

# Beavers, Biodiversity and Wetlands of Hope



BY DR. GLYNNIS A. HOOD

All you could see across the surface of the beaver pond were my lips, nostrils, eyes, and hair. Everything else – my clothes, my mud-covered socks, and my enthusiasm – was completely hidden under the murky water. It wasn't that I didn't ask, "Why am I standing in a beaver pond in my clothes just to keep a wetland intact?", but no one could hear me as my lips made fish-like movements (as described by my field assistant) just to keep air in my lungs. Swimming here (my favourite stroke is the dog paddle... suggesting I'm not a strong swimmer) was required to install a pond leveler to prevent beavers from flooding a popular equestrian trail, while still allowing beavers and their wetlands to remain on the landscape for years to come. By design the leveler operates as a siphon every time the pond rises above the desired height and ensures that the usual flooding doesn't occur. The effort of installing one of these devices is very rewarding – both in time and money saved by land management



*A summer day at the lodge on Grebe pond in Miquelon Lake Provincial Park.*

PHOTO: © G. HOOD



*Beavers play an important role in mitigating the impact of drought, an important reason for protecting their place on the landscape.*

PHOTO: © G. HOOD

authorities and in the preservation of aquatic ecosystems that would otherwise be regularly drained.

In Alberta, we have already lost over 65 percent of our non-boreal wetlands due to draining and infilling and are just beginning to understand the more complex bogs and fens within our boreal region. To say that beavers play an important role in creating and maintaining Canada's wetlands is an understatement. The Canadian landscape evolved with beavers on it and the two are intimately linked. Today's North American beaver (*Castor canadensis*) has existed since prior to the last ice age and has shared its habitat with sabretoothed cats, woolly mammoths and the beaver's distant cousin, the giant beaver (*Casteroides ohioensis*). The giant beaver weighed up to 100 kg and was up to three metres long; it disappeared with many other land mammals approximately 11,000 years ago.

Despite being trapped nearly to extinction during the fur trade, the beaver has made a remarkable comeback and now fills almost every available habitat there is. Amazingly, in Alberta, trapping beavers was prohibited until the 1930s

because population levels were so low. When I was a PhD candidate at the University of Alberta, my advisor, Dr. Suzanne Bayley, and I had the good fortune to work in Elk Island National Park where beavers had been extirpated from the mid-1800s to the early 1940s. Only after transferring beavers from Banff National Park to Elk Island, did beavers slowly begin to find their way to habitats that had been void of beavers for almost 100 years. When we examined the historic aerial photographs, climate data, and beaver occupancy data for the park, we discovered a remarkable aspect of beaver ecology that would receive international attention.

## Beavers and Drought

Beavers are crucial to alleviating the impacts of drought. Over and above climatic variables, the presence of beavers is the most important variable keeping water on the landscape, even during periods of extreme drought. During our study of a 54-year period (1948 to 2002) we discovered that, even during drought, wetlands with beavers had nine times the extent of open water than similar ponds without beavers. Moreover, there were two



*Installing a pond leveler to maintain water levels and prevent flooding of trails in the Cooking Lake/Blackfoot Provincial Recreation Area.*

PHOTO: © G. HOOD

major droughts within our study period (1950 and 2002), which allowed us to see how beavers fared in the dry years. Although it was the fourth driest year on record, 1950 had over 47 percent more precipitation than 2002 (the driest year on record). Remarkably, 2002 still had 61 percent more open water. The reason was that the area we analyzed with 1950 data had not yet been re-colonized by beavers; in 2002 beavers were actively working the landscape and were able to keep water around. Local farmers knew what beavers could do; some actively sought out landowners with beavers on their properties so they could help feed and water their cattle. Beavers were actively mitigating the effects of drought by digging channels and deepening ponds. Just as a farmer drains water off the fields in the spring by digging drainage ditches, beavers dug channels to concentrate water into the ponds during the drought. Ponds with beavers were some of the only ones with water; many others dried up completely.

