

Report on the Progress of Recovery Strategy
Implementation for the Gravel Chub (*Erimystax x-*
punctatus) in Canada for the Period 2008–2015

Gravel Chub



2016

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Preface

Section 46 of the *Species at Risk Act* (SARA) requires the competent Minister to report on the implementation of the recovery strategy for a species at risk, and on the progress towards meeting its objectives within five years of the date when the recovery strategy was placed on the Species at Risk Public Registry.

Reporting on the progress of recovery strategy implementation requires reporting on the collective efforts of the competent Minister, provincial organizations and all other parties involved in conducting activities that contribute towards the species recovery.

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Executive Summary

The *Species at Risk Act* requires the competent Minister to report on the implementation of the recovery strategy for a species at risk, and on the progress towards meeting its objectives within five years of the date when the recovery strategy was placed on the Species at Risk Public Registry. A great deal of effort, involving multiple approaches, has been expended over the timeframe from 2008 to 2015 within the Thames River to abate threats to historically occupied Gravel Chub habitat (e.g., siltation, nutrient loadings and toxic compounds). Protection and improvement of this watershed have been undertaken through the “Habitat Improvement and Stewardship” and “Habitat Protection and Management” recovery approaches identified in the recovery strategy for the Thames River Aquatic Ecosystem.

Habitat stewardship programs in the Thames River watershed have resulted in water quality improvements through the implementation of agricultural best management practices and projects such as milk-house wash-water system installation, tree planting, livestock fencing, and clean water diversion. Fish and benthos sampling has been undertaken to provide insight into the effectiveness of habitat improvement efforts, and water quality improvements have been noted in several portions of the watershed.

Public outreach activities (e.g., presentations to schools, community groups, special interest groups) conducted by Fisheries and Oceans Canada, the Upper Thames River and Lower Thames Valley conservation authorities have increased awareness regarding species at risk in the Thames River watershed. The yearly Thames River Clean Up (approximately 2000 yearly participants) has harnessed public interest and support to remove garbage from up to 200 km of river shoreline each year.

A number of initiatives have occurred over the last several years to reduce the impacts of baitfish harvesting on species at risk fishes, including the Gravel Chub. A baitfish primer has been developed that identifies the baitfish species of Ontario and changes to the Ontario Fishery Regulations in 2008 resulted in the exclusion of species at risk fishes from the list of fishes that can be legally used as live bait, including the Gravel Chub.

Intensive sampling of historical Gravel Chub sites was conducted downstream of Wardsville in 2014; however, permission was not obtained to sample the other historical stream reach near Muncey. The Gravel Chub was not detected in this survey, which appears to provide further evidence of its extirpation; although, targeted sampling is required within the remaining section of the Thames River (at Muncey) to determine with greater certainty that this species has been extirpated from Canada. The results of this sampling are necessary to confirm the status of the species and subsequently whether recovery is feasible. Recovery actions towards maintaining populations will only be possible after this information is gathered.

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1. Background

1.1. COSEWIC¹ Assessment Summary

Common Name: Gravel Chub

Scientific Name: *Erimystax x-punctatus*

COSEWIC Status: Extirpated

Reason for Designation: Last reported in Canada in 1958, Gravel Chub was possibly lost due to siltation of the rivers where it had occurred.

Canadian Occurrence: No longer found in Canada.

COSEWIC Status History: Last recorded in Thames River drainage, Ontario in 1958. Designated Endangered in April 1985 and uplisted to Extirpated in April 1987. Status re-examined and confirmed in May 2000. Last assessment based on an existing status report.

1.2. Threats

1.2.1. Threats to the Species

Table 1 displays an assessment of the threats to the Gravel Chub (*Erimystax x-punctatus*) as found in the previously published recovery strategy (Edwards et al. 2007).

¹ Committee on the Status of Endangered Wildlife in Canada

Table 1. Threat classification for Gravel Chub. Taken from Edwards et al. (2007).

