NORTHEASTERN MINNESOTANS FOR WILDERNESS, SAVE THE BOUNDARY WATERS,
CENTER FOR BIOLOGICAL DIVERSITY, CURE

November 21, 2025

Commissioner Sarah Strommen
Minnesota Department of Natural Resources
500 Lafayette Rd. N.
St. Paul, MN 55155

Commissioner Katrina Kessler
Minnesota Pollution Control Agency
520 Lafayette Rd. N.
St. Paul, MN 55155

Re: State Nonferrous Mineral Exploration Plan Submitted November 6, 2025 by Franconia Minerals

Dear Commissioner Strommen and Commissioner Kessler:

On November 6, 2025, the Department of Natural Resources ("DNR") received an exploration plan from Antofagasta, PLC via the wholly-owned subsidiary of Twin Metals Minnesota LLC (itself a wholly-owned subsidiary of Antofagasta. PLC), Franconia Minerals ("Franconia"). The exploration plan includes at least nineteen drill pads, **twelve** of which would be located within the Dunka Mine Area, including the drainage of Unnamed Creek (Bob Bay of Birch Lake), and the other **seven** along the shoreline of Birch Lake in the Rainy River-Headwaters watershed. The purpose of Franconia's exploratory drilling plan ("Plan") is to utilize state mineral leases to advance the development of a sulfide-ore copper mine within the Rainy River-Headwaters watershed, directly beneath Birch Lake.

The allowability of mining in the Rainy River-Headwaters watershed is the subject of a pending Minnesota Environmental Rights Act ("MERA") action by Northeastern Minnesotans for Wilderness ("NMW"). In its May 31, 2023 Findings of Fact, Conclusions of Law, and Order issued as part of that action, DNR determined that Minnesota's regulations on noise and light were inadequate to protect the Boundary Waters Canoe Area Wilderness ("Boundary Waters") from mining activities in the Rainy River-Headwaters watershed and ordered rulemaking to expand the State's Mineral Management Corridor within which mining related surface disturbance is prohibited. On May 12, 2025, an Administrative Law Judge ("ALJ") agreed with DNR that Minnesota's rules on noise and light do not protect the Boundary Waters and recommended a rule change to DNR. The adequacy of DNR's mine siting rule and its ability (or lack thereof) to protect the natural soundscape, dark skies, and clean water of the Boundary Waters is now before the DNR Commissioner in the MERA case, and the process is ongoing. By demanding that DNR approve exploratory drilling in the Rainy River-Headwaters watershed before the MERA action and related administrative proceedings have concluded, Franconia is essentially requiring DNR to preempt the ongoing MERA lawsuit, short circuiting DNR's

analysis on noise and light pollution, as well as NMW's intent to demonstrate in the court proceedings the validity of evidence on the egregious water quality issues sulfide ore copper mining poses in the Boundary Waters watershed. For DNR to even consider an exploratory drilling plan by Franconia that would generate the very light and noise that the DNR said and NMW experts demonstrated would pollute the Boundary Waters is completely incongruent with the ongoing MERA lawsuit and related proceedings.

Franconia's exploration plan dated November 6th, 2025 provides that, "[w]ithin each drill pad, all or part of the area may be cleared of vegetation to accommodate the drill rig, support vehicles, and a recirculation pit," and states that return water, drilling fluids, and drill cuttings will be directed to a recirculation pit or sump, the maximum size of which "will be 20 feet long by 20 feet wide by 10 feet deep." Each sump will have a maximum capacity of 4,000 cubic feet x 7.485 gallons per cubic foot, or 29,940 gallons of return water, drill cuttings, and drilling fluids. *See* Plan at 4.

Drill pads are typically established using some portion of crushed rock or gravel fill to level the site and reduce mud and rutting. Franconia does agree not to use crushed rock or gravel, without notifying the land surface owners. *See* Plan at 4. DNR noted in its comments to Twin Metals on its December 18, 2019 "Scoping EAW – Data Submittal" that no rock is entirely free of sulfur. *See* Minnesota DNR, 2020-06-15. RGU Comments on Proposer's Initial Data Submittal, at Comment 20.[1]

The Franconia plan calls for drawing drilling water from Birch Lake and specifies that drilling operations will require at least 500 gallons and not more than 2,000 gallons of make-up water per day. *See* Plan at 5. Make-up water is required each day due to the loss of volume of operating return water through mixing with drill cuttings and fluids, infiltration into and migration through the soil walls and bottom of the sumps, and migration through joint sets and faults in the Birch Lake deposit area.

NMW's field data collected over the past five years with a YSI hand pad and multi-probe sonde calibrated each field day, shows that average dissolved oxygen levels at Birch Lake monitoring sites in and around Bob Bay range from 87.5 to 89.4 percent saturation. Return water, drilling fluids, and drill cuttings for exploratory boring into the basal contact zone (BMZ) of the Duluth Complex will contain high concentrations of metal sulfides, which in addition to being exposed to water and oxygen in the make-up water will also be exposed to water and oxygen in the recirculation pits/sumps, meaning the metal sulfides in the drill cuttings, particularly drill cuttings from boring through the BMZ, will produce high concentrations of sulfate. This sulfate will reach Birch Lake through the modes of loss of make-up water noted above, and from the drill cuttings and mud proposed to be left in place once drilling ceases and the sumps are backfilled and abandoned. *See* Plan at 6.

Moreover, water quality data in the Minnesota Pollution Control Agency ("MPCA") database shows that the Dunka Mine Area is already highly polluted with sulfate from discharges from the Dunka Pit and surrounding waste rock stockpiles. This sulfate pollution flows into Birch Lake (along with pollution from the Northshore Peter Mitchell Pit) at levels that exceed

[1] https://files.dnr.state.mn.us/input/environmentalreview/twinmetals/2020-06-dnr-rgu-comments.pdf

Minnesota's legal standards and resulted in the MPCA proposing and EPA listing of Birch Lake and the lower reach of the Dunka River as impaired for sulfate. **Rather than remedy the sulfate pollution, as is required by law, if it approves the Franconia exploratory drilling plan, DNR (and MPCA) would be allowing the addition of even more sulfate pollution to the Dunka Mine Area, Birch Lake, and the Boundary Waters. The drilling plan proposed by Franconia would cause and contribute to the existing impairment of Birch Lake.** The MPCA sulfate data also documents the flowage of this pollution north to and into the Boundary Waters at Fall Lake. **Sulfate reaching Birch Lake from exploratory drilling activities will also reach the Boundary Waters.**

The Administrative Law Judge's Findings of Fact, Conclusions of Law, and Recommendation in the MERA Action

On May 12, 2025, the ALJ issued Findings of Fact, Conclusions of Law, and Recommendation in the Matter of Minnesota Environmental Rights Act Challenge to MN Rule 6132.2000 (ALJ Report). The ALJ recognized the serious and catastrophic risks posed by nonferrous metallic mineral mining in the Rainy River-Headwaters to the Boundary Waters. The ALJ found:

