

Introduction

The mining proposed in Minnesota today is different from any mining in the state's history. PolyMet Mining Corporation and Twin Metals Mining are proposing copper-nickel mines in northern Minnesota in regions of the state with the highest concentrations of nickel and copper deposits in the entire United States.¹

Copper-nickel mining occurs when the land is excavated for heavy metals which reside in rocks containing sulfide minerals. During extraction, sulfide is brought to the surface exposing it to moisture and oxygen forming sulfuric acid that can leach into the surrounding environment - this process is known as Acid Mine Drainage (AMD).² AMD could significantly impact the areas influenced by the proposed mines which are within the watershed of the Boundary Waters Canoe Wilderness and Lake Superior watershed, two of Minnesota's most precious resources.

In addition to the environmental harm, economic and social drawbacks exist as well. Knowing this, should the state government allow copper-nickel mining in Minnesota? What regulations should be implemented to prevent or reduce the risks of mining? Given the significance of these watersheds and the potential for environmental harm, Minnesota must consider alternative solutions to the current mining proposals, including strong regulations or presidential action in order to protect the state's unique and diverse natural resources from this type of mining.



Fig. 1: Acid Mine Drainage (AMD)
<http://www.friends-bwca.org/issues/sulfide-mining/>

Methods

For this study, I reviewed three case studies of states that have had copper, nickel, or other heavy metal mining operations in the past. To determine the most reasonable solutions for Minnesota I analyzed Wisconsin's "well-regulated" Flambeau Mine, Montana's highly toxic Berkeley Pit, and the proposed gold mine outside the border of Yellowstone National Park. By comparing the social, economic, and environmental impacts of these mines, as well as their successful and failed regulations before and after mining, I was able to propose viable alternatives for Minnesota, with the ultimate goal of protecting the environment as well as the economy and greater community.

Results: Case Studies

Mine	Prior Regulations	Realized/Potential Environmental Impacts	Resulting Action	Condition
Berkeley Pit, MT <i>The Disaster</i>	None	<ul style="list-style-type: none"> 130 billion liters of AMD within Pit A Superfund site still filling at a rate of ten million liters per day Killed 342 migrating snow geese who took rest in the Pit 	<u>Reclamation Debt Service Fund</u> : the state government taxes mining companies to secure money for clean-up	Will stop mine if mineral prices are low
Flambeau Mine, WI <i>A So Called "Well Regulated Mine"</i>	Strong State Regulations	<ul style="list-style-type: none"> Removal of over 8,500 tons of soil and 600 million gallons of water contamination within 5 years All post-mining metal concentrations were more than half of predicted 	<u>Prove-it-First</u> : the company must prove that a similar mine has operated for at least 10 years and closed for 10 years without polluting	Will stop mine until success model is found
New World Mine, Yellowstone, MT <i>A "Pristine" Proposal</i>	Moderate State Regulations	<ul style="list-style-type: none"> Park waterways risked by AMD leaching, leaving wildlife vulnerable In 1995, Yellowstone was added to the World Heritage Sites in Danger List 	President Bill Clinton proposed a land exchange for \$65 million	Will stop mine if land has National intrinsic value



Fig. 3: The Berkeley Pit in Butte, MT
<http://www.pitwatch.org/>



Fig. 4: The Flambeau mine in Ladysmith, WI before reclamation
<http://dnr.wi.gov/topic/Mines/Flambeau.html>



Fig. 5: An illustration of the tailing pond for the New World mine
<http://www.minnpost.com/earth-journal/2014/04/>

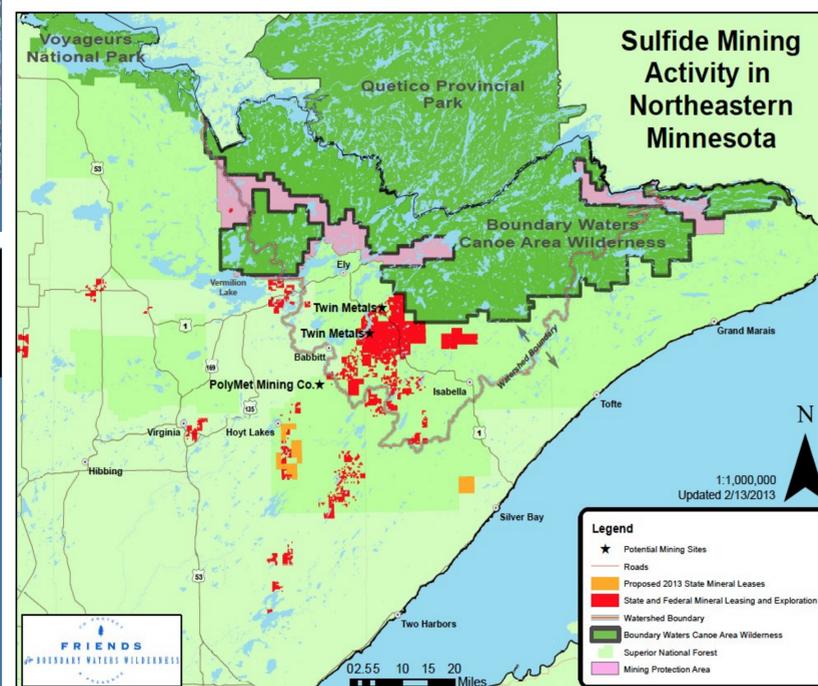


Fig. 2: Map of mine locations for PolyMet Mining Corporation and Twin Metals Mining proposals in Northeastern Minnesota.
<http://www.friends-bwca.org/issues/sulfide-mining/>

Conclusion

Based off of these case studies, Minnesota has three potential solutions to act on the Twin Metals and PolyMet mines proposals:

1. Taxation of the mining companies to secure proper funds for reclamation
2. Prove-It-First law to ensure environmental protection
3. Presidential action to stop the mining near the border of the BWCA

Considering the long history of mining in Minnesota, suggesting a ban is not a reasonable solution for current proposals. Proven economic benefits from copper-nickel mines have increased support from communities state-wide. State government regulations are necessary to ensure the protection of the northwoods. With the incorporation of a taxation fund, companies would only be deterred from mining if mineral prices were too low to make a significant profit. If presidential involvement were to occur, the land surrounding the BWCA would be protected, while remaining land would still be at risk to mining. **The Prove-it First law is the most feasible solution for Minnesota.** This law ensures the protection of natural resources by requiring companies to prove that a similar mine has not polluted before their operations are approved.

Sources

- ¹ Mining, PolyMet. "Northmet Project." <http://www.polymetmining.com/>.
- ² Johnson, D. Barrie, and Kevin B. Hallberg. "Acid Mine Drainage Remediation Options : A Review." *Science of the Total Environment*, no. 338 (2005): 3-14.