Atlantic and Shortnose Sturgeon Monitoring in the Lower Kennebec River

NUWCDIVNPT – Annual Monitoring Report

March 2026

Background

This year-round telemetry study, managed by the Naval Undersea Warfare Center Division Newport (NUWCDIVNPT) since May 2021, monitors ESA-listed Atlantic sturgeon (*Acipenser oxyrhynchus*, threatened) and shortnose sturgeon (*A. brevirostrum*, endangered) in the lower Kennebec River and adjacent coastal waters. The 2019 National Marine Fisheries Service (NMFS) Biological Opinion (GARFO-2019-01719) for Kennebec River maintenance dredging recommended future studies to characterize year-round habitat use by the Gulf of Maine Distinct Population Segments (DPS) of Atlantic sturgeon and shortnose sturgeon. The monitoring array extends from Dresden, Maine downriver to Fort Popham, with offshore stations forming a curtain between the Fox-Seguin Islands and the Jackknife Ledge Dredge Disposal area (Fig 1). This array is designed to track tagged sturgeon, but also records movements of other tagged migratory species, such as white sharks (*Carcharodon carcharias*).

The project's objectives are to support U.S. Navy environmental compliance and permitting associated with the Kennebec River Federal Navigation Project and activities near Bath Iron Works (BIW), while identifying optimal dredging windows that maintain operational readiness and minimize impacts to ESA-listed species. These monitoring data provide a year-round environmental baseline to support Navy consultations and regulatory decision-making related to dredging and other in-water activities. Specific goals include: monitoring year-round presence and migration patterns of both sturgeon species; documenting sturgeon activity near Bath Iron Works; increasing the number of tagged sturgeon; and recording coastal movements of sturgeon and NOAA-designated highly migratory species offshore from Popham Beach.

Collaborators on this project include State of Maine Department of Marine Resources (ME DMR), University of Maine (UMaine), U.S. Geological Survey (USGS), Portsmouth Naval Shipyard, and University of New Hampshire. Data collected from this study has helped to determine movement patterns in and out of the Kennebec basin, identify potentially new overwintering and/or foraging areas, and identify coastal movements of protected sturgeon between river systems in the Gulf of Maine.

As of January 2026, there are 15 year-round telemetry monitoring stations from Courthouse Point in Dresden to Fort Popham (including one in the Eastern River offshoot) and five stations offshore (Figure 1 points labeled CRTHPT to FORTB). Seven of the in-river stations are co-managed by ME DMR (seasonally from April to November) and NUWCDIVNPT. Downloads of telemetry stations occur on a biannual basis, in May and October. In river, the array has detected both species of sturgeon, as well as tagged American shad (*Alosa sapidissima*), striped bass (*Morone saxatilis*), and ESA endangered (Gulf of Maine DPS) Atlantic salmon (*Salmo salar;* captive-reared). To date, offshore data for the project include detections for both species of sturgeon, striped bass, white sharks (*Carcharodon carcharias*), thresher sharks (*Alopias vulpinus*), and Atlantic bluefin tuna (*Thunnus thynnus*).

