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BREAKING BARRIERS, DRIVING CHANGE

Five questions with Nick Mazany-Wright

CWF Spatial Ecologist and Aquatic Barriers Database Manager

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Did you know more than half of Canada's freshwater fish are at risk of extinction? Aquatic barriers built for our benefit have a negative impact on freshwater ecosystems. Don't let yourself be a barrier to habitat restoration. Find out more here as Nick Mazany-Wright explains just how important the Canadian Aquatic Barriers Database is, and how you can get involved.

1. WHAT IS FRESHWATER CONNECTIVITY?
Freshwater connectivity refers to the ability of fish and other aquatic species, nutrients, and energy to flow freely within freshwater ecosystems (rivers, lakes, and wetlands) without the physical disruption of this movement by barriers. Connectivity is vital for maintaining processes like fish migration to important habitats to complete life cycles, distributing food sources and nutrients throughout the system, and regulating water temperature. Unfortunately, in many freshwater ecosystems across the country, aquatic barriers disrupt these processes and disconnect portions of our streams, rivers, and lakes. Freshwater connectivity has been declining in Canada in recent decades and is identified as a threat to many aquatic species at risk.

2. WHAT IS AN AQUATIC BARRIER?
An aquatic barrier is any structure that disrupts the connectivity of freshwater ecosystems and can include both natural and human-made features. From a conservation perspective, an aquatic barrier is generally considered based on its effects on fish passage — can aquatic species move freely past this feature? But it is also important to account for the other ecosystem processes affected by aquatic barriers. Streams and rivers can naturally be disconnected by features like waterfalls, which, if big enough, have likely always blocked fish movement and are not usually considered for fish passage restoration. Alternatively, infrastructure like dams and stream crossings (where a road or rail line crosses over a stream) are artificial features constructed on the landscape that disconnect important parts of freshwater systems, and these structures have increasingly been the target of restoration efforts across Canada to improve fish passage and connectivity.

3. WHAT EFFECTS DO AQUATIC BARRIERS HAVE ON FRESHWATER ECOSYSTEMS?
Human-made aquatic barriers are often important infrastructure features that provide social and economic value. However, these same structures often have negative ecological impacts on streams and rivers. Dams restrict the amount of water in these systems, disrupt the downstream movement of nutrients and sediments, and change the temperature and structure of the waterbody. Poorly designed and installed stream crossings, usually in the form of culverts, can become perched above the stream, create velocity barriers as flowing water is constricted through the narrow pipe, and cause water to pool on the upstream end of the structure. Our freshwater species have evolved to use streams and rivers to move large distances to access important spawning and rearing habitat. If fish passage is not accounted for in the design of these structures, they will block the movement of fish and other species. Dams may be built with fishways – engineered structures designed to allow fish to move past the dam freely. Similarly, stream crossings can be designed as clearspan bridges, rather than culverts, to ensure that streams and rivers are not disconnected. In many cases, these pieces of infrastructure have outlived their purpose and can be removed from the landscape. When evaluating potential barrier restoration projects, it is necessary to weigh the social and economic costs against the potential ecological gain to ensure that resources are being used to maximize connectivity.

4. WHY IS A NATIONAL DATABASE NECESSARY? HOW DOES IT HELP FISH AND OTHER SPECIES?
We know that these aquatic barriers are prevalent across Canada, that barrier removal is needed to restore connectivity and access to vital habitat, and that restoration projects are expensive. But we don't have the answers to some important questions: How many barriers exist in Canada? How much habitat is not accessible for fish and other species? How do we identify the most important barriers to restore and maximize benefits for these species? We need a comprehensive information source to answer these questions, which is where the CWF Canadian Aquatic Barriers Database (CABD) comes in! The vision for the CABD is all of Canada's barrier and connectivity information in one place. The CABD will allow CWF and other organizations across the country to assess and report on the status of habitat connectivity, inform management and regulatory decisions relating to infrastructure construction and management. It also supports barrier restoration planning and prioritization of projects to improve connectivity and fish passage for important species. Additionally, the database will inform research and monitoring initiatives to better understand the effects these barriers have on freshwater ecosystems and the species they support and provide a national forum for sharing resources, best practices, and success stories to support education and public outreach.

5. HOW CAN I FIND OUT MORE AND GET INVOLVED?
To learn more about the CABD and our work to assess and improve freshwater connectivity, visit our webpage or explore the CABD web tool at aquaticbarriers.ca. The Canadian Aquatic Barriers Database is a multi-year project that is supported in part by financial contributions from Fisheries and Oceans Canada and the RBC Foundation. We are always looking for more information about aquatic barriers across the country. If there is a barrier blocking fish movements in your neighbourhood, take a picture and send us an email at **cabd@cwf-fcf.org** to let us know!
—MADELINE MYLREA