

Two Fish, One Fish, No Fish:

Alberta's Fish Crisis

By Lorne Fitch, *P. Biol.*



Dr. Seuss's *One fish, two fish, red fish, blue fish* is a classic children's story, a simple rhyming book for beginning readers. We need a similar rhyme to help people grasp the problems afflicting Alberta's native fish species. It might read like this:

Two fish, one fish, dead fish, no fish,
No grayling or goldeye, something's
amiss.
This one has a tumor and a rotten fin,
There's no home for that one to live in,
Say, what a lot of fish there used to be,
Where are the fish for my kid and me?

My apologies to Dr. Seuss, but what would he have thought of the sorry state of fish in Alberta? Like convicts on death row, trends indicate dead fish swimming, where populations have been driven to

perilously low levels.

The current status of fish populations cannot be appreciated until we acknowledge where we were by reviewing historical abundance and distribution. Only then, will we grasp where we are, appreciate the losses, and see the potential for recovery.

It's sad but true that just too few fish live here anymore. It was not always so for fish and their downward spiral started long before Alberta became a province. Here's that history.

Grant us our daily fish... no more

Fish were once a staple in the diet of native peoples and fur traders, especially in the parkland and boreal forest regions. David Thompson, the Hudson Bay Com-

pany surveyor, fur trader, and mapmaker wrote in the late 1700s: "...when a new trading House is built...everyone is anxious to know the quality of the fish it contains for whatever it is they have they have no other[food] for the winter."

In 1798 a Hudson Bay Company post was established on Lac La Biche. Over 200 years later Dr. Andrea McGregor painstakingly quantified the harvest of fish from Lac La Biche that supported the westward expansion of the fur trade and settlement in her doctoral thesis. The annual harvest of lake whitefish increased from 85 tons caught in 1800 to over 1,200 tons in 1875. But even subsistence harvest by a relatively small population was not sustainable and the fishery collapsed in 1878.

One fish collapse followed another. To add indignity to the mortal injury of overfishing, by the 1950s the essential watershed integrity that supported the lake and its fish populations had been compromised.

Insult followed indignity and by 1970 walleye had effectively been extirpated and by the 1990s pike and perch populations had declined dramatically. The finny wealth of lake whitefish that encouraged settlement has been reduced to a fraction of historic levels.

We've influenced the ecological cogs and wheels of the lake's delicate mechanism, tipped the balance so far that the lake may not have the capability to snap back to some previous steady state.

David Thompson would not be impressed.



Fishing Near Fort Macleod 1902 File NA-4954-34 PHOTO: © GLENBOW MUSEUM

Arctic grayling - going, going, gone

Arctic grayling shimmer, even in tea-coloured water and, with their huge dorsal fin, seem more to sail through the water than to swim.

This member of the trout family had a historic range through the entire Peace, Hay, and Athabasca river basins. Grayling slipped between our fingers. More than half of Alberta's current grayling populations have been reduced to 10 percent or less of their historic population numbers. Also, there has been a 40 percent contraction in the range of grayling waters. Most of this contraction has happened in living memory.

Examples include the Beaverlodge and Redwillow rivers of north-western Alberta. Prior to the 1980s these rivers supported one of the largest spawning runs of Arctic grayling in Alberta. No grayling have been seen in the Beaverlodge River since 1994; they are now considered "extirpated." Populations in the Redwillow River are classified as "declining."

Why did historically abundant populations of Arctic grayling (and northern pike, bull trout and mountain whitefish) disappear from the Beaverlodge River?

Alberta Fish and Wildlife investigations report a "perfect storm" of cumulative, synergistic causes that resulted in crashes in fish numbers and distribution. The perfect storm came in the form of a series of land use decisions. Forest was rapidly replaced by agricultural fields; riparian fringes were narrowed and often disappeared with the patterns of settlement. Wetlands were drained and now roads interrupt drainage and channel flow. They send water to rivers faster. Both floods and droughts are exacerbated.

The Beaverlodge River has been transformed from a low productivity watercourse to one with an excess of nutrients. A small amount of nutrients promote growth and are beneficial in producing more of the things fish like to eat. Excess overwhelms the system. Oxygen is robbed from the water and fish suffocate.

If the changes in the Beaverlodge River and the loss of fish provide a lesson, it is that fisheries management — maintaining fish — often has little to do with how we manage catching fish (ie. seasons, catch limits, harvest size). Instead, the integrity of the watershed, the integrity of habitat, primarily dictates whether fish will persist or not. The cumulative effects of land and water use in the Beaverlodge watershed eroded the ability of fish to persist. Several species, consequently, have disappeared.

