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Memo: Risks to hibernating turtles from third crossing construction causeway

We were asked by the City of Kingston to comment on concerns raised by Parks Canada that turtles may have accessed the area of the river enclosed by the Aquatic Exclusion and Turbidity Curtain (AETC), and therefore be at risk from the proposed causeway placement taking place this winter. The turtle overwintering period typically lasts from mid-October to mid-April, and as of writing this memo, the Cataraqui River turtles will be in their overwinter locations, with only small localized movements for the remainder of the winter.

Based on our review of available information regarding turtles in the river summarized below, it is our opinion that risk to turtle winter mortality is quite low. This opinion is based on our knowledge of the Cataraqui River, background knowledge of the Cataraqui River turtles, and research into overwintering behavior. Nevertheless, this report provides additional monitoring recommendations intended to further minimize potential risk to turtles.

Background Knowledge and Study: We have been undertaking ecological surveys in the river between Kingston Mills and the Lasalle Causeway since 1985. These include turtle-focused surveys for the Third Crossing (Ecological Services 2011), as well as surveys that would include turtle searches including the wetland evaluation (Ecological Services 1990), the ANSI designation (Ecological Services 2001), several ecological studies for Parks Canada including Ecological Services (1998), and several nearby impact assessments including Riverview, the Hwy. 15 quarry, and River Park Condominium just north of the western access point of the Third Crossing. Turtle surveys associated with the river between Kingston Mills and the Lasalle Causeway have been undertaken by a variety of others including Blancher (1984), LGL (2007), and Rideau Canal Parks Canada staff (undated). There are also many citizens groups that do turtle survey work in this area including Turtles Kingston, Herpetofauna of Kingston, Kingston Field Naturalists, Help the Turtles, and Friends of the Kingston Inner Harbor. The latter having also undertaken radio telemetry studies. The IPD Team has also spent 95 hours dedicated to turtle surveying and trapping at the Project Location from Sept. 23, 2019 to Oct. 31, 2019. As well, 5,886 hours of game camera use has also been recorded. On-site construction staff, including ODS divers have been given Species at Risk (including turtles) awareness training, and have been instructed to be aware of any turtles on site. Their time has involved over 4,000 hours, which also involved some underwater camera use. By any measure, this is an extensive body of knowledge and observation to draw on and gives us confidence as to where turtles tend to be concentrated in the river.

Based on the studies completed to date, and observations on site, the following comments are offered: All sightings of Blanding's turtles have been more than 2 km north in the wetland/cattail areas associated with Hwy. 401, which is also noted in internal documents of Parks Canada. Musk turtle

sightings have consistently been off the north shore of Belle Island and the inner harbor, and map turtles are concentrated in the inner harbor shoreline areas. Snapping and painted turtles tend to be more diffuse, although most observations have consistently been made in near shore areas, especially along portions of the western shoreline throughout the river for nesting purposes. There is no evidence to date that shows the bridge route as a prime turtle use area.

Overwinter Behavior: The main concern with the bridge causeway work appears to be the risk of burying hibernating turtles when causeway fill is put in place. From research and background knowledge, we can discern that this risk is quite low.

This low risk is most important in regard to Blanding's turtles (Threatened), where all observations, as well as favored winter habitat features (e.g., see Edge et al. 2019) are well north of the bridge route in closer association with the river north and south of Hwy. 401. It would appear that other turtles exploit the favorable winter conditions here as well, as highlighted by the map turtle telemetry work of the Friends of the Kingston Inner Harbor.

The risk to Eastern musk turtles from the causeway is considered to be quite low. For musk turtles we would expect hibernation to occur within proximity to their summer concentration areas, which does not include the Third Crossing area. The Musk turtles is primarily a southern species that is known to be anoxia intolerant. This poses special challenges in the winter, because they cannot survive long periods buried in the winter mud in due to their sensitivity to anoxia (Ultsch and Cochran 1994, and Ultsch 2006). Consequently, they are more likely to be found near ice free areas, or areas that may receive some oxygen such as muskrat burrows. This also matches with work by Ernst (1986) who also found them in muskrat burrows, and to be sluggish, which suggests that they are capable of winter movement.

Musk turtles have strong site fidelity and small home ranges with limited movement. The area where we have consistently observed these turtles since 1990 is north of the Belle Island peninsula. This is also consistent with Ontario Ministry of Natural Resources and Forestry NHIC records and fits in with habitat preferences for near shore lily pad rich areas (Picard et al. 2011, Edmonds and Brooks 1996), which are more than 200 m south of the third crossing area. This lily pad area also fits within the standard home range sizes of musk turtles (see Belleau 2008), which is outside of the bridge route. Due to their anoxia intolerance we would expect musk turtles to overwinter in areas with higher oxygenation, and in relation to their summer home range. This could be closer to the navigation channel near Belle Island, or near outflows (e.g., Orchard St). The navigation channel is often open in winter near Belle Island, and we have observed otters hunting here in winter. Consequently, we would expect musk turtles that overwinter near the channel to avoid predation by taking advantage of natural cover such as the root areas of the cattail swales along the northern edges of the Belle Island peninsula. Belle Island musk turtles may also move to more favorable winter habitat nearer to Hwy. 401. We are unaware of otter hunting near Hwy. 401, but there is much natural predator avoidance cover here and the channel is often open in winter.