1. Siltation from agricultural and urban activities		Threat information		
Threat category	Habitat loss or degradation	Extent	Widespread	
			Local	Range-wide
General threat	Agricultural/Industrial practices	Occurrence	Historic/Current	
		Frequency	Continuous	
Specific threat	Siltation	Causal certainty	Medium	
		Severity	High	
Stress	Reduced population size	Level of concern	High	
2. Water quality deterioration from agricultural and urban activities (fertilizers, sewage treatment etc.)		Threat information		
Threat category	Pollution	Extent	Widespread	
			Local	Range-wide
General threat	Agricultural/Urban run-off	Occurrence	Historic/Current	
		Frequency	Continuous	
Specific threat	Nutrient loading	Causal certainty	Low	
		Severity	Unknown	
Stress	Toxic effects (reduced productivity, increased mortality)	Level of concern	Medium	

1.2.2. Threats to Critical Habitat

Although critical habitat was not identified in the original recovery strategy (Edwards et al. 2007), threats to potential Gravel Chub habitat were catalogued and include the following:

- Modification or poor management of a watercourse or surrounding watershed that leads to a significant increase in turbidity or sedimentation (may be agricultural, urban, infrastructure or forestry related);
- The construction of new dams and impoundment of upstream habitats;
- Toxic materials spills;
- Excessive nutrient loading that results in a significant decrease in dissolved oxygen at substrate level; and,
- Dredging or other instream works (e.g., pipeline water crossing) that result in increased levels of turbidity and sedimentation and the disturbance of riffle habitats.

2. Recovery

2.1. Recovery Goals and Objectives

Long-term Recovery Objectives

The long-term goals of the previously published recovery strategy for the Gravel Chub (Edwards et al. 2007) are to encourage healthy, reproducing Gravel Chub populations in the Thames River through habitat improvements if the species is found to be present and, if appropriate, to re-introduce the species if it is confirmed to be extirpated.

Short-term Recovery Objectives (5 year)

- i. Confirm that Gravel Chub is no longer present in historical areas of occurrence in the Thames River. This is important as very little field work has been done in the area of the historic capture sites of Gravel Chub in the Thames River;
- ii. Determine the extent and quality of Gravel Chub habitat in areas of former occurrence;
- iii. Identify key habitat requirements in order to define critical habitat and implement strategies to protect and restore historically occupied habitats;
- iv. Identify threats, evaluate their impacts and implement remedial actions to reduce their effects;
- v. Examine the feasibility of relocations, captive rearing and re-introductions; and,
- vi. Identify responses to, and evaluate the success of, recovery measures.

2.2. Performance Measures

Performance measures, as presented in the recovery strategy, are dependent on confirming the presence of the Gravel Chub in the Thames River. As the species has not been encountered in the intervening eight years, the original performance measures are not applicable at this time.

3. Progress Towards Recovery

3.1. Research and Monitoring Activities

Surveys specifically targeting Gravel Chub in the lower Thames River (Research and Monitoring approach i-1 in the recovery strategy) were conducted over a three-day period June 24-26, 2014 using a Missouri trawl. The effort expended in the search constituted a total of 26 hauls and did not yield a single specimen (Table 2). However, access to historical Gravel Chub stream reaches was only permitted by the Moravian of the Thames First Nation (Delaware Nation), while permission was not granted to sample near Muncey (a reach of river bordered by the Chippewas of the Thames First Nation, Munsee-Delaware Nation, and Oneida Nation of the Thames). For this reason, it is difficult to confirm the population status of Gravel Chub in the Thames River, as only one of the two historical Gravel Chub locations has been sampled. The upstream location near Muncey is also likely to provide the most suitable habitat conditions (higher/good water clarity); therefore, the presence of Gravel Chub within reaches of river at this location and in the near vicinity must be ruled out to conclusively state that the species has been extirpated from the Thames River (J. Barnucz, Fisheries and Oceans Canada [DFO], pers. comm. 2015). In addition to this targeted survey, a substantial amount of sampling for other species using various gear types (e.g., Missouri trawls, seine nets) in areas close to, or

upstream and downstream of the original capture locations, have been conducted; however, Gravel Chub was not detected during these surveys (Table 2).

