HUDSON RIVER PK

Fish Survey Report 2021

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Purpose

As part of a 33-year research effort, Hudson River Park conducts an annual fish survey to monitor local fish population dynamics and connect our community to the River. This fish survey informs our understanding of fish diversity and abundance in the Park. By tracking fish diversity over time, we can see broad changes within population dynamics and within specific species — for example, the average size of fish — and infer how seasonal changes and major events, like storms, affect local fishes.

COVID-19

Due to the COVID-19 pandemic, the Park's fish survey was both shortened and downsized in 2020, running from July-December with 8 traps (down from 24) and without any public fishing programs. The survey therefore consisted solely of trap-based collection and additionally moved to Pier 40 from Pier 25. In 2021, the fish survey ran the full year but still remained at 8 traps, streaming the surveillance process bimonthly. This was done in order to maintain public engagement while adhering to state safety protocols.

Key Questions

- How do fish populations vary between years and species?
- How does Pier 40 compare to Pier 25 in terms of species and abundance?

Fig. 1 | Pier 40 gangway and floating dock, where survey traps were monitored in 2021

Fig. 2 | Silver perch (*Bairdella chrysoura*), not caught since 2003

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Methods

- Traps were emptied 3-5 times a week during the most active parts of the year (May to October) and 1-3 times a week during the remainder, with lower frequency during winter.
- Surveillance consisted of checking 8 traps (four minnow traps and four crab pots) and streaming the process biweekly on the Park's Instagram (IGTV) live.
- All fish caught were identified and had their total length (cm) measured, then were either held temporarily at Hudson River Park's River Project Wetlab or released.
- Data analysis was performed using Microsoft Excel.
- Catch per unit effort (CPUE) is defined as the number of fish caught divided by the product of the number of functional traps and days since traps were last

Major Findings

There were 17 species caught in 2019, 14 in 2020, and 15 species in 2021. Four of these in 2021 were species that were not caught in 2020 —The American eel, cunner, silver perch, and spotted hake — with two having not been seen for many years: cunner not since 2015, and silver perch (Fig. 2) not since 2003 at pier 26! Similar abundance in the most prevalent species (black sea bass, oyster toadfish, and blackfish) were observed, as well as a steady incline in the number of Syngnathids (seahorses, pipefish, & kin) since 2019 (Fig. 4). Despite fluctuations, there has been no significant change in the number of species caught since 1988, however many species that were abundant in the past appear in low numbers at present, and vice versa.