- "Because the waters of the BWCAW are prohibited ORVWs, any new activity that results in *any* loading or degradation in the BWCAW is prohibited. Even a single ounce of sulfate pollution added to the waters of the BWCAW violates the antidegradation requirements." ALJ Report Finding ¶ 139

- "A nonferrous metallic mineral mine in the RRH watershed presents many risks to the water quality of the BWCAW from the possible release of sulfate into the watershed. There are many possible ways that sulfate could be released from a mine, including leaks, accidents, failures of water treatment, and spills, among other things. If sulfate pollution reached the BWCAW, there would be substantial and long-term adverse effects due to the current low-sulfate and pristine quality of the water. Furthermore, sulfate pollution in the BWCAW would be impossible to remediate due to the lack of infrastructure in the Wilderness and the limitations of current technology." ALJ Report Conclusion of Law ¶ 21

- "…The strict antidegradation water quality standard of the BWCAW prohibits any mine from being permitted in the RRH watershed if it cannot comply with the water quality standard for prohibited ORVW. As a practical matter, it is currently impossible for a mine to comply with the antidegradation water quality standard and thus obtain a permit…" ALJ Report Conclusion of Law ¶ 22

Finally, the ALJ Report agreed with the DNR that Minnesota's rules on light and noise are inadequate to protect the Boundary Waters.

- "Industrial mining activity in the RRH watershed is likely to project enough light to be visible many miles into the BWCAW. Increases in BWCAW sky glow from new mines would interfere with the unique dark sky wilderness experience that BWCAW provides

and could jeopardize the BWCAW's status as an International Dark Sky Association Dark Sky Sanctuary." ALJ Conclusion of Law ¶ 26

- "The ecological effects from light pollution can persist for months or years. Nocturnal insects may develop different sensory and behavioral traits in response to light pollution, and nocturnal bird migration may also be affected. Plant physiology may be altered and nocturnal ecological processes can be completely disrupted by light pollution. Lighting from mining, especially from mines closer to the BWCAW boundary, will have substantial negative effects on the BWCAW because the current light levels are low. Adding new mines to the RRH watershed will likely worsen the ski quality in the BWCAW." ALJ Conclusion of Law ¶ 27

- "Noise and light impacts to the BWCAW would be long-term because mining operations typically continue for decades." ALJ Conclusion of Law ¶ 28

- "Noise and light impacts to the BWCAW that would accompany a proposed mine amount to a material adverse impact in violation of MERA." ALJ Conclusion of Law ¶ 29

- "Minn. R. 6132.2000, together with the MPCA noise regulations, are **not adequate** to protect the BWCAW from pollution, impairment, or destruction associated with noise and light impacts arising from nonferrous metallic mineral mining in the RRH watershed." ALJ Conclusion of Law ¶ 30

- "Because Minn. R. 6132.2000 is not adequate to protect the BWCAW from noise and light pollution under MERA, the DNR must undertake rulemaking to ensure sufficient protection of the noise and night wilderness conditions of the BWCAW." ALJ Conclusion of Law ¶ 31

U. S. Forest Service Environmental Assessment & Public Land Order 7917

The ALJ Report noted federal decisions affecting mining in the Rainy River-Headwaters:

- "Twin Metals held two mineral leases in the Superior National Forest – one lease was located adjacent to the BWCAW, and the other lease was located within three miles of the BWCAW. Both leases were located within the RRH watershed." ALJ Report Findings of Fact ¶ 164

- "On December 14, 2016, the U.S. Forest Service (USFS) withheld its consent for renewal of the two mineral leases in the Superior National Forest held by Twin Metals, citing "the inherent potential risk that development of a regionally-untested copper-nickel sulfide ore mine within the same watershed as the BWCAW might cause serious and irreplaceable harm to this unique, iconic, and irreplaceable wilderness area." ALJ Report Findings of Fact ¶ 165

- "The USFS concluded that "even a remote possibility of damaging the

BWCAW" outweighed the economic benefits of the mining operations proposed by Twin Metals. The USFS noted that Twin Metal's proposed mining operations could result in significant damage to the BWCAW:

> 'Based on information provided by [Twin Metals] to date . . ., existing science, and examination of similar proposals, there is no reason to doubt that the mining operations [Twin Metals] hopes to eventually conduct could result in [acid mine drainage] and concomitant metal leaching both during and after mineral development given the sought after copper-nickel ore is sulfidic. This fact is very significant given [Twin Metals]'s two leases are adjacent or proximate to the BWCAW and within the same watershed as the wilderness. It might be possible for [Twin Metals] to develop a mine which employs mitigation and containment strategies that reduce the mine's potential to cause [acid mine drainage] and leached metals that could harm the wilderness. However, at the very least it is equally possible that available water treatment technologies would be unable to prevent the spread of any [acid mine drainage] and leached metals in the watershed. Further, there appears to be even less likelihood that any contamination of the BWCAW resulting from [Twin Metals'] mining operations could later be remediated, especially not in a manner compatible with the BWCAW's wilderness character. Moreover, any degree of contamination of the BWCAW by [acid mine drainage] and leached metals has the potential to seriously degrade the wilderness area's character and quality. Thus, even if the probability that [Twin Metals'] mining operations might generate and release [acid mine drainage] and leached metals was very low, which the [US]FS does not believe to be the case, the environmental harm to the BWCAW that could result from any contamination of the area with [acid mine drainage] and leached metals might be extreme.'"

ALJ Report Findings of Fact ¶ 166

- "On January 24, 2022, the USFS confirmed that its 2016 withdrawal of consent still represented the agency's position. On January 26, 2022, the Bureau of Land Management (BLM) cancelled Twin Metals' mineral leases in the RRH watershed, noting that the USFS did not consent to renewal." ALJ Report Findings of Fact ¶ 167

- "On September 19, 2021, the USFS submitted an application to the BLM for withdrawal of approximately 225,504 acres of the Superior National Forest within the RRH watershed, excluding the BWCAW and the Mining Protection Area, from disposition under U.S. mineral and geothermal leasing laws for 20 years, subject to valid existing rights". ALJ Report Findings of Fact ¶ 168

- "In its withdrawal application, the USFS described water quality as 'a focal Point' for the BWCAW and contended that '[p]otential impacts from mining could alter water quality and thus degrade key components of the wilderness ecosystem such as habitat for wildlife (lynx, moose, loons), fish (walleye, lake trout, and other game fish), and wild rice.' The USFS emphasized that it was uncertain whether perpetual

maintenance of waste storage facilities and perpetual treatment of water discharge was possible, and noted that increased traffic, noise, light, dust, and other emissions from mining operations could alter the wilderness character of the BWCAW. The USFS further noted that permanently stored waste from mining could 'lead to irreversible degradation of this key water-based wilderness resource.'" ALJ Report Findings of Fact ¶ 169

