Aquatic Ecosystem Recovery in the Thames River Watershed

INGRID TAYLOR

Thames River Recovery Team, Upper Thames River Conservation Authority, 1424 Clarke Road, London, ON, N5V 5B9, Canada, email taylori@thamesriver.on.ca

Abstract: The Thames River drains 5285 km^2 of land and is the second largest watershed in southwestern Ontario. Most of the watershed is in the Carolinian life zone, making it one of the most biologically diverse aquatic regions in Canada. The Thames River hosts 25 aquatic or semi-aquatic species at risk as designated by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC); these include 12 fish species, 7 mussel species, and 6 reptile species. A recovery team was formed in 2002 that consists of representatives from federal and provincial agencies, First Nations groups, conservation authorities, and the University of Western Ontario. This diverse team has taken on the challenge of developing an ecosystem-based recovery plan for this large aquatic ecosystem, which is also situated in a highly developed urban and rural sector of southern Ontario. The associated urban and agricultural land uses contribute to siltation, nutrient and toxic loadings, altered water flows, thermal pollution, dam and barrier impacts, and exotic species invasion, all of which are identified threats to populations of the aquatic species at risk. The Thames ecosystem approach has already demonstrated success in communication and education about species at risk, and in habitat stewardship and restoration efforts. Success has also been made in forming new partnerships with the First Nations of the Thames and in coordinating efforts with two conservation authorities. The ecosystem approach has, however, presented challenges in coordinating the magnitude of species-specific scientific information and in prioritizing the needs of the 25 species at risk. The size of the Thames aquatic ecosystem with its associated division of jurisdictional coverage, and the issues presented by both urban and rural populations, present challenges to the logistics of recovery planning.

Key Words: species at risk, ecosystem recovery, Thames River, Ontario

The Thames River is one of Canada's most southern watercourses. It originates northeast of London, Ontario, and flows 273 km through the agricultural heartland of southwestern Ontario to Lake St. Clair, which drains into Lake Erie. The river drains 5285 km^2 of land and is the second largest watershed in southwestern Ontario (Wilcox et al. 1998). The Thames consists of three distinct branches: the North Thames begins north of Mitchell and flows through St. Mary's, the Middle Thames begins southwest of Tavistock and flows through Thamesford where it joins the South Thames, and the South Thames starts west of Tavistock and passes through Woodstock. The north and south branches meet in London at the historic Fork of the Thames. From there, the

Thames flows in a southwesterly direction through Chatham and into Lake St. Clair (Wilcox et al. 1998).

There are a number of features in the Thames watershed that provide an array of habitat opportunities for aquatic species. The postglacial landscape, dynamic physical features (e.g., fluctuating water levels, pools and riffles, high nutrient levels due to the long growing season), cold and warm water streams, and the Carolinian influence all contribute to the watershed's biological diversity (Wilcox et al. 1998). The watershed's complex system supports one of the most diverse aquatic communities in Canada, including approximately 90 species of fish, 30 species of freshwater mussels, and 30 species of reptiles and amphibians.

The Thames is situated in a highly developed part of southern Ontario, and as such, faces many pressures from urban and rural land uses and human activities. The total population of the Thames watershed is over half a million; 78% of the population resides in cities, 7% in towns and villages, and 15% in rural areas. The dominant land use in the watershed is agricultural, which accounts for 70% of total land use, whereas urban areas and roads account for another 16%. Forest cover comprises 11% of the watershed, and watercourses and water bodies account for 3%. There are four First Nations within the Thames watershed; their lands account for 1.5% of the total watershed area (Thames River Coordinating Committee 2000).

The water quality and aquatic habitat of the Thames and its tributaries have been drastically affected in the past century by human activity. Twenty-five aquatic or semi-aquatic species that are currently found or which historically occurred in the Thames have been listed as species at risk by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). They include

- 7 species of freshwater mussels (snuffbox [*Epioblasma triquetra*], wavy-rayed lampmussel [*Lampsilis fasciola*], round hickorynut [*Obovaria subrotunda*], kidneyshell [*Ptychobranchus fasciolaris*], mudpuppy mussel [*Simpsonaias ambigua*], rayed bean [*Villosa fabalis*], and round pigtoe [*Pleurobema sintoxia*]);
- 12 species of fish (gravel chub [*Erimystax x-punctatus*], northern madtom [*Noturus stigmosus*], eastern sand darter [*Ammocrypta pellucida*], black redhorse [*Moxostoma duquesnei*], lake chubsucker [*Erimyzon sucetta*], northern brook lamprey [*Ichthyomyzon fossor*], greenside darter [*Etheostoma blennioides*], bigmouth buffalo [*Ictiobus cyprinellus*], silver shiner [*Notropis photogenis*], pugnose minnow [*Opsopoeodus emiliae*], river redhorse [*Moxostoma carinatum*], and spotted sucker [*Minytrema melanops*]); and
- 6 species of reptiles (eastern spiny softshell turtle [*Apalone spinifera*], stinkpot turtle [*Sternotherus odoratus*], spotted turtle [*Clemmys guttata*], northern map turtle [*Graptemys geographica*], queen snake [*Regina septemvittata*], and eastern ribbonsnake [*Thamnophis sauritus*]).

The Thames River Recovery Team was formed in 2002 to address the issue of protecting and recovering these identified species at risk. The team includes representatives from the following agencies: Department of Fisheries and Oceans Canada, Upper Thames River Conservation Authority**,** Lower Thames Valley Conservation Authority, University of Western Ontario, Oneida Nation of the Thames, Chippewas of the Thames, Delaware Nation, Munsee-Delaware First Nation, Middlesex Stewardship Committee, Ontario Ministry of Environment, Ontario Ministry of Natural Resources, and Canadian Wildlife Service.

