sort of remediation will be needed for that specific use. From an appraisal standpoint, this adds additional complexity to the process.

These studies should include a variety of development scenarios that are based on a realistic view of the physical possibility, legal permissibility, financial feasibility, and maximum productivity of the parcel and may involve the appraisers' use of other consultants such as land-use planners and civil engineers. Clear and informed estimates of remediation costs for each scenario can then be developed and utilized to ascertain more accurate conclusions of value. Funding for this sort of evaluation should be folded into project and acquisition budgets.

- 3. Identify Relevant Comps:** Each of the potential uses being evaluated must utilize “comps” of property with *similar use potential*. This evaluation anticipates a range of potential projects. Is the highest and best use recreation? Industrial park? Campground? Ranching, farming or forestry? Open space or wildlife refuge?

Indications of value require a clear understanding of the use under consideration. The use potential of the “comps” must match realistic potential use of the subject property for the measurement to be relevant and meaningful to valuation of the subject property.

A final step in the appraisal process is to investigate whether the comparable sales that are used have been adjusted to reflect any adverse conditions on those comparable property sales. If the “comp” involved an AML, the sales price needs to reflect these adverse conditions (legal and physical constraints, etc.). For example, if the subject

property is being evaluated as a possible park, the comps must have a similar use potential to serves as a value indicator for the subject property.

Additionally, the “comps” themselves must reflect current knowledge about the facts of contamination. In order for a “comp” to be relevant it must have:

- i. similar potential to the subject property, and
- ii. the appraiser must determine whether the sales price of the “comp” was adjusted to reflect the costs to remediate the site.

4. Identify Detrimental Conditions: AMLs may be considered to have “detrimental conditions” relevant to appraisal. Historically the chemical and physical hazards presented by mining features have NOT been considered by local decision makers to have created “detrimental conditions” when assigning zoning or uses to AML parcels.

Appraisal methods have been developed for a wide variety of complicated property circumstances, from being the site of a famous mass murder to being in the potential path of volcanic lava flow. A typical appraisal of these sorts of property evaluations and the remediation stages is depicted in Figure 4 (below).

Figure 4: Detrimental Conditions Stages¹⁷

	Assessment	Repair	Ongoing
Cost	Cost to assess & assumption of responsibility	Repair Costs & Responsibility Remediation Contingencies All loss of utility while being repaired	Ongoing costs & Responsibility Ongoing & maintenance monitoring
Use	All loss of utility while assessed Disruptions Safety Concerns Use Restrictions	All loss of utility while being repaired Income Loss Expense Increase Use Restrictions	Ongoing use disruption Alterations to highest & best use
Risk	Uncertainty Factor Discount, if any, where extent of damage is known	Project Incentive Financial incentive, if any, to complete repairs	Market Resistance Residual resistance, if any, due to situation

Engineers working to develop remediation estimates must have the required licenses and expertise to identify, evaluate and handle hazardous waste as well as physical hazards. They must be able to work cooperatively with the evaluation team to understand the potential end uses of a site based on the information developed in the

Informed Assessment. The appraiser may need to work with engineers to determine what sorts of uses are practical on the site and then identify methods necessary to achieve remediation objectives. This engineering work will define the limits on the property's remediation potential based on feasibility as well as cost.

Class X: It is also noteworthy that in some cases, the cost of the remediation may be found to exceed the value of the property. These properties are termed "Class X" properties. Class X properties range from those which are physically impossible to remediate (such as those flooded by lava from a still active volcano or having fallen down a cliff), to those which are so expensive to remediate that the property has lost considerable if not all value. Another relevant example are properties where the source of the contamination comes from offsite, and the property owners do not have the ability to stop the continued flow of contamination. This is a serious and common problem that afflicts properties in the Gold Country near abandoned mines that are discharging metals into storm water runoff onto and through neighboring properties.

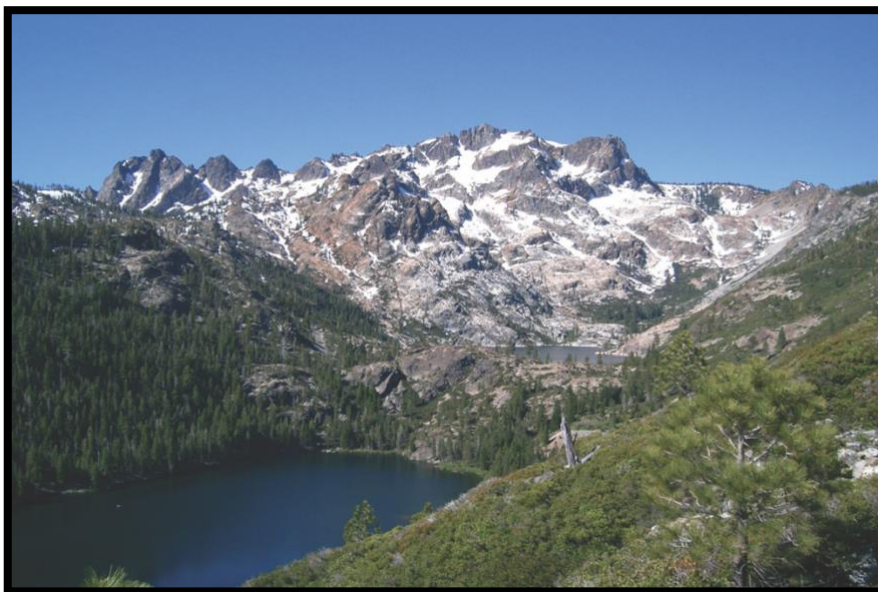
- 5. Calculate the Appraisal:** The final appraisal of an AML must reflect a value based on realistic uses of the property. When the various scenarios of use are analyzed, the scenario that results in the highest economic value is the highest and best use and reflects an accurate value conclusion.

Case Study: Acquisition of an AML for Recreation “buying an AML with unassessed liability”

A large abandoned hydraulic mine was recently acquired by a non-profit organization for recreation. A map to subdivide the property into large parcels had been approved by the local county, and the whole property with cliffs, ponds and creeks was up for sale. The seller mentioned that it was an old gold mine but stated to TSF staff on tours of the site that “they haven’t seen anything toxic on the land.” Adits, shafts and other physical hazards were evident. To assess the property, the group hired an engineering firm, which took soil and water samples. No chemical hazards of concern were found.

Funds from state bond money were used to acquire the property. The property is currently used by the public for recreation on trails that were recently built on the property. The physical hazards on the property have not been abated. Some observations:

- *The property was not at risk of development.* Further subdivision or development would have triggered review under CEQA, including a more complete evaluation of the chemical and physical hazards on the property. These hazards were observable and evident and would likely have cost millions of dollars to remediate if the property were to be developed.
- The property has a discharge that creates a water quality liability under the Clean Water Act. This discharge was not detected by the environmental engineering firm because their samples were not taken during rain events. *The assessment failed to find the hazardous discharge.*
- The appraiser did not take into consideration the chemical and physical hazards on the property, nor the cost to remediate them so that the property could be to be developed for a “higher and better purpose.” *The appraised value did not consider the risks and liabilities on the land.*



Sardine Lakes, built to serve gold mines in the Sierra Buttes Gold Lakes Basin.

C. Informed Assessment: Clarifying Liability & Responsibility

An unknown number of large and impacted AMLs have been sold based on a verbal assurance of the seller that “there are no hazards present.” Many owners of AMLs are in fact unaware of the physical and chemical hazards on their property.

Historically, landowners have been reluctant to allow their property to be evaluated for physical or chemical hazards prior to acquisition. This lack of curiosity has served as protection from having to tell potential buyers about hazards on AML properties. Some sellers have been less scrupulous in disclosure, downplaying or failing to disclose what they know. While this ignorance may serve the seller, it does not serve the property buyer, grant maker, lender, or the public interest.

Current Disclosure: the “Abandoned Mines Advisory”

Irrespective of whether a legacy mine is identified on a property as part of assessment, a standard element of an escrow in California’s Gold Country (and other mining districts in the state) is the “abandoned mines advisory.” A typical advisory provides an all-inclusive statement that attempts to define the liability associated with AMLs in this way:

“No California law requires the disclosure of abandoned mines in a real estate transaction, unless the existence of an abandoned mine is within the actual knowledge of the seller and is deemed to be a fact material to the transaction... this [escrow] report does not contain an abandoned mines disclosure from any government database or map or any other source, in order to protect the seller from liability for non-disclosure of unrecorded abandoned mines.” 18

This disclosure leaves the issue of what is “deemed material” up to the subjective judgement of the seller. Contrast this to the rigorous approach taken to termite inspections prior to sale of a home, which requires a licensed professional to do onsite evaluation and testing, and that these results be reported as part of the purchase in order to estimate cost to repair. Clearly this “abandoned mines advisory” disclosure does not provide any useful information to the prospective buyer and does nothing to clarify or reduce liability associated with abandoned mines.

Assigning Liability: The “responsible party” for chemical and physical hazards associated with abandoned mines is often, by default, the current property owner even if that individual did not create the hazard or profit from the mining operation that created it. In many cases the mining company that caused the damage is no longer in existence. If the hazard(s) are on public land, the cost of remediation, as well as the liability for any violation of environmental laws such as the Clean Water Act, can fall on public agencies.

The questions of responsibility and liability are directly related to land use and land ownership – past and present. Approximately half of the land in the Sierra Nevada region is privately owned. There are almost no incentives for private landowners to disclose hazards or conduct voluntary remediation of abandoned mines. The liabilities associated with abandoned mines are often only discovered when property changes hands or undergoes development. These land use changes,

such as dividing a parcel or developing a property, can sometimes require abandoned mine remediation.

Property owners who learn through Informed Assessment that there is evidence of legacy mining on property they own are faced with difficult choices. If a property owner knows there are hazards they must share it as part of the escrow. Seller disclosure is not optional at the discretion of the seller. *Due to the enormous risks and potential liabilities associated with abandoned mines, disclosure must “trump” landowner privacy concerns.*

The sort of liability that AMLs present depends upon their hazards: 19

Contaminated Water: It is important to remember that water quality impacts such as the presence of mercury discharge can only be established when sampling takes place during the rainstorm events that mobilize the heavy metals. Clean Water Act discharge violations are invisible most of the year, but discharge during rainstorms can create serious environmental and public health problems – and liability.

New or current property owners of abandoned mines that are found to have a discharge of a toxic material that violates the federal Clean Water Act or the state Porter-Cologne Water Quality Control Act (collectively, “water quality laws”) *are responsible for the clean-up even if they had no knowledge of the problem prior to acquisition.* For many prospective buyers the identification of a potential water quality violation discharge would end any further consideration of purchasing the property due to both the difficulty of estimating costs associated with correcting these violations, and the diminished use potential of the property.

Projects developed on AMLs must also be careful to not create a new liability by disturbing tailings piles or working in mercury contaminated sediment. For example, the simple act of building a trail or a road across a swale (that drains into a creek) may require putting in culverts. If the trail or road goes through a *hydraulic mine* landscape, the culvert may collect mercury contaminated sediment as part of storm run-off from that mine and thus, convey it to the “surface waters of the state.” This could be technically considered a “point source” discharge under the Clean Water Act requiring remediation.



Discharge into Humbug Creek from the North Bloomfield Tunnel, Malakoff Diggins State Historic Park, 2013

Toxic Soil: If the site has contaminated soil, a different set of liabilities is engaged. Under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) and various California state laws, the entity responsible for *creating the soil contamination is liable* (not necessarily the current owner of the land) for the clean-up. Again, research into the historic ownership of the legacy mine done as part of Informed Assessment may reveal a *potentially responsible party* that can participate in paying for remediation required for development of that property.

The complex liability around gold mines is compounded when the region is high in naturally occurring or background levels of toxic minerals, such as arsenic and lead. The unique geology of California that results in presence of gold often co-occurs with these metals and minerals. When these toxic materials are in the rock that is crushed and treated as part of the gold mining process, these naturally occurring metals become concentrated in mine wastes associated with hard rock mines.

The public health hazards from exposure to these materials were studied by TSF in our *Gold Country Recreational Trails Assessment and Abandoned Mines Assessment* in 2009.²⁰ This original research investigated the potential for exposure to mining toxics from dusty activities such as dirt biking, riding horses, and running. Soil from popular public trails that were built on AMLs was sampled and tested.