- "In support of its withdrawal application, the USFS initiated an environmental review, accepted public comments, and issued an Environmental Assessment (EA) in December 2022." ALJ Report Findings of Fact ¶ 170

- "The EA noted that 'existing literature suggests that hardrock mineral mining of sulfide-bearing rock, no matter how it is conducted, poses a risk of environmental contamination due to the potential failure over time of engineered mitigation technology.' The EA concluded that wastewater and leaks pose risks to the BWCAW, which can be reduced through mitigation measures, but those risks will increase as facilities age. 'After mining is complete and a mine is closed and remediated, the risk of leaks, accidents, and failures may increase because there is more uncertainty on whether the resources and capacity will be available for long-term monitoring and corrective action.'" ALJ Report Findings of Fact ¶ 171

- "The EA found that the primary risk to the BWCAW posed by mining is negative impact to water quality. According to the EA, the two most significant risks to water quality are tailings storage failures, and failures of wastewater collection, treatment, and discharge systems. A catastrophic failure of a wet basin tailings storage dam in the RRH watershed could travel downstream and impact the water quality of Birch Lake, which, in turn, poses a risk, although reduced, to downstream waters such as the BWCAW. Failures of water collection, treatment, and discharge systems could also result in exceedances of water quality standards in Birch Lake and further downstream to the BWCAW." ALJ Report Findings of Fact ¶ 172

- "The EA concluded that mining in the Superior National Forest would negatively impact experiencing solitude and primitive recreation in the BWCAW due to noise and light pollution." ALJ Report Findings of Fact ¶ 173

- "On January 26, 2023, the U.S. Secretary of the Department of the Interior issued Public Land Order No. 7917, which withdrew approximately 225,504 acres of federal land in the Superior National Forest from disposition under mineral leasing laws for 20 years, subject to existing rights. The purpose of the withdrawal is to protect and preserve the natural resources, ecological integrity, and wilderness values in the RRH watershed, the BWCAW, the Mining Protection Area, and the 1854 ceded territory from the potential adverse effects of mining." ALJ Report Findings of Fact ¶ 174

- "As of the date of this Recommendation, Public Land Order No. 7917 remains in effect." ALJ Report Findings of Fact ¶ 175

Public Land Order No. 7917 prohibits mining on 225, 504 acres of federal lands in the Rainy River-Headwaters for twenty years (January 2023 – January 2043).

Impairment of Birch Lake

Birch Lake is listed as impaired for mercury in fish tissue (as are downstream lakes in the White Iron chain of lakes and into the Boundary Waters) and impaired for sulfate as a wild rice water. Franconia's proposed exploration activities will only exacerbate the two existing impairments by adding sulfate to Birch Lake and increased mercury in fish tissue in Birch Lake, causing or contributing to both impairments.

Impermissible Water Quality Degradation of the Boundary Waters

The sulfate impairment of Birch Lake is directly and solely traceable to pit water and leachate discharges from the Northshore Peter Mitchell Pit and the Dunka Mine Area. From 2021 through 2024, the Northshore Peter Mitchell Pit and Dunka Mine Area, from NPDES-permitted surface discharge points alone, discharged more than 6,235 metric tons of sulfate into Birch Lake through the Dunka River and Unnamed Creek (Bob Bay). Concentrations in these two tributaries are 1,860 to 21,700% higher than neighboring tributaries to Birch Lake that are not affected by mining. These elevated concentrations are the result of pumping mine pit water out of the two pits and into the Dunka River system, and mining activities (creation of mine pits and of mine waste rock stockpiles) affecting on less than 10 square miles of land in the 1,220 square mile Rainy River-Headwaters watershed draining to Fall Lake.

All other tributaries to Birch Lake are diluting sulfate pollution from the mines.

At the boundary of the Boundary Waters Canoe Area Wilderness on Fall Lake, more than 20 to 33 miles downstream from mining discharges, sulfate concentrations remain elevated in comparison with the reference streams that do not host mining lands. **The sulfate impairment of the Boundary Waters is directly traceable to pit water and leachate discharges from the Northshore Peter Mitchell Pit and Dunka Mine Area.** See the attached map: *All 2023-2024 EPA Method 300 Sulfate Data from All Collectors at MPCA IDed Monitoring Sites*.

A statistical analysis conducted by Downstream Strategies of the Rainy River-Headwaters watershed sulfate concentration data in EQuIS and produced by state-certified analytical laboratories using EPA Method 300, concluded with a reasonable degree of scientific certainty that sulfate discharges from the Dunka Mine Area and the Northshore Peter Mitchell Pit are degrading water quality in the Boundary Waters. See: *Statistical Analysis of Rainy River Watershed Sulfate Concentrations,* September 19, 2025, Downstream Strategies

In short, as DNR's own findings in the MERA lawsuit, the ALJ Report, and sulfate data in the MPCA database compel, DNR should reject further drilling by Franconia in the Rainy River-Headwaters watershed as proposed in the Franconia exploratory drilling plan. Water quality data in the MPCA database through 2024 shows that sulfate from two taconite mines is reaching into the Boundary Waters at impermissible levels. We know this because Birch Lake is impaired due to mining discharges of sulfate, and that sulfate flows downstream. The current

rules on water quality have not prevented this, are therefore inadequate and must be amended to ban sulfide-ore copper mining in the Rainy River-Headwaters watershed in order to adequately protect the Boundary Waters. Allowing mining-related activities in the same area while the MERA case is pending is nonsensical. NMW urges DNR to deny approval of any such plan.

1. **Franconia's Proposed Exploratory Drilling Will Cause Noise and Light Pollution in and around the Boundary Waters.**

On May 31, 2023, DNR concluded that Minn. R. 6132.0200 is inadequate to protect the Boundary Waters and its watershed from pollution, impairment, and destruction likely to result from the extraordinary noise and light pollution associated with mining-related activities. Consequently, DNR ordered rulemaking (to occur after a contested case proceeding) to expand the State's Mineral Management Corridor to protect the Boundary Waters from noise and light pollution. The ALJ agreed with DNR that Minnesota's rules on light and noise do not protect the Boundary Waters. The proposed exploratory drilling would cause the same light and noise pollution that DNR and the ALJ said would harm the Boundary Waters and must be stopped.

The experience of Wilderness includes an untrammeled wilderness soundscape, which encompasses silence and solitude. In 2020, acoustic ecologist Gorgon Hempton identified the Boundary Waters as one of fewer than ten places left in the United States where visitors can escape from the constant noises of civilization for more than 15 minutes. Exploratory noises, such as drilling, blasting, and heavy diesel truck traffic, have already been found to be disruptive in the Boundary Waters. Despite mining company assurances that noise mitigations would be followed during drilling, significant noise from Franconia's and TMM's exploratory drilling on leases between 2006 and 2014 damaged the Boundary Waters' wilderness character on and around Little Gabbro, Gabbro, and Bald Eagle Lakes, Lake One, the portage from Turtle to Bald Eagle, and on portions of the South Kawishiwi River. That exploratory drilling also severely damaged the natural soundscape on and around Birch Lake.

