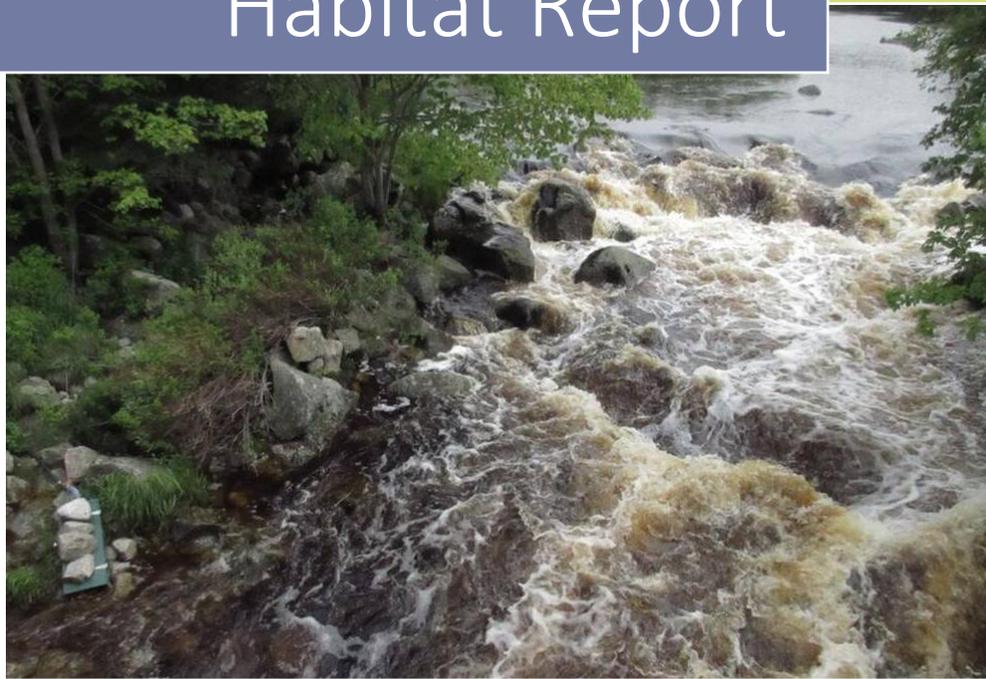


2015

East River, Chester Watershed  
Habitat Report



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# East River, Chester, Watershed

## American eel (*Anguilla rostrata*) Habitat Surveys 2015

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### Introduction

Bluenose Coastal Action Foundation, in partnership with Fisheries and Oceans Canada (DFO) and the Scotia-Fundy Elver Advisory Committee, has been studying annual elver recruitment on the East River, Chester since 2008. In addition to studying elver recruitment, a survey of adult silver eel seaward migration was initiated on the East River in 2014, and was continued in 2015. Monitoring elver recruitment requires estimating the number of elver at the mouth of the river, whereas monitoring silver eel escapement requires estimating the number of eel in various parts of the watershed. The latter has raised questions on the availability of, and access to, quality fish habitat within the upper reaches of the watershed. Therefore, as part of the 2015-16 American Eel project activities, Coastal Action initiated the development of a Fish Habitat Restoration Plan for the East River, Chester watershed. The focus of efforts during the 2015 field season was on fish passage, crossings, and culverts.

### Study Area

The East River drains into Mahone Bay, with its watershed located in the Municipality of the District of Chester. The watershed has two main tributaries; Canaan River located 4 km upstream from the mouth of East River, and Barry's Brook, which is another 0.5 km in the same direction, with a total drainage area of 134 km<sup>2</sup> (Figure 1). A previous study, from 1983 to 1994, undertook electrofishing surveys on the River and found the American eel to be the predominate species (Jessop, 2002).

Due to acidification, the pH classification of the watershed is in Category 2, where levels range between 4.7 to 5.0. The pH of East River is impacted by the area's natural geology and the regional geography's acidification. Underlying rock types, bogs, and poor water drainage all have an effect on the pH levels of the river water (Jessop, 2002). In an effort to reduce acidification, previous projects on the river consisted of adding limestone to the headwaters, which resulted in raising the pH levels from 5.3 to 6.7 (Jessop, 2002; Watt & White, 1992). Over the course of the project, Coastal Action field technicians used a YSI Sonde to sample the water chemistry and found the pH readings ranged from 4.25 to 6.96.

