

## PUBLIC HEALTH

## The lesser evils of battling round goby infiltration

The round goby (*Neogobius melanostomus*) is a freshwater fish native to the Black and Caspian Sea regions of Eurasia. In Canada it was first discovered in 1990 in Lake St. Clair, a relatively small lake nestled between Lakes Huron and Erie in the Great Lakes water system. Like other invader species such as the zebra mussel and Eurasian ruffe, the round goby was probably introduced in ballast water from transoceanic vessels. Ballast tanks are used to balance ships; they are emptied and refilled according to the amount of cargo a ship must carry. Since arriving in Canada, round gobies have spread throughout the Great Lakes. They are aggressive, voracious feeders able to forage in the dark; they take over prime spawning habitat, out-competing native fish and altering the ecosystem.

To date, the round goby has been identified in only 2 inland rivers in Ontario: the Trent River system and a short 5-km stretch of Pefferlaw Brook, which empties into Lake Simcoe. Its presence in the Lake Simcoe watershed threatens the lake's ecosystem and a \$200-million-a-year angling industry. Ontario's Ministry of Natural Resources (MNR) has lately had a single, timely opportunity to intervene to eradicate the round goby before the species reaches Lake Simcoe.

In September 2005, the local public health authority and the provincial Ministries of health and the environment received an MNR proposal to use a piscicide (i.e., a fish pesticide) Chem Fish, the active ingredient of which is rotenone (5%), to eradicate this species of goby. Rotenone is found in many registered insecticidal products in Ontario; however, its classification as a piscicide had lapsed. Although used periodically by many US state fisheries programs, it had not been used in Ontario in more than 5 years. The Ontario Pesticide Advisory Council has recently reclassified Chem Fish as a schedule 1 (restricted use) product. This means it is considered to be very toxic and can be applied only by a licensed applicator under permit approval.

The plan was to apply diluted liquid piscicide at several stages along the brook and to the wetlands and canals at its mouth in mid-October, for a period ranging from a few days up to 3 weeks. Chem Fish has a strong odour and is not selective. Many fish were expected to be killed; the MNR proposal included a plan to collect the dead fish.

The full health-risk assessment recommended by the local public health unit was unfeasible because of the relative urgency of the situation and an apparent paucity of data. Enquiries made to the Pest Management Regulatory Agency (PMRA), the agency responsible for housing data and assessing the acceptability of any pesticide product, revealed that the ingredient rotenone was first registered in 1933. Having been in use for so long, it had not undergone an environmental review and risk assessment, although it was scheduled for a PMRA re-evaluation in 2006.

According to information contained in Extoxnet (<http://extoxnet.orst.edu/pips/rotenone.htm>), a database maintained by Oregon State University, rotenone has a relatively short half-life, binds readily to soil and consequently is unlikely to bioaccumulate or pose a chronic health risk. A quick review of the literature identified that chronic exposure to rotenone has been associated with Parkinson's-like symptoms, teratogenicity and carcinogenic effects in vivo and in vitro. The applicability of these results to this scenario was nevertheless questionable because of the administration route of and longer exposures to rotenone used in the studies. Of more relevance were observations after acute exposures among people: dermatitis,<sup>1</sup> gastrointestinal irritation, metabolic acidosis, pulmonary edema and cardiac arrest.<sup>2,3</sup> However, the intended application method, dilute dose and anticipated rotenone residence time made exposure of the public in this scenario likely to be insignificant. The risk of acute exposure was further reduced by plans to advise residents not to drink water taken directly from the river or the mouth of the river, and to supply drinking water from another source.

Upon consultation with the Public Health Division of the Ministry of Health and Long-Term Care, the public health risk was considered minimal.



M. Spencer Green

A group of round gobies swim in a new exhibit of the kinds of invasive species threatening the Great Lakes ecosystem, at Chicago's Shedd Aquarium (2006 Jan. 5). Round gobies eat the eggs of trout and bass.

The MNR notified all residents and businesses in the vicinity of the brook; a public meeting was held to present the plan and solicit public input. The response from the community was mainly positive, with most people agreeing that the imminent risk to the Lake Simcoe ecosystem seemed to outweigh the risk to public health.

The piscicide was applied in October 2005. There were no unforeseen events and the local health unit received no subsequent complaints or concerns from residents. It is too early to evaluate the effectiveness of the intervention.

Although pesticide application may be a necessary evil, tighter Coast Guard regulations that prevent freshwater hitchhikers from entering the Great Lakes system would be the preferred "ounce of prevention."

**Karim Kurji**  
Acting Medical Officer of Health  
**Mark Payne**  
**Helen Doyle**  
**Joe LaMarca**  
Health Protection Division  
York Region, Ont.

### REFERENCES

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