For example, TSF took samples at the popular and family-friendly dirt bike trails at the Foresthill OHV Area that used to be home to the legacy hardrock Marall Chrome Mine. At that site, soil testing found that the dust included fibers from naturally occurring asbestos in the rock. 40% of one sample taken from the trail was the asbestos fiber chrysotile, known to cause mesothelioma. (See the whole report [here.](#)) In retrospect, asbestos fiber-filled soils may not have been the wisest place to develop a *dirt bike trail.*)



Dirt biking at Marrall Chrome Mine, sampled as part of TSF Recreational Trails Assessment.

Physical Hazards and Dams: There are many dangerous physical hazards on AMLs such as eroding cliffs, unseen adits or shafts, and dangerously unstable piles of mine tailings and waste rock. Historic old (collapsing) buildings, crumbling foundations and old equipment create enticing hazards to explore. Old tailings ponds with deteriorating debris containment dams can create serious risks when they collapse, in addition to the likely water quality problem created if a large deposit of mining waste materials is suddenly released into a waterway.

Obstacles to Clarifying Liability

1. The legal considerations around water quality, soil contamination and cultural resource protection are inconsistent and spread across multiple jurisdictions. The policies and laws of these multiple jurisdictions change regularly, with minimal or no coordination.
2. The history of use on the property may not be well documented. It can be very difficult or impossible to determine a potentially responsible party. In many cases, even when found, the responsible party may have gone out of business long ago.

Using Informed Assessment to Clarify Liability on Lands with Abandoned Mines

Informed Assessment of AMLs reveals information about the landscape that must be addressed when land is being purchased. Informed Assessment will help clarify existing liabilities and avoid the creation of new liabilities as the property is developed. The time to clarify liability and identify responsibility for potential remediation is *prior to, not after*, purchase and/or project design.

Recommendations to Clarify Liability for Projects on AMLs

Summary: Informed Assessment of the property should be used to clarify liability as part of the acquisition or project design process itself. Limiting risk to the public and understanding the liability issues is fundamental when a non-profit or governmental organization is acquiring or developing projects on AMLs. Purchase and sale agreements should be structured to reflect the specialized interests of the seller, purchaser and the public. Project design and permitting should address any mine impacted lands discovered during the Informed Assessment.

1. **Choose the Buyer Carefully:** Consideration should be given to the type of entity to make the acquisition. One option is to use a non-profit vehicle that serves the purpose of holding the property while it oversees appropriate remediation, whereupon it gifts the remediated property to the final title holder (serving a “good Samaritan” function). An ideal candidate has a focused mission that includes mine remediation of the site for public use. If public funds are used for this purpose, the lasting public benefit must be maintained using legal documents such as conservation easements or a deed-restriction requiring that the property remain in public or non-profit ownership.
2. **Purchase and Sale Agreements (PSA):** The purchase and sale agreement should be constructed with the goal of clarifying liability from any identified physical or chemical hazards to both the seller and buyer.

TSF found that a standard purchase agreement is inappropriate for AML acquisitions based on the unique nature of sites. For the Champion Mine Pilot Project, TSF worked with a small team of attorneys to fashion a unique PSA (See Appendix I). As a policy matter, it may be possible to create standardized language in PSAs for use in clarifying liability issues for AML acquisitions. Or PSAs may be modified and improved as needed to serve as a

potential tool for minimizing liability of new public owners of mine impacted lands for pre-existing physical and chemical hazards on the site. The PSA should require:

- a. **Informed Assessment:** The PSA *should require Informed Assessment* to document the nature and extent of contamination present on the site when it was acquired. The details of the final purchase agreement should be influenced by the assessment findings. The assessment documentation should be included in the purchase agreement materials.

For example, finding a potential water quality discharge should not automatically dismiss a property from consideration for acquisition. However, the potential discharge should certainly be well understood and clarified in a proposed acquisitions Purchase and Sale Agreement based on what was identified during Informed Assessment. A good engineering solution may be enough to bring that property into compliance with water quality laws.

Informed Assessment may find a potentially responsible party that can could be held liable for remediation and long-term maintenance. These costs and opportunities should be evaluated and inform the PSA.

- b. **Buyer Access:** The PSA should include an access agreement to allow assessment of the property – including water and soil sampling as needed for Informed Assessment - before the purchase is final. If the Informed Assessment has already occurred, the buyer should be allowed to view all of the findings and have access for inspections of the site prior to close of escrow. The buyer or seller should be allowed to terminate the agreement if the findings are not acceptable.
 - c. **Disclosure:** Findings from the Informed Assessment should be memorialized as a deed restriction on the title of the property, or other instrument, to ensure full disclosure when evaluating the property for future potential buyers and lenders. The legislature should consider enacting legislation to require that any data found as part of an Informed Assessment (chemical or physical hazards) be added to the title of the subject.
3. **Clear Agreements between Seller and the Potential Buyer:** Working out the details on an acquisition of or project development on mine impacted property can be complex. Any entity purchasing or working on public AML property must be prepared to interact with the many interested parties to the transaction or project design. This requires clear communication and trust that the process will be fair and transparent.

Beyond the PSA, clear verbal agreements, or a written agreement such as a Memorandum of Understanding (MOU), between the purchaser and the seller that addresses the entire process from assessment through acquisition may improve the process. The agreement should include how information will be used and disclosed throughout the purchase and remediation activities; the role of Native peoples on their

ancestral lands; the role of other governmental representatives in the process; and public disclosures about the project.

Clear communication protocols are crucial if there are multiple non-profit or public partners in the transaction. If the property is being given to or bought by a non-profit organization for public benefit, the purchase agreement could include a clause that authorizes that a percentage of the acquisition cost be gifted to that organization. These funds would be used to cover the costs associated with remediation and long-term management of the AMLs.

4. **Address Potential Liabilities in Project Design:** Projects on mine impacted lands need Informed Assessment as part of project design. Building a road, a trail or a structure often requires grading and landscaping. These activities can create liability when they move contaminated mine waste rock or mine tailings. Use the Informed Assessment to design projects that do not exacerbate conditions on the ground and increase liability. Beyond that, an Informed Assessment can inform project design that supports abandoned mine remediation in addition to other potential public benefits of the project.
5. **Orchestrate the conditions and timing of the acquisition:** One option is to require that the property be fully remediated prior to the completion of escrow (leaving all the liability of the clean-up in the hands of the current owner). Another option is to require that a full remediation plan is developed prior to making a decision to actually acquire the land, with costs and liabilities clarified and reflected in the appraisal.

SUMMARY: TSF's NEW MODEL OF DUE DILIGENCE

TSF's new model due diligence decision and project flow chart (See Figure 5, page 30) demonstrates how to manage the issues raised in this report. This model captures what TSF has learned about Informed Assessment, appraisal, and limiting liability alongside our methods of engaging the people that are crucial to successful "due diligence."

These new protocols should be adopted by federal, state, local, tribal and non-profit organizations to protect their interests and investments. The buyer and the seller must both be willing to endure uncertainty and scrutiny during this process. This may discourage some from taking this ambitious work on, so the incentives must be equally compelling.

Private landowners, investors and developers, and the public, will find that using these new protocols protects their financial interests and enables more predictable, reliable and environmentally beneficial projects.

TSF's new model of due diligence combines Informed Assessment (looking backwards at the uses and owners that were on the land prior to the assessment) and planning (looking forward towards a new use for the land). The Model Due Diligence puts realistic figures on the cost to remediate, the value of the property and the potential benefits and costs of AML acquisition transactions.

This new model (Figure 5, below) requires Informed Assessment, full disclosure, as well as improved appraisal practices and transparency to work effectively. The differences between this model and current practice are summarized in Figure 6 (page 30).

Figure 5: The Sierra Fund's Due Diligence Model

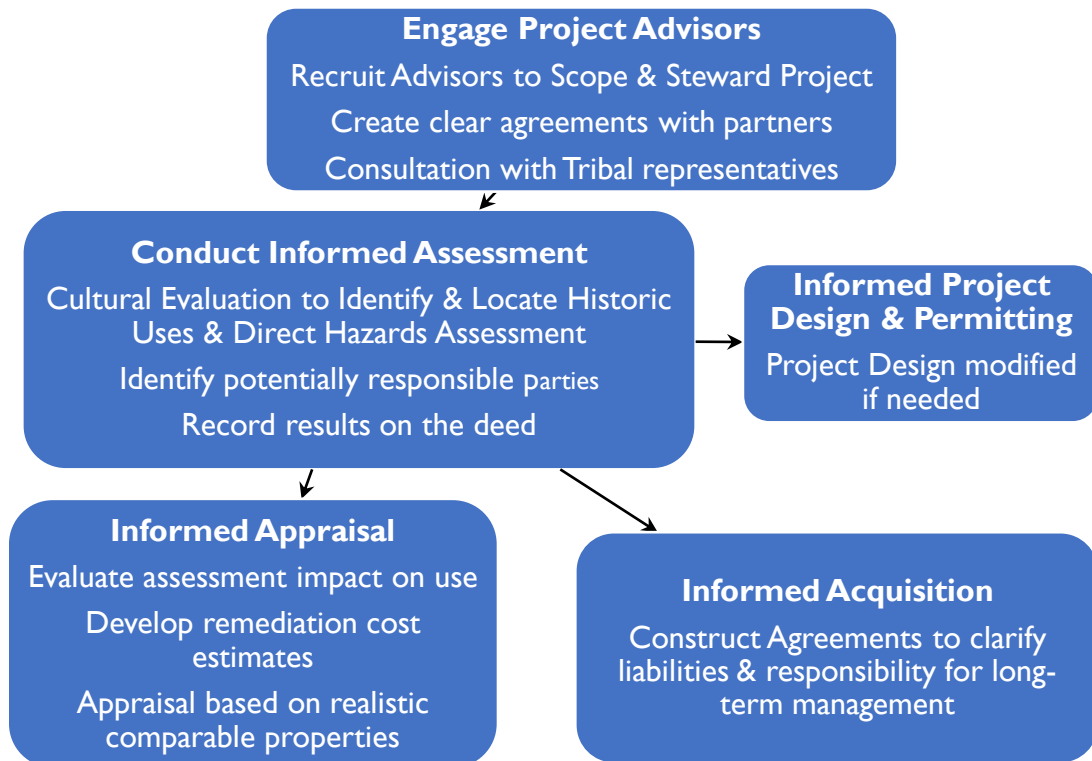


Figure 6: Comparing TSF's Due Diligence Protocols vs Current Model

Element	Current Model	TSF Model
Project Oversight	Current landowner along with potentially underqualified consultants, including environmental engineers, appraisers, real estate agents and regulators. Tribal outreach not usually done unless required by law.	Consultation with Native peoples leaders/other community leaders. Creates standards that must be met by consultants who join the project. Clear agreements and communication between project advisors.
Assessment of the property prior to acquisition	"All Appropriate Inquiry" may include visual evaluation, literature review, and interview of owners (with no incentive to know anything). May include some evaluation for chemical and physical hazards during fair weather, consistent with current regulations. May include an estimate to remediate hazards. Not usually required for conservation acquisitions.	Informed Assessment is guided by a team of qualified cultural and environmental advisors who coordinate their work to ensure that all chemical and physical hazards are identified and appropriate remediation and/or project mitigation costs are accurately estimated. Realistic potential uses are identified and properly scoped. Water runoff is sampled during rain events. Research into history of activity by previous owners is conducted. Informed Assessment automatically triggered for acquisition projects on AMLs.
Assessment for project development	Uninformed assessments typically occur after property acquisition and project development.	Informed Assessment is automatically triggered prior to designing and approving projects that require permitting on AMLs.
Appraisal for acquisition	Appraisal "assumptions & limiting conditions" usually preclude consideration of AML hazards, and associated remediation costs. Appraisals avoid "highest and best use" studies which require multiple use studies to accurately determine conclusions of value.	Realistic costs to remediate AMLs based on potential end use are included in the appraisal. The appraiser has demonstrated expertise in appraising AML lands. The appraisal reflects the Informed Assessment, and a realistic understanding of potential end uses of the property or project.
Use of Relevant Comps	Appraisals typically utilize "comparable sales" which may or may not be consistent with the subject property's use potential.	The appraisal compares "apples to apples" when evaluating mine impacted lands for sale. Appropriate end use informs the comps used.
Appraisal Conclusions	Speculative	Market based
Remediation success	Many stalled or cancelled projects	Successful projects with multiple public benefits

Action #1 Summary: Use Due Diligence Protocols on Mine Impacted Lands

Early Engagement of Key Partners: Project partners must include qualified experts across a range of topics. Throughout the process clear communication is required between partners working collaboratively on the AML assessment for acquisition or a development project. When working with a non-profit organization, clear and specific agreements early in the process spelling out expectations and responsibilities is a top priority. Engage historic tribal representatives from the region early in the process.

