



Fish Blueprint

Background

The Fish Blueprint was developed to inform funding applicants of priority fish monitoring and research for NWT CIMP. The Blueprint also guides the NWT CIMP Steering Committee and staff on the allocation of NWT CIMP funds.

The Blueprint describes information that is necessary to understand cumulative impacts of human and natural disturbance on fish. NWT CIMP has adopted the Canadian Council of Ministers of the Environment (CCME) definition of cumulative impacts as a change in the environment caused by multiple interactions among human activities and natural processes that accumulate across space and time. As a product of the Mackenzie Valley Resource Management Act, NWT CIMP is focused on monitoring cumulative impacts that are relevant to land and water management issues in the NWT.

NWT CIMP is currently focused on geographic areas of past, current or proposed development. These are areas where cumulative impacts from human activities are most likely, and decision-makers will be interested in the results. The Fish Blueprint is aligned with the priorities of the 2017 [GNWT Knowledge Agenda](#).

Along with “caribou” and “fish”, the theme of “water” was chosen as a key monitoring and research priority in a survey of NWT environmental decision makers and regulators in 2011. The Fish Blueprint contains water monitoring and research priorities of NWT land and water regulators and subject-matter experts. NWT Land and Water Boards and the Mackenzie Valley Environmental Impact Review Board provided NWT CIMP with broad priorities for monitoring of cumulative effects of human and natural disturbance on fish in 2011. These priorities were revisited in 2014 and reconfirmed by NWT regulators.

NWT CIMP engaged over 50 subject-matter experts with direct involvement in fish research and monitoring in the NWT to refine these priorities into specific subject areas that can be addressed via the proposal process. These experts included staff from Indigenous renewable resource and co-management boards, Federal and Territorial government scientists, university researchers, industry, and environmental consultants. NWT CIMP staff assessed and compiled the responses into this Blueprint. NWT water regulators, fish subject-matter experts, and the NWT CIMP Steering Committee reviewed the draft Blueprint. The Blueprint is reviewed and updated annually.

Fish Monitoring Themes

The discussion described above resulted in the development of five themes:

1. Compile and analyze existing data
2. Develop and validate standards and protocols
3. Assess cumulative impacts of anthropogenic and natural disturbances
4. Collect baseline data on fish ecology in areas of development interest
5. Assess contaminants in fish

Specific research and monitoring priorities are listed under each theme. Some priorities could fall under more than one theme, but to minimize redundancy they are only listed once.

NWT CIMP Funding Priorities

1. Compile and analyze existing Data

- a. Compile, analyze, and publish existing long-term fish monitoring data to assess:
 - i. Cumulative impacts
 - ii. Spatial and temporal trends
 - iii. Regional variability of fish, fish health and fish habitat
 - iv. Predominant drivers of variability

2. Develop and validate standards and protocols (includes models)

- a. Develop and validate standardized fish sampling protocols¹ that can be adopted by northern regulatory agencies for:
 - i. Using existing data to understand cumulative impacts on fish
 - ii. Collecting fish ecology, occupancy (i.e., presence/absence), population, and community data
 - iii. Developing northern species toxicity thresholds
 - iv. Assessing contaminant concentrations and transfer in fish
- b. Develop and/or validate models² that can predict:
 - i. Habitat use and critical habitat
 - ii. Spatial and temporal shifts in distributions and habitat use
 - iii. Fish community and population change

3. Assess cumulative impacts of anthropogenic and natural disturbances

- a. Assess cumulative impacts of disturbances on fish and fish health including:
 - i. Resilience and resistance of fish to disturbances
 - ii. Acclimatization and adaptation (e.g., assessing the capacity of fish species to acclimatize and adapt to disturbances)
 - iii. Determination of thresholds limiting abundance, distribution, or habitat use
 - iv. The rehabilitation and recovery of fish and fish habitats
 - v. Identification of critical habitat indicators
 - vi. Determination of the carrying capacity of critical habitat
 - vii. Threats to local fish harvesting

4. Collect baseline data on fish ecology in areas of past, current, or future development interest

- a. Collect data on fish ecology in areas of past, current or future development interest/other priority areas

5. Assess contaminants in fish

- a. Assess heavy metals and other contaminants in fish including:
 - i. Current and projected concentrations in the food web
 - ii. Changes in concentrations and bioavailability over time, geographical location, and environmental conditions

¹ Developed standards and protocols need to have the ability to effectively detect or measure effects or changes

² Predictive models must use standardized data collection methodologies to ensure future data can be added to models

- iii. Drivers of contaminants in northern food webs
- iv. Mechanisms of contaminant movement through food web

Note: When studying heavy metals in fish tissue, if it is determined that total arsenic concentration exceeds 3.5 ppm or the total mercury exceeds 0.5 ppm in fish tissue, NWT CIMP requires that the waterbody be identified to NWT CIMP and HSS. Researchers who are interested in establishing the relationship between total arsenic and the various species of arsenic within fish tissue should contact NWT CIMP for more information.