

THE REEL DEEL: A STUDY OF AMERICAN EELS, MACROINVERTEBRATES, & WATER QUALITY IN THE BRONX RIVER

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Introduction

American eels (*Anguilla rostrata*) are a species of catadromous fish—they spawn in the Atlantic Ocean and migrate to freshwater streams, such as the Bronx River, where they spend the majority of their lives (10–30 years), and then return to the sea to reproduce and die.³ American eels are currently endangered due to overfishing, pollution, and predation, and additionally, dams placed in these habitats can block their migration patterns.² However, monitoring them can give scientists insight about how they are coping with these challenges, and how they can be better protected. Aquatic macroinvertebrates, such as crawfish, snails, or leeches, are cold-blooded invertebrates that are large enough to see without a microscope.⁸ They form the basis of the aquatic food web in freshwater ecosystems—both their bodies and the plant material that they break down are consumed by other organisms. Finally, macroinvertebrates are good indicators of environmental health because they can be identified with simple equipment, and certain species have low pollution tolerance. This means that finding one of these species demonstrates that the water quality is healthy.⁸

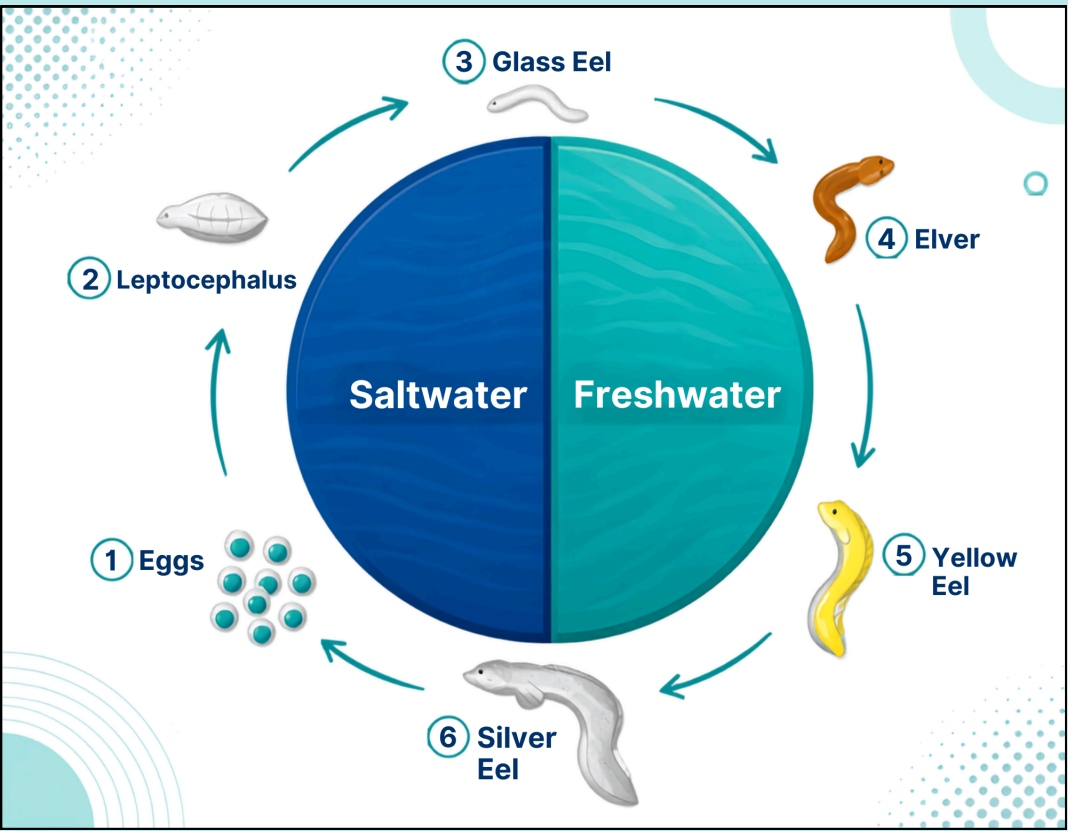


Image 1. The life cycle of the American Eel. Diagram by Basil Davila



Image 2. Observing an eel caught using the mop during field work. Photo Credit: Noor Kazmi

This study took place in the Bronx River, the only freshwater river in New York City. Eels migrate through this river, having to cross the dam on 182nd street at Fishway, and then Twin Dams in order to get upstream. These dams can block eels’ migrations and thus affect eel populations at different points along the river.¹³

Abstract

The American eel (*Anguilla rostrata*) is a catadromous species of fish that spawns in the Sargasso Sea and migrates to the freshwater rivers on the east coast of the United States.³ They are an endangered species impacted by climate change, overfishing, pollution, and dams, causing their populations to decline across their habitats.² In addition to American Eels, macroinvertebrates are also present in freshwater habitats like the Bronx River. This study monitored the presence of American eels and the diversity of macroinvertebrates downstream of dams at two different sites in the Bronx River: Twin Dams and Fishway. Water quality was also tested to compare the variation at both sites, and almost all values fell within the expected ranges for a freshwater river. Our results support the hypothesis that Fishway would have a higher abundance of American eels was supported as Fishway had more eels than Twin Dams.



