



Tracking the noble beast: Radio-Telemetry in Georgian Bay

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Our lab has been doing wetland research in Georgian Bay since the early 2000s, and we've had a dedicated muskie research project since 2012. Our muskie work has primarily revolved around identifying and characterizing "suitable" habitat, basically "Where is there good muskie habitat?", "What does it look like?", and "Why is this good habitat?".

In particular, we have focused on spawning and nursery habitat because those early life stages are when muskies are most vulnerable. Our overarching goal is to figure out what features make up a suitable habitat (e.g. water depth, water temperature, types of vegetation) and use that information to map out potential muskie spawning and nursery habitats throughout Georgian Bay. Ideally, we can then use that map to identify suitable areas that should be protected from future human development, restore degraded sites that are no longer suitable, and guide development of more intensive field surveys of young muskellunge and their habitat.

A major piece of our research has been radio-tagging and tracking adult muskies. We surgically implant small radio transmitters in the body of the fish so we can track their movements throughout the season. This amounts to us spending many long days boating around, waving an antenna back and forth, and hoping to hear our receiver make the telltale "cricket" sound that means a tagged fish is nearby.

Between 2012 and 2016, we tagged 51 muskies at sites in southeastern, northeastern, and northern Georgian Bay and have tracked these fish for up to three consecutive years. Our most intensive tracking efforts have typically been during the spawning season, typically late April through May. By tracking adult muskies during the spawning season, we hoped to follow them to their spawning sites, which would in turn point us

towards likely nursery habitat later in the season. The most striking finding of our spawning-season tracking has been the level of site-fidelity demonstrated by adult muskies; most of our tagged muskies returned to the same spawning site year after year. Male muskies in particular would return to the same one or two spawning sites where they would spend most of the spawning season. These areas were typically in shallower waters (1 – 2m deep), near the outer edges of wetlands. Female muskies also returned each year to the same general area, spending their time in deeper waters than where males frequented, until they ventured into the shallower areas to spawn. We saw evidence of this type of behaviour at all three of our study sites in Georgian Bay. This level of spawning site fidelity in adult muskies could be a problem if their historic spawning and nursery grounds are degraded or destroyed. If they continue to try and spawn in areas that cannot support the early life stages, then over the long term there could be declines in the population.

We have also tracked some of our muskies throughout the summer to see what types of habitats they were using after spawning had ended. While spawning and nursery habitat were our biggest concern regarding the long-term sustainability of the Georgian Bay muskie population, we seized the opportunity to investigate post-spawn habitat use. Given the uncertainty in how lake levels and lake temperatures may change in the future, we wanted to develop a better understanding of muskies' summer habitat. Much like our work with spawning and nursery habitat, we are trying to characterize good habitat so we can find it in other regions of Georgian Bay, and see if or how it might change in the future. We also equipped some of the transmitters with temperature and depth sensors so that we can eventually characterize the thermal and depth preferences of fish at various times of the year. In addition to our tracking we also

continuously monitored how water temperature changed with depth throughout the season, and used sonar to map water depths and vegetation structure. We're still in the early stages of working with these data, but the most obvious habitat features we see muskies using are typically what you would expect: obvious structures like the edges of weed beds or steep underwater ledges and shoals. We also found muskies sitting under docks on more than a few occasions. We lost track of some of our tagged fish during the summer, which we presume means they moved out to deeper areas beyond our detection range. The few that we successfully tracked on a regular basis appeared to have established their "summer home range", even though most of these overlapped spatially with each other. For example, there were a few notable weed beds or shoals that often had a muskie present, but not always the same one.

Our research aims to develop a better understanding of muskie habitat in Georgian Bay. We need to understand how environmental changes, either natural or human-induced, have affected muskies and their habitat in the past, and predict how critical habitats may change in the future. Georgian Bay's muskie fishery is world class and we hope the work we are doing will help keep it that way. 

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