Fish Survey Report 2025

Purpose

For 37 years, Hudson River Park's River Project has utilized trapping techniques to measure marine biodiversity and population dynamics in Park waters. Data collected by the survey elucidates annual species diversity, abundance, and population changes throughout the Estuarine Sanctuary. This survey also provides fish and invertebrates to stock the River Project Wetlab aquarium. This space invites students and the public to connect to and learn about our unique ecosystem by hosting visiting researchers, education programs, and public open hours. By tracking fish diversity over time, broad changes within Lower Hudson fish assemblages and specific species can be observed, helping to broaden regional understanding of our aquatic neighbors.

Key Questions

- How has fish abundance and diversity changed over time, year to year, and site to site?
- What species call Hudson River Park's estuarine sanctuary home?

Methods

• Traps were emptied 3-5 times a week during the most active parts of the year (May to October) and at least once a week in the off-season.
• Three trapping locations were utilized throughout the season: Pier 26, Pier 40 East, and Pier 40 West (**Fig.1**). Sampling concluded at P40 East in June.
• Surveillance consisted of checking up to 10 traps (four minnow traps, four crab pots, one box and one pinfish) at each site (**Fig. 2**). Box traps were added in September.
• All fish caught were identified, measured (cm), and were either held temporarily for education in the River Project Wetlab or released immediately.
• Data were analyzed using Microsoft Excel.

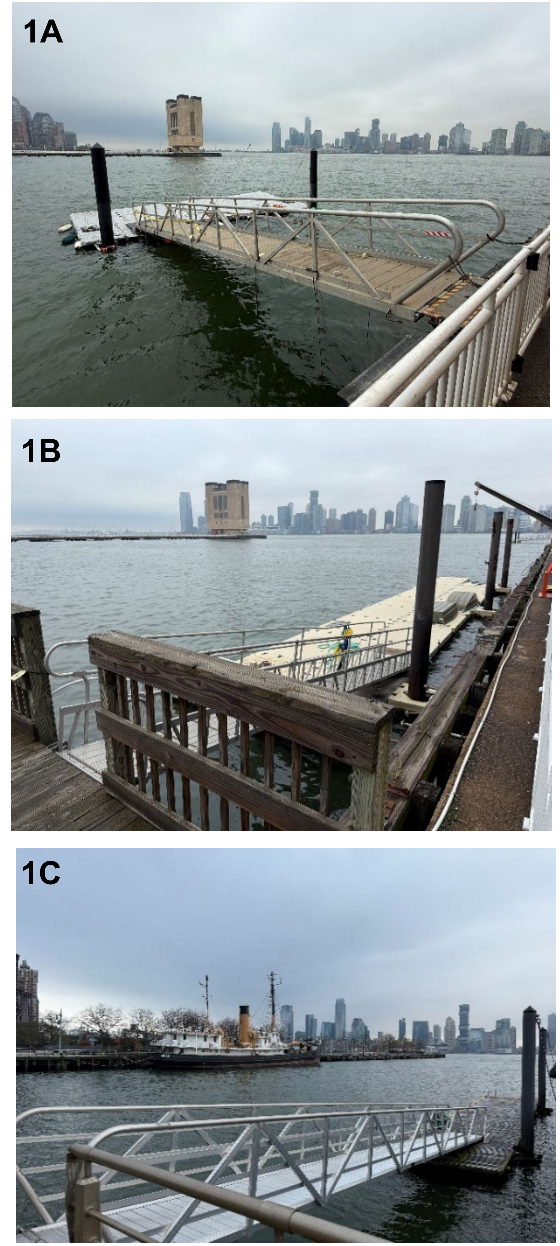

Fig. 1 | Fish survey trap sites, 2025, **A**) Pier 40 West, **B**) Pier 40 East and **C**) Pier 26 floating docks.

Methods: Survey Traps

The fish ecology survey utilized four types of traps this season: crab, minnow, box, and pinfish. Pier 26 and Pier 40 hosted four minnow pots, four crab traps, and one pinfish trap throughout the season. One box trap was added to the Pier 26 and Pier 40 West sites in September, following their success in 2024 trial deployments.

Crab traps are sturdy, quadrilateral cages made up of metal mesh with openings of about 1.5-2”. They have 4” wide entry points for fish to enter the trap and are approximately 2’x2’x1’ in dimensions.