Informed Assessment: Informed Assessment of a mine impacted property should start with a Cultural Evaluation followed by a Hazards Assessment. These two efforts must be well coordinated; the finding of mine features and understanding of site operations from the Cultural Evaluation should direct and inform environmental sampling and analysis associated with the Hazards Assessment. This will also improve investor and public confidence in acquisitions.

Informed Appraisal: An appraisal of land in historic mining areas needs to incorporate the cost to remediate chemical and physical hazards into the appraisal process. In order to understand the highest and best use of the property, and therefore identify appropriate comparable sales for appraising the value of the property, new standards and protocols are required. New training and licensing requirements may be required as well.

Informed Acquisitions: Clarifying risk to the public and understanding liability issues is primary when acquiring or designing a project on a mine impacted property. Purchase and sale agreements should be structured to reflect the specific interests of the owner, purchaser and the public towards these ends. Clarifying liability to investors increases market confidence.

Informed Project Design: Project modifications made as needed to remediate physical and chemical hazards identified, and to avoid creating new exposures or liabilities.



*Four Generations of Nevada
City Rancheria Foothills
Nisenan celebrating the
opening of the Angkula Seo
Suspension Bridge
on Deer Creek Tribute Trail,
a joint project of the Tribe,
TSF, and many other
partners.
2016*

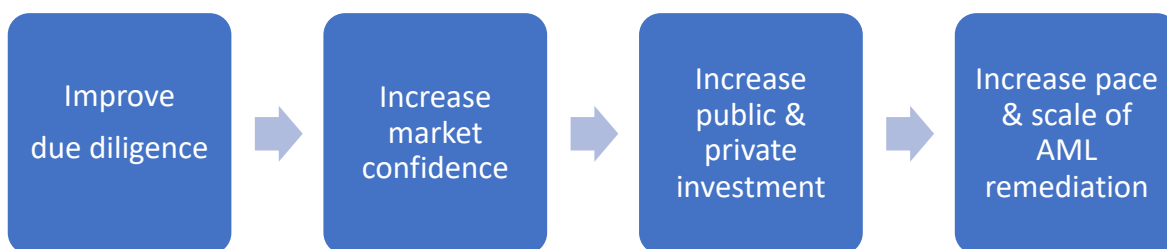
Action #2: Increase Pace & Scale of Mine Remediation

Many unremediated mines are dangerous, yet there are no incentives to clean up mine impacted lands that compromise millions of acres of California's historic mining regions – regions that serve as Californian's primary source of water supplying consumers as far away as Los Angeles. TSF's pilot projects demonstrate that mine remediation activities on AMLs can:

- Reduce discharge of contaminated water and sediment.
- Improve water quality and reservoir storage capacity.
- Reduce fire danger and create healthier forests.
- Reduce carbon emissions and improve carbon sequestration.
- Improve watershed resiliency.
- Create new recreational opportunities and habitat.
- Protect public and environmental health.
- Improve climate resiliency in California's headwaters.
- Recognize and re-establish tribal stewardship of ancestral landscapes.

Given the multiple benefits that result from mine remediation, AMLs should be a target for acquisition and restoration investment. Achieving market confidence in due diligence protocols and practices is absolutely central to improving the pace and scale of mine remediation and protecting public health. The Sierra Fund's Due Diligence program advances our goal to increase the pace and scale of mine remediation in the state. Improving due diligence will increase the confidence of market participants and incentivize mine remediation. (See Figure 7)

Figure 7: How Due Diligence Leads to Increased Mine Remediation



TSF has developed scientific and policy tools that support remediation of dangerous AMLs throughout the state. *TSF has two overarching recommendations to increase the pace and scale of AML remediation:*

A. Enact New Policies to Incentivize Mine Remediation

B. Include Assessment & Remediation of Mine Impacted lands as part of Permitting Publicly Funded Projects on AMLs

A. Enact New Policies to Incentivize Mine Remediation

The need to tackle abandoned mine remediation has recently been recognized and prioritized at several levels of government:

New Federal Directive: An Executive Order issued by President Biden January 27, 2021 "Tackling the Climate Crisis at Home and Abroad" notes that "climate considerations shall be an essential element of United States foreign policy and national security." *The Executive Order specifically calls out the need to reclaim land impacted by abandoned mines.*

New State Spotlight on AMLs: At the state level the *need to increase the pace and scale of mine cleanup* was recently underscored by a report released by the California Legislative Analyst's Office (LAO) in August 2020. The report, ["Improving California's Response to the Environmental and Safety Hazards Caused by Abandoned Mines"](#) ²¹ discusses some of the key challenges associated with remediating abandoned mines. The report acknowledges that responsibility to inventory, assess, and remediate abandoned mines is spread across a number of state, federal, and private agencies and landowners, which complicates efforts to prioritize and implement projects. It notes that funding to remediate mine impacted lands is limited and also spread across multiple agencies, diminishing effective use of allocated resources.

Case Study: Willow Creek Debris Control Dam

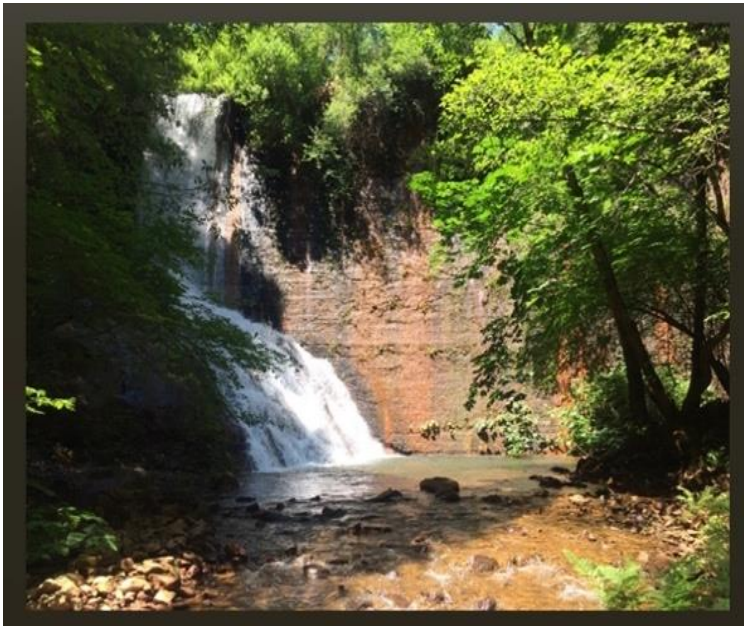
"dangerous mining features need to be evaluated, prioritized & remediated"

Willow Creek debris control dam was built as part of a hydraulic mining operation in the late 19th century in what is now the Tahoe National Forest. Standing 60 feet tall, nearly 280 feet wide and nearly 4 feet thick, the dam appears to rise out of the creek bottom like a fortress wall, while the top appears to be a large meadow and wetlands with a small creek running through. Seepage through dam face has been observed. Erosion of bedrock is evident below

the dam on the right side where the primary flow is beginning to undercut behind the dam face.

The dam is directly off the side of state Highway 49 and easy to see from the road. If the dam were to fail, the mine waste behind the dam would flow down Willow Creek and into the New Bullards Bar Reservoir. At this time there is no funding to abate this potential hazard.

Willow Creek debris control dam: Photo at left and on front cover depicts main stem of Willow Creek flowing over the dam on the right side (2017).



The LAO's Report includes three recommendations to support increased remediation of AMLs:

1. Designate a single state entity as the lead agency to facilitate consistent, ongoing coordination of the state's planning and prioritization efforts.
2. Develop a statewide strategic plan that would better ensure that limited resources are directed to the most critical projects.
3. Create a new funding mechanism to support abandoned mine remediation.

Obstacles to Increasing Pace & Scale of Mine Remediation

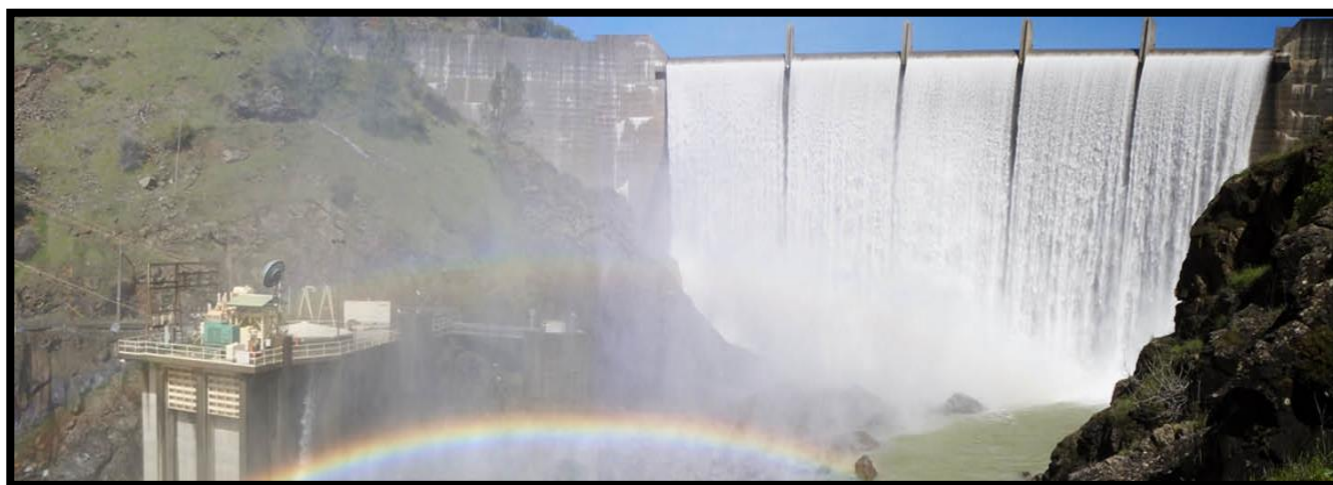
1. **Cultural Blindness + Resistance:** The evolving scientific understanding of the complex threat to human and landscape health posed by mercury and other legacy mining toxins in the historic mining regions hasn't attracted much public attention. Until quite recently no one even seemed to notice that there were mine impacted lands in the middle of town. And, speaking publicly about the toxic legacy of the Gold Rush era – including the stripping Native people's land and lives – raises an uncomfortable topic.
2. **Fear of the Unknown:** A leading obstacle to addressing AML remediation is the very rational fear about the potential cost of admitting the problem, leading to denial about the size and scope about the problem. This is true for individual landowners as well as government and non-profit organizations that own mine impacted land.

Concerns about liability reflect the truth that the primary way that abandoned mines have gotten attention and resources for remediation is from lawsuits filed around water quality discharges from AMLs. For example, a lawsuit filed in 2004 by the San Francisco Bay Keeper against the Empire Mine State Historic Park for discharges under Clean Water Act violations drove the Park to undertake a very impressive and innovative water treatment system – after millions of dollars in fines were levied against the Park.

3. **Patchwork of land ownership:** Remediation efforts are complicated by checkered land ownership patterns where legacy mine sites may stretch across multiple owners. Principal landowners in the region include the federal government, the state, tribal and local governments, non-profit organizations, and thousands of private landowners.
4. **Regulatory Chaos:** Jurisdiction to take action on this problem is split between local, state and federal agencies creating regulatory conflicts and turf battles. There are clearly a number of environmental regulations that need to be strengthened and clarified at every level, touching a wide variety of functions from public and environmental health to land use planning and permitting:

Federal Policy: There is already a 100-year backlog of past land acquisitions and projects by federal agencies that may need review. This is especially important when those lands are now or are proposed to become publicly accessible for development, recreation, mining, forestry or ranching purposes.

