

The Gwich'in people of Canada's North have depended for centuries on a colourful fish called the Dolly Varden – which is now on the verge of extinction. In a race to save the species, locals and conservationists are combining forces, writes **Elie Dolgin**

Hello, Dolly

NE'EDILEE CREEK, YUKON

Conservationist Nathan Millar knew that time was running out.

Despite his high-tech equipment and sophisticated methodology, the 27-year-old fisheries biologist with the Gwich'in Renewable Resource Board in Inuvik could not locate the spawning grounds of the Dolly Varden – an Arctic fish recognized last year by the Committee on the Status of Endangered Wildlife in Canada as one of the highest-priority species for assessment.

To protect the fish from extinction, Mr. Millar needed to find the fish's spawning grounds in the Vittrekwa River system. He had travelled to the headwaters of the Vittrekwa, a tributary of the Mackenzie River, with a plan to implant radio transmitters in individual fish to track them as they migrated upriver.

After 10 days of casting trap nets in the water, however, he had tagged only four – and was losing hope of ever finding the breeding site.

Then, the unique skills of a local Gwich'in elder came to the rescue. Mr. Millar's field assistant, Steven Tetlich, a hunter and fisher from Fort McPherson, NWT, suggested they talk to his uncle, William Teya. As a boy, Mr. Tetlich had been enthralled by his uncle's stories of caribou-hunting expeditions and streams full of spawning *dhik'ii*, the Gwich'in name for the Dolly Varden.

With nothing to lose, they picked up Mr. Teya in a helicopter and let him point the way.

"Even though he hadn't been there in 50 years, and he had been there by dogsled at the time, he knew exactly where to go," Mr. Millar says. "We landed and found the spawning grounds within minutes."

Thanks to Mr. Teya, the Dolly Varden (*Salvelinus malma*) may once again thrive in the Mackenzie River Delta and provide a valuable resource for the local population. The Gwich'in people have depended on the fish for centuries – besides being a rich source of protein, for them and their dogs, the Dolly Varden provided the Gwich'in with medicinal fish oil, which they used as drops for sore ears.

POLKA-DOT PATTERN

A close relative of salmon and trout, it is a type of char that usually feeds in the ocean, but returns to fresh water to breed. Its body is mostly bluish-grey, with a white edge on its lower fins, but its most striking features – and the inspiration for its name – are the small, freckled pink spots on its sides. The fish was named by settlers after a polka-dotted calico pattern that was popular at the time; the material itself was



Shortly before his death, William Teya, left, provided crucial help to the conservation team. At right is his nephew, Steven Tetlich. PHOTO COURTESY OF NATHAN MILLAR



Tag and release: Biologist Nathan Millar tracks individual fish by implanting radio transmitters. PHOTO COURTESY OF NATHAN MILLAR

named after the fashionable, rosy-cheeked Dolly Varden character in Charles Dickens's novel *Barnaby Rudge*.

Today, biologists recognize three subspecies of Dolly Varden: a northern variety, found in the Alaskan peninsula, eastward along the coast of the Beaufort Sea, and into the Mackenzie River Delta; a southern variety that ranges from Puget Sound in Washington state up to southern Alaska; and a third land-locked subspecies, found only in an inland lake on the Japanese island of Hokkaido. The major difference between the two Canadian varieties is not their appearance – they vary only

slightly in their numbers of scales, vertebrae and gill rakers – but rather their genetic histories, which have been shaped by interbreeding with other species.

"Hybridization plays a historical and contemporary role in why these fish are so variable," says Eric Taylor, a zoologist at the University of British Columbia. After studying the Dolly Varden's DNA, Prof. Taylor has found that the northern variety once interbred, or hybridized, with a separate species called Arctic char, although it no longer does so today. The southern variety, on the other hand, continues to interbreed with a species

called bull trout. These interspecies interactions, Prof. Taylor says, have created a genetic footprint that is driving the two varieties apart and could lead to complete speciation.

Interbreeding can be detrimental for a species, but for Dolly Varden, this is the least of its troubles. Whereas the interbreeding southern variety's numbers are stable, the non-interbreeding northern variety appears to be on the brink of collapse. As with most endangered fish, overfishing is partly to blame. But climate change is also an issue, as the Dolly Varden thrives in cold Arctic waters. "It's a sentinel species for aquatic animals in the north," Prof. Taylor says, describing the fish as "an aquatic polar bear."

The northern Dolly Varden is found in only six river systems in Canada: three in the Northwest Territories, two in the Yukon and the Vittrekwa, which straddles both territories. Two of these six had been surveyed before Mr. Millar's study, with both showing drastic declines in the fish population.

In order to reverse the trend, conservation managers must know more about the fish's basic biology in the different river systems. Since finding the site two years ago, Mr. Millar and his team have captured more than 100 Dolly Varden in the Ne'edilee Creek, an offshoot of the Vittrekwa River in the Yukon, and using techniques such as radio tagging, chemical testing and genetic

analysis, gained a wealth of knowledge.

Mature males, for example, come in two sizes: a "residential" group, 20 to 30 centimetres long, which lives in fresh water and feeds on small insects; and another group, 45 to 70 cm long, which travels to the sea to double their size feeding on small marine fish, then return to spawn. The two different survival strategies allow the fish to "hedge their bets," says Jim Reist, a research scientist with Fisheries and Oceans Canada in Winnipeg.

MALE MIGRATION RIDDLES

River systems with both male forms are found elsewhere, Dr. Reist noted, but unlike other populations, residential males make up the majority of the Vittrekwa population, and seafaring males complete the long, dangerous trek to the Beaufort Sea episodically, rather than every year. What drives most males to stay, though, is still unclear. "We don't understand what the triggers are," Dr. Reist says.

The Gwich'in recently started a management plan for Dolly Varden in the hope of restoring a small subsistence fishery. When Mr. Teya led Mr. Millar and his team to the spawning grounds of the Ne'edilee Creek, it was just in the nick of time – both for the fish and for Mr. Teya to pass on his knowledge. Mr. Teya died a few months later at the age of 74. » *Elie Dolgin is a science writer and broadcaster in Philadelphia.*

'Aquatic polar bear'

Not just overfishing, but climate change is also an issue, as the Dolly Varden thrives in cold Arctic waters.

Ne'edilee Creek is an offshoot of the Vittrekwa River located in this area near Tsih Mountain.



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