Minnow (**Fig. 2B**) traps are significantly smaller than crab traps with a much finer mesh grade, shaped like two baskets joined by a hinge. Each side has a round opening that is just under 1” across, with a total length of about 1.4’.

Box traps were the largest traps utilized this year, consisting of a rectangular, welded steel frame 3’x1.7’x1.1’ in dimensions with fine fabric mesh tied into a cod end that can be opened to empty the contents of the trap. There is one horizontal opening for fish, 1.5’ long and 1” wide.

Pinfish (**Fig. 2A**) traps are a medium-sized rectangular steel mesh trap 1.5’x1’x.6’ in dimensions with a sliding access door. Similar to box traps, there is one vertical rectangular opening for fish, 2” long and 4” wide.

Having differently sized traps allows broader surveillance of species, allowing observation of fish of different sizes, life stages, and habits. Minnow traps tend to catch smaller fish and exclude larger fish, while crab traps catch large organisms and release smaller ones. Box traps can catch large but flatter fish like summer and winter flounder, as well as smaller species less commonly observed in the survey. Pinfish traps are ideal for juvenile fish, flat fish and baitfish. Pinfish traps also collected unique invertebrate species like spider crabs.

Fig 2. | Hudson River Park staff checking **A**) a pinfish trap at Pier 40 **B**) a minnow trap at Pier 26.

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Major Findings

In 2025, a total of 21 species were collected, of which 13 were observed at both Pier 26 and Pier 40. Singular instances of Atlantic silverside and an American silver perch were only observed at Pier 26, while smallmouth flounder, spotted hake, butterfish, northern sea robin, and northern puffer were only observed at Pier 40. All other, more abundant species were observed at both trap sites.

As is typical, tautog, oyster toadfish, and black sea bass were among the most common species, making up 64.7% of the total catch (**Table 1**), up from 2024 where they comprised 57.3% of the total catch. While their relative abundance was higher than in 2024, they represent a significantly smaller portion of total catch compared to previous years (81.1% in 2023, 91% in 2022, and 84% in 2021). Oyster toadfish numbers were especially high this year with 233 individuals being caught, almost three times higher than 2024. Out of those 233 individuals, 63.4% were less than 5cm in length showing a significant portion were juveniles, including many young of the year.

An ongoing trend since 2021 has been a significant increase in skilletfish abundance. This year marked their highest abundance and total catch since their regional resurgence in 2011. Their prevalence has been consistently increasing over the past few years (0.7% in 2022, 5% in 2023, 8.4% in 2024, 13.6% in 2025). Prior to 2011, they had been absent from the Hudson River for nearly a century due to habitat degradation. As work is done to restore oyster populations and improve water quality in the harbor, it's expected that skilletfish populations will grow alongside them.

Table 1 | Total 2025 catch by species and study site, up to Dec. 17th

Species	Pier 26	Pier 40W	Pier 40E	Total 2025	% Total Catch
Oyster toadfish	68	164	1	233	45.2%
Skilletfish	18	44	8	70	13.6%
Black sea bass	15	44	1	60	11.6%
Blackfish	30	9	2	41	7.9%
Goby, spp.	9	12	0	21	4.1%
Northern pipefish	7	11	1	19	3.7%
Flounder, summer	2	12	0	14	2.7%
Feather blenny	4	9	1	14	2.7%
Lined seahorse	2	7	1	10	2.0%
American eel	4	3	1	8	1.6%
Perch, white	2	3	1	6	1.2%
Striped bass	2	4	0	6	1.2%
Spot	2	2	0	4	0.8%
Butterfish	0	3	0	3	0.6%
Hake, spotted	0	2	0	2	0.4%
Atlantic silverside	1	0	0	1	0.2%
Flounder, smallmouth	0	1	0	1	0.2%
Perch, american silver	1	0	0	1	0.2%
Sea robin, northern	0	1	0	1	0.2%
Northern puffer	0	1	0	1	0.2%
Total	167	332	17	516	

Notable Species

Over the 37 years of its operation, our fish ecology survey has collected 55 of the 88+ known species of fish present in the waters of NYC. Outside of resident species that are observed each year, the traps occasionally collect uncommon species or new ones altogether. In 2025, this trend continued with a number of uncommon species present in the survey catch.