The exploratory drilling now proposed by Franconia, if permitted, would create distinctive, unnatural, and persistent noise, some of which would be audible during otherwise calm and quiet times at distances of more than 14 miles away, polluting, impairing, and destroying a key characteristic of the Boundary Waters not just with audible industrial noise, but with a component of low-frequency noise, which is uncommon and thus recognizable even at lower decibels than nearby high frequency natural sounds.

The exploratory drilling proposed by Franconia would also damage special features on and around Birch Lake. These include two federal campgrounds on the shore of Birch Lake and the South Kawishiwi River, Camp Northern Lights YMCA camp, Voyageur Outward Bound School (VOBS) on the South Kawishiwi River, and a set of at least 14 dispersed backcountry water-access campsites on the shores of Birch Lake and the South Kawishiwi River. Those who have not lived in or spent substantial time in an area subjected to exploratory drilling might not understand why this is so. Exploratory drilling typically continues 24 hours a day for months and seasons on end, a ceaseless attack on the natural soundscape and the hearing and quality of life for all within earshot. Franconia's proposed exploration plan acknowledges that, "[d]rilling operations will be conducted on a 24-hour per day 7-day per week schedule." *See* Plan at 4.

> To understand what the sound of constant drilling and heavy equipment is like, if you have never lived through it, try this for a few months or so: put your Kitchen-Aid mixer on the counter, plug it in, throw rocks into the steel pot, and leave it running with the blades hitting the side of the pot 24 hours a day, seven days a week, for months on end. Occasionally turn the mixer off, bang on it with a hammer, and restart it minutes later, without notice. That is what it sounded like to us, even when the drilling sites were miles away.

Decl. of Stephen Koschak, Dec., 21, 2022, at ¶16.

> Even prior to 2006, we were impacted by the noise of Franconia drilling at the Birch Lake site, four or five miles down the lake. Franconia anchored a barge in the middle of the lake but noise travels a long way over water. The noise funneled down the lake so we heard it at our property but the entire lake was also affected by this relentless auditory pollution for an entire summer. The drilling noise was loud enough that I know it impacted the campsites around the lake. Our guests asked us about it all summer long, taking time away from our work and creating an anguishing situation for us, as we had no idea how long it would continue. I went on a tour of the Franconia drilling operation and experienced the deafening noise in the immediate vicinity. I have some experience with sound abatement in the construction of buildings and noticed there was no attempt at sound abatement at the Franconia operation. I also saw that the drilling barge flew both an American and a pirate flag, which I felt was a statement of the mining company's attitude toward neighbors on the lake and the forest environment.

Id. at ¶ 24.

As noted above, in and before 2006, similar exploratory drilling occurred in close proximity to the sites now proposed by Franconia. Despite mitigation efforts, people at River Point Resort & Outfitting Company more than five miles from the drilling sites were disturbed almost without letup by the sounds of drilling, finding any preventative measures inadequate to protect special features on Birch Lake and the South Kawishiwi River. If the November 6, 2025 exploration plan is approved, this horrible noise will return to Birch Lake and continue through March 2027, or longer if another exploration plan were to be submitted by Franconia. Approval of Franconia's November 6, 2025 drilling plan opens the door for other plans at any or all of the other state leases in the watershed.

In addition to noise pollution, drill pads would cause light pollution. Drilling around the clock necessitates industrial lighting equipment at the Franconia drill pads, at least seven of which would be on or adjacent to the Birch Lake shoreline.

Given that noise and light pollution from mining activity in the Rainy River-Headwaters is set to be addressed as part of the ongoing MERA action, NMW requests DNR wait until the close of rulemaking and the MERA lawsuit to determine whether any new nonferrous metallic mineral exploration in the Rainy River-Headwaters watershed is permissible, and if so, what

mitigation measures, plan adjustments, and other conditions would be necessary for Franconia – or others – to proceed. Until such time, Franconia should delay any preparation for exploration in the Rainy River-Headwaters watershed.

2. **Birch Lake Is Impaired for Mercury in Fish Tissue and Is a Wild Rice Lake Impaired for Sulfate.**

Allowing Franconia's exploration plan to proceed as submitted would likely pollute Birch Lake and the water flowing to Birch Lake, which would contribute to the existing impairments of Birch Lake for sulfate and mercury in fish tissue. For that reason alone, Franconia's plan must not be approved.

Birch Lake is a wild rice water impaired for sulfate. Data demonstrating such impairment have been received and accepted by the MPCA and the Environmental Protection Agency. Birch Lake has long been on the impaired waters list for mercury in fish tissue (HgF). The fish in Birch Lake have a high enough mercury burden that Birch Lake cannot be covered by Minnesota's statewide mercury TMDL, which only covers lakes with fish tissue mercury concentrations exceeding the water quality standard of 0.2 mg of mercury per kilogram of fish tissue but less than or equal to 0.572 mg of mercury per kilogram of fish tissue; Birch Lake requires its own TMDL, which has not yet been prepared.

To sanction activities that *increase* the pollutant reaching a waterbody that is already impaired for that pollutant violates the Clean Water Act. Franconia's plan proposes road building, road widening, other earth movement such as the clearing of drill pads and addition of fill to drill pads along and near the shore of Birch Lake and drilling multiple boreholes on those pads. If the plan is approved, the creation and maintenance of these features is expected by DNR to continue for a 15-month period ending March 31, 2027 - that is, unless another exploration plan were to be submitted before the end of March 2027 - in which case exploration activities in and around the Birch Lake deposit might continue indefinitely beyond 2027. The totality of the planned activities is likely to cause erosion, runoff, and transport of contaminants – including sulfate in drill cuttings and drilling mud and mercury in conjunction with eroded soils – directly and through surficial soils and shallow groundwater into Birch Lake, and surface waters draining to Birch Lake. Addition of sulfate to Birch Lake is likely to increase both the release of mercury from sediments into the water column and the methylation of mercury, further increasing mercury in fish tissue. Thus, Franconia's proposed exploratory mining is likely to violate the Clean Water Act by causing or contributing to two existing impairments in Birch Lake.