In most watersheds Arctic grayling are either a distant memory or, even worse, forgotten about entirely.

Looking for the last Goldeye

Goldeye have a prominent place in fishing stories from the past. Goldeye are deep-bodied fish, flattened laterally and silvery with large scales. They are named for their large, yellow-gold eyes which are adapted to the dim light and turbid water of prairie and parkland rivers.

The goldeye of the Battle River were tasty and once abundant. Harley Louis of the Montana First Nations near Hobbema recalled how productive fish traps were in the 1940s: "We'd catch enough fish [goldeye] to fill our saddlebags and ride back for a big feed of fish with our families."

It didn't last.

A fish biodiversity study sampling 128 kilometres of the river, from the headwaters at Battle Lake to the border, undertaken between 2005 and 2007 captured just seven goldeye. A few pike and walleye were found but 80 percent of the catch consisted of white suckers and minnows. Suckers are tough, resilient fish capable of survival in harsh circumstances. Even they were suffering lesions, eroded fins, and growths.

A provincial government river monitoring program found that over the span of 2009 to 2010 the Battle River had the poorest water quality of all river sites monitored in Alberta. The water's so bad, goes the joke, that when the angler turns his back, the worm makes a break for it.

What's the matter with the Battle River?

Dr. Michael Sullivan, Provincial Fish Science Specialist, sums it up succinctly: "too many nutrients coupled with too few filters spells big trouble for fish".

What has changed from the Battle River of Harley Louis's day to the one of today?

As the wave of settlement and development spread and the ecological integrity of the watershed became more and more compromised, fish numbers, fish distribution and fish health all declined. It wasn't the space race, nor the arms race but the food production race, aided by the horsepower race in farming that led to the decline and disappearance of native fish from watercourses in the settled portion of Alberta.

Perhaps ironically, there is safe haven for fish in the Battle River within the boundaries of Canadian Forces Base Wainwright, a military base. This isn't a function of armed soldiers protecting fish, but rather a landscape that is relatively unchanged. The military base, formerly Buffalo National Park, is uncultivated, uncleared native Aspen Parkland.

The Battle River through the military base is where the last few goldeye can find habitat conditions to their liking and where pike and walleye populations make their last stand. As was the case for grayling, the lesson from this safe haven on the Battle River is that effective fish population maintenance and restoration depends fundamentally on habitat. Everything else done on behalf of fish pales beside watershed integrity. Give me that integrity rather than mostly cosmetic window dressing designed to make me feel good.

Even a goldeye can see that.

It's a bear market for bull trout

Bull trout look like baseball bats with fins. They are torpedo-shaped and similarly dangerous to other aquatic species. Think of bull trout as the aquatic version of a grizzly bear — a summit predator.

And, as with grizzlies, the range of the bull trout has shrunk drastically. Bull trout



Bull trout from Allison Creek circa 1920

have now been eliminated from the Redwillow and Beaverlodge rivers, the North Saskatchewan River below Drayton Valley, the upper Crowsnest watershed – including Crowsnest Lake, the Willow Creek watershed, the Red Deer River downstream of Dickson Dam, the Rosebud River, the lower Bow River, the lower Oldman River and the lower St. Mary, Waterton and Belly rivers. In many watersheds bull trout may have disappeared before we even knew they had been there.

These reductions in the current range of bull trout continue. In 2005, Travis Ripley, then a provincial fisheries biologist, predicted extirpation of bull trout, in as little as two decades, from 24 to 43 percent of streams in the Kakwa River Basin subject to logging and road construction.

The provincial government's recent *Bull Trout Conservation Management Plan (2012-2017)* summarizes population status for the species. Remarkably the report escaped the spin doctors found in the province's Orwellian Public Affairs Bureau in 2012. Its authors clearly make the case bull trout are in trouble. No wonder the species has been designated as "threat-

ened" under Alberta's *Wildlife Act*. Population trends indicate that 61 percent of Alberta's 51 bull trout core areas show declines; 39 percent are stable or increasing.

However, tucked into the tables and unjustifiably sunny narrative of the management plan are a series of red lights flashing out danger signals to be interpreted and decoded. "Stable" populations are still below their historical levels and the word doesn't imply the population is healthy, only that there have been no changes in survey results over the short time of monitoring. Of the mere handful of populations to have increased in numbers over time most of them exist in areas protected from industrial land use pressures. A close examination leads to the conclusion that 94 percent of the provincial bull trout population is still in trouble.