The newest and 56th species collected by the fish ecology survey was the smallmouth flounder, which belongs to a different family than the more regularly caught summer flounder (*Paralichthys dentatus*). While this species has been collected during the Tribeca Mobile Monitoring Program, it's the first confirmed sighting of this species within the fish survey traps. This specimen (**Fig. 3A**) was caught in the newly deployed box traps at the Pier 40 trap site, and measured 5.5cm, which is slightly below half of their maximum recorded size of 13cm.

Another notable catch of this year was a northern pufferfish. This species was last caught in July of 2012 and has only had three sightings in the survey since 2005. The northern puffer is native to the eastern seaboard of North America, spanning from Newfoundland down to Florida. It primarily resides in bays and estuaries, emphasizing the importance of protecting this vital habitat. This juvenile (**Fig. 3B**) measured in at 5.5cm and 18g. Pufferfish can grow up to 36cm in their short, 4-year life span.

A pair of rare spotted hake were found in Pier 40 traps this year, with one getting caught in a minnow trap and another in a pinfish trap. It belongs to a genus of cold-water fish in the cod family (Gadidae). They are typically found in cooler waters in the North Atlantic, meaning that warming waterways could lead to less local sightings of this fish. This fish was last collected in survey traps in 2021, but their frequency in traps has been in decline since the early 2000's, along with other similar species such as tomcod.

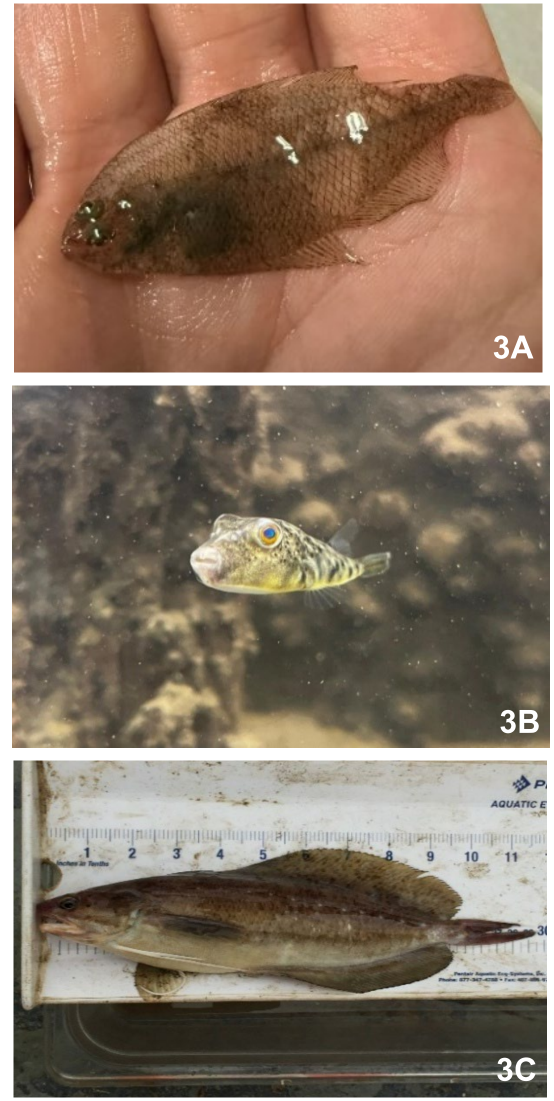


Fig. 3 | **A**) Smallmouth flounder (*Etropus microstomus*), **B**) Northern puffer (*Sphoeroides maculatus*), **C**) Spotted hake (*Urophycis regia*).

For invertebrates, this year consisted of a few noteworthy catches. For the first time in the history of the Fish Ecology Survey, Atlantic horseshoe crabs were observed, caught on top or inside the entryways of our traps. A total of five individuals (**Fig. 4A**) were collected in early summer. Horseshoe crabs rely on coastal beaches to spawn, which may explain their lack of prevalence in Manhattan. It's unclear as to why so many appeared on traps this year, and further data would be needed to speak to the status of horseshoe crab populations more broadly.

Some introduced and potentially harmful crab species were caught this year, including a plethora of Pacific shore crabs (*Hemigrapsus sanguineus*), which were caught at Pier 26 and Pier 40 throughout the entire year. Though their presence is not irregular, the abundance was. More uncommonly, an individual mitten crab (*Eriocheir sinensis*) was found at Pier 40, and two green crabs (*Carcinus maenas*) at Pier 26 and Pier 40.