3. **Sulfate Pollution from Two Taconite Mines is Degrading Water Quality in the Boundary Waters; Franconia's Proposed Exploratory Drilling will Add to That Pollution**

Data in the MPCA database demonstrate that elevated sulfate contributed to Birch Lake via Dunka River and Unnamed Creek (Bob Bay, Birch Lake). This is confirmed by the listing of Birch Lake by the EPA as impaired for sulfate. Sulfate from the Peter Mitchell Pit and the Dunka Mine Area is traceable at elevated concentrations as far downstream as NMW has yet sampled,

which at this point is across the Boundary Waters Canoe Area Wilderness boundary at Fall Lake, more than 23 miles downstream from Unnamed Creek (Bob Bay, Birch Lake), 28 miles downstream from the Dunka Pit direct pit dewatering discharge to Dunka River, and 33.6 miles downstream from MN0046981-SD-002 (the nearest Peter Mitchell Pit NPDES-covered surface discharge to Dunka River). There is no dispute over the path of pollution directly from Birch Lake into the Boundary Waters. Sixteen of Franconia's proposed drilling locations would be located downstream of and within the heavily polluted Dunka Mine Area in the catchment of Unnamed Creek (Bob Bay, Birch Lake). The other three proposed drill pads would be located on the north shoreline of Birch Lake across from Bob Bay, immediately adjacent to the lake. Sulfate from exploratory drilling activities detailed above will reach Birch Lake, and that additional sulfate loading delivered to Birch Lake in the Bob Bay area will cause an additional load downstream at the Boundary Waters' boundary on Fall Lake.

Conclusion

For at least these reasons, NMW requests that DNR reject Franconia's exploration plan submitted on November 6, 2025. A mineral exploration plan should not be approved when it will, or is likely to, result in a violation of the federal Clean Water Act's prohibition on causing or contributing to an existing water quality impairment. Nor should Franconia be allowed to pollute, impair, and destroy the Boundary Waters and its watershed with noise and light pollution—particularly when such noise and light pollution is under evaluation in a pending MERA case – and with sulfate pollution now known to be transported into the Boundary Waters.

Sincerely,

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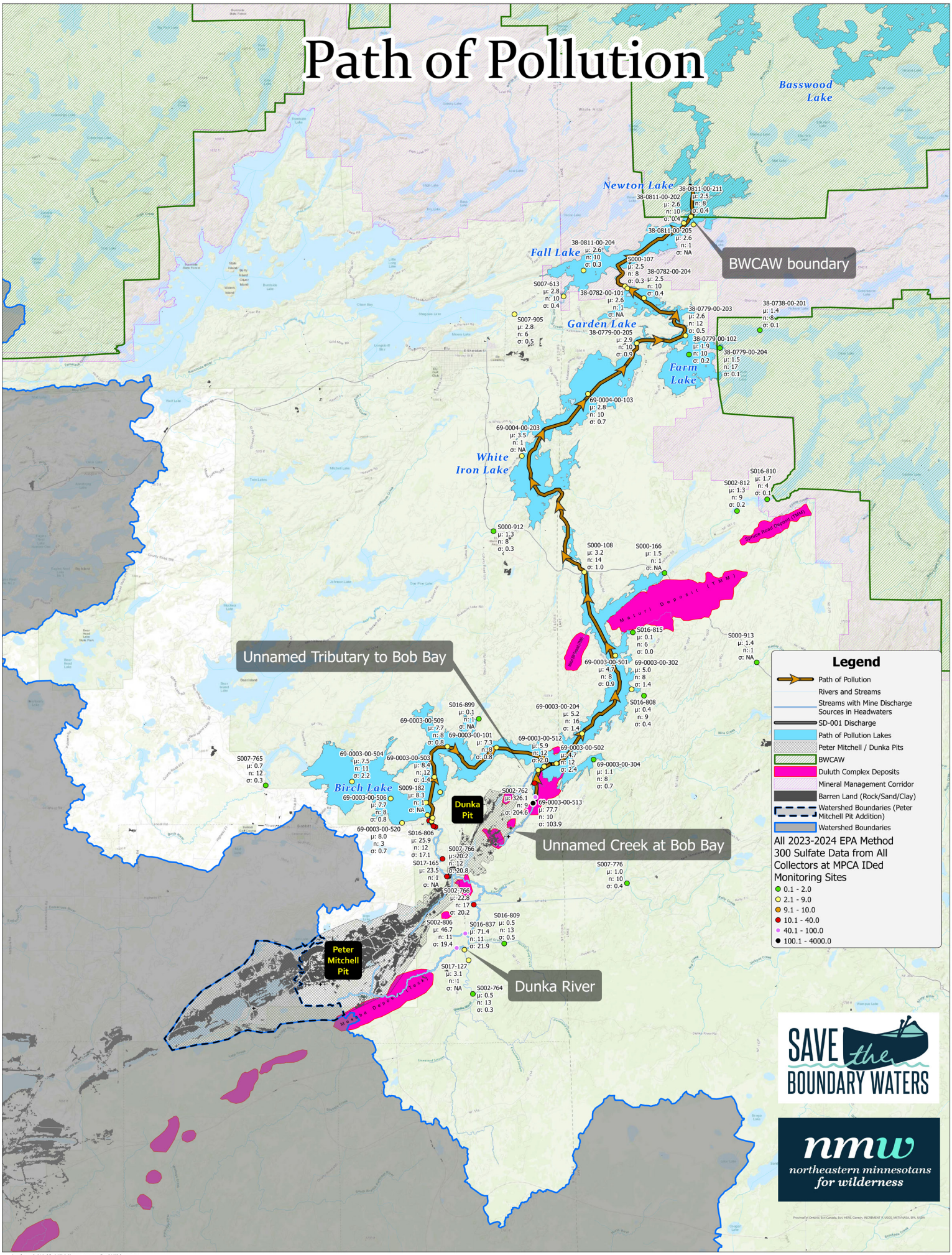
Path of Pollution
Basswood Lake
Newton Lake
Fall Lake
Garden Lake
Farm Lake
White Iron Lake
BWCAW boundary
Unnamed Tributary to Bob Bay
Unnamed Creek at Bob Bay
Dunka River
Dunka Pit
Peter Mitchell Pit
Birch Lake
Spruce Road Deposit (SRM)
Maturi Deposit (TMM)
Mesaba Deposit (Taconite)
38-0811-00-211 μ: 2.5 n: 8 σ: 0.4
38-0811-00-202 μ: 2.6 n: 10 σ: 0.4
38-0811-00-205 μ: 2.6 n: 1 σ: NA
38-0811-00-204 μ: 2.6 n: 10 σ: 0.3
S000-107 μ: 2.5 n: 8 σ: 0.3
38-0782-00-204 μ: 2.5 n: 10 σ: 0.4
S007-613 μ: 2.8 n: 10 σ: 0.4
38-0782-00-101 μ: 2.6 n: 1 σ: NA
S007-905 μ: 2.8 n: 6 σ: 0.5
38-0779-00-203 μ: 2.6 n: 12 σ: 0.5
38-0779-00-205 μ: 2.9 n: 10 σ: 0.9
38-0779-00-102 μ: 1.9 n: 10 σ: 0.2
38-0738-00-201 μ: 1.4 n: 8 σ: 0.1
38-0779-00-204 μ: 1.5 n: 17 σ: 0.1
69-0004-00-103 μ: 2.8 n: 10 σ: 0.7
69-0004-00-203 μ: 3.5 n: 1 σ: NA
S016-810 μ: 1.7 n: 4 σ: 0.1
S002-812 μ: 1.3 n: 9 σ: 0.2
S000-912 μ: 1.3 n: 8 σ: 0.3
S000-108 μ: 3.2 n: 14 σ: 1.0
S000-166 μ: 1.5 n: 1 σ: NA
S016-815 μ: 0.1 n: 6 σ: 0.0
S000-913 μ: 1.4 n: 1 σ: NA
69-0003-00-501 μ: 4.7 n: 8 σ: 0.9
69-0003-00-302 μ: 5.0 n: 8 σ: 1.4
S016-808 μ: 0.4 n: 9 σ: 0.4
S016-899 μ: 0.1 n: 1 σ: NA
69-0003-00-509 μ: 7.7 n: 8 σ: 0.8
69-0003-00-204 μ: 5.2 n: 16 σ: 1.4
69-0003-00-101 μ: 7.3 n: 8 σ: 0.8
69-0003-00-512 μ: 5.9 n: 12 σ: 2.0
69-0003-00-502 μ: 4.7 n: 12 σ: 2.4
69-0003-00-304 μ: 1.1 n: 8 σ: 0.7
S007-765 μ: 0.7 n: 12 σ: 0.3
69-0003-00-504 μ: 7.5 n: 11 σ: 2.2
69-0003-00-503 μ: 8.4 n: 12 σ: 1.4
S009-182 μ: 8.3 n: 1 σ: NA
69-0003-00-506 μ: 7.7 n: 8 σ: 0.8
S002-762 μ: 326.1 n: 9 σ: 204.6
69-0003-00-513 μ: 77.7 n: 10 σ: 103.9
69-0003-00-520 μ: 8.0 n: 3 σ: 0.7
S016-806 μ: 25.9 n: 12 σ: 17.1
S007-766 μ: 20.2 n: 12 σ: 20.8
S017-165 μ: 23.5 n: 1 σ: NA
S007-776 μ: 1.0 n: 10 σ: 0.4
S002-766 μ: 22.8 n: 17 σ: 20.2
S002-806 μ: 46.7 n: 11 σ: 19.4
S016-837 μ: 71.4 n: 11 σ: 21.9
S016-809 μ: 0.5 n: 13 σ: 0.5
S017-127 μ: 3.1 n: 1 σ: NA
S002-764 μ: 0.5 n: 13 σ: 0.3
Legend
Path of Pollution
Rivers and Streams
Streams with Mine Discharge Sources in Headwaters
SD-001 Discharge
Path of Pollution Lakes
Peter Mitchell / Dunka Pits
BWCAW
Duluth Complex Deposits
Mineral Management Corridor
Barren Land (Rock/Sand/Clay)
Watershed Boundaries (Peter Mitchell Pit Addition)
Watershed Boundaries
All 2023-2024 EPA Method 300 Sulfate Data from All Collectors at MPCA IDed Monitoring Sites
0.1 - 2.0
2.1 - 9.0
9.1 - 10.0
10.1 - 40.0
40.1 - 100.0
100.1 - 4000.0
SAVE the BOUNDARY WATERS
nmw
northeastern minnesotans for wilderness
Author: J. Wolfe NE Minnesotans for Wilderness
Date: 7/21/2025
0 0.5 1 2 Miles
N

