Factsheet - Re-designation of the Fish Tumour and other Deformities Beneficial Use Impairment

SUMMARY

- In the 1980s, internal and external tumours and deformities in fish in the Detroit River were found at elevated rates.
- These deformities can be caused by pollution and sediment contamination.
- Through legislation and better management practices, sediment contamination in and pollution discharges to the Detroit River have decreased.
- Recent research indicates that liver tumours have decreased, with 1 out of 112 (<1%) fish analyzed having a liver tumour. 2% is the Great Lakes reference rate for such tumours.
- Based on this research, it is recommended that the status of the fish tumour and other deformities beneficial use impairment for the Detroit River be changed to 'not impaired'.

BACKGROUND

The Detroit River has been used intensively for international shipping, industrial and agricultural development, recreation, and drinking water for decades. This has led to environmental degradation and as a result, the Detroit River was listed as an Area of Concern (AOC) in 1987. The Detroit River Remedial Action Plan (RAP) was established to develop and implement actions to clean up the river. Under the RAP, 14 Beneficial Use Impairments (BUIs) were created to measure progress towards the cleanup. A Beneficial Use Impairment (BUI) is a condition that interferes with the ability of humans to use the aquatic environment and for the aquatic environment to support aquatic life. These 14 BUIs must be considered not impaired before the Detroit River can be removed from the list of AOCs. The fish tumours and other deformities BUI was deemed 'impaired' under the RAP.

WHAT WAS THE PROBLEM?

Historically, pollution discharges from the heavily urbanized and industrialized shorelines of the river have contributed to fish tumours and other deformities in fish species. Pollutants such as polycyclic aromatic hydrocarbons (PAHs) have accumulated in the sediment and waters, causing tumours and other deformities in various fish species. Research in the 1980s indicated that there was an elevated incidence of liver tumours in Detroit River fishes. External lesions or deformities are not a good indicator of contaminant exposure; hence, liver tumours are the focus of this BUI.

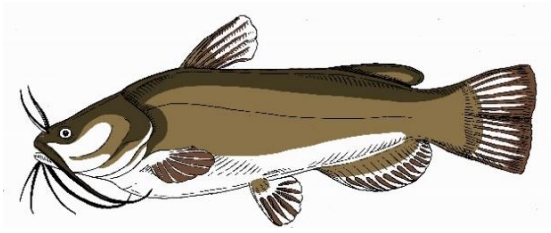
WHEN WILL FISH TUMOURS IN THE DETROIT RIVER BE CONSIDERED NOT IMPAIRED?

To understand the status of fish tumours and other deformities within the Detroit River, the DRCC established the following criteria, which, when met, indicates that this BUI on the Canadian side of the Detroit River is no longer impaired. The criteria is:

> *"When incidence rates of liver tumours in (3-5 yr old) brown bullhead are not statistically different than the Great Lakes background rate (2%)."*

WHY THE BROWN BULLHEAD?

The brown bullhead is an indicator species. Indicator species can reveal problems with their environment based on their health and population. The brown bullhead was chosen as the study organism as it is found throughout the lower Great Lakes, is in direct contact with sediments when searching for food, is sensitive to contaminants, and has a small home range. Since the likelihood of liver tumours increase with age and longer exposure to contaminants, fish aged 3-5 years were selected for this study.



Brown bullhead
Illustration by Hannah Wilson

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WHY LIVER TUMOURS?

Liver of brown bullhead with a white tumour.
Photo credit: USFWS

Research suggests external tumours are likely caused by a virus, while liver tumours are caused by chemical contaminants. Therefore, liver tumours in the brown bullhead are considered to be an indicator of sediment and habitat quality.

RESULTS OF RESEARCH & MONITORING

In 2002 and 2016, 112 brown bullhead were collected from 3 sites in the Canadian waters of the Detroit River. Researchers collected 67 brown bullhead in 2002 and 45 bullhead in 2016 that were in the 3-5 year age bracket. This monitoring informed the DRCC of the status of fish tumours in river fish.

Below are the results of the studies examining liver tumours in brown bullhead in the Detroit River:

- Brown bullhead (3-5 yrs of age) from the upstream Detroit River (Peche Island) did not have any liver tumours (0/28 fish). Tumour prevalence (i.e., the proportion of the population with a given characteristic) in these fish was not significantly different from reference sites in the Detroit River (i.e., sites that have been exposed to only small amounts of contaminants).
- Brown bullhead (3-5 yrs of age) from the midstream and downstream sites (Turkey Creek and Bois Blanc, respectively) had 1 fish with a liver tumor (1/84 fish or 1.2%). There was no significant difference in tumour prevalence between these fish and fish at reference sites.

Results of brown bullhead sampling

Survey year	Location	# of fish collected (3-5 yrs old)	# of fish with liver tumours	% of fish with liver tumours
2002	Peche Island (upstream)	26	0	0%
	Turkey Creek (midstream) & Bois Blanc (downstream)	41	1	2.4%
2016	Peche Island (upstream)	2	0	0%
	Turkey Creek (midstream) & Bois Blanc (downstream)	43	0	0%
TOTAL		112	1	<1%

CONCLUSIONS

Although contaminants are still present in sediments in the Detroit River AOC, the prevalence of tumours in brown bullhead are decreasing. In part, this is because of legislation introduced by both Canadian and U.S. authorities to restrict the discharge of many pollutants into the river. The brown bullheads caught on the Canadian side of the Detroit River show a <1% prevalence of liver tumours – a rate that is lower than the Great Lakes background rate of 2%. Brown bullheads were used as an indicator species and based on these results it is assumed that tumour prevalence in all species meets the criteria. Therefore, liver tumours in the Detroit River are not more prevalent than other Great Lakes sites. No other remedial/restoration actions are required to meet BUI criteria.

For more information or to download the report, please visit www.detroitriver.ca.

The Detroit River Canadian Cleanup implements the Remedial Action Plan on behalf of a community-based partnership working together to protect, restore and enhance the Detroit River ecosystem.

Detroit River Canadian Cleanup
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