



### NWT Cumulative Impact Monitoring Program (NWT CIMP)

A source of environmental monitoring and research in the NWT. The program coordinates, conducts, and funds the collection, analysis and reporting of information related to environmental conditions in the NWT.

### NWT Environmental Research Bulletin (NERB)

A series of brief plain language summaries of various environmental research findings in the Northwest Territories. If you're conducting environmental research in the NWT, consider sharing your information with northern residents in a bulletin. These research summaries are also of use to northern resource decision-makers.

## Impacts of Linear Development on Fish

Linear developments such as roads, pipelines and seismic lines usually cross water bodies. This can have an impact on fish and fish habitat. Impacts can include the blocking of migration routes that prevents fish from feeding, spawning and accessing over-wintering areas, or contamination from leaks and spills that poison fish or the food fish eat.



Fig. 1. A variety of linear developments common in northern regions; (A) an all-season road, (B) a snow road, (C) a winter trail, and (D) seismic line. These types of linear developments often cross watercourses, such as the creek (E), and could impact fish and fish habitat if not constructed and maintained properly. The Inuvik Airport is shown in the background, near the Town of Inuvik, NWT, Canada. Photo: J. Kanigan, GNWT-ENR(CIMP).

### Why is this research important?

The NWT has many lakes and rivers. Appropriate monitoring and management is essential for responsible development of our northern resources, to properly protect sensitive northern fishes. Fish are a key component of northern ecosystems, and of significant economic and cultural importance to people in the NWT.

### What did we do?

A variety of information relating to impacts of roads, pipelines and other linear developments was reviewed and summarized, with a focus on impacts to fish in northern ecosystems. Industry uses many types of linear development; therefore activities relating to the oil and gas sector were used as examples.

### What did we find?

- Sediment from construction activities and erosion is getting into the water. Sediment can cover spawning beds, suffocate eggs, clog gills and make it hard for fish to find food.
- Water withdrawal for ice road construction can remove too much oxygenated water from small lakes and pools of streams, not leaving enough for over-wintering fish. Fish can also get sucked into water intakes.
- Infilling or dredging—for example, for barge landings—can remove or destroy fish habitat.

### What does this mean?

The impacts of linear developments on fish can be made worse when coupled with natural disturbances like forest fires, or broad-scale impacts like climate change that can alter ecosystems. Appropriate monitoring and management is essential for responsible development of northern resources, while properly protecting sensitive northern fishes. Fish are a key component of northern ecosystems and are of significant economic and cultural importance to people of the NWT.

### What's next?

This information can be used by regulators and resource managers to anticipate and mitigate the impacts of linear developments on fish and their habitats, which would benefit northern aquatic ecosystems in general. Also, this summary of potential impacts and data gaps can be used to justify future research and monitoring of northern aquatic systems in advance of future developments.



A perched culvert prevents upstream movement of most fish species. Photo: K. Maier, Gwich'in Renewable Resources Board

### What are linear developments?

Linear developments are developments made in lines, such as highways, winter roads, pipelines, transmission lines and seismic lines. In the NWT, linear developments usually cross streams, rivers and lakes, and have the potential to impact fish and fish habitat.

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### References and citations

Cott, P.A., Schein, A., Hanna, B.W., Johnston, T.A., MacDonald, D.D., and M. Gunn, J.M. 2015. Implications of linear developments on northern fishes. *Environmental Reviews*. 23:1-15, DOI 10.1139/er-2014-0075.