Downstream Strategies
Ideas that sustain.

To: Matt Norton, Policy and Science Director
Campaign to Save the Boundary Waters
Northeastern Minnesotans for Wilderness

From: Evan Hansen and Dale Shannon

Re: Statistical analysis of Rainy River watershed sulfate concentrations

Date: September 19, 2025

The Rainy River Headwaters watershed in northeastern Minnesota includes a network of lakes and rivers that flow into the Boundary Waters Canoe Area Wilderness (BWCAW) at Fall Lake. In the headwaters of the watershed, two taconite mines—the Dunka Mine and the Peter Mitchell Pit—discharge high levels of sulfate.

Sulfate concentration data have been collected in many lakes and rivers across the watershed, including (1) upstream from the mines, (2) downstream from the mines, and (3) in reference streams that are unimpacted by copper-nickel sulfide mining and therefore illustrate background sulfate concentrations.

A visual observation of these monitoring data suggests that sulfate concentrations decrease gradually, with the highest concentrations generally found immediately downstream from the Dunka Mine and Peter Mitchell Pit, and lower concentrations found further downstream. A visual observation also suggests that sulfate concentrations downstream from the mines—all the way to the BWCAW—are elevated as compared with reference streams.

In this memo we analyze the sulfate data to test whether these visual observations are statistically supported. With this analysis we answer two linked questions:

1. Do sulfate concentrations in lakes and rivers downstream from the mines follow a pattern in which they decrease the further they are from the mines?
2. Are sulfate concentrations at the boundary of the BWCAW above the background levels found in reference streams?

As documented below, our statistical analysis answers “yes” to both questions. We therefore conclude with a reasonable degree of scientific certainty that sulfate discharges from the Dunka Mine and the Peter Mitchell Pit are degrading water quality in the BWCAW.

304.292.2450

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Davis, WV 26260

The dataset

Data were provided by Northeastern Minnesotans for Wilderness.[1] Monitoring results were only included in our analysis if they met all of the following conditions:

- the chemical name was "Sulfate;"
- the laboratory's analytical method for testing sulfate was 300(A), 300.0, or 300.1;
- the sample type was "Sample" (i.e., it was not a quality control sample); and
- the sample was collected in 2023 or 2024.

For samples that were below the method detection limit, a value of one-half of the method detection limit was used for our analysis.

Assigning monitoring locations to groups

To perform our analysis, we assigned every monitoring location to a group. We started with 10 groups that included sites that are similar distances from the Dunka Mine and Peter Mitchell Pit. These groups demonstrated a declining mean sulfate concentration for groups sequentially further from the mines. However, t-test results suggested that the distributions of sulfate concentrations were statistically similar between some adjacent groups. After combining statistically similar groups, we settled on the six groups used in this analysis.

Groups 1 through 5 are downstream from one or both of the Dunka Mine and Peter Mitchell Pit, and the group numbers correspond to their proximity to these sulfate sources. For example, monitoring locations in Group 1 are closer to the mines than monitoring locations in Group 2.

Group 1 includes monitoring locations on the tributaries to Birch Lake that are downstream from the Dunka Mine and Peter Mitchell Pit. These sites generally had the highest sulfate concentrations due to their proximity to the mines and because the sulfate had not yet been diluted in Birch Lake or by downstream lakes and rivers.