Future recovery efforts should focus on obtaining permission to access the historically occupied reach near Muncey from the three first nations adjacent to this reach, to truly determine the presence or absence of this species and map out the extent of suitable habitat. This will only be achieved through an agreement with all three First Nations to ensure their support as well as possible collaboration on any sampling efforts in these areas.

The degree of progress made regarding the implementation measures prescribed in the recovery strategy is displayed in Table 3. There are still several measures that have yet to be undertaken that pertain to Gravel Chub life history and the identification of critical habitat for all life stages. These measures are dependent on the discovery of an extant population within the Thames River.

Table 2. Sampling surveys conducted since the completion of the recovery strategy.

Projects Specifically Targeting Gravel Chub						
Year	Project	# of Sites	Sampling Gear	Effort	# of Gravel Chub Detected	CPUE
2014	Gravel Chub Critical Habitat Survey	26	Missouri Trawl (boat) - small 1/8" outer covering (2.5m)	26 trawls	0	0
Other Projects that Sampled Potential Gravel Chub Habitat						
2012	Sea Lamprey Control	16	Missouri Trawl (boat) - small 1/8" outer covering (2.5m)	48 trawls	0	0
2013	Northern Madtom Population Genetics Survey	48	Missouri Trawl (boat) - small 1/8" outer covering (2.5m)	48 trawls	0	0
2015	2015 Round Goby Distribution Survey	45	Missouri Trawl (boat) - small 1/8" outer covering (2.5m)	135 trawls (3 pass survey)	0	0

Table 3. Research and monitoring activities conducted/ongoing since the completion of the recovery strategy.

Activities	Recovery Objectives Addressed	Results	Agencies Involved	Funding Sources	References
(i-1) Monitoring- Gravel Chub Survey					
Conduct a targeted survey in areas of historical occurrence. This must include sampling with a trawl net, the gear that captured them in 1958.	i	<ul style="list-style-type: none"> A targeted fish survey was conducted within one of the two stream reaches where Gravel Chub was historically found using trawling gear. A total of 26 sites within an 18 km section of river were sampled with no Gravel Chub detected. 	DFO	DFO	Barnucz 2014
(i-2) Monitoring- Habitat Surveys and Mapping					
Investigate and identify the habitat characteristics of the Gravel Chub. Evaluate and map the distribution, quantity and quality of habitats in the area of historical occurrence.	ii	<ul style="list-style-type: none"> Habitat within and adjacent to historical locations was recently surveyed and habitat conditions were found to be similar to the preferred habitat of Gravel Chub as reported in the literature: <ul style="list-style-type: none"> Stream beds of clean sand and/or gravel 	DFO	DFO	Barnucz 2014

Table 3. Research and monitoring activities conducted/ongoing since the completion of the recovery strategy.

Activities	Recovery Objectives Addressed	Results	Agencies Involved	Funding Sources	References
		substrates; <ul style="list-style-type: none"> • Depths up to 1.5 m; • Moderately clear to clear water; • Deep riffles and runs with moderate to fast velocities. <ul style="list-style-type: none"> • The targeted habitat survey yielded 26 sites, which were used for the targeted trawling survey. 			

3.2. Management Activities

Gravel Chub may benefit from the recovery measures and activities prescribed for the Thames River in several recovery strategies and/or management plans for other at risk species. Since 2008, a total of three freshwater mussel recovery strategies and one management plan have been completed, leading to the implementation of a number of beneficial activities. Furthermore, two recovery strategies and two management plans have since been completed for fish species at risk, adding to the attention focused on the Thames River watershed. Many of these complementary implementation measures involve stewardship programs and best management practices to address issues including the degradation of the riparian zone, livestock access to stream reaches, municipal and agricultural runoff, as well as wastewater and drain maintenance activities. These habitat improvement/threat reduction efforts are currently occurring throughout the watershed including the lower Thames River, where Gravel Chub historically occurred, as well as the upper portion of the watershed where landuse practices contribute to many of the threats observed downstream.