The land comprising most of the watershed area was formerly owned by Bowater Mersey, and as such, has many roads, bridges, and historical dams and sluiceways throughout. Many of the historical structures have been removed, but some remnants still remain.

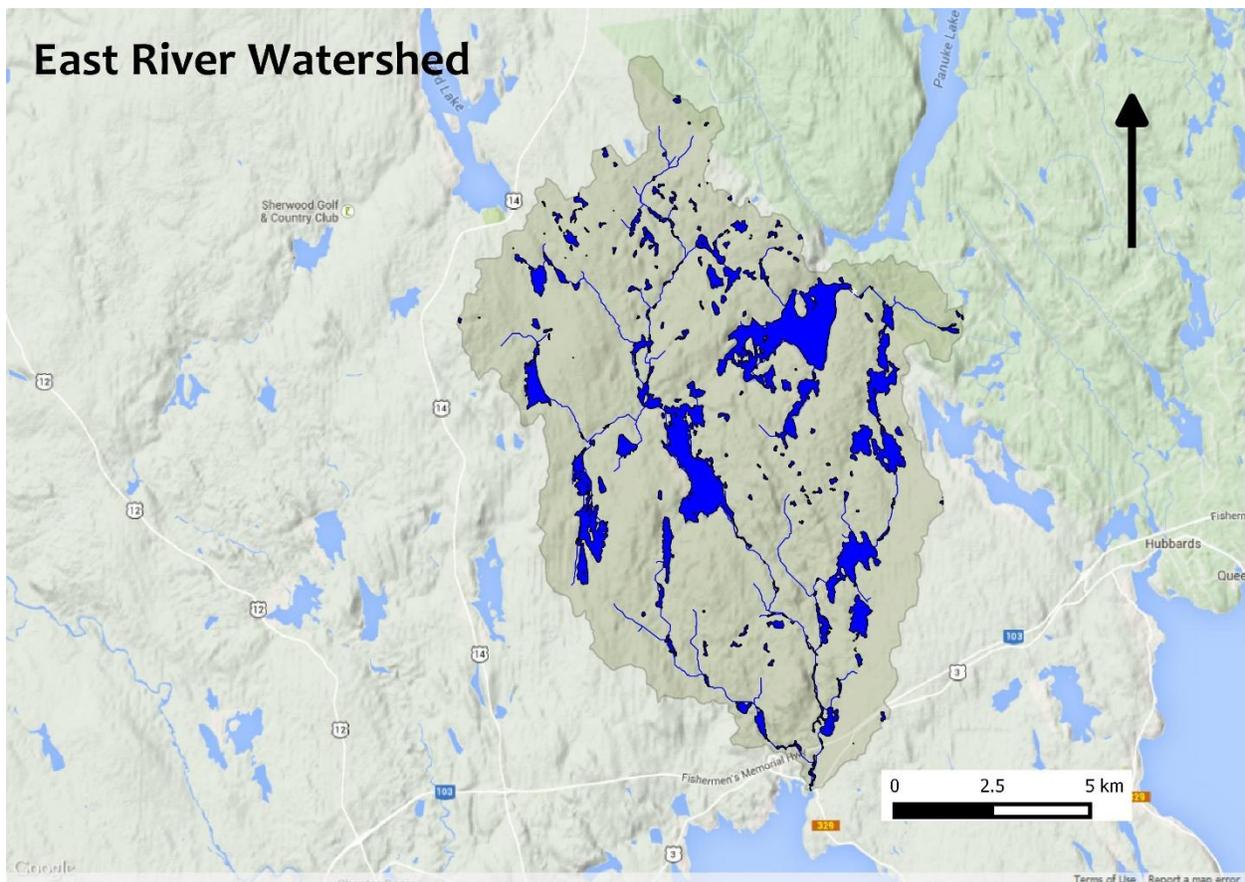


Figure 1: East River, Chester Watershed (GIS BCAF 2015)