This year saw an increase in abundance of the native common spider crab. While they are usually found in bays, estuaries and shorelines along the East Coast, they weren't commonly caught in survey traps at such volumes until recently. A total of 113 individuals (**Fig. 4B**) were caught between late July and December, with their abundance peaking in mid-October. Their average carapace width was 1.5cm., indicating most specimens were young-of-year juveniles. More data is required to understand why they were so populous this year, but as with many other estuarine/marine species, high salinities may have played a role.

Blue crabs (**Fig. 9**) were likewise numerous this year, with 119 individuals caught between all three sampling locations. This was significantly higher than the amount caught in previous years (43 in 2024, 39 in 2023). Their average carapace length was 8.5cm, highlighting a range of juvenile and adult blue crabs, but large, spawning adults were also observed.

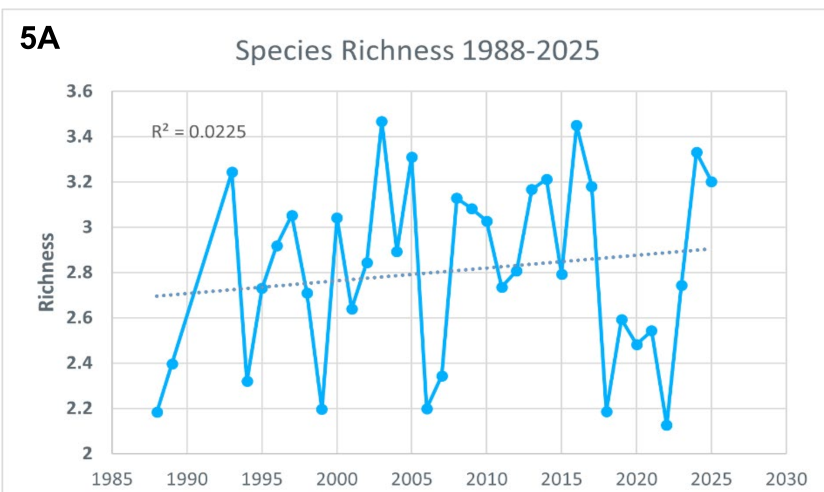
Fig. 4 | **A**) Horseshoe crab (*Limulus polyphemus*) **B**) Spider crab (*Libinia emarginata*), both on a measuring board.

Thirty Years of Data

Between 1988 and 2025, species richness is observed to be highly variable with large inter-annual fluctuation, and although the trend shows a slight (R^2=0.02) increase, this is not statistically significant overall (**Fig. 5A**). Likewise, species evenness shows a slight (R^2=0.15), not statistically significant decrease (**Fig. 5B**). This indicates that while the overall number of species collected as a part of this ongoing survey has not changed significantly, species composition is shifting. Fish that once used to be more prevalent, such as cunner and tomcod, have become far less abundant while others – oyster toadfish, tautog, skilletfish, and black sea bass – now make up a greater total proportion of the catch.

It is unknown what is driving this decrease in evenness of the fish population in the Park's sanctuary waters. There are several potential factors, one of which is increasing water temperatures which force smaller and cold-water fishes towards alternate habitats. Another possibility is that fishes that are less niche dependent are filling the gaps left by diminishing species or otherwise contributing to their decline via predation or competition.

The sudden spike in species richness between 2022 and 2025 was like affected by the addition of new trap types, as well as the expansion of the survey to two dedicated sites in 2024, though total number of species observed this year is nearly the highest ever seen (n=21).



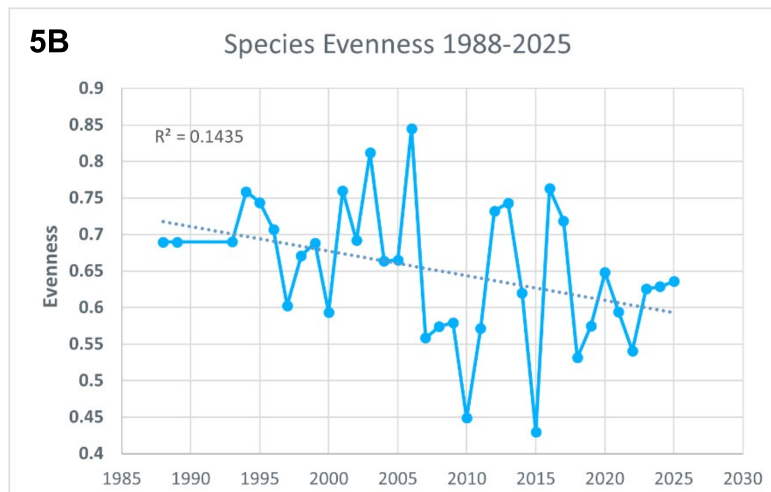


Fig. 5 | Species richness (Margalef Index) (**A**) and evenness (**B**) from 1988 to 2024. *Data up to Dec. 17th