It's a "bearish outlook" for bull trout, a pessimistic future given their range has shrunk and continues to do so while their numbers follow a similar downward trajectory.

It's a cutthroat world for the cutthroat trout

The trout is called a "cutthroat," not from personality or behaviour, but rather for a brilliant vermilion/orange slash on the underside of its jaw. In the clear streams of the upper Oldman and Bow watersheds seeing the flash of a cutthroat, a splash of liquid sunshine, is to glimpse a magnificent piece from nature's art gallery.

Duncan McEachran, a veterinary surgeon, traveled in 1881 from Fort Benton, in Montana, to Calgary along the foothills of the Eastern Slopes in search of possible ranch locations. Not only was he stunned by the potential of the foothills grasslands to support a livestock industry, he commented on the streams that ran clear and cold and were "full of trout...which are most delicious to eat."

From the June 15, 1903 edition of the *Calgary Herald* comes this insight into cutthroat populations in the Bow River watershed: "Two sportsmen went out after trout at Fish Creek one day last week and

as a result brought back 400 fish."

Yes, anglers were greedy, wasteful, and even rapacious, but the bigger impacts that destroyed trout populations were the landscape scale impacts on trout habitat: logging, mining, hydropower development, agriculture, and petroleum development.

The combination of overfishing and industrial land uses depleted cutthroat populations until a cry rose from sport-fishers to restock lakes and streams. Although cutthroat from the Spray system were used initially, non-native rainbow trout which were easier to obtain and rear became the species of choice for stocking efforts. Cutthroat populations, already hit by overharvest and habitat degradation, were overwhelmed by the new, foreign neighbour in their midst.

It is apparent that perhaps less than five percent of historical habitat is currently occupied by cutthroat in the Bow watershed, somewhat more in the Oldman. Cutthroat trout are now designated as "threatened."

There are approximately 5,500 genetically pure fish remaining in both watersheds, which is about the present human population of the Crowsnest Pass. Not so very long ago cutthroat trout outnumbered people in Alberta.

What happened to all those fish? What can we do about it?

The simple answer to the first question is: we killed them. We may not have meant to, we may not have been aware of the consequences of our actions and we might have firmly believed more fish existed.

Answering the second question is more difficult – at least if we want to get off the path we've been on since the 1800s. Here I think the first step is to rethink what we mean when we say that "fish are harvested." The phrase means much more than the obvious – the fish caught and kept by anglers and commercial fishers. We also harvest fish by the ways we develop, the ways we exploit, the ways we use landscapes.

Each unit of habitat, the sum of appro-



Logging on Spray River, 1889-1890 File NA-35535-211 PHOTO: © GLENBOW MUSEUM

appropriate water quality, quantity and temperature along with abundant overhead and instream cover, clean substrate and riparian shading is capable of producing and sustaining a number of units of fish. Any activity that degrades or eliminates units of habitat effectively harvests fish because it removes the potential for fish to exist.

A fish removed from the water on the end of a fishing line may die sooner, but death is just as inevitable when fish habitat is altered, compromised or destroyed. The difference is a fish removed by angling usually has minimal impact on the viability of the population. Lost habitat not only eliminates the existing fish but also any hope for population recovery.

Farmers, miners, off highway vehicle users, roughnecks, homeowners, politicians and a cast of thousands have devastated Alberta's fish populations without ever catching let alone frying a single fish. Instead, large numbers of fish, populations of fish, and watersheds of fish were killed through habitat alterations, loss of critical

habitats, water withdrawals, and pollution. Alberta's fish have died by a thousand cuts, not a thousand hooks.

Fish losses in Alberta are not solely an artifact of history — it's a current event, happening as you read this, in a watershed near you. The past has an annoying way of trespassing into the present. Every decision about how we use and develop land, water, and other resources is a decision about the fate of fish. And, the myth of endless growth and the policy of multiple use without weighing the consequences of either mindset has sentenced many fish to an untimely end.

A prognosis for Alberta's native fish.

With a few tiny exceptions, there has been precious little movement towards actively managing or restoring fish habitat. The recent *Fish Conservation and Management Strategy for Alberta* contains good words on integration, planning, monitoring, use of science and stewardship to benefit fish. But, it is weak on the crucial issue of im-



Poorly designed roads such as this one in the McLean Creek off-highway vehicle area send silt and sediment into streams to kill fish. PHOTO: © L. FITCH

plementation. It doesn't demand enough actions that would ultimately produce and sustain fish by protecting and restoring habitat. Since watershed management is the key to keeping fish swimming everyone involved in land use and landscape planning must pitch in. Fisheries biologists cannot do this on their own.