## Background

As Nova Scotia is centrally located within the natural geographical range of the American eel, and the population is listed as ‘threatened’ (COSEWIC) and undergoing assessment for listing under the federal *Species at Risk Act (SARA)*, it is important to understand the population dynamics and habitat requirements in order to develop conservation strategies. As eels are migratory in both their juvenile and adult form, aquatic connectivity is highly important to the species. If barriers impede American eel upstream migration, a high concentration of eel downstream could potentially increase cannibalism, predation, increased disease, and increased competition for food (Pratt, et al 2014). American eel are widely known to occupy various different habitats with varying ranges of temperature, salinity, and pH. While eel are quite tolerant of the varying ranges, certain temperatures between 17°C to 20°C are preferred (for yellow eel) and lower temperatures below 5°C to 8°C may cause them to go into a state of torpor (Pratt, et al. 2014). Additionally, although eel are quite tolerant of low pH, it may indirectly affect densities and growth, as prey may be affected by low pH.

However, there are still unknowns and uncertainties regarding American eel and their preferred habitat. Identifying eel abundance and habitat characteristics in East River, Chester will generate new data on the species in this area. The mark-recapture portion of the project provides an indication of

the abundance and distribution throughout several areas of the watershed, including both the acidified Canaan Branch and the less acidified East Branch that was previously limed to sustain salmon.

### Surveys

In 2015, potential barriers preventing eel migration throughout the East River watershed were examined using GIS, through road-waterway crossings. Potential barriers were prioritized, based on closeness to main river area, as well as amount of habitat gained. Six road crossings were identified as high priority of needing fish passage assessments, but several additional sites were also examined (Figure 2).

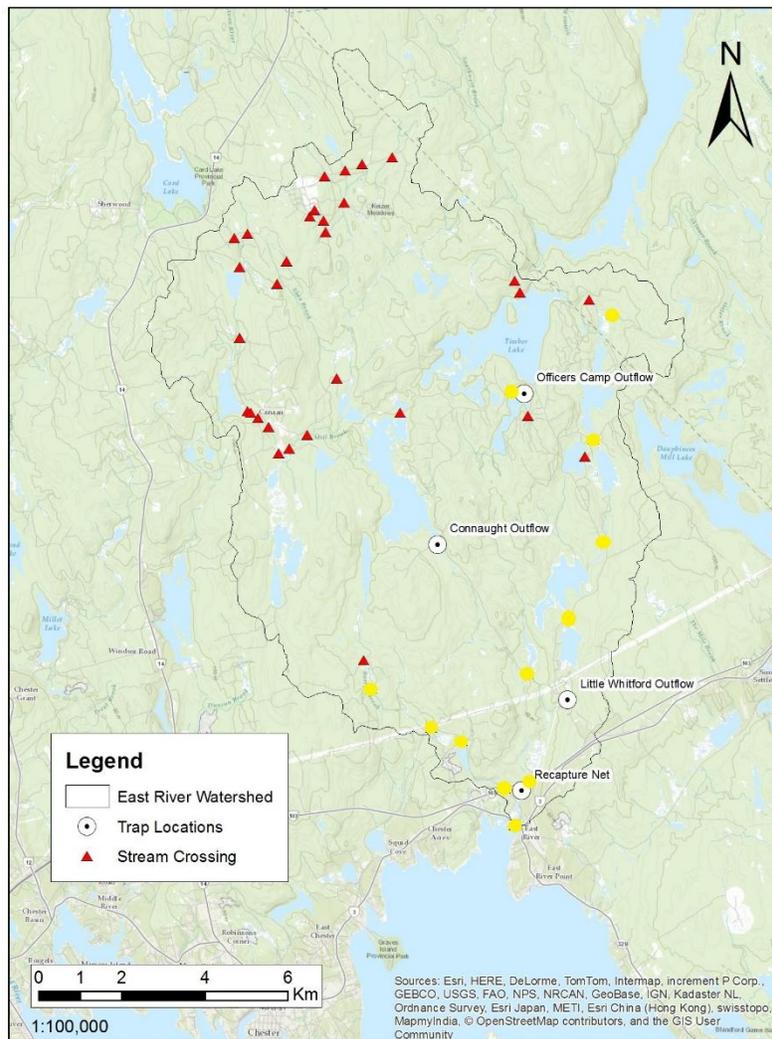


Figure 2: Map of all crossings within East River, Chester watershed (GIS BCAF 2015). Yellow indicates sites that were examined.