Image 6. The 2026 Eel Research Team. Photo Credit: Noor Kazmi

Research Questions & Hypotheses

Research Question #1

How does water quality (pH, salinity, temperature, dissolved oxygen, Nitrogen and Phosphorus) vary between two dammed sites along the Bronx River (Twin Dams and Fishway)?

Research Question #2

How does the diversity (assemblage and composition) of aquatic macroinvertebrates differ between two eel monitoring sites located downstream of two dams along the Bronx River?

Hypothesis

Macroinvertebrate diversity will be higher at the Twin Dams site due to less disturbance, slower water flow, and more surrounding riparian habitat.

Research Question #3

How does the capture rate and mode growth stage of American eels using passive eel mops differ between two sites along the Bronx River?

Hypothesis

American eels caught using the passive eel mops method will be significantly higher in Fishway than Twin Dams due to Fishway’s eel mops being closer to the Atlantic Ocean and the beginning of the eels’ migration.

Discussion

The values for each water quality test did not vary significantly between the two sites, and almost all water quality parameters fell within an expected range for fresh water.

Our first hypothesis was not supported because the diversity of aquatic macroinvertebrates between the two sites was identical; scuds, clams, crayfish, leeches, worms, snails, and nymphs were found at both sites, beetles were only found at Twin Dams, and mites were only found at Fishway.

Our second hypothesis was supported, as 21 eels were found at Fishway and only four eels were found at Twin Dams. There were likely more eels at Fishway because its dam is the first one in the eels’ migration upstream. This means that the eels did not have to cross any barriers before arriving in the mops, which were located downstream of the dam at Fishway. However, to get to Twin Dams, the eels had to cross the dam at Fishway, a barrier that likely accounted for the fewer eels found further upstream.

This research adds to scientific knowledge about the effect of dams and barriers on eels, and helps support the idea that dams can harm eel migration patterns. In the future, this experiment could be expanded across more dams along the Bronx River to better understand the dams’ effects. Hopefully, this research inspires efforts to make more accessible structures so that eels and humans can coexist.



Image 7. Three elvers from the eel mops. Photo Credit: Michael Juarez



Image 8. A crawfish caught during macronetting. Photo Credit: Michael Juarez



Image 9. Analyzing macroinvertebrates using a dichotomous key. Photo Credit: Noor Kazmi

Methodology

This study was conducted at two sites along the Bronx River: the 182nd Street Dam and Fishway at River Park (Fishway), and Twin Dams. Fishway is south of the Bronx Zoo and the first dam the eels run into when migrating upstream from the Atlantic Ocean. Twin Dams is inside the Bronx Zoo near the bison exhibit and is approximately 1,159.65 meters further upstream than Fishway.

Eel Mops

Eel mops are artificial eel habitats that mimic vegetation and seaweed, used as a passive trap for capturing eels. There were three eel mops at each site, with each mop placed approximately 15 feet apart from each other, and 10–12 feet from the river bank. Each site was regularly checked one to two times per week from July through early August 2026 (5 weeks). Mops were rinsed into a bucket of water to remove any eels and macroinvertebrates. The number of eels and their life stage were recorded along with the taxonomic diversity of macroinvertebrates. Amphipoda (scuds) were excluded from being counted given their disproportionately high abundance. All invertebrates were released back at the point of capture, and eels were released upstream of the dam at Fishway to assist in their migration.

Macronetting

Macronetting is an active catching method that involves pulling a net under the water to scrape up macroinvertebrates in the dirt. Macronetting was performed three times per week, with six collections taken during each netting event. Macroinvertebrates were identified to an order or family level using a guide, dichotomous key, and magnifying lens. All macroinvertebrates, including scuds, were counted in macronetting. After each collection, the macronet was rinsed out and the specimens were released at the point of capture.

Water testing

Water quality was assessed by measuring pH, temperature, carbon dioxide, ammonia nitrogen, turbidity, and salinity. Water samples from a depth of 12–14 inches were collected in a container. The temperature was recorded on site, and the other factors were tested in the lab using LaMotte water testing kits.



