

*ADEQ Mission:
"To protect and enhance public health and the
environment of Arizona."*

Improving the Legacy: ADEQ's Efforts to Restore Streams on Abandoned Mine Lands

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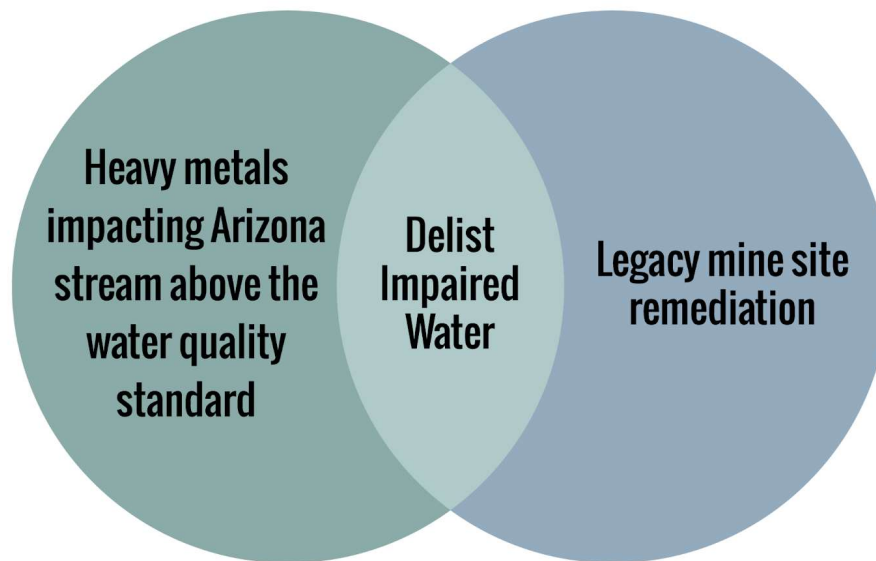


- Thank you
- My name is Natalie Muilenberg
- I lead the Watershed Improvement Unit at ADEQ
- Team of hydros, sci, and PMs who remediate abandoned mines that are SW quality exceedances under CWA
- Our program is not large by any measure, but we do what we can with what we have, prioritizing those sites that can negatively impact public health and the environment

Why We Do It



- As you can see, these streams are frequented by humans and wildlife, which is why we want to clean up these sites
- 2 main watersheds – Hassayampa River south of Prescott and several streams in the Patagonia Mountains south of Tucson
- streams are “impaired” under CWA for exceeding standards (copper, lead, zinc, cadmium)
- Both watersheds have existing TMDLs, or Total Maximum Daily Loads
- Projects focus on achieving load reductions



- Goal – delist impaired waterbody
- To improve surface water quality for wildlife and people
- Work within this nexus of abandoned mine remediation and the Clean Water Act



Evaluate | Understand contaminant characteristics and contributions to prioritize sites



Implement | On-the-ground remediation



Verify | Effectiveness monitoring

- Process is simple –
- evaluate and characterize the sites to figure out what features in particular are the cause of the metals exceedances
- Obtain outside expertise and resources to implement remediation
- conduct effectiveness monitoring to measure the success of the remediation and quantify the metal load reductions from the waterbody

Success for Streams

Over 5 years –

- **6** AML sites remediated
- **2** individual parameter delists as result of 1 site remediation
- **20+** project partners (private landowners, contractors, and federal)
- Positive impacts at **7** individual waterbodies



- And it worked!
- We've remediated 6 abandoned mine sites since 2018
- One site's remediation led to 3 pollutant delistings
- We're measuring other positive impacts at 7 individual waterbodies
- Not just ADEQ – our partnerships are critical
- Public and private landowners – without them, we wouldn't have access to these sites to clean them up

Sites:

Hillside
Three R
McKinley
Storm Cloud
Eugene
Poland

Delists:

Boulder Creek – beryllium and zinc

Waterbodies/Reaches:

Three R Canyon (2)

Hassayampa River (1)
Eugene Gulch (1)
Boulder Creek (3)

What's Needed to Do More



- National effort with guidance, funding, and resources (like Good Samaritan legislation)

- Accurate inventory of sites and features



- Thoughtful metrics to measure success

- Interdisciplinary solutions – engineering, hydrogeology, sustainability, project management, biology, archaeology



- Innovation – creative and sustainable reuse of byproducts and land

- And there's much more to do!
- SMIO estimates over 100,000 abandoned mines in the state
- Unknown how many are impacting streams and rivers
- There are many more across the American West
- states are often left with minimal funding and scant resources
- A national effort is needed to improve these lands for future generations
- ADEQ has identified a need for:
 - a complete and accurate statewide inventory of sites and their features
 - a comprehensive and holistic approach to remediation that can address not only surface water impairments but also groundwater contamination, drinking water system impacts, air quality, and hazardous waste
 - innovate and find unique approaches to abandoned mine features like adits and tailings and consider long-term sustainability of the land, its use, and the people and wildlife who depend on it



Questions? Want to get involved?

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- There are many ways you can work with us!
- We are always looking for ideas and solutions.
- Please feel free to reach out to me
- And I look forward to seeing some of you at the tour tomorrow, where you will get to see some of the sites in person

Thank you!