Upon examining each of the road crossings in 2015, it was determined that no further assessment would be necessary. As the land was formerly owned by Bowater Mersey, proper bridges were found to be in place, all with natural stream bottoms, ideal for fish passage, and no blockages to fish migration.

The largest road waterway crossing is below Highway 103 which provides access to the rest of the watershed and almost all of the lake habitat within the watershed. The crossing consists of several large concrete culverts, all of which already have fish passage measures in place. Baffles in the middle culvert provide access for fish passage, even during periods of low flow.

Because the land comprising most of the watershed was previously owned by Bowater Mersey, many dams and sluiceways had been in place historically, but have since been removed to allow fish passage. However, one exception remains at the outflow of Timber Lake, inhibiting fish passage upstream to the headwaters of the East River, into Timber and Officer Camp Lakes (Figures 3, 4, and 5).



*Figure 3: View of flow control structure at Timber Lake (2015). Both the right and left sides are equipped with stop logs; a small opening in the center directs waterflow through at a high velocity.*



Figure 4: View from upstream center of Timber Lake flow control structure (2015).



Figure 5: View from downstream looking upstream of Timber Lake flow control structure (2015). Note that the drop over the stop logs is about five feet. Many fish observed pooled on both sides below the stop logs.

Upon visiting this site on several occasions (monthly throughout July to October), fish were observed pooling in large numbers at the base of structure, swimming against the current in an attempt to swim upstream. Species observed included numerous small American eel, White Sucker, and Brook Trout.

Due to the extent of the size and type of structure, it was re-examined with NSLC Adopt-A-Stream Program staff, and deemed necessary to consult with a fish passage engineer to determine future directions. Additional funding would be required, as cost would likely be steep for not only a consultation, but also for construction of a fish passage structure, or alternatively removal of the structure. As well, due to a number of cottages surrounding Timber Lake, public consultation would be required as part of the process.

As part of the silver eel escapement mark-recapture part of the study, a marking site was set up at the headwaters of the watershed, at the outflow of Officer Camp Lake into Timber Lake. The trapnet essentially captured everything moving downstream; however, catches were very low for eel as well as other fish species. A total of only 16 eel were captured between September to November, along with a few Brook Trout, Golden shiners, and Banded killifish. The low number of eel captured at this site could be attributed to the barrier impeding upstream migration at the outflow of Timber Lake.

However, a fair number of eel were captured at the other two upstream trap sites. A rotary screw trap at the outflow of Connaught Lake caught 249 eel throughout September to November, including many suspected female eel (based on size, > 40cm). The outflow of Little Whitford Lake, which is much closer to the river's mouth, captured 99 eel, the majority of which were smaller males.

Additionally, several of the streams observed appear to be straightened, likely as result from the former land uses of Bowater Mersey. Although American eel are quite capable of passing through such streams, lack of quality habitat features such as meanders, sills, and pools in the streams may cause difficulties for other fish species to pass. There is a potential for future restoration work for the benefit of other fish species; however, this type of restoration work is likely indifferent to the eel.

## References

- COSEWIC. 2012. COSEWIC assessment and status report on the American Eel *Anguilla rostrata* in Canada, Committee on the Status of Endangered Wildlife in Canada. Ottawa, xii + 109 pp. [www.registrelep-sararegistry.gc.ca/default\\_e.cfm](http://www.registrelep-sararegistry.gc.ca/default_e.cfm).
- T.C. Pratt, et al. 2014. Recovery Potential Assessment for the American Eel (*Anguilla rostrata*) in eastern Canada: functional description of habitat. Canadian Science Advisory Secretariat (CSAS). Fisheries and Oceans Canada. [http://www.dfo-mpo.gc.ca/Csas-sccs/publications/resdocs-docrech/2013/2013\\_132-eng.pdf](http://www.dfo-mpo.gc.ca/Csas-sccs/publications/resdocs-docrech/2013/2013_132-eng.pdf)