The federal government owns the Central Valley Project – serving the entire state of California - whose headwaters are in the Sierra Nevada's Gold Country. This massive project includes the reservoirs and water conveyance facilities as well as the forested landscapes that surround them. The federal forests include features built during the Gold Rush for mining purposes that are nearing or at the end of their functional life. The federal government also owns debris control dams, such as Englebright Reservoir on the Yuba River that are filling up with mercury and heavy metal contaminated sediments. They continue to block fish passage.



*United States Army Corps of Engineers Englebright Dam
Main Stem, Yuba River*

State Policy: There are many challenges facing the state of California in grappling with this issue.

- a. **Backlog of Assessment:** There is also a 100-year backlog of lands that were not assessed for abandoned mine land toxics prior to their purchase by the state. Due diligence protocols prior to new land acquisitions have recently been improved by state agency requirements, but their assessment methods and standards are not consistent and do not incorporate the principles of Informed Assessment. This includes the State Water Project reservoirs and water conveyance facilities on the Feather River that receive drainage from upstream abandoned mines.
- b. **Poor Communication and Coordination:** Regulatory agencies take a variety of approaches when it comes to due diligence. Their assessment methods are not coordinated. As underscored by the Legislative Analyst's report, there is no regular communication between regulatory agencies such as State Water Resources Control Board and the Department of Toxic Substance Control, and agencies such as California State Parks and Department of Fish and Wildlife that own abandoned mine properties. While the Abandoned Mine Land Unit (AMLU) of the DOC has convened meetings to discuss these issues, they have been irregular and closed to the public.

- c. **Abandoned Mine Reclamation is Nobody's Job:** These factors have led to almost no interest in this legacy, orphan problem. *There are no dedicated sources of funds for an informed, coordinated and efficient approach to this large landscape problem getting worse at the heart of our state's water supply.*

Presently, the only state funds dedicated to remediating legacy mines are the gold and silver fees (\$5/oz gold, \$.10/oz silver).²² These funds are used by the Abandoned Mine Land Unit only to abate physical hazards on state-owned lands. The California state 2021/22 budget anticipates a total of \$844,000 this year in revenue from this source.²³ Lack of funds have created a frozen system where AMLs are not being assessed and addressed comprehensively - or at all.

The failure to recognize these issues also impacts decision makers who regularly ignore mining legacy issues. For example: The state's premiere environmental justice mapping tool, EnviroScreen (created by California Environmental Protection Agency's Office of Environmental Health Hazard Assessment) has a screening methodology to identify California communities that are disproportionately burdened by pollution. Despite the evidence of the serious public health danger of AMLs, EnviroScreen doesn't map mine impacted lands. Their toxic hazards are not deemed to present an important environmental justice issues, even though these AMLs demonstrably and significantly impact the health of low-income and tribal communities.

- d. **State Mercury Regulations Not Helping:** For more than 10 years California's State Water Resources Control Board has been mulling ways to address mercury contamination of the San Francisco Bay and Delta. After many years of study, scientists have determined that 98% of the mercury in these water bodies comes from gold and mercury mines in upstream tributaries.²⁴ Most of this "fresh mercury" is sediment-bound and is transported mostly during winter when there are high, turbid flows into and out of low elevation reservoirs. Also, activities that release mercury-contaminated fine sediment into the water column during the summer when biological activity is high can lead to local methyl mercury production. The Delta or Bay cannot be cleaned up until this ongoing discharge stops.

To stop the discharge of mercury into these source tributaries (and the state and federal water projects as well as the Bay and Delta), the Board has considered setting limits on the amount of mercury that reservoirs are allowed to discharge as part of their regular operation. The challenge is that reservoir operators in the state's headwaters aren't dumping mercury into their water discharge – the mercury is coming from upstream gold and mercury mines over which they have no control.²

- e. **General Plans silent on AMLs:** State guidelines for local general plans are silent on the topic of mine impacted lands. California county general plans are supposed to

² Atmospheric deposition of mercury into reservoirs from sources such as cement factories and coal fired power plants is also a problem in the state that will require water quality treatment activities not addressed in this report.

focus on long-range planning. As state general plan guidelines point out “...considering current conditions and past planning decisions is important to ensure that the land use element does not perpetuate or exacerbate existing problems.” Counties are required to map “important mineral lands” – but are not required to identify legacy mines or mine impacted lands. 25

Case Study: Blue Lead Mine, Nevada County
“the CEQA Loophole for water quality permitting for mining”

In April 2015, The Nevada County Board of Supervisors voted in favor of a mitigated negative declaration of environmental impact and a use permit allowing Blue Lead Gold Mine LLC, to open an open pit gold mine on a 74-acre site. The Blue Lead Gold Mine was hydraulically mined from the late 1880s until the mid-1940s, and evidence of potential mercury on the site was presented. The assessment done as part of the soil sampling found no contaminants of concern, but no sampling during rain events was done.

The California Environmental Quality Act (CEQA) required environmental permit section pertaining to water quality mitigation measures were incomplete. This fact was pointed out during the hearing by The Sierra Fund before the Board of Supervisors unanimously approved the mine permit. The Board stated at that time that water quality permitting is not required as part of a CEQA review for mining – and the regional water board regulator agreed that this was the “custom.” This “custom” is not consistent with CEQA. It appears to be a unique loophole for mining permits.

Neighbors of the project sued over the inadequate assessment and the potential for legacy mercury contamination from the old hydraulic mine to be discharged as part of the mine operations. The suit was settled in 2016 with no public statement. The mine permit was never completed.

Local Level: Counties have a great deal of discretion in developing the land use regulations that guide development within their boundaries. This discretion has been broadly but ineffectively applied to mine impacted lands.

- a. **AMLs Ignored:** General plans in mining areas of the state typically overlook potential hazards of abandoned mines. When permitting new projects, planners in the Gold Country have often used the logic that, given that an entire community was built on legacy mine tailings and waste rock, these are normal conditions that do not need special consideration or environmental review under CEQA. This thinking has resulted in schools, subdivisions and senior care facilities being built on known and unrecorded physical and chemical hazards.
- b. **CEQA Sequencing for New Mine Water Quality Permitting:** Counties and cities serve as the lead agency for most environmental reviews, which normally require that *all environmental impacts* of a project be assessed prior to permitting. This

usually means water quality impacts as well as the usual impacts (traffic, noise, dust, habitat destruction) of any project.

It is noteworthy that mining enjoys an unusual “sequencing” to water quality permitting under CEQA. Uniquely, water quality review and permitting for mining is not done as part of the lead agency’s CEQA environmental impact review process. Current practice for mine permitting is for the lead agency (usually a county or city) to approve the mining permit and associated financial mechanisms, reclamation plan, and the CEQA document, as a bundle *before* evaluation of water quality impacts or proposed water quality mitigation measures has been complete. In some cases, such as for the Nevada County approval of the Blue Lead Mine permit in 2016 (see Blue Lead Mine, Nevada County Case Study page 39), the water quality section of the CEQA document is simply left blank.

Only *after* the lead agency approves the CEQA document and mining permit does the project sponsor apply to the regional water board for water quality permitting. At that time, the regional water board reviews the operation and reclamation plan for potential water quality impacts and orders possible remediation measures.

This strange sequencing in application of CEQA requirements for water quality evaluation prior to approval of a land use permit will need legislative action to resolve. TSF has met with regional and state board regulators to learn more about the rationale for this loophole.

Public Policies to Incentivize Abandoned Mine Land Remediation

Summary: TSF’s recommendations address these obstacles by reducing the uncertainties and risks around AML remediation, increasing incentives to remediate, and creating new sources of funds for strategic investment to increase pace and scale of mine remediation. TSF is calling for a new paradigm around AMLs across all decision arenas, where new Due Diligence Protocols are practiced whenever public dollars or agencies are involved.

NEW POLICIES TO INCENTIVIZE MINE REMEDIATION: All levels of government need to take a *more unified approach* toward AMLs. As the broader implications of the slowly emerging hazards from the historic mining era are clarified – from hydraulic mine debris clogging water storage to mercury contaminated food webs and toxic landscapes – the response must become much more sophisticated.

- I. Adopt new policy at the State & Federal Levels:** *Nationally*, the president and governors should lead a campaign to increase pace and scale of mine clean up as part of forest, meadow, wetland, and riverine restoration activities. *In California*, the legislature and the governor should work together to evaluate the findings of the LAO report and move forward to carry them out in coordination with the new Presidential Executive Order.

- a. *AMLs owned by public agencies should be inventoried, assessed for physical and chemical hazards, prioritized and remediated, especially when these AMLs are targeted for other activities such as forest treatment or development of recreational opportunities.*
- b. *Acquisition of targeted AMLs with the goal of remediation for public benefit should be incentivized, and these activities should be funded with loans or grants.*
- c. *Acquisitions of AMLs using public funds should require the appraisal to include an Informed Assessment. The appraisal industry should be directed to implement Informed Assessment of mine impacted lands in public contracts so that remediation costs are necessarily included in final appraisals.*
- d. *State legislation is needed to require disclosure of information developed as part of an Informed Assessment of an AML. Results from an Informed Assessment (chemical or physical hazards) should be required to be added to the title of impacted properties.*
- e. *The State Water Resources Control Board (Board) is preparing regulatory action with the goal of reducing mercury discharge from reservoirs. TSF has articulated a comprehensive Headwater Mercury Source Reduction Strategy to identify ways to reduce mercury discharge from historic mining areas.²⁶ This strategy proposes identifying the largest dischargers of mercury in a watershed, such as hydraulic mines, and remediating them using a variety of techniques. This approach paves the way to increasing the pace and scale of hydraulic mine remediation by tackling the leading source of mercury threatening the San Francisco Bay and Delta. Recommendations for action by the Board include:*
 - i. *Adopt Total Maximum Daily Load (TMDL) regulations requiring that when a reservoir is found to discharge more mercury than allowed under their permit, the reservoir owner must identify the source of that mercury.*
 - ii. *If the mercury is from upstream sources, the Board should consider requiring the adoption of best management techniques at these identified mercury sources. This would create regulatory pressure to remediate these mines while providing a potential income stream to do so.*
- f. *General Plans need to be strengthened:*
 - i. *The state should enact legislation requiring that local government general plans support improved planning and remediation of AMLs. General plans in mining impacted regions of the state should be required to develop specific measures for how they intend to assess, prioritize, and remediate abandoned mine sites. In the context of planning for future growth, such*

assessment may inform future decisions about whether certain locations are appropriate for additional commercial and industrial facilities.

- ii. New policies could include a requirement that general plan maps indicate the presence of mine-impacted lands, and that plans to remediate legacy mines in the local jurisdiction must be developed and implemented. Funding for updating local general plans needs to be provided.
- g. The loophole allowing the approval by a lead agency of a required permit and environmental document required by CEQA for a mining project *ahead of completing the water quality impact review* must be closed.
- h. The DTSC environmental justice mapping tool, *Enviroscreen*, needs to be *augmented* to recognize the many toxic hazards on AMLs.

2. Adopt Policies at the local level:

- a. Counties and cities should take action to *update their general plans* and maps to reflect AML concerns *regardless* of whether the state requires this action. Where chemical or physical hazards are identified, the plan needs to outline how these hazards will be addressed and remediated as part of the permitting structure.
- b. Environmental review of projects by planning commissioners and administrators must require Informed Assessment for known toxic materials using up-to-date methods. Local planning and building departments need to adopt new requirements regarding Informed Assessment and remediation prior to approving maps and projects on AMLs.

3. Improve Tribal Consultation: Tribal consultation is already required for some planning activities.²⁷ Meaningful engagement and inclusion of Tribal representatives early in the process of designing policies, projects, programs to clean up mine impacts lands on their ancestral homelands must become the normal protocol and required when public funds are being used. Participation by tribal leaders should be compensated for their expertise and time on a scale like other professionals on the project. Funding for this activity must underpin planning, policy, and project activities.

4. New funding for mine remediation must be developed including:

- a. Raising the “gold fee” charged on current gold and silver mining. The current fee for gold was set when gold prices were about \$500/oz. Gold prices/oz. in early 2001 were more than \$1,700. A higher fee should be set and tied to gold prices.
- b. Creating pollution and carbon credit offset programs tied to mine remediation including sediment and mercury discharge reduction activities.