Catch Per Unit Effort

Over the years, the trap survey has changed locations several times (2006, 2011, and 2020) and between sites (Piers 25/26 & Pier 40), with varying numbers of traps, especially prior to 2006. To compare fish data between these differing methods, Catch Per Unit Effort (CPUE) was calculated using the following formula:

$$CPUE = \frac{\#\ of\ Fish}{\#\ of\ Functional\ Traps * \#\ of\ Days\ Since\ Last\ Trap\ Checking}$$

The fish ecology survey primarily makes use of two types of traps: minnow and crab traps. This year, pinfish traps were added for the first time in the survey's history. Likewise, box traps were once again added after their success in 2024. More fish per unit effort were caught at Pier 40 compared to Pier 26; a common trend each year, with Pier 40 West providing the majority of fishes observed (**Fig. 6**).

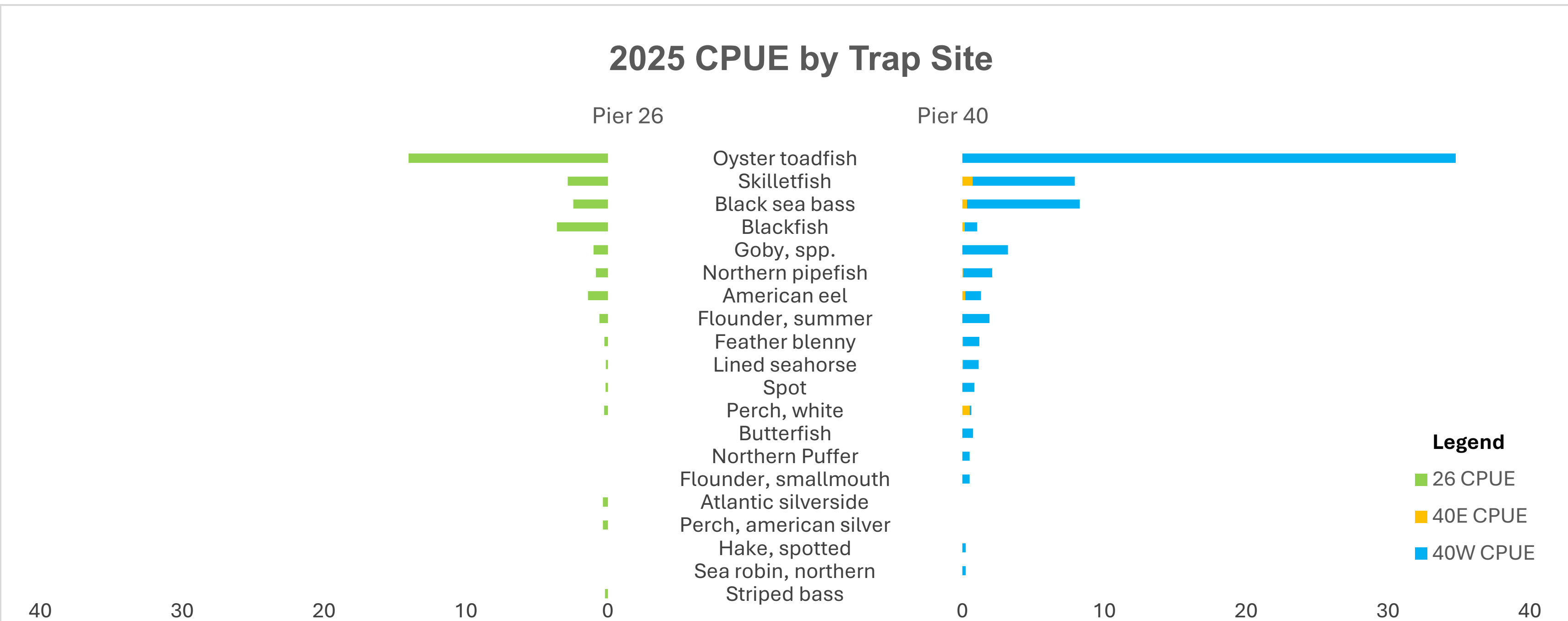


Fig. 6 | Comparison of catch abundance between Pier 26 and Pier 40 locations in 2025. *Data up to Dec. 17th.