### **Beavers and Biodiversity**

Since that study my current research program in and around Miquelon Lake Provincial Park at the southern extent of the Cooking Lake Moraine in east-central Alberta has expanded to examine the effect of beaver-modified wetlands on biodiversity and the availability of open water. In 2008, my student Chantal Bromley (BSc) and I conducted a research project to determine whether active beaver ponds provided waterfowl with access to open water earlier in the season than ponds without beavers. Not only did the ponds open up an average of 11 days earlier adjacent to the occupied beaver lodges, Canada geese would fight among themselves for the right to nest atop these lodges. Often times we would see two sets of geese fighting over a lodge, only to find another couple walking up the backside of the lodge and settling in for the spring nesting season. Shorebirds and mallards were also drawn to these open water areas. After a Canadian winter, early access to open

water is critical for many wildlife species. Often during our surveys, we would also see the tracks of weasels, foxes, coyotes, deer, small rodents, and birds adjacent to these open-water areas. It became so common that I started to call them “boreal polynias” after the open water areas in Canada’s high Arctic.

Building on our observations of wildlife tracks around active lodges during the winter months, another of my students, Tim Nelner, and I designed a research project to examine biodiversity of land mammals around beaver ponds in Miquelon and on the adjacent agricultural lands. Although there were no discernible differences in the number of winter tracks and wildlife species within Miquelon during the winter months, the agricultural lands were a different story. On agricultural lands where farmers had chosen to keep an active beaver lodge or two on the property, the number of species of wildlife and the density of tracks was over twice that of lands in the same agricultural areas without inhabited

beaver ponds. In fact, the beaver ponds on the adjacent agricultural lands appeared to be acting as stepping stones across the landscape and helped increase habitat connectivity between various protected areas in the southern moraine.

From 2008 to 2011, entomologist Dr. David Larson and I worked with our summer students to gather hundreds of thousands of aquatic macroinvertebrate specimens representing over 46 different taxa. Adding to the hydrological effect of beaver channels during the drought, we were also beginning to notice a difference in species distribution throughout the same beaver pond. After sampling macroinvertebrates from shoreline, open water, and beaver channel habitats, a remarkable trend began to appear. Not only did beaver channels have a higher number of species, they were also a hotspot for predaceous macroinvertebrates. Some species were exclusively found in active beaver ponds, while surprisingly, the abandoned beaver ponds were producing the bulk of the mosquitoes.

Having beavers actively maintaining a beaver pond actually kept the mosquito population down, either through the increased presence of aquatic predators or through increased pond depth.

### Channels across Landscapes

Although ponds with active beaver colonies were higher in some measures of biodiversity, the channels really caught our attention. A beaver channel is a long trench that beavers dig perpendicular to the pond edge so they can haul back branches to their lodge. They also act as escape routes and travel corridors supporting the beaver's activities around the pond. Using a geographic information system (GIS), I determined that channels can extend over 200 metres away from the pond edge and increase the pond perimeter almost tenfold. New niches and increased vegetated-edge provide extensive habitats for many other species in the pond, including macroinvertebrates and amphibians. Dr. Cindy Paszkowski



**Grinding Machine III**  
48"x48" on wooden cradle panel  
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and my student, Nils Anderson (MSc), have discovered that beaver channels might act as an important dispersal aid for wood frogs as they make their journey from water to land in the late summer and early fall. Anderson's research is ongoing, but shows interesting trends. When looking at some of these channels on an aerial photograph, it is amazing to see how they also link several ponds across the landscape. The implications of channels acting as ecological linkages invite much more exploration.

### Swimming for Wetlands

So, why do I swim in beaver ponds despite my dislike of swimming? My answer: why not swim there if it is going to save a wetland? My research and that of my students shows there is so much more to these complex ecosystems than meets the eye. Despite being the ponds with some of the highest levels of biodiversity and resilience during

drought, they are often the first to be drained when conflict with humans occurs. In mid-September, we just installed another pond leveller with the generous financial assistance of the Alberta Conservation Association; the Alberta Sports, Recreation, Parks and Wildlife Foundation; and the in-kind support of Alberta Parks; the Alberta Trail Riders Association and some very loyal friends. Pond by pond, a bit more biodiversity and hope is left on the landscape. ♣

*Dr. Glynnis Hood, a former Parks Canada warden, is an associate professor in Environmental Science at the University of Alberta's Augustana Campus in Camrose. For nearly thirty years she has worked on protected areas issues from the west coast to the subarctic. Aquatic ecology, beaver management, and human-wildlife interactions fuel her passion for teaching and research.*