3.3. Stewardship and Outreach Activities

Areas within the Thames River ecosystem with the highest percentages of soil loss contributing to siltation and turbidity levels are the Middle Thames River (21.2%), Mud (19.9%) and Reynolds (26.4%) sub-watersheds (TRRT 2005). These sub-watersheds are all upstream of former Gravel Chub collection sites. Although limited recovery efforts specifically directed toward Gravel Chub have occurred within the species' former range, activities to protect the Thames River ecosystem have been ongoing. Most significantly, the Recovery Strategy for the Thames River Aquatic Ecosystem (TRRT 2005) has been the guiding document in stewardship activities designed to improve conditions for a variety of aquatic species at risk. The Upper Thames River and Lower Thames Valley conservation authorities (UTRCA, LTVCA) are key contributors to this watershed-based recovery initiative and they continue their efforts to provide habitat protection for all aquatic life in the Thames River watershed.

Public outreach activities conducted by DFO, UTRCA, and the LTVCA have increased awareness regarding species at risk in the Thames River watershed. Outreach activities include species-specific community education and awareness through multimedia presentations to schools, community groups, special interest groups, and at public events. These activities are estimated to have reached over 5000 individuals. Additionally, the yearly Thames River Clean Up (approximately 2000 yearly participants) has harnessed public interest and support to remove garbage from up to 200 km of river shoreline each year. The annual reforestation rate within the boundaries of the LTVCA (where historical Gravel Chub sites are found) is approximately 50 000 – 80 000 trees per year and in 2012, nearly 70 000 trees were planted. Additionally, funding has been made available to landowners for septic tank inspections and upgrades, runoff and erosion control as well as additional Best Management Practices (LTVCA 2013).

A number of initiatives have occurred over the last several years to reduce the impacts of baitfish harvesting on species at risk fishes, including the Gravel Chub. A baitfish primer (Cudmore and Mandrak 2011) has been developed that identifies the baitfish species of Ontario. This primer has been made available to commercial bait harvesters, anglers and the general public via Ontario Ministry of Natural Resources and Forestry (OMNRF) offices, ServiceOntario offices, and the DFO website. The Gravel Chub, among other species at risk fishes, was identified as an illegal baitfish in this document. In addition, changes to the Ontario

Fishery Regulations in 2008 resulted in the exclusion of species at risk fishes from the list of fishes that can be legally used as live bait, including the Gravel Chub. Starting in 2007, the OMNRF has implemented a training program and licence requirements with several commercial bait harvesters with the goal of minimizing the risk of spreading invasive species and of selling non-target species.

3.4. Summary of Progress Towards Recovery

The Gravel Chub has not been encountered in the period since the establishment of the recovery strategy in 2007 (Edwards et al. 2007), which appears to provide further evidence of its extirpation. However, the status of this species in the Thames River cannot be determined with certainty at this time as intensive surveys, targeting Gravel Chub using appropriate gears and effort, have only occurred in one of the two historical Gravel Chub sites.

As discussed above, habitat stewardship programs in the Thames River watershed have been ongoing for many years. Water quality improvements have been achieved through agricultural best management practices and projects such as milk-house wash-water system installation, livestock fencing, and clean water diversion. Fish and benthos sampling has been undertaken to provide insight into the effectiveness of habitat improvement efforts, and water quality improvements have been noted in several portions of the watershed.

Although the Gravel Chub has not been detected, consultation with species experts and academics has led to the determination of several habitat preferences; however, there are still major knowledge gaps regarding the life-history characteristics and critical habitat features required by Gravel Chub at each life stage. Much of the Thames River upstream and downstream of historical Gravel Chub sites has been impacted by high levels of sediment and nutrient loading associated primarily with agricultural activities. Currently, the extent of suitable habitat for Gravel Chub remains unknown.

4. Concluding Statement

The recovery of the Gravel Chub in the Thames River, as stated in the original recovery strategy, is still believed to be feasible. However, this requires confirmation through intensive targeted sampling using a quantified approach with appropriate sampling effort and gear (i.e., trawl), and an assessment of habitat conditions, in the stream reach adjacent to Muncy. Recovery actions towards maintaining healthy Gravel Chub populations (should the species be detected) will only be possible after this information is gathered.

5. References

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