

Understanding Environmental Flows

Environmental flows are one part of the bigger picture in every water management decision. Getting it right takes specialized, science-based expertise to work through the trade-offs involved.

We work as environmental flow specialists alongside project teams and developers, bringing proven practices into every stage of a project—from early engagement and baseline data, through design and scenario development, to environmental assessment and permitting, operations and compliance.



STAKEHOLDER ENGAGEMENT

Science tells us what the river needs. Engagement brings that science together with water use, community values, and Indigenous rights and knowledge.

- **Inclusive engagement:** working with regulators, communities, and Indigenous peoples early and respectfully, including consideration of cultural flow values and traditional knowledge
- **Stakeholder documentation:** recording engagement outcomes and stakeholder input as part of the project record

FLOW & AQUATIC LIFE CHARACTERIZATION

Understanding the natural flow regime, and the aquatic life it supports, is the foundation of every environmental flows assessment. We study the river's flow and ecosystem before your project begins, then simulate how the environment will change afterward.

- **Baseline hydrology:** characterizing existing flows across seasons and years
- **Water balance modelling:** quantifying project-related changes from withdrawals, diversions, storage, and landscape alteration
- **Fish community surveys:** establishing species presence and distribution through field studies
- **Life stage mapping:** identifying where and when fish migrate, spawn, and rear

DESIGN CONSIDERATIONS

Design decisions shape what's possible later. Bringing environmental flow needs into design early allows options that get harder, and costlier to capture later on in the project.

- **Avoidance, mitigation, and offsetting by design:** design determines which of these measures are available, and building flow considerations into the layout early captures opportunities that would be impractical and costlier to retrofit
- **Aligning with regulations:** shaping design choices to meet regulatory requirements streamlines permitting and review
- **Early consideration, win-wins:** bringing environmental flows into design conversations early can create outcomes that work for both the project and the river

ECOLOGICAL ASSESSMENT

Flow determines habitat, and habitat determines ecosystem health. We run the scientific studies that show how aquatic ecosystems respond across the full range of flows your project may create, and create performance measures that can be predicted and monitored.

- **Ecohydraulic modelling:** linking flow conditions to usable habitat for fish at each life stage
- **Habitat availability and passage:** assessing how flow changes affect fish access to critical areas across the year
- **Scenario assessment:** comparing baseline and project conditions to quantify habitat change

CUMULATIVE EFFECTS & CLIMATE CHANGE

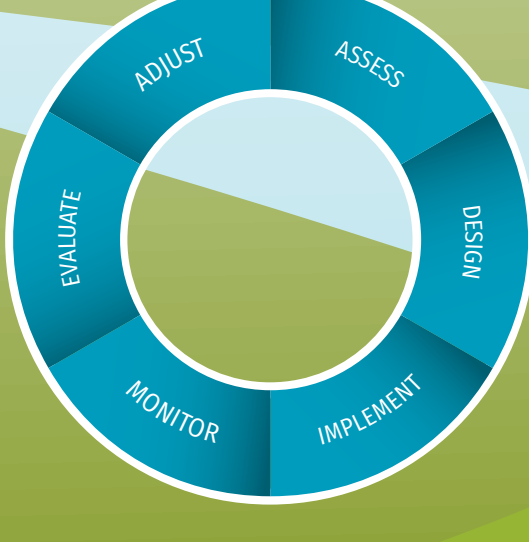
Your project does not operate in isolation. Existing water uses, historical landscape changes, groundwater, and a changing climate all affect what the river can sustain. We assess your project in that full context.

- **Groundwater interaction:** understanding how subsurface water contributes to streamflow and how project activities affect that exchange
- **Cumulative effects:** quantifying how your project's flow changes interact with existing alterations across the watershed
- **Climate and drought risk:** evaluating low-flow conditions under current and future climate scenarios

DECISION MAKING & MANAGEMENT

Trade-offs are inevitable, and decisions need to hold up over time. We help weigh options against water use, community values, and long-term outcomes, and build in ways to revisit those decisions as conditions change.

- **Trade-off analysis:** presenting scenarios that make the choices visible, showing what different flow management options mean for fish, water users, and communities
- **Adaptive management:** designing monitoring programs that allow decisions to be revisited as conditions and understanding evolve



ENGAGE EARLY

Stakeholders, regulators, and Indigenous peoples shape the scope of your assessment. Engaging early, and documenting that input as you go, avoids delays caused when new data, opinions, and values surface late in the assessment.

INVEST IN BASELINE DATA

Environmental flows assessments depend on good baseline data across disciplines, including hydrology, habitat, and fish surveys. Gaps in flow records or field data can lead to delays or more risk-averse decisions.

DESIGN CONSIDERING ENVIRONMENTAL FLOWS

The best mitigation is built into the project from the start, saving time and cost associated with assessment and potential delays. Projects that treat environmental flows as an afterthought may require redesign late in permitting.

LEAD WITH THE SCIENCE

Thorough analysis reduces uncertainties, making regulators' jobs easier. Proponents who present clear, objective science and propose solutions move faster through review.

CONSIDER CUMULATIVE EFFECTS & CLIMATE CHANGE

Your project doesn't operate in isolation. Existing water uses, historical alteration, and a changing climate all affect what the river can sustain, and what your project needs to plan for.

DECIDE, STAY FLEXIBLE

Environmental flow decisions carry real trade-offs for fish, water users, and communities. Structured, adaptive decision-making, revisited as new information comes in, leads to outcomes that hold up under scrutiny.



The right environmental flows strategy for your project depends on its specific setting, water values, and regulatory context. Trinity Consultants brings the expertise to develop a tailored approach that carries your project from early engagement through operations and compliance, across hydropower, mining, and other water-intensive sectors. No matter where your project stands today, we can help. Learn more at trinityconsultants.ca.