- c. Explore the creation of a new public/private resilience bond, structured to allow “investors” to provide up-front funds for activities such as remediation of the hydraulic mines upstream from storage or hydropower facilities that are the source of the sediment filling up the reservoirs.

B. Include AML Assessment & Remediation When Permitting Publicly Funded Projects on AMLs

Projects on mine impacted lands are often begun without awareness of the mining features and hazards on the property. This can lead to serious problems that emerge later in the acquisition process or project implementation. Despite this, many organizations resist recognizing the potential presence of historic mining toxins during acquisition or project development. Up until recently there has been little information available on why or how to remediate AMLs. But there are a LOT of myths:

Myth #1: “Including abandoned mine remediation in projects will slow everything down.”

With modern technology like Lidar and access to experts that add needed layers of expertise to forest health projects, this does not have to be true. The expertise to identify AMLs, describe them generally in the CEQA scope and project description, and then have the permit incorporate known accepted best management techniques, is now available. Adding this information early to plans opens the door to address specific mine features (such as a debris control dam, mine tailings or obvious physical hazards) which could then be added to the already existing permit *instead of starting from scratch*. These future projects will bring additional benefits to water quality, water storage, and landscape health. Everyone wins.

On top of that, CEQA doesn’t allow the project proponents to ignore or not mention the very obvious mines on the forest. Projects on mine impacted lands without prior Informed Assessment could result in unanticipated liabilities and unanticipated costs.

Myth #2: “Including abandoned mine remediation in project design draws funds away from other projects.”

In fact, including informed due diligence as part of any project may not only save money in the long run, but it may also attract new sources of funding. Multi-benefit projects are increasingly favored by foundations and government agencies looking for efficient and impactful investments.

Myth #3: “AMLs aren’t really that dangerous.”

Yes. Yes they really are. (*We used to think that way about lead paint.*)

Obstacles to Including Mine Remediation when Permitting Projects on AMLs

1. Informed Assessment is not currently required prior to most conservation projects such as trail building, wetlands and habitat restoration, or development of urban parks or gardens.
2. Project proponents and decision makers often do not recognize the significance of historic mining hazards when planning projects on public lands owned by governmental agencies.
3. Remediation in the project design may increase the cost and complexity of the permit and the project in the short term.

Case Study: Deer Creek wetland restoration in mine debris²⁸ “project design changes to reflect Informed Assessment”

A project to restore wetlands by improving connectivity between the creek and a meadow on land owned by the Bureau of Land Management on Deer Creek outside of Nevada City was proposed by local environmental organizations. This project was part of a larger trail project along the creek. Plans for the restoration included moving large amounts of material (that had been mobilized in a flood a decade before. The material was largely waste rock and mine debris from upstream legacy gold mines where mercury had been used.

A NEPA review of the project found no issues of concern even though there were many warning signs and indications that the site was potentially seriously compromised (illustrating the inadequacy of previous assessment protocols). However, before the project got seriously underway, USGS scientists began to monitor the material onsite for heavy metals including mercury. Their evaluation found that the material containing mercury contaminated silts and clays was eroding into the creek, at an average rate of around 168 cubic meters per year during the study period (2010-2013) (Howle, et. al., 2016).²⁹

As a result of this research, the project was stopped to reduce potential additional contamination of the creek. BLM created required environmental review materials about their findings and held several local meetings to discuss the project. Funds that had been designated for this restoration purpose were reassigned to other projects.

Including AML Remediation in Projects & Permitting

The most efficient and effective time to begin Informed Assessment and due diligence is when a project on historic mine impacted land is being *scoped*. The AML feature may require remediation activities that will contribute to improving the environmental outcome of the overall project. Due diligence may trigger moving a dirt bike trail off asbestos contaminated dust, identify the best place to put a parking lot, or require erosion control measures that should be included in the mitigation measures for the project.

Due diligence can identify important cultural resources that need to be protected during project implementation and direct recommendations for management practices post-remediation. The tribal consultation requirements under AB 52 and other regulations are often tied to permitting processes, making this a good opportunity to engage on all sides. 30 31



Case Study: Tahoe National Forest Project
“including hydraulic mines during forest treatment projects”

TSF is working with Yuba Water Agency and the Tahoe National Forest on a suite of watershed resiliency projects on the forest. TSF has identified hydraulic mine sites by using Lidar that are within planned forest health projects. We have evaluated two of these hydraulic mine sites, and one is ready for remediation design. This will include addressing highly erosive areas, creating biochar on site with by-product materials from fuels reduction activities (non-merchantable timber), and amending denuded soils with biochar to promote revegetation to reduce offsite discharge of sediment and mercury.

TSF is working with these partners to incorporate information about hydraulic mines developed for the federal environmental impact statement into a project now planned for that same footprint. This project is undergoing CEQA permitting that can incorporate the already developed information. In this way, mine remediation activities can be piggybacked onto the forest health project permitting without causing delay or missing the opportunity to generate multiple benefits from this project.

If Informed Assessment has already been performed, the permitting process for a project is the opportunity to identify and assess any mine features and consider mitigation measures that can be part of related projects on the landscape. Designing, coordinating, and implementing complementary projects will result in lower costs than addressing each element individually. If some historic mining feature is not included in the permitting, and therefore is not properly

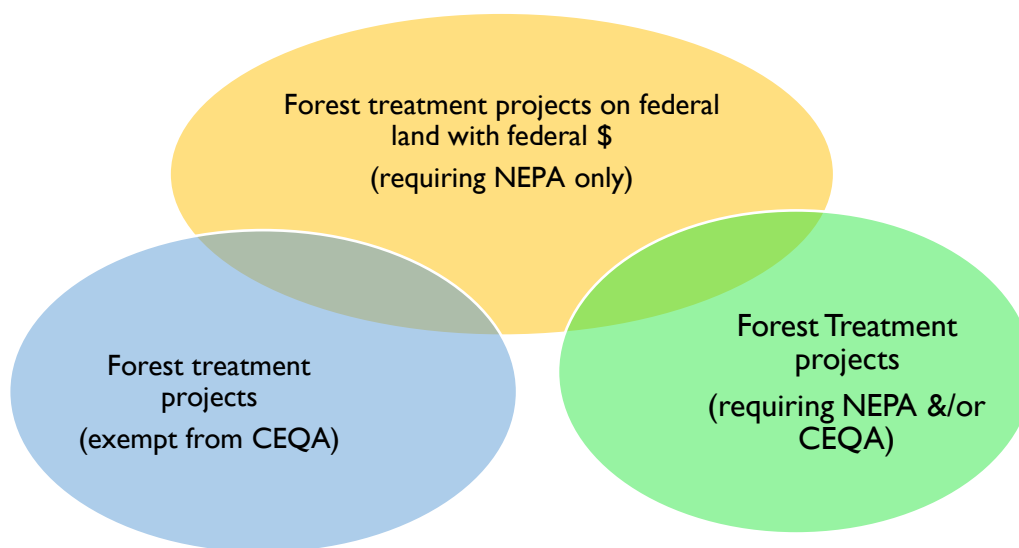
managed during the project development, liability for any problems that result can spiral costs out of control. *Projects using public funds should use TSF's due diligence model to go through project design and permitting.* It's a logical approach that should be applied to some of California's most urgent priorities, *including such projects as improving forest resilience and fire safety.*

Seeing the Forest and the Mines: California is investing billions of dollars in forest treatment to reduce the very real threat of wildfire – and getting ready to invest billions more. People are focused on moving as rapidly as possible, which is clearly important given the imminent threat. Now is the time to seize the opportunity to solve multiple problems while deep in the trees with heavy equipment.

Comprehensive forest health in the historic mining regions requires that the underlying context – that these are mine-scarred landscapes – be integral to how fuels treatment efforts are prioritized, planned for, and implemented. If the assessment for a proposed project on AMLs has not been done using Informed Assessment, it is likely that the opportunity to remediate a mercury-discharging hydraulic mine site will be entirely overlooked when the forest around it is being treated. The legacy mined area – even when surrounded by a forest under treatment – may be omitted from treatment entirely in the CEQA review and documentation.

Not all forest projects are equal under CEQA: Some of the funding available for emergency forest treatment is generated from bonds passed by the voters for this purpose. Projects using bond funds directed at preventing wildfire (such creating fire breaks and aggressive thinning along roads) are deemed so urgent that CEQA evaluation has been completely waived. Another large source of revenue comes from the US treasury through projects on federal land (USFS, BLM) using federal funds and are therefore exempt from CEQA as well. Federal projects go through NEPA evaluation instead of CEQA. (See Figure 8, below)

Figure 8: Understanding Forest Project Permitting on AMLs



Emergency treatment of forests to prevent wildfire must not be delayed by requiring unnecessary red tape. At the same time, there are potentially dangerous physical and chemical hazards on these lands. These hazards must be brought to the attention of both forest treatment crews and emergency fire-fighting crews in a timely and useful way. This needs to be considered whenever mine impacts lands are present on these sites.



*Mine features and
tailings burned over
in the August 2017
Los Lobos Fire
Rough & Ready, CA*

Photo June 2019

Recommendations to Include Mine Remediation in Projects on AMLs

Summary: TSF proposes that projects, including forest health projects, on mine impacted lands that are subject to CEQA include Informed Assessment as part of the permitting process. The state needs to support this goal by providing new resources and coordination to the effort.

- 1. Plans for fuels treatment and forest health on AMLs should prioritize hydraulic mine sites because they are sites with high erosion potential. If not remediated, they will be sites of contaminated sediment discharge that will take up valuable water storage space in downstream reservoirs.*
- 2. The state should create publicly available Lidar data sets for all abandoned mine landscapes, prioritizing forest lands that are expected to be treated to reduce fire danger and improve forest and watershed health. Make this data available and easily accessible to wildfire fighting crews.*
- 3. The state should create a publicly accessible GIS database of mine impacted areas on public lands that can be easily used for project identification.*
- 4. The state should create a clearinghouse of information about how to combine mine remediation with forest health treatments. This includes identifying sites in need of soil*

regeneration that are candidates for receiving chipped material, onsite biochar creation, and other complimentary forest health practices that can be incorporated into projects.

5. The state should create a permitting structure that directs the use of best management techniques (such as the ones developed in TSF's pilot projects at Humbug Creek and Champion Mine and outlined in our report on reducing mercury in the state's headwaters) on identified mine sites in the CEQA and NEPA documents created for all projects, including forest treatment projects. CEQA permitting for forest health treatment on AMLs should open doors to mine remediation by describing comprehensive forest health treatments and mitigation measures using best management techniques.
6. The state should create a collaborative team of experts from the CalEPA, Natural Resources Agency, Native American Heritage Commission, and the university systems to advise strategies for remediating mines and protecting cultural resources on abandoned mine lands that are prioritized for projects such as thinning the forest.
7. The state and federal should provide funding for these additional activities from the state's AML remediation funds as well as other funding sources as identified.

Action #2 Summary: Actions to Increase Pace & Scale of AML Remediation

NEW POLICIES TO INCENTIVIZE MINE REMEDIATION: Leaders at every level should take action now to transform legacy mining impacts into resilient ecosystems and communities. The state and federal government must create new policies and programs in a comprehensive strategy to remediate California's AMLs. The state should implement actions to address AMLs proposed in the 2020 report by the California Legislative Analyst's Office. The 2021 Presidential Executive Order calling for increasing AML remediation should facilitate coordination around this topic with federal partners.

Adopt Impactful Policies: Legacy mines on federal and state lands should be identified, catalogued, assessed, and prioritized for remediation. CEQA must be strengthened to require mine remediation in local government general plans. Adoption of best management techniques should be part of the Water Board programs to reduce mercury discharge from reservoirs. Local government planning and permitting must require consistent Informed Assessment prior to project approval. Funding for projects on mine impacted lands should be expanded and reformed to require the due diligence protocols prior to acquisition or project design and implementation.

Include Mine Remediation in Projects on Public Lands: Projects on public lands with mine impacted lands, including forest health projects, should include mine remediation in their design and permitting. New resources must be created to inform and direct project planning and implementation on public lands with AMLs.

THE SIERRA FUND: READY TO TAKE ACTION

The Sierra Fund (TSF) was founded in 2001 with the mission to protect and restore the resiliency of the landscapes and communities of the Sierra Nevada. For nearly two decades TSF has spearheaded an effort to address historic mining impacts on the forests, meadows, rivers and people of California's headwaters.