Fig. 3 | Spotted hake (*Urophycis regia*) being measured by Park staff

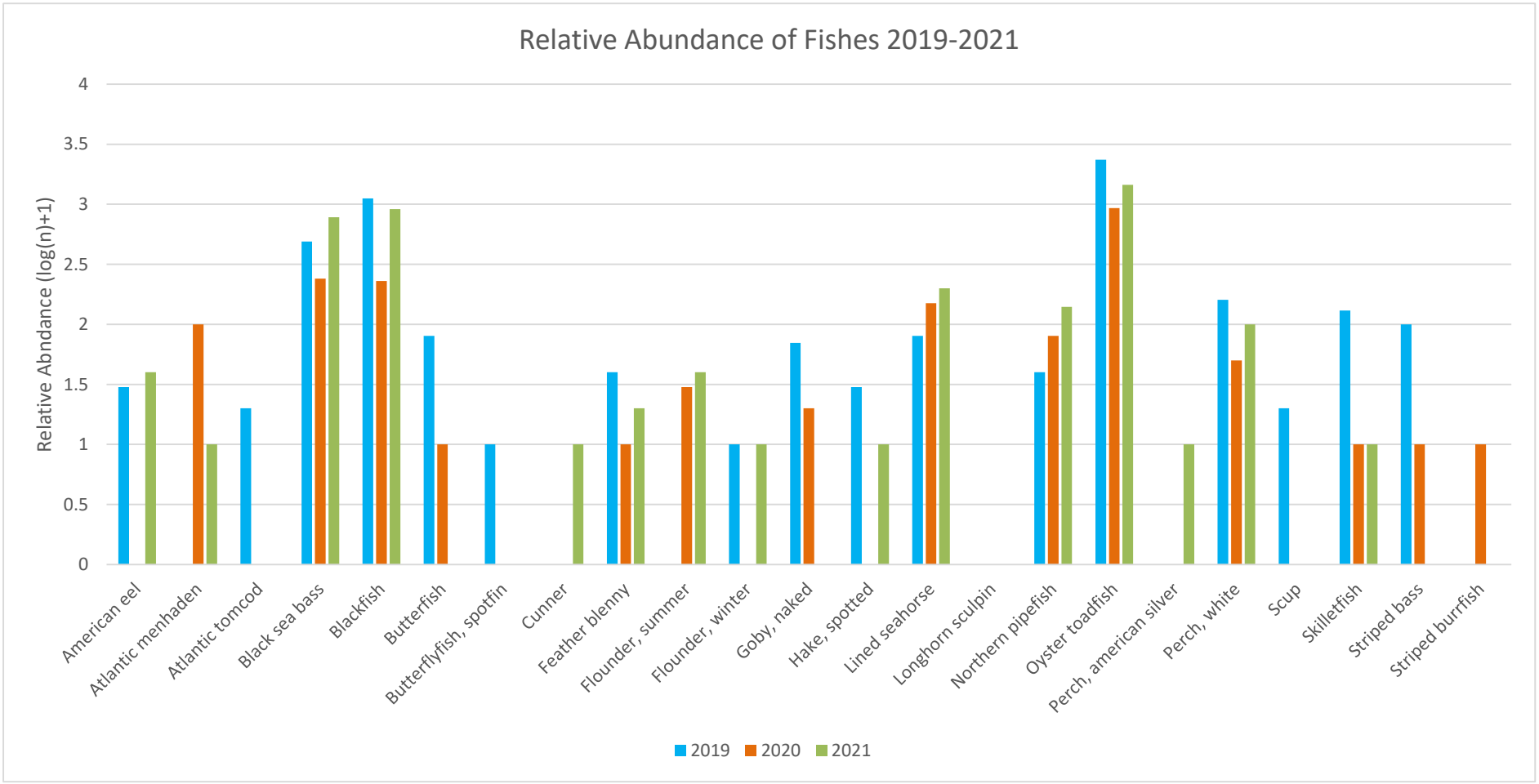
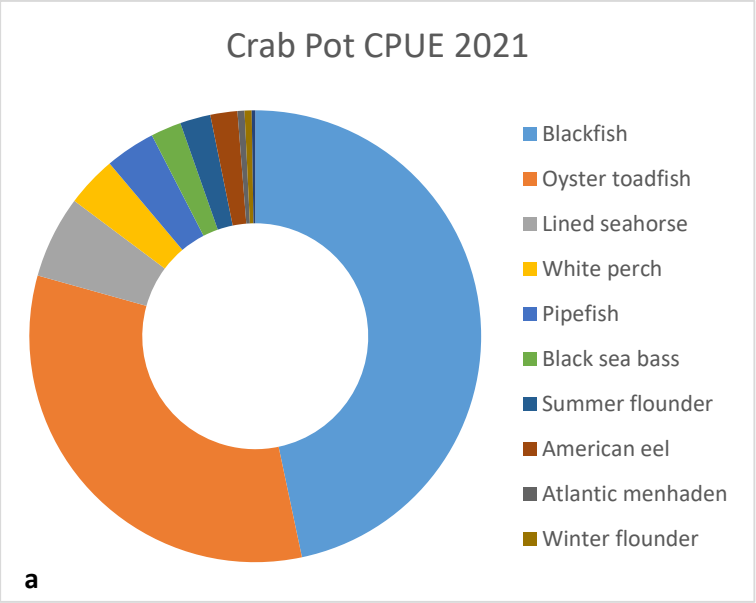


Fig. 4 | Relative abundance of fish caught via trapping 2019-2021. Abundance data were subjected to logarithmic transformation in order to aid in visualization. Unique species observed each year were tomcod, butterflyfish, and scup in 2019, burrfish in 2020, and silver perch in 2021.

The fish ecology survey makes use of two types of traps: minnow pots and crab pots. Because of the difference in the size of their entrances and grating, these traps catch fish at different size classes: minnow pots catch smaller fish while crab pots catch much larger organisms.

While there was a good deal of species overlap between the two varieties (blackfish, oyster toadfish, lined seahorse, northern pipefish and black sea bass), other species were found exclusively in crab or minnow pots (Figs 5a & 5b). Crab pot exclusive species included white perch, summer flounder, American eel, Atlantic menhaden, winter flounder and cunner. Minnow pot exclusive species included feather blenny, skilletfish, striped bass and silver perch.
The largest proportion of catch from crab pots was made up of blackfish, followed by oyster toadfish, with these two species making up over 75% of total crab pot catch (Fig 5a). On the other hand, the largest proportion of catch from minnow pots was made up of oyster toadfish, followed by black sea bass (Fig 5b).

These differences in species by trap type are likely because of each species' 1) maximum size - Minnow trap exclusives such as blennies and skilletfish will never grow large enough to be caught by a crab pot, 2) life stages in which they live in the River – black sea bass juveniles appear to be more prevalent than their adults and vice versa for blackfish, and/or 3) behavior – seahorses like to hold on to the bars of a crab pot and don't typically enter minnow traps.



