

oilsands

FISH-FRIENDLY

Applying science to preserve native fish populations in the oilsands region

BY DARRELL STONEHOUSE

Protecting and preserving native fish populations during oilsands development is the right thing to do. It is also mandated by government as a condition of development, putting it front and centre for operators looking to obtain and maintain their social licences to operate.

One of the major tools being used to preserve fish populations is compensation lakes—artificial bodies of water that mimic native fish habitat.

Canadian Natural Resources (CNRL) began developing the first compensation lake in the oilsands region in 2008. Horizon Lake, also known by its Cree name Wāpan Sākahikan, was developed in close consultation with local people to incorporate traditional aboriginal knowledge into its design. The \$20-million lake covers 80

hectares and contains around 116,000 fish from surrounding streams.

“The compensation lake is now a self-sustaining ecosystem with native fish species that are repopulating and thriving,” says Calvin Duane, CNRL’s environment manager.

Because Horizon Lake is the most advanced of the compensation lakes constructed in northeastern Alberta, it is now the subject of a groundbreaking \$1-million project to understand and optimize fish habitat in compensation lakes throughout the oilsands region.

University of Alberta researchers are leading the project with support from CNRL and Mitacs, a national non-profit research-funding organization.

“In order to sustain future development in Alberta’s oilsands region, companies ►



need to pay as much attention to the environment as they do to economics,” says Ken Minns, former head of habitat science at Fisheries and Oceans Canada, based in Burlington, Ont.

“It’s about earning the ecological and social licences to operate,” he says, adding that the project’s findings are expected to help Alberta companies offset oilsands-related disturbances to freshwater bodies in the Athabasca region and beyond by establishing guidelines for sustainable lakes. “There has always been an issue in the public domain related to large oil projects and whether or not they provide adequate environmental consideration. It’s time to move away from contention and get serious. We know development is going to take place, and the trick is to find the most environmentally benign way to do it.”

Led by Mark Poesch, assistant professor in the University of Alberta’s department of renewable resources, and working with representatives from Edmonton-based environmental consultancy EcoVision, the research team will assess fish habitat health and deploy the latest methods in ecosystem development at Horizon Lake.

The leading-edge technology used by the researchers includes hydro-

acoustics, a technique that uses sound waves to assess fish habitat, similar to a commercial fish finder, as well as environmental DNA and an emerging technique that uses traces of DNA in water samples to identify and monitor freshwater species. It’s a sophisticated approach that allows the team to examine the whole ecosystem of the lake and learn how it behaves without causing stress to the fish since they don’t have to be handled, Poesch explains.

“Part of our challenge is that we have to figure out what natural looks like,” Poesch says. “It’s rare that we get the chance to use science in such an applied way where we can actually make a difference on the ground. At the end of the day, we’ll have a better understanding of how to build a new lake from the ground up and make it sustainable into the future so all Canadians can benefit from it.”



KEN MINNS,
former head of habitat
science, Fisheries and
Oceans Canada

The project is funded through Mitacs’ Converge program, a new national pilot program that facilitates research and development projects between Canadian small- to medium-sized enterprises and multinational corporations in collaboration with Canadian researchers. Converge



MARK POESCH,
assistant professor,
department of
renewable resource,
University of Alberta



The native Arctic grayling species is one of the major targets for protection in the oilsands region.

THE RESEARCH PROJECT WILL

1

Assess methods for measuring fisheries productivity between compensation lakes and natural systems.

2

Assess the relationship between habitat and fisheries age and growth.

3

Assess the efficacy of artificial structures to improve habitat suitability of a species of concern.

4

Assess ecosystem function/functional diversity in compensation lakes.

5

Determine food-web structure and trophic dynamics.



ALEJANDRO ADEM,
chief executive officer
and scientific director,
[Mitacs](#).

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"The Mitacs Converge program is all about providing local companies with global access to leading-edge research and development and innovation, which in turn helps up-and-coming Canadian organizations reach the next level of growth," says Alejandro Adem, Mitacs' chief executive officer and scientific director.

For EcoVision, which has until now primarily conducted urban work, the oilsands project is helping extend the company's reach into non-urban areas, while supporting the resource extraction sector. EcoVision is dedicating a full-time staff member and access to the hydro-acoustics technology to the project.

There has been a number of other compensation lakes built in the oilsands following construction of Horizon Lake.

In the spring of 2010, Shell completed the construction of Jackpine Lake. Jackpine Lake is a half-square-kilometre body of water adjacent to Shell's Jackpine Mine leases, which border Syncrude's leasehold and reserve lands belonging to its First Nations neighbour, Fort McKay.

The lake is uniquely located in the watershed—the Muskeg Creek feeds

it with high-quality water year round and it lies right next to the Muskeg River. Shell chose to build the lake 11 metres deep, nearly twice the depth required as indicated by modelling, in order to increase the probability that fish could live in it year-round. This helps the surrounding watershed by providing an increase in high-quality wintering habitat that is limited in this area, says the company.

Shell used a conventionally constructed channel for the inlet to the lake from the Muskeg Creek. However, for the outlet, Shell pioneered a natural-paradigm approach by providing a very small channel and allowing the water to erode its own channel. This will gradually result in a channel that perfectly fits the lake, matches natural channel characteristics, stays in compliance with all water-quality requirements and requires no reclamation.

Shell is reclaiming the lake's shoreline entirely with indigenous species, including water-loving willows and rat root. Surrounding areas near the lake are being reclaimed with species that prefer drier ground. For this reclamation, Shell directly placed the surface layer of roots, soil and seeds that had been preserved during construction of the lake, as well as additional reclamation soils removed and stockpiled from salvage activities on the Jackpine Mine, resulting in one of the largest direct placements of reclamation material in the oilsands region to date.

At Imperial Oil's Kearl Mine, three compensation lakes are being built to replace fish habitat disturbed by development at a ratio of two to one. The first of these compensation lakes is nearing completion. It will eventually connect to the existing Kearl Lake and be deep enough to allow fish to overwinter in it. ■