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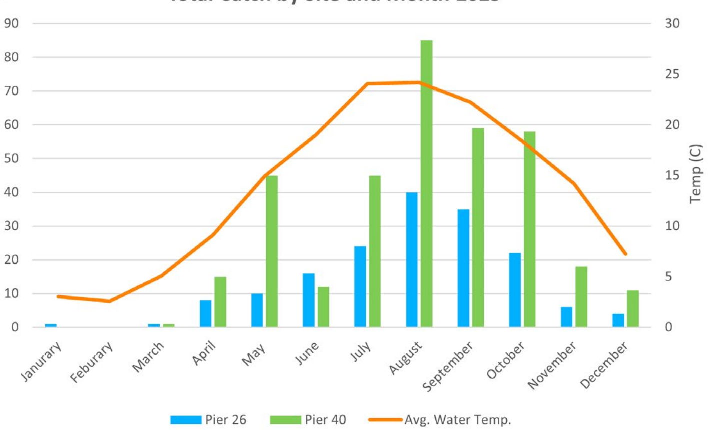
Abundance & Diversity

In 2025, monthly catch and species richness varied slightly compared to previous years. The highest monthly catch was observed in August with a total of 124 fish caught (**Fig. 7A**). This lines up with the peak catch time in 2024, but with an increase of 38 individuals. Monthly species richness peaked in July with a total of 12 species observed across both sampling locations (**Fig. 7B**).

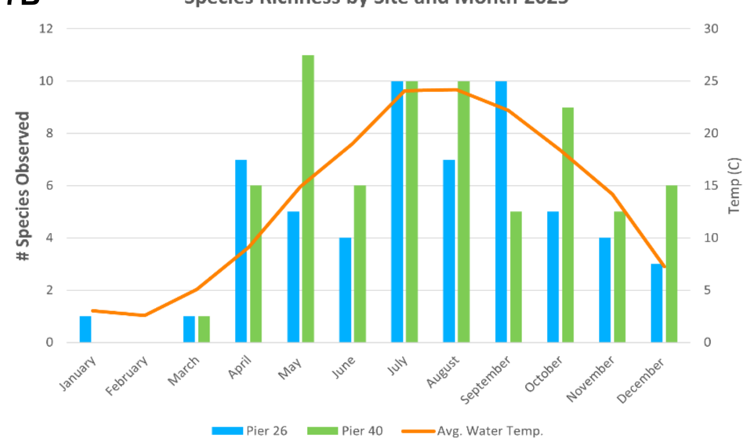
Total yearly catch was significantly higher at Pier 40 than Pier 26 with the Pier 40 site observing over double the number of individuals caught at Pier 26. This is likely not due to any temporary variance in the number of traps with the inclusion of due to Pier 40 East, as during the months of peak productivity (June to October), Pier 40 still recorded double the number of catches compared to Pier 26 despite an equal number of traps.

Both total catch and species observed exhibited a significantly strong positive correlation with water temperature (catch R^2=0.73; p<0.01, richness R^2=0.76; p<0.02). The warmest months are observed to be when the majority of teleost fish are most active and encompass most species' migration periods. Fish catch was highest in the estuary from July-October, with May also seeing a higher catch rate and overall richness than usual. An earlier abundance of species compared to previous years may be a result of the new pinfish traps or annual variation in temperature and salinity, the latter which was significantly higher in spring/early summer (~5ppt, p<0.001). Outside of this time, fish catch decreased significantly alongside dropping temperatures. Historically, July and August are often when non-resident or unexpected species make their way into the lower Hudson, including marine species such as pufferfish and tropical strays like butterflyfish.

7A



7B



Figs. 7 | **A**) Total catch, **B**) species richness and average water temperature at Pier 26 and Pier 40 sites in 2025. *Data up to Dec 17th.

Habitat Enhancement Monitoring

Separate from the fish ecology survey, the Tribeca Habitat Enhancement Project is an ongoing effort to restore native oyster populations and enhance marine habitats within the Park and the Hudson River. Since 2020, over 250 habitat enhancement structures (reef balls, gabions, textured piles, oyster wraps and biohuts) have been installed between Pier 26 and Pier 34. Twice annually, a subset of reef balls and gabions are pulled up from the river to check for oyster growth, structural health, and presence of other living organisms using these structures for shelter.

