

New peer-reviewed study in *Science Advances*: First-ever comprehensive summary on impacts of mining to salmon and trout in northwestern North America highlights opportunities to improve the application of science to mining policy and governance

Paper freely available here, starting July 1 at 11AM Pacific: <https://www.science.org/doi/10.1126/sciadv.abn0929>

CONTEXT

In northwestern North America, a new rush of mining exploration and production is underway. At the same time, the U.S. and Canada are spending billions to clean up past and present mines. The scale of proposed mines continues to increase and presents a complicated suite of cumulative effects to the environment. In particular, mining can harm fish such as Chinook salmon and bull trout, which are important economic drivers for many communities and culturally important resources for Indigenous Peoples. Our paper highlights key windows where mining policy could be strengthened by science in the U.S. and Canada among federal, state (AK, MT, ID, and WA), provincial (Y.T., B.C.), and First Nations and Tribal entities.

KEY FINDINGS

- We estimate that northwestern North America has **encompassed over 3,600 mines** since 1857 (see figure on final page). Many rivers that are exposed to mining cross political boundaries.
- Despite the promise of technologically advanced infrastructure, mining continues to harm fish and fish habitat through excessive pollution discharge, habitat degradation, and modification of water flows and temperatures.
- Despite known examples of some mines causing harm to fish and their habitats, **it is impossible to comprehensively evaluate mining impacts due to a lack of transparency and access to data**, particularly data collected and modeled during impact assessments which remain proprietary to companies. Information on basic operational details can be unavailable or separated across many sources. Information on placer mining is particularly limited.
- **Regulated monitoring programs are unlikely to efficiently detect pollution trends, especially in the era of climate change.** Mine monitoring can lack sufficient characterization of baseline or reference conditions, and the frequency (time-scale) of sampling may not efficiently detect trends in dynamic and changing ecosystems.
- Bond estimates appear inconsistent relative to the size of individual mines, raising questions about whether they accurately characterize reclamation costs and create potentially challenging governance and compliance issues.
- Water quality criteria change by jurisdiction, including across the same watershed.
- Risks of mining may be underestimated because of climate change, cumulative effects, unproven mitigation approaches, and propagation of risks to downstream locations.

RECOMMENDATIONS

We are concerned that the risks and impacts of mining on fish are underestimated across the watersheds of northwestern North America. If mining policies and regulations can be designed to protect salmon and trout, they are likely to protect many other aspects of watershed health. We hope this paper advances opportunities for using stronger science in decision-making, transparent risk assessment, and integrating goals and values of impacted communities.

Specifically, we recommend:

1. Governments should track and **publicly release information** about the size and locations of **placer mines**.
2. **Major mining project proposals**—especially those whose impacts cross international jurisdictions—should **automatically trigger** federal, regional, and/or watershed-scale planning and assessment which also includes the goals and values of rightsholders and stakeholders;
3. **Mitigation technology** for projects that move into operational phases should be required to be **fully funded and proven** before mine production begins, rather than based on theoretical or lab-tested technologies that lack validation at the scale of the operating mine.
4. **Working groups across all levels of affected governments** should be formed to consolidate basic mining information into international publicly available, user-friendly, and annually updated data portals. Industry-collected data needs to be made public.
5. **Before a mine is permitted**, potentially impacted jurisdictions should agree to consistent protocols for a **collaborative, watershed-scale monitoring and evaluation program**. This program should include agreement on specific monitoring objectives, identify thresholds, mandate consequences if thresholds are exceeded, and define the final reporting.
6. Impact assessments should adhere to **precautionary approaches**, consider climate change, and properly incorporate cumulative effects.
7. Jurisdictions should **publicly disclose and centralize information** related to estimating **reclamation bond amounts** for individual mines.

FURTHER INFORMATION

We would be pleased to meet with you to discuss our new research and its implications. After July 1, our paper is available free of charge at <https://www.science.org/doi/10.1126/sciadv.abn0929>. Contact:

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Citation: Sergeant, C. J., E. K. Sexton, J. W. Moore, A. R. Westwood, S. A. Nagorski, J. L. Ebersole, D. M. Chambers, S. L. O’Neal, R. L. Malison, F. R. Hauer, D. C. Whited, J. Weitz, J. Caldwell, M. Capito, M. Connor, C. A. Frissell, G. Knox, E. D. Lowery, R. Macnair, V. Marlatt, J. K. McIntyre, M. V. McPhee, N. Skuce. Risks of mining to salmonid-bearing watersheds. *Science Advances*8, eabn0929. <https://www.science.org/doi/10.1126/sciadv.abn0929> *Link becomes active and open access to the public when study is published on July 1.*

Supplemental Figure:

Current and past producing metal and coal mining locations in northwestern North America. Outlined watersheds are referenced in the paper. Teal circles represent the largest currently operating mines in the region ($n = 26$), where sizes are proportional to daily milling rate in tonnes per day (tpd). The inset illustrates the high density of mineral tenures (purple polygons) in the BC extent of the Stikine, Iskut, and Unuk Rivers.