Group 2 includes sites in Birch Lake that are upstream from the Unnamed Tributary to Bob Bay.

Group 3 includes sites in Birch Lake that are downstream from the Unnamed Tributary to Bob Bay.

Group 4 includes monitoring locations that are also impacted by the mines, but are downstream from Birch Lake. These include sites in South Kawishiwi River, Farm Lake, and White Iron Lake.

Group 5 includes the monitoring locations furthest downstream from Birch Lake: in Garden Lake and Fall Lake. The Fall Lake sites are the closest to the BWCAW.

Group 6 includes the background monitoring locations in reference streams. These include the monitoring sites upstream from the Dunka Mine and Peter Mitchell Pit, in addition to the sites in the Rainy River Headwaters watershed not included in Groups 1 through 5—except for Shagawa River monitoring locations.

[1] Spreadsheets named "Sulfate_Data_Request_NWM_06_04_2025" and "filter_full_log" were emailed from Matt Norton on August 20, 2025.

Sulfate concentrations in the Shagawa River are generally elevated as compared with background concentrations observed in the reference sites located elsewhere in the watershed. Wastewater treatment at Ely and Winton and/or hydrological connections between the Shagawa River and Miners Lake may explain the higher sulfate concentrations in the Shagawa River. Because Group 6 is intended to include true reference streams with background levels of sulfate, the Shagawa River sites were not included in this group.

Also with respect to the Shagawa River, its sulfate concentrations are similar to those in Garden Lake. However, as summarized by Thomas Myers, the Shagawa River flow is only 10 percent of the flow from Garden Lake and "…cannot be the control for the [sulfate] in Fall Lake." According to Myers, "…the Shagawa River load has only a small effect on the total excess [sulfate] load entering the BWCAW."[2]

Statistical results

As illustrated in Table 1, our dataset includes 456 sulfate monitoring data points collected across the six groups over two years: 2023 and 2024. Group 1 (tributaries to Birch Lake downstream from the mines) and Group 6 (reference streams) have the most data points: 124 and 131, respectively. The other four groups have at least 38 data points.

The mean sulfate concentration of 53.71 mg/L is much higher in Group 1 than in any other group. As observed in Table 1, the mean decreases for groups that are further downstream from the mines. The mean concentration of the reference streams in Group 6, 1.03 mg/L, is lower than the means for every other group.

Table 1: Descriptive statistics by group (mg/L)

Group	Count	Mean	Std. dev.	Min.	Max.	Std. error	Lower 95% conf. interval	Upper 95% conf. interval
1	124	53.71	100.33	0.10	556.00	9.01	35.88	71.55
2	68	7.83	1.25	2.50	11.50	0.15	7.52	8.13
3	56	5.15	1.75	0.90	8.60	0.23	4.68	5.62
4	47	2.91	0.81	1.40	4.90	0.12	2.68	3.15
5	38	2.50	0.35	1.80	3.20	0.06	2.38	2.62
6	131	1.03	0.63	0.10	3.10	0.05	0.92	1.14
Total	**464**							

Figures 1 and 2 present these results graphically. The height of the bars represents the mean for each group, and the error bars show the range that the mean could take if one were to be 95 percent confident that the mean for the population from which the sample was drawn was within that range. While Figure 1 includes all six groups, Figure 2 omits Group 1 so that differences between the other groups are more apparent.

[2] Prefiled Direct Testimony of Tom Myers, Ph.D. on Behalf of Petitioner Northeastern Minnesotans for Wilderness. State of Minnesota Office of Administrative Hearings. In the Matter of Minnesota Environmental Rights Challenge to Minn. R. 6132.2000. OAH Docket No. 25-2004-39617.

Figure 1: Means and 95 percent confidence intervals for all six groups (mg/L)