These data offer a unique snapshot into marine life, some of which that aren't commonly seen in the Park's trap survey. In 2025, a total of 87 fish of 10 species were caught (**Table 2**). Two species that were absent in Park traps this year were found: cunner and conger eel. A high abundance of gobies were found (44%) within structures while their abundance in survey traps was only 4.1%. Inversely, oyster toadfish only made up 18.7% of abundance in these structures despite being the most common fish caught in benthic traps at 45.2%.

Fig. 8 | Juvenile American conger eel (*Conger oceanicus*).

Table 2 | Difference in relative fish abundance between habitat enhancement structures and fish ecology survey traps. "Goby spp." is inclusive of both naked (*G. bosc*) and seaboard (*G. ginsburgi*) gobies, for a total of 10 species.

Species	Enhancement Relative Abundance (n=134)	Fish Trap Relative Abundance (n=516)
Goby, spp.	44.0%	4.1%
Oyster toadfish	18.7%	45.2%
Feather Blenny	12.7%	2.7%
Skilletfish	10.4%	13.6%
Black sea bass	6.0%	11.6%
Cunner	3.7%	0.0%
Conger Eel	3.7%	0.0%
Blackfish (Tautog)	0.7%	7.6%
American Eel	0.0%	1.6%

A highlight from this survey was the presence of five American conger eels (*Conger oceanicus*) (**Fig. 8**), a species which hasn't been observed via traps sampling since 2005. During the June habitat enhancement survey, three individuals (7.5cm, 7.5cm, 8cm) were caught, and in September, anther two (25.5cm & 26cm). These five individuals were juveniles as this species can grow to over 2 meters long. Congers are commonly seen in the Park's habitat enhancement structures, highlighting the importance of hard substrate for maturing marine life.

Take Aways

In 2025, a total of 21 species were observed across three study sites in Hudson River Park. This is near the highest number of species observed (max annual R= 22), and well above the average number of species observed (R = 17.3). There is a large degree of inter-annual variation, especially in the catch of less abundant species, while prolific fish like black sea bass, oyster toadfish, and tautogs are observed in high numbers each season. Among these more abundant species, oyster toadfish made up a higher proportion of the total catch in 2025 compared to 2024, while tautog and black sea bass catch were both lower than the previous year. This annual variation in catch is not uncommon, with natural variations in water quality, food sources, and available habitat often causing short (~3 year) cycles, commonly observed in typical population dynamics. Many less abundant species, including skilletfish, summer flounder, and feather blennies made up a larger proportion of this year's catch compared to last year. With the addition of pinfish traps and box traps, we observed a novel species in the survey (smallmouth flounder) as well as particularly rare species in the survey (spotted hake, northern puffer). Smallmouth flounders have likely been caught before but may have been misidentified as their relative the summer flounder, another left-eyed flatfish.

Fig. 9 | Blue crab (*Callinectes sapidus*) on a measuring board — one of the most common species caught in the survey outside of fish.

Fig. 10 | Juvenile black sea bass (*Centropristis straita*) in hand.

Future Directions

The Park's River Project will continue to collect fish abundance and diversity data as the fish ecology survey continues. This marks the second full year of multi-site data collection that will allow Park staff to better understand differences in available micro-habitat throughout Hudson River Park. As both sites continue to be monitored, we are excited to explore long term catch patterns. In addition to salinity and temperature data, staff are now collecting dissolved oxygen, pH, and turbidity data during each trap checking session using a handheld sonde. Paired with annual catch data, trends in how local biodiversity is impacted by changing environmental conditions can be explored. This will help elucidate differences in observed catch and richness between sites and years. Following the success of the pinfish traps and the continued use of box traps from 2024, the Park will continue utilizing different trap types to catch and monitor under-represented species. Continued analysis of ongoing mobile species monitoring from the Tribeca Habitat Enhancement project will further shine light on species not typically encountered in the survey traps.

Fig. 11 | Tautog (*Tautoga onitis*) in hand. Their dark coloration acts as an important camouflage on the riverbed.

Fig. 12 | American eel (*Anguilla rostrata*) on a measuring board, this female measured nearly 60cm.

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