The recovery team decided to develop an ecosystem-based recovery strategy for the Thames River aquatic species at risk. The goals of the Thames River Aquatic Ecosystem Recovery Strategy are to use an ecosystem approach to stabilize and improve species at risk populations within the Thames River ecosystem, and to reduce or eliminate the threats to these species and their associated habitats so that their long-term survival in the natural environment is ensured. As a means of achieving these goals, actions have been designed for improving aquatic ecosystem health and alleviating many of the common threats to the aquatic species at risk. The ecosystem approach also allows for more efficient use of resources, streamlines the public consultation process, and benefits non-at-risk aquatic species in the hopes of preventing their future listing.

Background information about the 25 at-risk species and the Thames watershed was compiled in two reports: *Species at Risk in the Thames River Watershed* (MacKinnon and Madzia 2003) and the *Thames River Recovery Synthesis Report* (MacKinnon et al. 2003). Although the 25 species have diverse habitat requirements and preferences, they share several common threats. The primary threats to the Thames River aquatic ecosystem include siltation, nutrient loadings, toxic compounds, altered water flow, impoundments (barriers to movement), exotic or invasive species, thermal pollution, and lack of public awareness. The recovery strategy is intended to guide activities within the Thames watershed in order to alleviate these threats to the species at risk. Approaches to guide recovery actions fall into four major categories: research and monitoring, habitat improvements, habitat protection, and communication and education. In each of these areas, the ecosystem approach to recovery has had both successes and challenges.

The Thames ecosystem-based recovery strategy has already demonstrated success in monitoring, habitat improvement efforts, and communication and education about species at risk. Success has also been made in forming new partnerships with the First Nations of the Thames and in coordinating efforts with the Upper Thames River and Lower Thames Valley Conservation Authorities. The ecosystem approach has, however, presented challenges in coordinating the magnitude of species-specific scientific information and in prioritizing the needs of the 25 at-risk species. Another continuing challenge involves equalizing species at risk efforts in the upper and lower portion of the Thames watershed due to limited funding and staffing resources, both historic and ongoing, within the lower Thames.

Research and monitoring in the Thames has been expanded to include species at risk. Fish monitoring has been ongoing in the upper Thames and now includes the at-risk species. Monitoring of fish species has also been initiated in the lower Thames as a means of filling

knowledge gaps. Research on mussels in the Thames has been limited; building capacity in the area of mussel monitoring and research is a challenge the Thames recovery effort is currently tackling. Zebra mussels (*Dreissena polymorpha*) were discovered in the Thames, at Fanshawe reservoir, in late 2002. A zebra mussel monitoring program was established in 2003 to track the spread of this invasive species, which is known to be a major threat to native mussel species.

The Thames initiative has also benefited from research and monitoring that was initiated by the Queen Snake and the Eastern Spiny Softshell Turtle Recovery Teams. Detailed research into queen snake critical habitat needs, habitat use, and current threats has been undertaken in the watershed, and a mark-recapture study is ongoing in the area. The first evidence of a queen snake hibernaculum was discovered on the shores of the Thames in early spring 2003 (Gillingwater, pers. comm.). A long-term monitoring program for the eastern spiny softshell turtle has been ongoing in the watershed since 1994. This turtle has acted somewhat as a mascot for the watershed, and the research team's work has been invaluable in promoting the interests of species at risk throughout the Thames watershed.

The Thames River recovery strategy has been successful in utilizing existing delivery mechanisms and ongoing activities within the watershed that are aimed at improving water quality and community awareness. For example, overall water quality has benefited from habitat improvements made through agricultural stewardship activities and implementation of agricultural Best Management Practices (e.g., stream buffers, livestock exclusion fencing), and from farm incentives offered through a project that is supported, in part, by the province and municipalities. A community forestry program, which works with school groups to renaturalize riparian areas in both urban and rural sections of the watershed, has also been utilized as a delivery mechanism for species at risk habitat improvement projects. The Thames River annual cleanup is another community initiative that has attracted over 1600 volunteers who have cleaned up over 200 km of the Thames' shoreline. This initiative is closely linked with species at risk and ensures that queen snake sites are avoided during the cleanup.

Active community and landowner outreach programs within the Thames watershed have enabled the Thames aquatic ecosystem recovery process to spread its species at risk message effectively. Shortly after the recovery team formed in 2002, a Thames River recovery logo was designed to identify the program, and the overall Thames River aquatic species at risk ecosystem initiative was given a media launch. The logos were produced in the form of stickers and magnets, and together with posters and informative displays that highlight species at risk in the Thames, were featured and distributed at community events and meetings, shows (e.g., farm, garden, and outdoors shows), symposia, and First Nations gatherings. Species at risk information is also included as part of the visitor's guide for the watershed's three campgrounds; approximately 25,000 copies of the guide are distributed per year. Several species at risk education days for Grade 4 students are held each year at three locations in the watershed. The species at risk message has essentially been incorporated into the two conservation authorities'

overall public education and outreach programs, and is part of the daily business of managing the watershed using an ecosystem-based approach.

With the public already tuned into the Thames species at risk, the Thames recovery team is now preparing for public consultation on its draft of The Thames River Aquatic Ecosystem Recovery Strategy. The public consultation process will include six meetings throughout the watershed, and will be targeted to the specific needs of the agricultural, urban, and First Nations communities. While this one-time public consultation process will drive the recovery strategy closer to completion, the true success of species at risk recovery efforts in the Thames lies in incorporating the initiative with existing and ongoing watershed programs that are aimed at the common goal of improving water quality and ecosystem health over the long term.

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Personal Communications

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