

# Exploring the Implications of the Haliburton Reservoir Lakes System on the Trent Severn Waterway

What are the ecological impacts caused by regulated water level fluctuation on Little Hawk, Big Hawk, and Halls Lakes?

## THE SITE

Halls, Big Hawk and Little Hawk Lakes are freshwater lakes located in the Haliburton Highlands region in central Ontario. They fall within the greater Trent River Basin. Originating from the headwaters at Kenissis Lake, water from Nunikani flows into the Hawks Lakes, then to Halls Lake, where outflow carries on to Boshkung Lake.

Both Halls and Hawks Lakes play an integral role in the management of this watershed, as they act as reservoir lakes for the Trent Severn Waterway.

How do the current operations of the Trent Severn Waterway impact the natural environment of these reservoir lakes?



## OPERATIONS OF THE TRENT SEVERN WATERWAY

The Trent Severn Waterway (TSW) is a 367 km long canal system connecting Lake Ontario to Port Severn on Georgian Bay. The water levels of the TSW are managed using a reservoir system, which implements large drawdowns on reservoir lakes located at the headwaters to mitigate spring flooding. Spring freshet refills these reservoirs, and over the course of the summer water is drawn from these lakes to maintain more consistent levels downstream for navigation purposes. This regime results in dramatic annual fluctuations.

Halls and Hawks Lakes are two reservoir lakes experiencing drastic water level fluctuations (WLF's) on the TSW. In Halls Lake, peak levels occur in May and are on average 2.5 meters higher than winter lows. Levels drop over the course of the summer due to operational practices and evaporation, reaching winter low again in October. Hawks Lakes experience fluctuations upwards of 4 meters, following the same annual cycle.

## THE EXISTING RESEARCH ON COMPARABLE WATER BODIES SUGGESTS

Large water level regulation that includes significant drawdowns has been observed to result in changes to sediment composition, nutrient cycling and availability, and reduction in carbon and organic concentrations in the water and sediment.

Regarding the biotic community, changes to species composition, richness and productivity have been observed in macrophytes, and certain fish species such as lake trout, peled and whitefish. Juvenile fish species are noted to be more vulnerable, as they are more dependent on the littoral zone.

Not all findings were; Many studies suggest that ecosystems are able to adapt to consistent annual fluctuations. Fluctuations of up to 2 meters were seen to optimize ecosystem productivity and diversity in many studies.

## THE SITE-SPECIFIC RESEARCH SHOWS

Benthic monitoring on Halls and Hawks Lakes suggest that the chemical and physical properties, as well as benthic community composition of these lakes are consistent with the conditions of other lakes on the TSW and in Haliburton County. Research on fish communities on Haliburton county found that fish productivity, biomass and abundance was fairly consistent between regulated lakes (including Hawks Lakes) and unregulated reference lakes. These findings suggest that WLF has not negatively affected these components on Halls and Hawks Lakes.

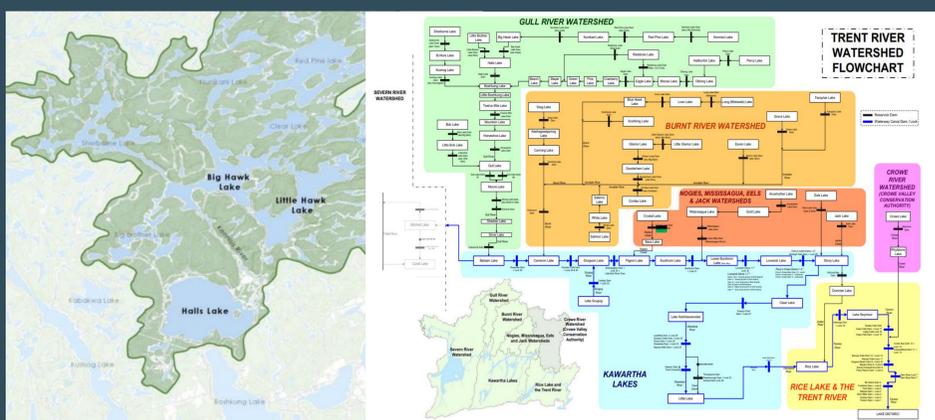
The abiotic condition of Halls and Hawks Lakes is characteristic of a water body adapted to WLF, suggesting that although changes to their ecological integrity may have occurred, its current state is a generally healthy ecosystem.

## GAPS IN THE DATA

Studies on comparable water bodies suggest that consistent WLF's cause littoral species to shift down the water column; Further site-specific research establishing the location of this adapted littoral zone is needed to evaluate the affects of WLF on Halls and Hawks Lakes. Determining the extent of the water column species utilize for near-shore activity may shed light on where shoreline development is safe to occur on reservoir lakes.

Refill rate of reservoir lakes was also observed to influence ecosystem health; further site-specific research on refill rate may be valuable in determining environmental impact of WLF.

Longer-term studies on the effects of WLF is necessary.



## THE BYLAW

The County of Haliburton has proposed a by-law prohibiting shoreline development within 30 meters of the high water mark, with the intention of shoreline preservation. In the case of Halls and Hawks Lakes, the zone in which development is prohibited is greater than 30 meters for most of the year, due to the drastic decreases in water level they experience annually that cause their shoreline to retreat.

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