Our deliberate approach starts with a 360-degree view of the problem and the community members at risk. TSF has led numerous innovative pilot projects that demonstrate effective methods to restore ecosystem function and resiliency and that protect public health; raised millions to support collaborative activities in rural communities; and sponsored successful state legislation establishing the Sierra Nevada Conservancy and securing mining law reforms to protect communities. TSF's work is executed through three core programs:



TSF Staff Alex Keeble Toll M.A., M.Sc., and Carrie Monohan Ph.D. sample the turbid water in Deer Creek in Nevada City, during a typical storm when the creek ran orange, a color associated with discharge from hydraulic mine landscapes.

Ecosystem Resiliency Program (ERP) relies on scientifically rigorous strategies to document threats to landscape health and quantify the outcomes of restoration on the whole system. We use pilot projects to understand problems and to design solutions, an approach that has allowed TSF to generate new funding for the benefit of the greater region.

Environmentally Healthy Communities Program (EHCP) provides tools to identify risks to humans from the landscape-scale devastation of the Gold Rush. TSF has held educational presentations in all 22 counties of the Sierra and released key studies to show the extent of human exposure.

Capacity Building Program (CBP) leverages the outcomes of TSF's other programs to increase the visibility of the overwhelmingly rural, economically disadvantaged, and underrepresented region. TSF builds capacity by bringing new resources to the Sierra through projects, including funding, technical expertise, and advocating for policies to benefit communities.

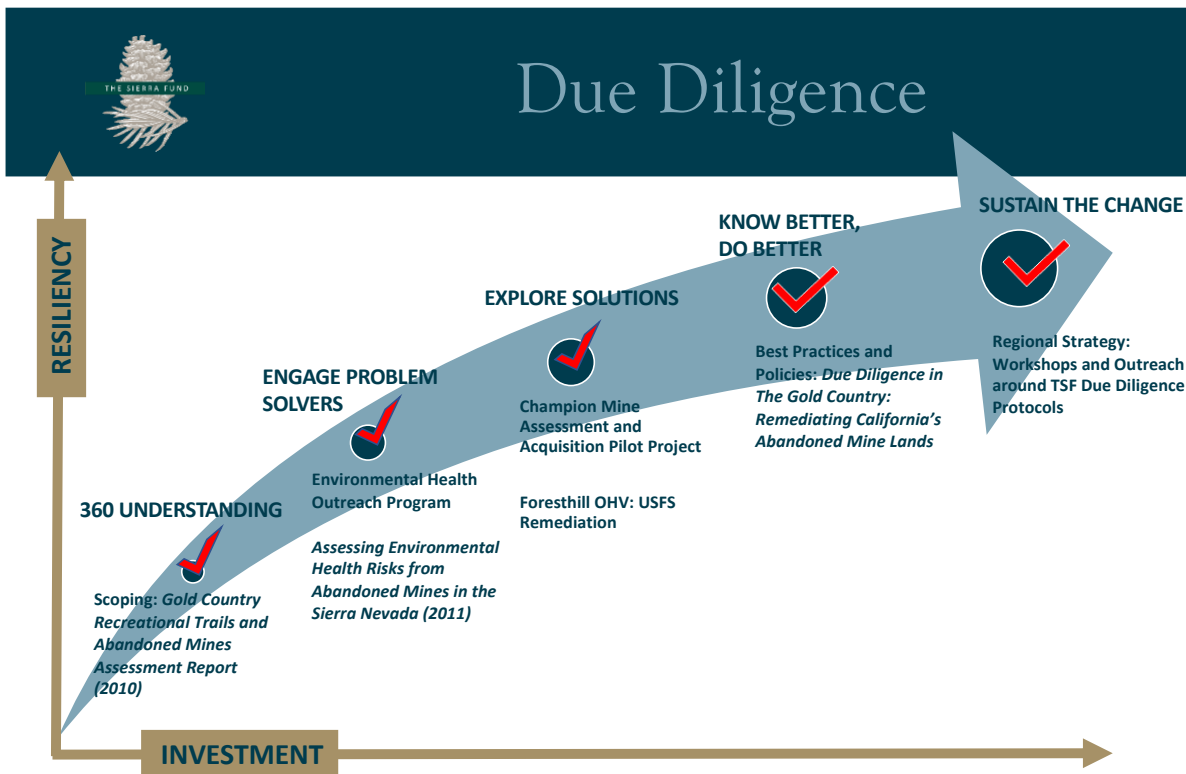


Figure 9: The Sierra Fund's Strategic Program Arc

Examples of work include:

- **Mining's Toxic Legacy (2008):** More than a decade ago, TSF released our seminal comprehensive report detailing the environmental, cultural, and human health impacts of the historic mining and related activities and outlining recommendations for action. This research catalyzed three State Assembly committees to convene hearings to explore for the first time the long-term impacts of the Gold Rush on the public lands and waters of the state.
- **Gold Country Recreational Trails and Abandoned Mines Assessment Report (2010):** To document the community risk associated with the inhalation of dust contaminated with arsenic, lead, chromium and asbestos, TSF assessed trails across abandoned mine sites.
- **Gold Country Angler Survey (2011, 2018):** TSF surveyed more than 400 anglers between 2009-2016, helping to ensure that posted fish advisories are responsive to the language(s) spoken by anglers and that healthy eating guidelines reflect all species being consumed.
- **Environmental Health Outreach Program (2014):** To increase access to information on mercury in fish, TSF held 10 trainings, reaching 100 healthcare professionals. TSF learned

that the vast majority of healthcare providers in the region do not routinely provide information on mercury in fish to those they serve, including pregnant women and children.

- **Post It Day (2015-Present):** In 2015 TSF launched an annual volunteer event to ensure that state-issued fish consumption advisories for mercury are posted at regional water bodies where they apply. To date, TSF has posted more than 125 state-issued fish consumption advisories at 25 water bodies, in five watersheds, in Spanish and English. Since the first advisories were posted there has been a two-fold increase in the number of anglers that correctly read the fish advisories. 32

If something is worth doing, it's worth doing over again. If it's worth doing over again, it's worth doing it right the first time.

-Caroll Vogel, Bridge Builder Extraordinaire



Nevada Irrigation District Combie Reservoir project equipment and TSF staff and volunteers from left Izzy Martin, Rick Humphreys, Alexandria Keeble-Toll, Nick Graham and Carrie Monohan, 2019.



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TSF Staff member Greg Thrush doing public outreach and education about how to protect the public from exposure from legacy mining toxins

June 2018

End Note References

- 1 DOC, 2000. California's Abandoned Mines: A Report on the Magnitude and Scope of the Issue in the State. Department of Conservation. Office of Mine Reclamation. Abandoned Mine Lands Unit. June 2000
- 2 USDI, 2015. Technical Evaluation of the Gold King Mine Incident. San Juan County, Colorado. Reclamation, Managing Water in the West. October 2015
- 3 For more on the reservoirs and mercury contamination refer to The Sierra Fund publication, *Headwater Mercury Source Reduction (HMSR)*, <https://sierrafund.org/headwater-mercury-source-reduction-strategy/>
- 4 <https://goldcountrymedia.com/news/102811/cave-ins-are-fact-of-life-in-foothills/>
- 5 DOC, 2000. California's Abandoned Mines: A Report on the Magnitude and Scope of the Issue in the State. Department of Conservation. Office of Mine Reclamation. Abandoned Mine Lands Unit. June 2000
- 6 *ibid*
- 7 <https://oehha.ca.gov/fish>
- 8 DTSC Envirostor website: <https://www.envirostor.dtsc.ca.gov/public/>
- 9 EPA Fact Sheet <https://semspub.epa.gov/work/09/100021123.pdf>
- 10 <https://semspub.epa.gov/work/09/1146780.pdf>
- 11 EPA website on Banner Lava Cap Superfund Site: <https://cumulis.epa.gov/supercpad/SiteProfiles/index.cfm?fuseaction=second.Healthenv&id=0904343>

12 https://oag.ca.gov/system/files/attachments/press_releases/Arrest%20Declar_Gold_Country_Lenders.pdf

13 <https://www.theunion.com/news/crime/gold-country-lender-ceo-resentenced-in-nevada-county-superior-court-after-conviction-partially-reversed/>

14 <https://sierrafund.org/programs/ecosystem-resiliency/hydraulic-mines-inventory/>

15 Humbug Creek Assessment report <https://sierrafund.org/projects/malakoff-diggings/>

16 2020/2021 Uniform Standards of Professional Appraisal Practice *Advisory Opinion 9 The Appraisal of Real Property that May Be Impacted by Environmental Contamination* The Appraisal Foundation, the Appraisal Standards Board <http://www.real-analytics.com/AO-9.pdf>

17 Bell, Randall A, MAI, *Real Estate Damages: An Analysis of Detrimental Conditions* published by the Appraisal Institute 1999. Page 9, Exhibit 0.6 Detrimental Condition Matrix

18 California Association of Realtors, Buyer & Seller Advisory <http://www.californiaoutdoorproperties.com/wp-content/uploads/2015/01/listing234doc11.pdf>

Also see: Nevada County Board of Realtors advisory addendum here: https://nevadacountyhomes.com/wp-content/uploads/2019/01/RegionalDisclosure_2-22-18.pdf

19 For more details about these complex state and federal regulations, see the CA Legislative Analyst's Office (LAO) excellent report on these issues, "Improving California's Response to the Environmental and Safety Hazards Caused by Abandoned Mines" here.

20 TSF Gold Country Recreation Trails Assessment available here: <file:///Users/izzy/Documents/TSF/TrailsAssessmentREPORT.pdf>

21 LAO report. <https://lao.ca.gov/Publications/Report/4258>

22 Fee Schedule in California Code of Regulations (CCR), Title 14, Division 2, Chapter 8, Section 3698 et seq.

23 <http://ebudget.ca.gov/2021-22/pdf/GovernorsBudget/3000/3480RWA.pdf>

24 RWQCBCV, 2010. Sacramento-San Joaquin Delta Estuary TMDL for Methylmercury. Staff Report. Michelle Wood, Chris Foe, Janis Cook, Stephen Louie. April 2010

25 https://opr.ca.gov/docs/OPR_C4_final.pdf

26 HMSR report <https://sierrafund.org/headwater-mercury-source-reduction-strategy/>

27 PUBLIC RESOURCES CODE DIVISION 5. PARKS AND MONUMENTS
CHAPTER 1.75. Native American Historical, Cultural, and Sacred Sites
5097.94. (m) To provide each California Native American tribe, as defined in Section 21073, on or before July 1, 2016, with a list of all public agencies that may be a lead agency pursuant to Division 13 (commencing with Section 21000) within the geographic area with which the tribe is traditionally and culturally affiliated, the contact information of those public agencies, and information on how the tribe may request the public agency to notify the tribe of projects within the jurisdiction of those public agencies for the purposes of requesting consultation pursuant to Section 21080.3.1.