It is all about priorities. There is consistency in policy that favors economic development over environmental protection. What is noticeably absent is the spine to address the thorny issues of conservation targets and thresholds.

One thing about fishery collapses is that they are not completely predictable and do not happen according to some recipe. All the fish don't die at once (usually); instead they disappear in a series of almost indistinguishable whimpers, too quietly, too silently for most to notice.

However, we are getting better at defining thresholds, the crucial lines that, once crossed, signal imminent fish population collapse. Sediment from an eroding human land use footprint has long been recognized as a mortal threat for fish. The relationship between road density, the land use footprint, sediment, and fish population persistence (or not) seems clear. The research results are exhaustive, categorical, and yet unconscionably ignored as our land use footprint continues to bleed sediment.



Clean gravel substrate, one key to healthy fish populations. PHOTO: © L. FITCH

The cumulative and, in many cases, irreversible loss of native fish virtually everywhere in Alberta over our history of settlement should shock us. If anything approximating this had happened to most of Alberta's charismatic mammalian species it likely would have made for banner headlines and some level of political commitment to action.

It is perplexing that this happened in modern times, with some level of environmental consciousness and overlapping government responsibility. It speaks to institutional barriers that preclude action, poor communication between silos in government, and a lack of oversight mechanisms. Couple a reluctance to regulate and enforce to this daunting list. Mostly it speaks to our failure to plan for tomorrow, to use existing evidence to guide us onto a path of better decisions.

A call for action.

Fish, given their watery homes, are largely invisible to us terrestrial creatures. It isn't that fish are actually invisible, it is that people are unused to seeing them, of perceiving that they live beneath the surface of the water. Of course, if no one sees them, are they really there at all? And, if they somehow disappear, does anyone note their disappearance?

It's this invisibility of fish that makes it too easy to disregard their present plight and the decline in habitat that supports fish. It makes it easier to ignore potential and lost capability and set erroneous goals for fisheries management.

As Dr. Andrea McGregor points out:

“...managers, scientists and citizens are likely to assume the ecosystem conditions of the intermediate and distant past resemble those of their own remembered history and thus can be ignored — a classic characteristic of the shifting baseline syndrome”.

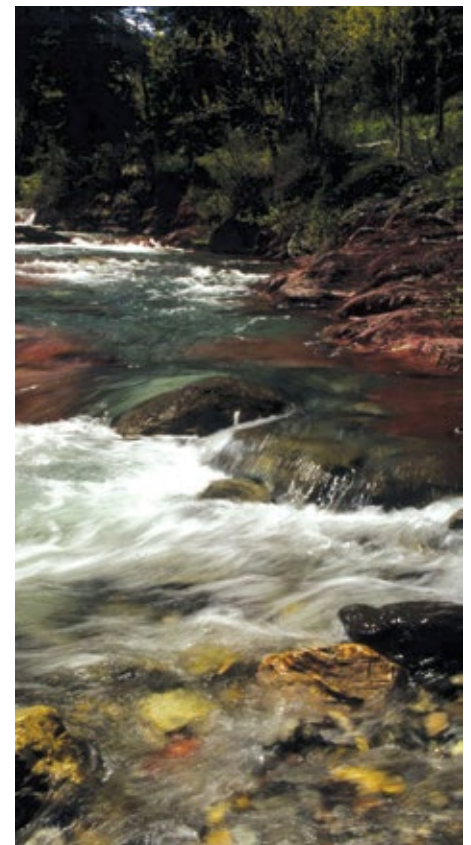
A question Albertans should answer, before the last fish swims to a watery grave, is this: Shall we be bold and ask for some of the fish harvest we have lost through

habitat losses back? To answer yes means we will require habitat restoration, riparian revival, fewer chemicals leaking into the water and, less sediment to muddy the water. The affirmative answer commits us to watershed improvement, true integrated planning, full cost accounting, and an ecological approach to decision making about future resource decisions.

Or, we could just answer no and call this failure to act, as we have become want to do — the price of progress. I hope that, on reflection, we will find progress sometimes has too high a price tag, especially when applied to fish.

In the Dr. Seuss classic that opened this essay is found this: “So, open your mouth, lad. For every voice counts.” Native fish need acknowledgement, empathy, encouragement and friends. ♣

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Habitat Heaven, Blakiston Creek, Waterton Lakes National Park PHOTO: © L. FITCH