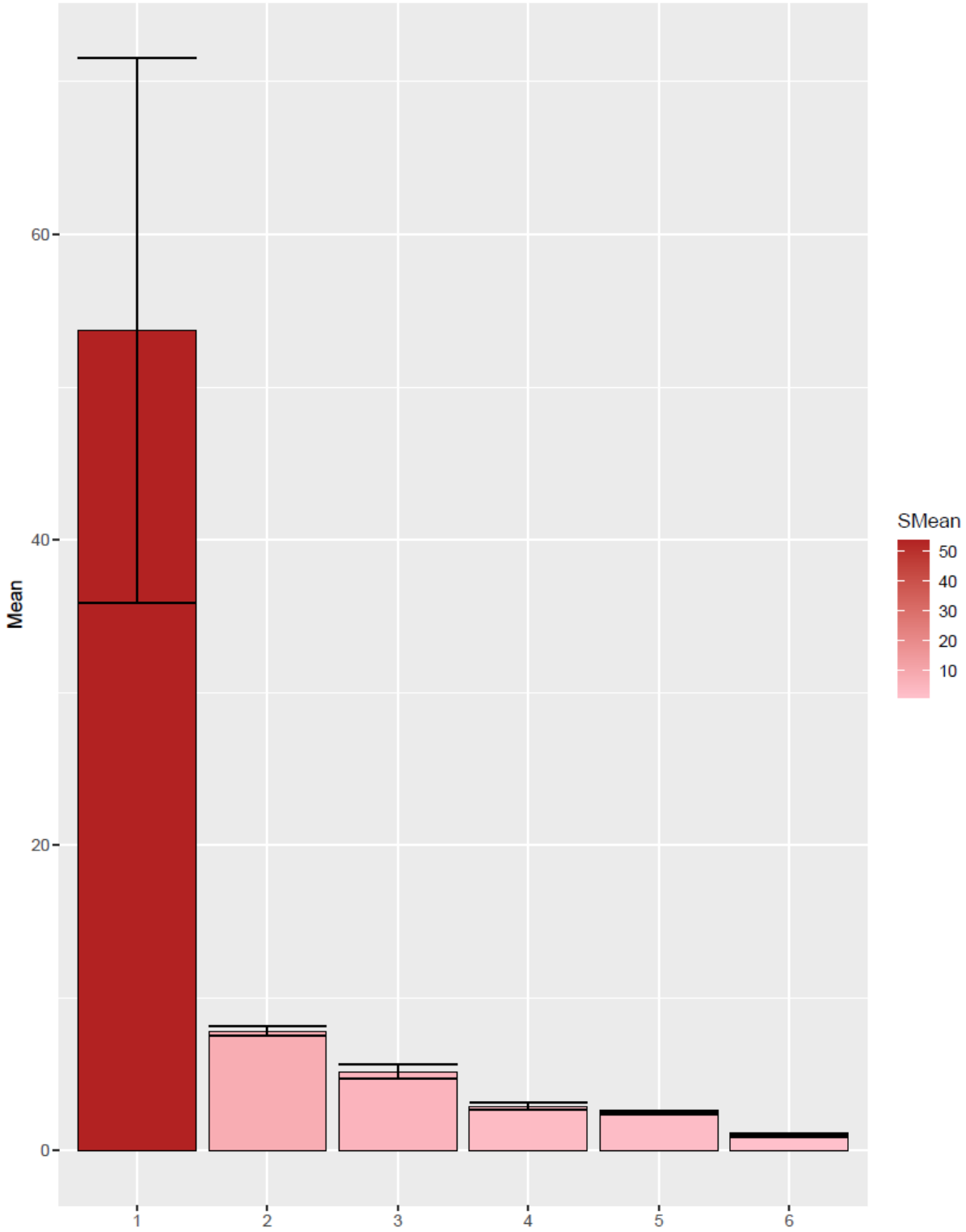
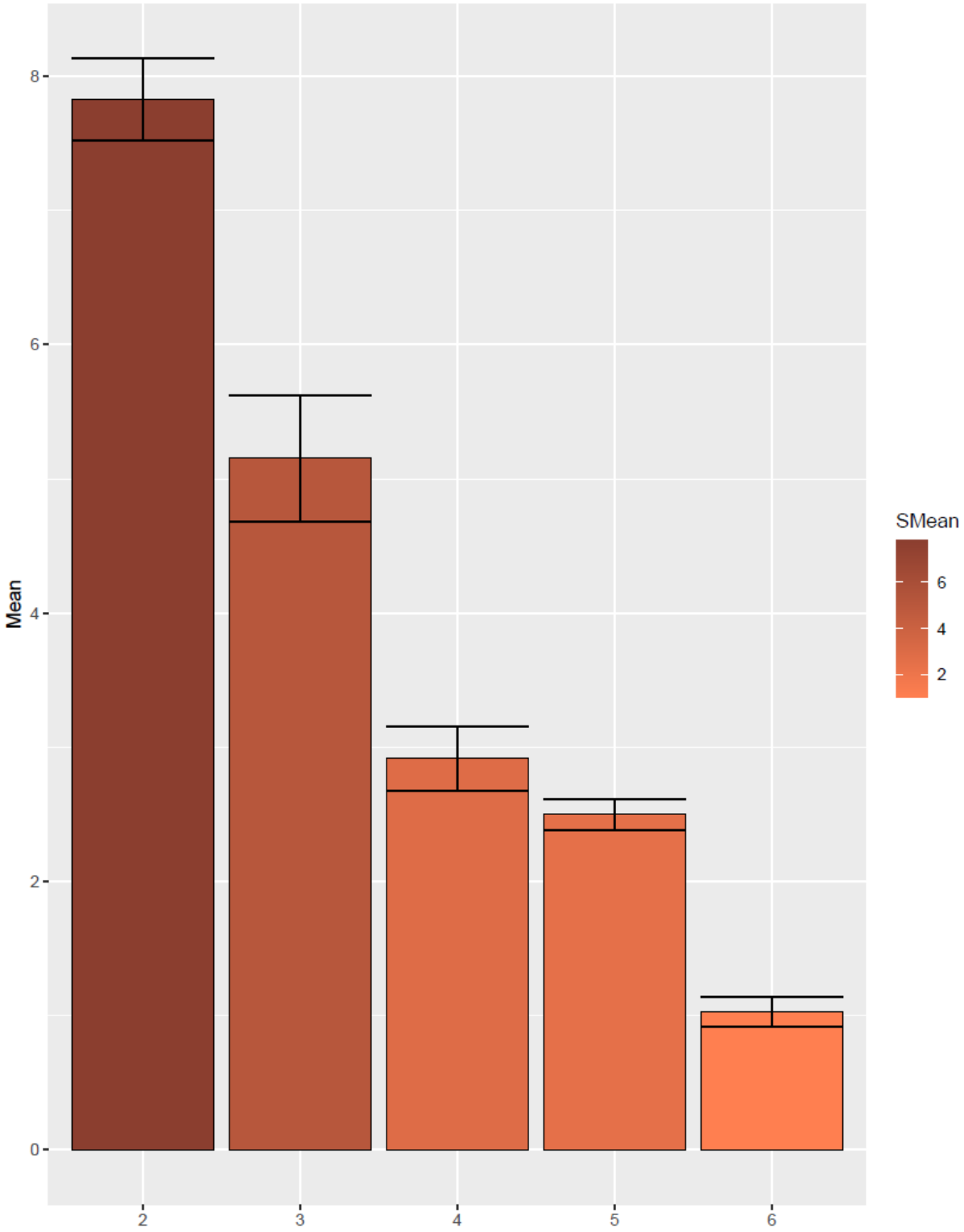


Figure 2: Means and 95 percent confidence intervals for Groups 2–6 only (mg/L)



To test whether the differences between the means of the neighboring groups are statistically significant as the water moves further downstream from the mine sites, paired difference t-tests were performed. As shown in Table 2, these differences are statistically significant: All paired difference t-tests exceed 2.5, with a probability of 99 percent or greater (p values shown as 0.00 or 0.01) that the populations represented by the samples are different between any two neighboring groups.

Notably, the distribution of sulfate concentrations in Group 5 (Garden Lake and Fall Lake, the last group before the BWCAW) is statistically different from the distribution of background sulfate concentrations in the reference streams (Group 6).

Table 2: T-test results

	Welch t-test				Standard t-test		
Comparisons	t-test	p value	Degrees of freedom		t-test	p value	Degrees of freedom
Groups 1-2	5.08	0.00	122.07		3.77	0.00	189
Groups 2-3	9.51	0.00	94.48		9.85	0.00	121
Groups 3-4	8.29	0.00	79.76		7.77	0.00	98
Groups 4-5	3.09	0.00	63.15		2.84	0.01	78
Groups 5-6	18.14	0.00	95.88		13.45	0.00	162

Note: The Welch t-test does not require a normal distribution of the population data. The standard paired difference t-test requires a normal distribution.

Conclusions

As mentioned above, the first question answered by this analysis is: Do sulfate concentrations in lakes and rivers downstream from the mines follow a pattern in which they generally decrease the further they are from the mines?

The answer is “yes.” With 99 percent statistical certainty, sulfate concentrations in lakes and rivers downstream from the mines do follow a pattern in which they decrease the further they are from the mines. Not only is this visually apparent in Figures 1 and 2; it is supported by the t-test results in Table 2.

The second question answered by this analysis is: Are sulfate concentrations at the boundary of the BWCAW above the background levels found in reference streams?

Again, the answer is “yes.” With 99 percent statistical certainty, sulfate concentrations in Garden Lake and Fall Lake (Group 5), which are closest to the boundary of the BWCAW, are above the background levels found in reference streams. Not only is this visually apparent in Figures 1 and 2; it is supported by the t-test results in Table 2.

We therefore conclude with a reasonable degree of scientific certainty that sulfate discharges from the Dunka Mine and the Peter Mitchell Pit are degrading water quality in the BWCAW.