28 URS, 2012. Final Engineering Evaluation/Cost Analysis Deer Creek. Prepared for Bureau of Land Management. June 2012

29 Howle, J.F., Alpers, C.N., Bawden, G.W., and Bond, Sandra, 2016, Quantifying the eroded volume of mercury contaminated sediment using terrestrial laser scanning at Stocking Flat, Deer Creek, Nevada County, California, 2010–13: U.S. Geological Survey Scientific Investigations Report 2015–5179, 23 p., <http://dx.doi.org/10.3133/SIR20155179>

30 https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201320140AB52

31 PRC, Div 5, Chapter 1.75, cited above

Appendices

DUE DILIGENCE IN THE SIERRA NEVADA GOLD COUNTRY REMEDIATING CALIFORNIA'S ABANDONED MINE LANDS



*Reclaimed gravel mines amongst hydraulic mining debris
in the Yuba Goldfields, Yuba County
From Google Earth*

Appendix I: Champion Mine Case Study

Appendix 2: Laws That Protect the Public From Exposure to Legacy Toxics

Appendix 3: All Appropriate Inquiry (AAI) defined

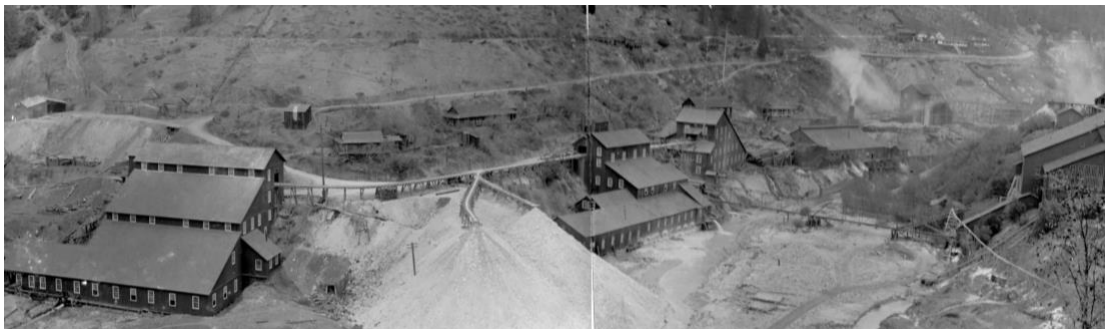
Appendix 4: Acronyms

Appendix I: CHAMPION MINE CASE STUDY

The Sierra Fund has studied projects at a variety of historic mines sites in California as case studies that highlight some of the issues faced in the attempt to assess, appraise, purchase and develop a project on an AML. These case studies demonstrate that in many instances the pre-acquisition assessment of properties with historic mining activities were inadequate. It is clear that best practices for assessment methods that address the presence of contaminants, contaminant transport processes and exposure potential need to be developed, to ensure responsible use of public funds for land acquisition, and to safeguard public health.

To understand the nuances of this complex issue, in 2013 The Sierra Fund launched a pilot assessment and acquisition project. This on-the-ground work was conducted at a legacy hard rock mine site outside of the town of Nevada City. Over the course of work to assess and acquire a parcel that had been the home of the former Champion Mine, on behalf of a local non-profit, TSF developed and tested best practices and protocols for:

- Assessing the site's physical and chemical hazards.
- Informing the appraisal process with these results.
- Structuring a Purchase Agreement that clarified liability
- Creating partnership agreements guiding the property acquisition.



Champion Mine is a historic a hard rock gold mine on Deer Creek just outside of Nevada City, California. At the height of its operation the Champion and Providence mines joined underground to become the largest hard rock gold mine in Nevada City. The historic Providence-Champion mine complex operated for upwards of 68 years. Between 1851-1919 approximately \$20 million in gold was recovered from the mine. Innovative mining techniques, such as the invention of chlorination treatment to improve gold recovery from the ore, were developed at this site.

Over the course of five years The Sierra Fund coordinated with the property owner, a cultural archeologist, contractors from the United States Environmental Protection Agency (USEPA), local First Nation leaders and an environmental engineering firm to evaluate the property prior to successful acquisition in 2018. The California Heritage: Indigenous Research Project (CHIRP),

is a tribally guided non-profit that now owns this property and is engaged in a planning project for the site.

Case Study Element: Informed Assessment

The purpose of the Informed Assessment of the Champion Mine Site was to determine the extent and concentration of potential contaminants of concern (CoC) and to protect the future landowner from liability. The scope of this assessment included:

1. Historical research (Cultural Evaluation) of mining operations associated with the Champion Mine Complex.
2. Hazards Assessment including surface soil sample collection (Environmental Sampling and Analysis) informed by the Cultural Assessment.
3. The site evaluation found no discharge from the property into the local creeks and other water bodies. Therefore, no water samples were taken.
4. Analysis of metals in soil samples below regulatory thresholds (California Human Health Screening Levels, CHHSLs) used to protect human health.
5. Recommendations of next steps.
6. These assessments were done in cooperation with the landowners following protocols outlined in the Purchase and Sale Agreement. The Sierra Fund also signed a Memorandum of Understanding with the non-profit organization acquiring the property. This MOU specified communication protocols, access to the property, and how information would be used and disclosed pre- and post-acquisition.

As part of this case study The Sierra Fund was able to compare the results of two different approaches to assessment:

Earlier Assessment: Prior to The Sierra Funds involvement, an assessment was conducted by an environmental engineering firm hired by the property owner. This assessment was done to determine if development of a portion of the property was possible. The purpose of the assessment was to see if one area of the property was free of contamination so that a case could be made to support development. The consulting firm took soil samples from just one area of the property and these did not reveal contaminants of concern at high levels. The assessment and soil sample results were used to defend the finding that the property was not contaminated, even though the areas where there were known mining features and potential associated contamination were not sampled.

This first assessment met State of California guidelines for “due diligence” prior to acquisition for conservation purposes. The assessment did correctly identify physical hazards on the property, however, it failed to identify the chemical hazards that were present. The estimate for remediation of the physical hazards identified in this assessment was \$200,000. No cost estimate to remediate the chemical hazards was provided.

Under the terms of many state or federal grants “assessment” costs are limited. In the case of the grant program funding this pilot project that amount was limited to \$10,000. When The Sierra Fund began this project, they determined that a more comprehensive assessment was

required. A waiver was requested, and received, to spend additional funds for Informed Assessment costs.

Informed Assessment: The Sierra Fund took an entirely different approach to assessment and worked with a cultural archeologist who conducted a Cultural Assessment to determine the operational history of the site. This was used to inform the Hazards Assessment and associated Environmental Sampling and Analysis which was first conducted by TSF scientists and then followed up by EPA Targeted Brownfield Assessment contractors.



Left: “Purple Dirt” near the chlorination treatment uncovered at the Champion Mine site



Right: TSF AmeriCorps Service Member Karen Atkins, using her Hazwopper training to test soil at the site safely

Environmental Sampling and Analysis

Sampling focused on target areas with mine features presumed to be areas of possible contamination based on historical operations and or potential sources of contamination to Deer Creek. Mine features were photographed and georeferenced using a Global Positioning System (GPS) to be able to compare sample locations to historical insurance maps of mine operations, specifically the detailed Sanborn Map, using ArcGIS. Soil samples were collected from locations that were associated with processing areas (such as the location of the chlorination works or amalgamation rooms) or from waste rock or mine tailings where contamination is commonly found.

The first sampling effort led by The Sierra Fund determined the presence of CoCs but did not determine the depth or extent of the contamination, which are needed to make cost estimates. Follow-up sampling by the consulting firm determined the extent of the contamination and the potential cost of removal was estimated. Using these improved assessment protocols, the concentrations of arsenic, barium, cadmium, chromium, copper, lead, mercury, nickel, and zinc

exceeded commercial CHHSL standards in some but not all samples. Areas with surface soil samples that exceeded CHHSL levels were identified for additional assessment to determine extent and remediation costs. The primary COC were lead and arsenic and arsenic has a wide range of bioavailability in this region, and so lead was the most important COC to determine future reuse and remediation options.

In addition, USEPA conducted a preliminary “potentially responsible party” (PRP) analysis using the operational history timeline that the Cultural Archeologist developed. The results of the preliminary PRP search could be used if the USEPA was asked to pay for and clean up the site by making it part of their Superfund Program.

Sampling Practices

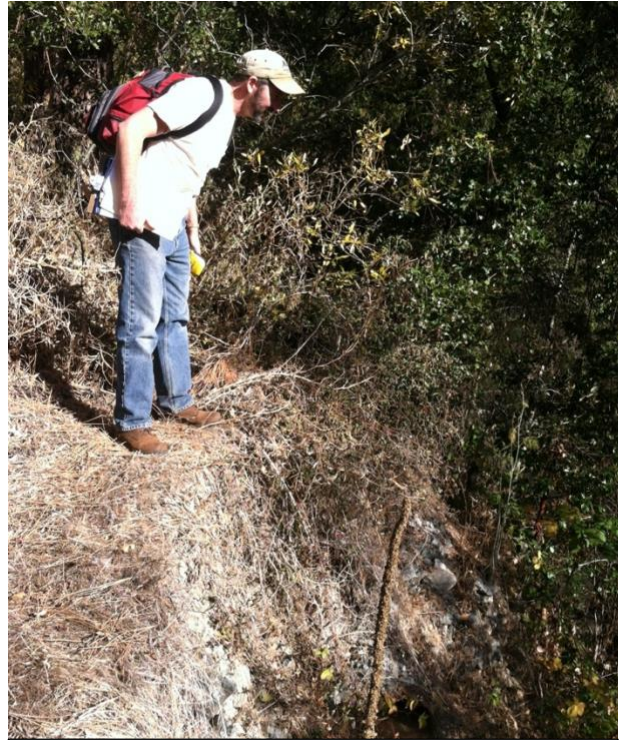
To obtain soil samples, samplers received Hazwopper training, wore dust masks and gloves and used a plastic trowel to clear away the top organic layer. The plastic trowel was used to shovel exposed soil from the top 10 cm of soil into a sieve that was held above a sample jar or bag. The top 10 cm was selected because it is the portion of the soil that is most likely to become airborne and inhaled as dust, and therefore represents exposure potential. The sieve was 4 inches in diameter and had a plastic frame with metal mesh with 1/8-inch square holes. Samples were collected into acid-cleaned polyethylene jars or plastic bags. Each jar was filled to the point of having at least 4 ounces of material. Each sample jar was sealed in double plastic bags provided by the trace metals certified laboratory selected to process the samples. To avoid cross-contamination, the plastic trowel and sieve were cleaned between samples using 409 spray and paper towels.

Samples were refrigerated until placed in a cooler with ice packs and sent to the EPA-certified lab, Brooks Rand Laboratory in Seattle, Washington (now Brooks Applied Laboratory in Bothell, WA). Samples were analyzed for potential contaminants of concern (COCs) as described in the State Water Resources Control Board’s California Code of Regulation’s also referred to as Title 22 metals from CCR Title XXII. Title 22 metals include; arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, lead, mercury, molybdenum, nickel, selenium, silver, titanium, vanadium and zinc. Samples were analyzed according to EPA method 3051 for all metals except mercury, and EPA method 1631 for mercury. The results were compared to California Human Health Screening Levels (CHHSLs) to establish if COCs are at or above levels of concern for commercial or residential use.

Summary of Best Practices for Assessment: Technical Details

1. Use a EPA certified consulting firm with Hazwopper Trained employees that can sample for contamination and make estimates for remediation costs. Make sure their scope of work includes the following components:
2. An Environmental Sampling and Analysis Plan that incorporates the results of the Cultural Evaluation - specifically the operational history of the site - and has judgmental sampling of targeted areas where possible contamination and or sources of contamination to nearby waterways could be present.

- a. Soil samples from locations that were associated with processing areas (such as chlorination or amalgamation rooms) or from waste rock or mine tailings where contamination is expected. Samples should be analyzed for Title 22 metals at a certified lab using EPA Method 6010B/6020/7000.
- b. If discharge comes from the site and/or mercury was used on site, collect storm water samples from drainages and waterways that may come in contact with contaminated areas during storm events. Have storm water samples analyzed at a certified trace metals lab, for Title 22 metals (EPA Method 6010B/6020/7000) and for mercury using EPA Method 1630 (filtered and unfiltered). Ensure ultra clean techniques are used for sampling mercury and that samples are sent to labs with low enough detection limits (see HMSR Appendix X for details).



Cultural Evaluation of the site with anthropologist Mark Selverston, MA

3. Geo-referenced and photographed sample locations to be able to compare sample locations to historical maps of mine features in ArcGIS.
4. Compare soil sample results to commercial and residential California Human Health Screening Levels (CHHSLs) to establish if COCs are at or above levels of concern.
5. Compare water sample results to Regional Water Quality Criteria for the California Toxics Rule and water quality regulations. NB: The water quality criteria for mercury is 50ng/L (ppt), samples must be sent to a lab that can detect mercury below this level.
6. A range of cost estimates for remediation depends on the type and extent of the hazards found and the planned future use of the property. For example, fencing off physical hazards may be sufficient for some re-use plans, where as other sites may warrant excavating and removing contaminated soil from specific areas.

The Sierra Fund's report on the Champion Mine assessment is available at this link on their [website](#).

Case Study Element: Impacts of Informed Assessment on Appraisal

In the Champion Mine pilot project, the understanding by all parties about the nature of the AML changed over time. When the land acquisition was first discussed, the landowner provided a remediation cost estimate that had been done on the parcel at their request by a local

environmental engineering firm. This evaluation, done using the “standard assessment” methods and focused almost exclusively on observable physical hazards on the parcel, estimated that remediation costs for the parcel would be approximately \$200,000. This cost was used in the appraisal and was subtracted from the appraised value in the appraisal to arrive at a conclusion of value for the property.