The risk to map turtles from the causeway is also considered to be quite low. There is no evidence that this is a favored map turtle summer area, in contrast to the known concentration areas in the river, primarily south of Belle Island, and the causeway route does not have features that are particularly favorable. Like musk turtles, map turtles are anoxia intolerant and therefore overwinter on the bottom

surface and can be easily observed in winter as they are rather sluggish and do not move away with any haste when approached. As an example of their winter behavior and ease of observation under the ice, videos have been posted to Youtube by Dr. G. Bulte of Carleton University, a turtle researcher. None of the staff on-site, including the ODS divers, have observed map turtles on the bottom in the causeway route. Map turtles are expected to overwinter in areas with higher oxygenation. Higher oxygenation could be achieved at outflows (e.g., Orchard St. outflow), or close to the navigation channel. Using radio telemetry, the Friends of the Kingston Inner Harbor have tracked map turtles in the fall moving from the Inner Harbor to Kingston Mills, which would provide them with more oxygenated waters. Map turtles are also communal hibernators, so the area within a few hundred meters north and south of Hwy. 401 is likely a favored spot for oxygenation purposes, but also because this section of the river/wetland has many predation cover features.

Snapping and midland painted turtles are anoxia-tolerant and therefore can bury themselves in the mud during winter. However, this is certainly not always the case and there is much winter research (reviewed by Ultsch 2006) that suggests winter behavior is driven by an attempt to find favorable physiological conditions. Consequently, both species will use animal burrows, root mass areas, or rest on the surface like musk and map turtles if conditions allow for it, such as in more oxygen rich areas. As such, we would expect some snapping and painted turtles to move to the winter areas favored by Blanding's and map turtles near Hwy. 401. Both snapping and painted turtles can be active under the ice, and both can be communal hibernators. They also have overwinter site fidelity, returning to the same site year after year, likely due to favorable conditions. There is nothing unique about the Third Crossing route that would see it as a favored overwintering site, but if it were favored, we would expect there to have been some observations in the route by the IPD team if numbers of turtles were moving to this area. As well, the extensive number of observers who have been surveying turtle use in the river in the last 30 years have never noted the bridge route as turtle concentration area. Finally, the nearshore western shoreline area has had many decades of disturbance from boat launches at the boat ramp, and associated with the marina activity which would have lessened its allure to painted and snapping turtles.

Other reasons for our limited concern about snapping and painted turtle winter mortality risks are due to the placement of exclusion barriers prior to the hibernation movement period, but also by the many recent disturbances in 2019 that could deter turtles from this area. These disturbances included boat based survey work, and work associated with the placement of the barrier itself including pile driving, and the vegetation removal.

The turtle exclusion cells are numbered from 1 to 7, with Cell 1 being closest to the west shore, and then working east and ending at Cell 7 on the east shore. We have few concerns with turtle winter mortality risks for cells 2 to 6 as past telemetry research has shown that both snapping and painted overwinter near shore (see Taylor and Nol (1988), Meeks and Gordon (1990), Crocker et al., (2000), Brown and Brooks (1994), and Ultsch (2006)). Much knowledge of near shore winter use is also provided by snapping turtle hunters in the U.S., where millions of snapping turtles have been shipped to Asian markets (Colteaux and Johnson 2017). This suggests that only Cell 1 and Cell 7 need focus. A determined turtle would likely find a way to get below or above the turtle exclusion fencing, but exclusion Cell 1 has remained intact and operational, so it will have some ability to inhibit turtle access. Furthermore, as discussed above, the Cell 1 area is unlikely to be a favored overwinter area , and all the recent fence and bridge work activity would have had some level of deterrence. Consequently, the risk

to a turtle getting buried here should be low. Cell 7 was damaged in a windstorm and at this point it is not operational as an exclusion fence. This is not a concern because snapping and painted turtles typically overwinter near shore, which on the east shore is limestone pavement (~25m). With little to no sediment for turtles to bury themselves, they would be easily seen from the surface. To date, no turtles have been observed resting on the bottom here, despite many hundreds of hours of effort in this relatively small area.

Recommendations

In making reasonable efforts to avoid harm, we recommend the following to further reduce the potential risk to turtles:

1. Prior to causeway filling undertake weekly visual inspections of the sediment bottom of Cell 1 and Cell 7, using a combination of underwater video camera and boat-based observation. This would pick up any surface turtles, but also have the potential to pick up half buried painted and snapping turtles, as they will stick up body parts to accommodate various respiration mechanisms.

2. It is our understanding that the IPD Team contacted the MNRF to see if there was a method for determining the presence of turtles buried in the sediment. MNRF was not aware of any such method. Similarly, we contacted Dr. J. Litzgus, turtle researcher from Laurentian University, and she was also not aware of any such method. However, she did note that probing and "muddling" are used by researchers and turtle hunters. Muddling is where people will walk a site feeling with their feet, or hands (depending on water depth). For safety reasons, we don't recommend this method in Cell 1, or the deeper water parts of Cell 7, due to the difficulty of walking in the type of sediment found here. However, probing would be possible from a boat with the use of a plastic tined horse rake, or a long tined plastic weed rake such as in the adjacent image. One day of effort should be sufficient to cover the relevant areas of Cell 1 and 7. The rake in the adjacent image could potentially be doubled or tripled in width to increase the area of coverage and thus reduce the search effort. Any turtles caught would need to be handled as per agreed upon protocols with Parks Canada for the third crossing work.

Respectfully submitted,

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