Image 3. A photo of Twin Dams site. Photo Credit: Michael Juarez



Image 4. An eel mop.⁶



Image 5. A photo of Fishway. Photo Credit: Nalani Morris

Water Quality	Twin Dams	Fishway	Expected Typical Range
pH ²	7.5	7.5	7.5 – 8.5
Temperature (°F) ⁴	71.6	74.95	65–75
Carbon Dioxide (ppm) ³	5.2	4.6	<12
Salinity (ppt) ⁶	0.14	0.225	< 0.5
Ammonia–Nitrogen (mg/L) ³	0.1	0.1	0
Turbidity (JTU) ¹¹	20	16.67	0 – 10

Figure 1. This figure shows the average water quality level of each study site for six freshwater parameters and the expected typical range of each parameter in a healthy river.^{5, 9, 10, 11, 12}

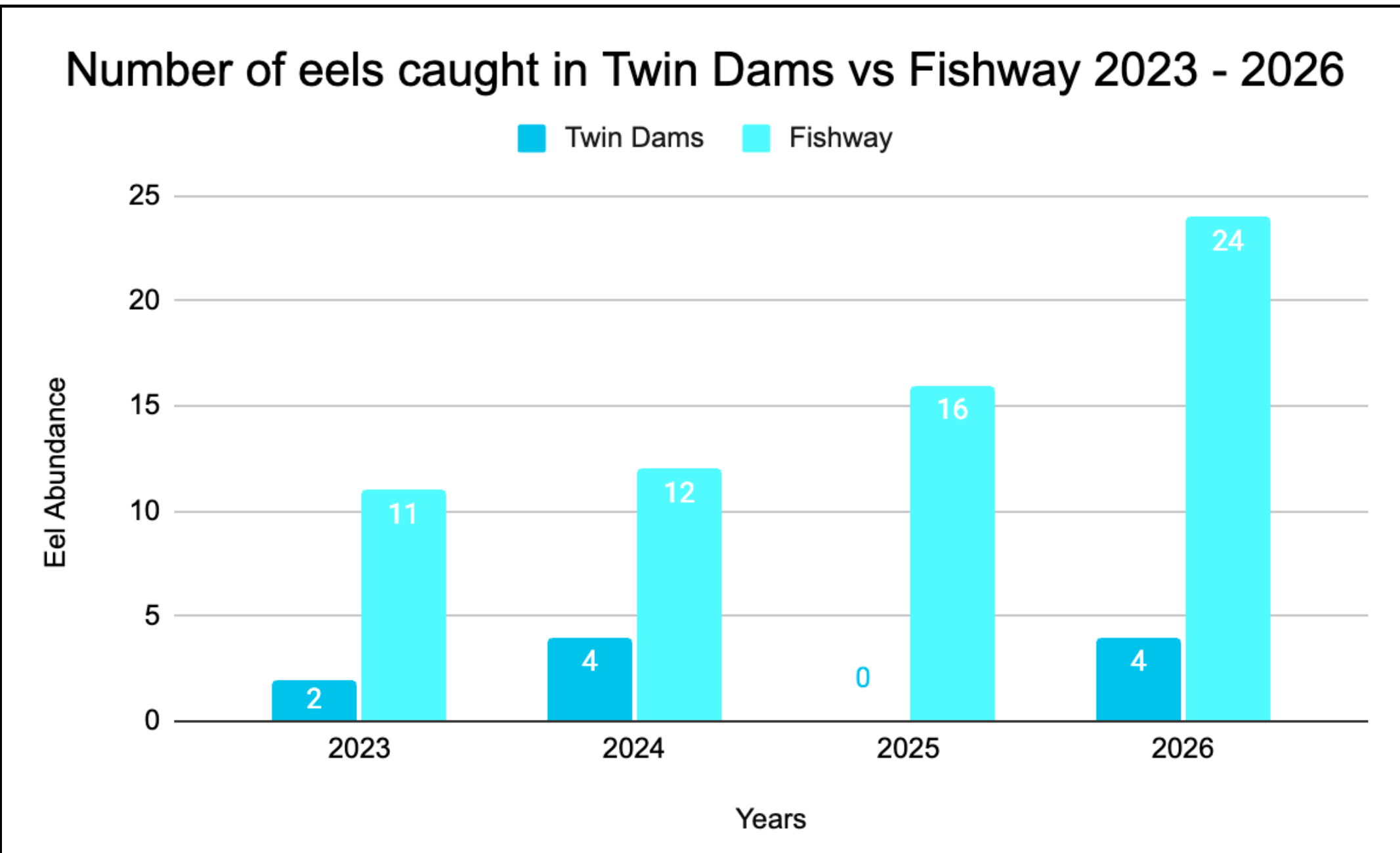


Figure 2. As of 2026, Fishway had 24 eels caught than all past years and Twin dams has had lower abundance of eels caught.

MACRO	SPECIES	TWIN DAMS	FISHWAY
SCUD		✓	✓
CLAMS		✓	✓
CRAYFISH		✓	✓
LEECHES		✓	✓
BEETLE		✓	✗
WORM		✓	✓
MITE		✗	✓
SNAIL		✓	✓
NYMPH		✓	✓

Figure 3. This shows all the macroinvertebrates that were caught and identified at both sites.

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