The USEPA analysis confirmed and underscored the severity of the contamination on the site. After the much more extensive evaluation done on the property as described above, the cost estimate by the EPA was a whopping \$7.7 million. This included cost to remediate the site, removing the discrete sites of very contaminated spots and doing hard landscaping to allow development.



Champion Mine Site survey, 2017

The fact that the site had no discharge into water was significant in deciding to move forward with the acquisition. Identified places with toxic dust with be fenced in order to keep people off the dirt for the short-term. The actual cost to remediate the property can't be truly estimated until a plan for use of the property is created by the current owners.

Over the next decades the new landowners, CHIRP, will evaluate the property to plan how they want to use the whole parcel. Only after that planning is complete will they pursue options to actually remediate some of the soil contamination if that is required for their use. At that time the mine features that need to be addressed will identified and specific engineered solutions will be created to properly remediate the property to its proposed use.

Case Study element: Understanding Liability and Structuring the Purchase

When The Sierra Fund stepped into the acquisition project, it was linked to the building of a trail along the same creek corridor, with the goal of both promoting this opportunity for the parcel to be protected from development and protecting the small town from incurring liability. Our evaluation found some contaminants of concerns in some discrete places we found no discharges triggering expensive, long-term liability. Our research also reveals a “potentially

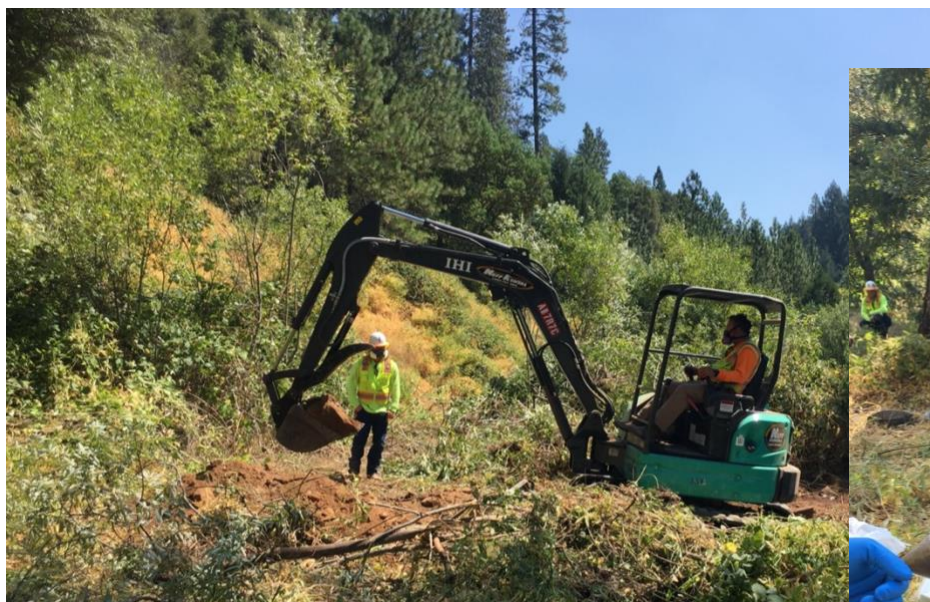
responsible party” who might have responsibility for remediating the problems we had discovered.

As part of this process The Sierra Fund worked with the seller to clarify key protocols to be observed prior to the acquisition, including when and how the property would be accessed for assessment, and how information from the assessment would be used. These protocols were included in the purchase and sales agreement. The Sierra Fund worked with a team of attorneys to craft a model purchase agreement that recognizes the unique liability issues that will need to be addressed before a new public or non-profit owner takes possession of an AML

Based upon the assessments, The Sierra Fund approached a local non-profit organization that serves the native people for whom the parcel encompasses ancestral homelands. They agreed to accept title to the property for cultural and environmental restoration purposes.

Case Study Element: Creating a Written Agreement with the Potential Purchaser

As the “third party” organization putting together the land use deal using a grant from the state Resources Agency, TSF navigated this process with the buyers using a written memorandum of understanding (MOU). The MOU between The Sierra Fund and the potential buyer of the property clarified how the process would unfold including when and how the decision to buy would be made, access to the property for assessment, how information from the assessment would be made available to the buyer and clearly defining the liabilities assumed by each part to the transaction.



TSF and EPA sampling on the Champion Mine Site



Appendix 2:

LAWS THAT PROTECT THE PUBLIC FROM EXPOSURE TO LEGACY TOXICS

Laws governing the development of property in California require that the lands be evaluated for chemical or physical hazards that might be present on the land be they naturally occurring or from historic use. Appropriate testing can reveal hazards that preclude certain kinds of uses but still allow other activities. A site may be inappropriate for a house but be safe for an industrial development.

The California Legislative Analyst's Office Report published in August 2020 "Improving California's Response to the Environmental and Safety Hazards Caused by Abandoned Mines" has an outstanding summary of the current state and federal programs that regulate toxic materials in air, water and soil. It includes a clear outline of assessment practices at the state and federal level and details the process of bringing toxic sites into the "Superfund" process. (Access this report [here](#).)

State Agencies

1. **The California Department of Conservation, Abandoned Mines Land Unit** manages a statewide database of abandoned mines and works to remediate public safety and environmental hazards posed by these mines. The Department of Conservation may have funds for the remediation of physical hazards for public lands.
https://www.conservation.ca.gov/dmr/abandoned_mine_land
2. **The California Department of Toxic Substances Control** sets and enforces standards for land restoration and cleanup through their Human and Ecological Risk Office's Risk Assessment programs. They oversee development of Preliminary Endangerment Assessments (PEA) which outline any required cleanup process and provide technical recommendations. They maintain EnviroStor, an online data management system for tracking efforts at sites with known or suspected contamination issues. DTSC will need to be involved to both set the cleanup standards for a site and to sign off that it is clean, they will conduct annual inspections of a site and must be paid annually for this service.
<https://dtsc.ca.gov/human-health-risk-hero/>
<https://dtsc.ca.gov/ecological-risk-assessment-hero/>
<https://www.envirostor.dtsc.ca.gov/public/>
3. **The California Office of Environmental Health Hazard Assessment (OEHHA)** has established California Human Health Screening Levels (CHHSLs) which establish safe levels of chemicals in soil. The CHHSLs are advisory and are published as reference values to estimate the degree of effort that may be necessary to remediate a contaminated site.
<https://oehha.ca.gov/risk-assessment/california-human-health-screening-levels-chhsls>
4. **The Regional Water Quality Control Boards** establish water quality assessment thresholds that allow enforcement of federal and state Clean Water Act Standards. The RWQCB will be involved in permitting remediation activities that have a water quality

impact and issuing water quality violations for any discharge that exceeds the Clean Water Act criteria.

https://www.waterboards.ca.gov/water_issues/programs/water_quality_goals/docs/wq_goals_text.pdf

In addition to these California state agencies, the federal Environmental Protection Agency (USEPA) has expertise and resources for AML assessment and remediation.

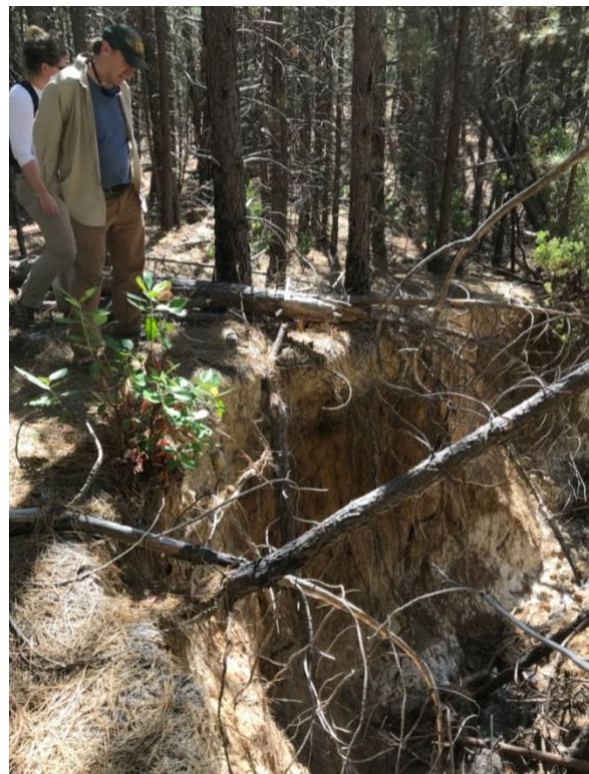
5. **The Targeted Brownfields Assessment (TBA) Program** of the USEPA has provided funds to implement important mine remediation activities in the Gold Country. The TBA funds can be used to have a certified contractor assess a site, estimate remediation costs and conduct a preliminary PRP search.

<https://www.epa.gov/brownfields/targeted-brownfields-assessments-tba>

The USEPA enforces the federal laws around The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). Unlike the Clean Water Act, CERCLA is not a permitting law. CERCLA, commonly referred to as Superfund, levied taxes on industries that historically were responsible for much of the pollution that generated the need for CERCLA in the first place. <https://www.epa.gov/superfund/superfund-cercla-overview>



Survey of Grizzly Creek debris control dam with TSF and USFS, Tahoe National Forest 2019



Appendix 3: All Appropriate Inquiries (AAI)

*For property owners or potential buyers seeking information about chemical hazards on specific properties, CERCLA calls for an “**all appropriate inquiry**” (AAI) to evaluate a property's environmental conditions and assess potential liability for any contamination prior to any development.*

Three Phases of Inquiry:

Phase I Environmental Site Assessment must be conducted by any party who may seek to claim protection from CERCLA liability as an innocent landowner, contiguous property owner or bona fide prospective purchaser. The AAI rule requires inquiries such as interviews with past and present owners; review of historical information; visual inspection; and review of commonly known or reasonably ascertainable information. Typical acquisitions of AMLs in the Gold Country, be they for public or private use, have relied on only this very limited Phase I Environmental Assessment. It is not unusual for new landowners to find out too late that there were physical or chemical hazards that were not discovered as part of the Phase I.

If a site is considered contaminated, a **Phase II Environmental Site Assessment** may be conducted, a more detailed and intrusive investigation involving chemical analysis for hazardous substances and/or petroleum hydrocarbons.

Phase III Environmental Site Assessment involves remediation of a site. **Phase III** delineates the physical extent of contamination based on recommendations made in **Phase II** assessments. This study normally involves assessment of alternative cleanup methods, costs and logistics.

Potentially Responsible Party

Toxic cleanup projects often begin with a “potentially responsible party” (PRP) search. A vital aspect of the thorough Cultural Assessment that should be part of the Informed Assessment is identification of previous owners of legacy mine lands and mills.

When the assessment of a property identifies physical or chemical hazards it is possible that previous owners are “potentially responsible” for their cleanup. In many cases the parties that are legally liable for creating these legacy abandoned mine lands have long vanished. However, in other cases legal research may identify PRPs that may be required to contribute to the remediation of the site.

Appendix 4: Acronyms

AAI: All Appropriate Inquiries
AMD: Acid Mine Drainage
AML: abandoned mine lands
AMLU: Abandoned Mine Lands Unit, CDOC
ATSDR: Agency for Toxic Substances and Disease Registry
BAT: Best Available Technology
BLM: Bureau of Land Management
BMP: Best Management Practices
CalEPA: California Environmental Protection Agency
CEQA: California Environmental Quality Act
CERCLA: Comprehensive Environmental Response Compensation and Liability Act
CDOC: California Department of Conservation
COC: contaminants of concern
DCD: debris control dam
DTSC: California Department of Toxic Substances Control
DWR: California Department of Water Resources
EPA: US Environmental Protection Agency
GIS: geographic information systems
LAO: California Legislative Analyst's Office
NEPA: National Environmental Policy Act
OEHHA: Office of Environmental Health Hazard Assessment
PRP: potentially responsible party
PSA: purchase and sale agreement
Water Board: State Water Resources Control Board
TEK: Traditional Ecological Knowledge
TSF: The Sierra Fund
USFS: United States Forest Service