Figs. 5a & 5b | Catch Per Unit Effort of fish caught in crab and minnow pots in 2021

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Take Aways

In 2021, the survey collected a total of fifteen different species. Several species, including oyster toadfish, black sea bass, blackfish, lined seahorses and northern pipefish, are consistently caught nearly every year, while others appear more intermittently (i.e., American eel, cunner, silver perch, spotted hake, and winter flounder, which were not seen in 2020). The presence of silver perch in particular was a surprising find in 2021, as this species has not been collected by this study since 2003. River project staff also completed catch-per-unit-effort (CPUE) calculations which account for number of traps and time between sampling dates in order to allow comparison to previous years of fish data when there were more traps. While the 2020 fish ecology survey only operated for six months and is not reflective of a full year of data, comparisons between 2021 and previous years nevertheless reveal interesting trends. From 2013-2021, the number of fish caught in crab pots has steadily increased. In the same time period, we also see a relatively consistent minnow pot catch until the year 2021, which exhibits a large increase to levels comparable to the crab pots. This steep increase in CPUE from minnow pots may be reflective of the change in survey site from Pier 26 in 2019 to Pier 40 in 2020, or another hereto unknown factor. The Hudson River Estuary is an important nursery environment for juvenile fish, and it is possible that variations in microhabitat and other conditions even in the short distance between Pier 26 and Pier 40 allow these sites to support different assemblages of juvenile fish species.

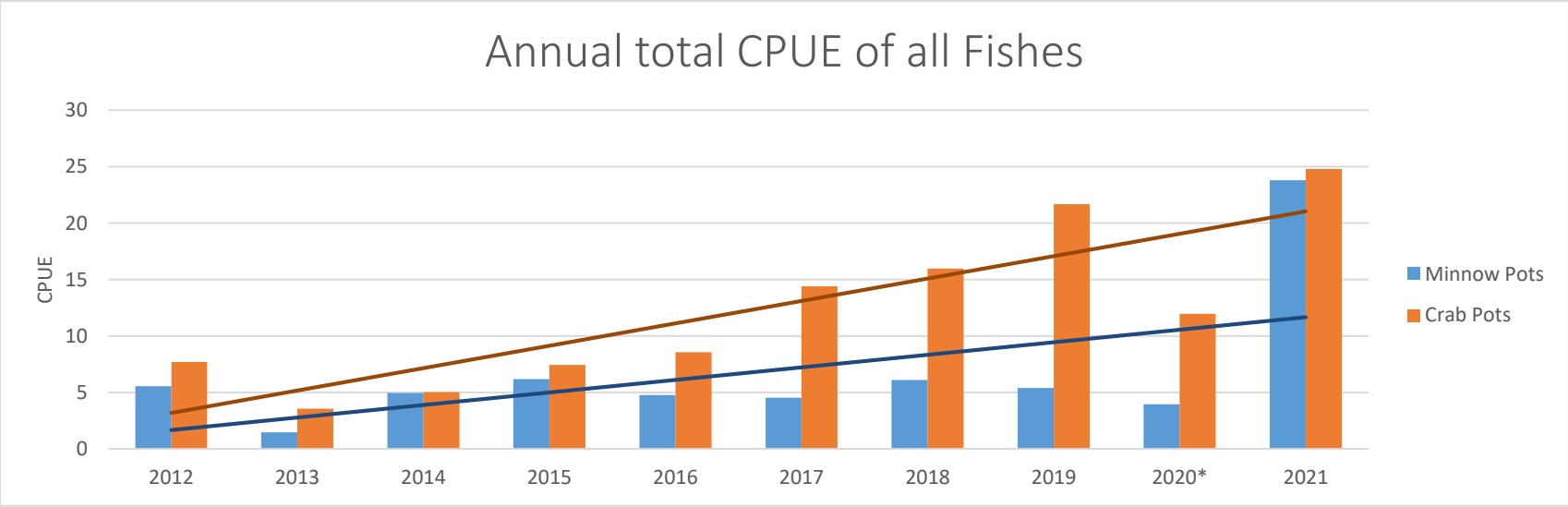

Fig. 6 | Catch Per Unit Effort of fish caught in crab and minnow pots 2012-2021. *2020 survey ran for 8 months, all other years 2012-2021 were year round with a minimum of 1 sampling day per week. Linear trend lines showed R^2 values of 0.29 for minnow, and 0.72 for crab pots over this time period.

Future Directions

Moving forward, HRPK's River Project will continue to collect data about the fishes in the Park as the trap survey continues. The Park plans to expand its survey sites in 2022, deploying another set of traps at Pier 26 near the sampling location this survey occupied from 2012-2019 and prior to 2005, in order to better compare the two primary sites of this historic survey. Future years will therefore be able to assess differences in microhabitat and more broadly assess fish populations within the Lower Hudson Estuary and inform scientists, students, and the community about the state of local fishes within the Park's waters.

Fig. 7 | Black sea bass (*Centropristis striata*) one of the most common fish of 2021

Fig. 8 | Lined seahorses (*Hippocampus erectus*) courting by holding tails

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