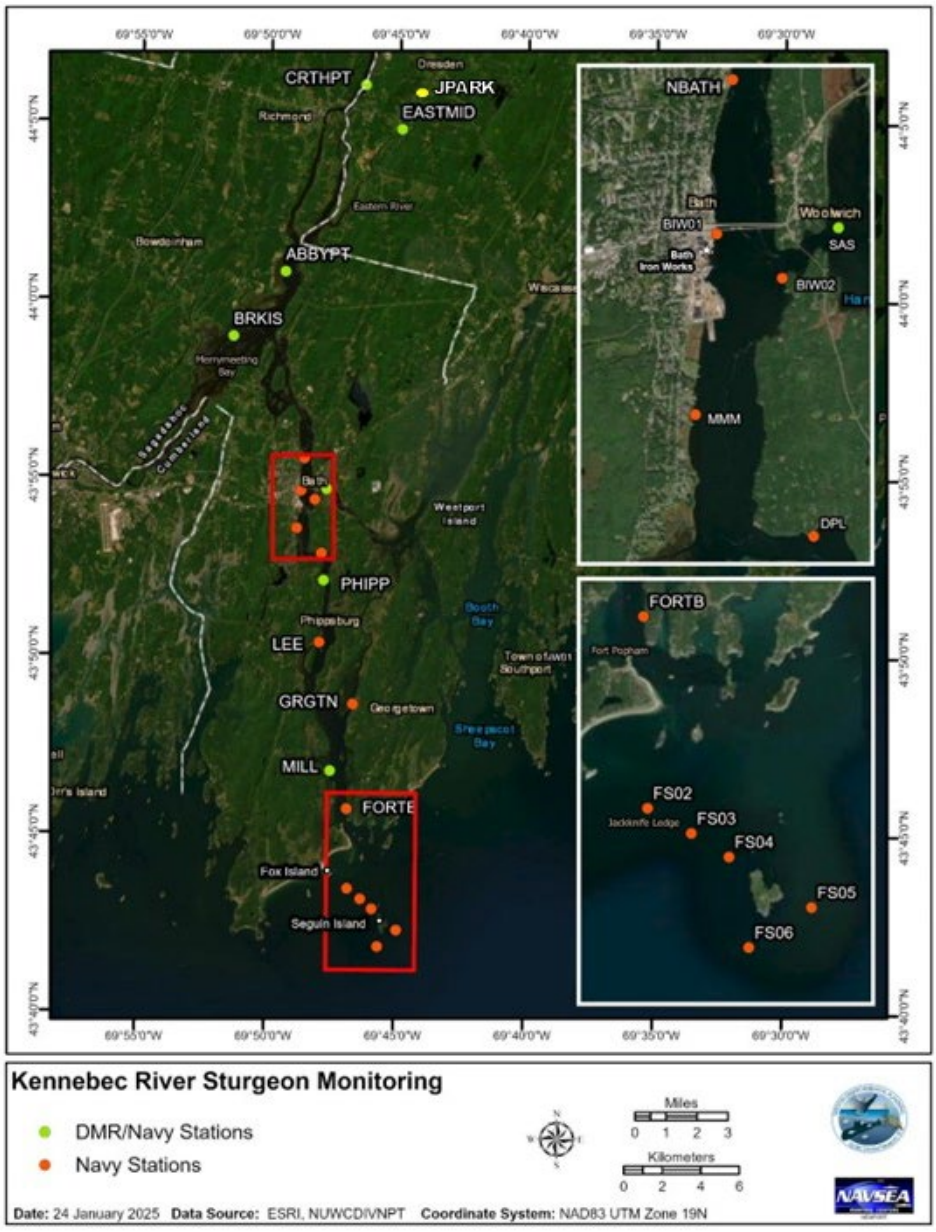

Figure 1. Location of current Navy and ME DMR monitoring stations in the lower Kennebec River basin extending to offshore Seguin Island. Stations beginning with "FS" (bottom right inset) are considered "ocean," while all others are "river." *NOTE: FS = Fox-Seguin; FORTB = Fort Popham; MILL = Mill Cove; GRGTN = Georgetown; LEE = Lee Island; PHIPP = Phippsburg; DPL = Doubling Point Lighthouse; BIW = Bath Iron Works; SAS = Sasanoa; NBATH = North Bath; BRKIS = Brick Island; ABBYPT = Abagadasset Point; EASTMID = Eastern Middle; JPARK = Jurassic Park; CRTHPT = Courthouse Point*

Data Summary November 2024 – October 2025

This summary highlights key findings from the November 2024–October 2025 monitoring period, covering species-specific detection patterns, seasonal movements, data from collaborating partners, and an opportunistic analysis of sturgeon residency during a pile driving event. During this period, the array recorded 426,926 matched detections across all stations. Atlantic sturgeon accounted for most detections (396,510 river; 953 ocean) from 49 unique individuals; while shortnose sturgeon generated only river detections (27,292 river) from 19 individuals (Table 1). Detections reflect tagging effort rather than overall population abundance. Key detection patterns and spatial use are summarized in highlights below:

Atlantic Sturgeon (AST) Highlights

- River stations accounted for >99% of detections (396,510), with 953 detections recorded offshore (Table 1).
- 35 unique individuals were detected in the river; 14 unique individuals were detected in the ocean, with an overlap of 13 unique tags.
- Patterns of detections from Nov-Apr compared to detections from May-Oct indicate seasonal upstream movement during warmer months (Table 2).
- Of 14 unique individuals detected at coastal ('FS') stations, four were tagged by NUWCDIVNPT.
- 19 unique AST detected were tagged by NUWCDIVNPT in 2022 (including those four detected at coastal stations)
- High-use stations:
    - The recorder at JPARK was only deployed from June-Oct 2025 but recorded the highest number of detections (178,404; 45% of all river AST detections), generated by eight (8) individuals (Table 3). Five of these were tagged by NUWCDIVNPT, and two by UMaine. These data point to high occupancy of AST for this station.
    - NBATH exhibited consistent AST detections over time (240 detection days) and high tag diversity (29 individuals) (Table 4).
    - NBATH recorded the highest number of unique tags (29 individuals) (Table 4).
    - BIW01 had consistently high volume of detects with 79,767 detections across 189 days from 27 unique tags (Table 4).

Shortnose Sturgeon (SNS) Highlights

- All detections occurred at river stations; no offshore detections were recorded (Table 2).
- Georgetown (GRGTN) accounted for the highest number of detections (8,926; 33% of total SNS detections) (Table 3) and the most detection days (90 days) (Table 4). Several individuals were not detected after August, and one in particular showed directed northward movement from Georgetown to Bath Iron Works in early – mid Augst over a period of 10 days, before not being detected during winter months. It is likely that shortnose sturgeon may be overwintering in areas that are not currently monitored.
- Mid-river detections during winter months were limited, suggesting overwintering farther upstream (Table 2).
- 10 of the unique detected SNS were tagged by NUWCDIVNPT in 2022.

Other Updates

- **University of Maine (UMaine)**
    - In summer 2025, UMaine acoustically tagged 10 AST and 14 SNS in the Kennebec River, and 28 AST and 11 SNS in the Penobscot River.
    - These new tags (all from the Kennebec) contributed a total of 21,960 detections in the Kennebec array during June–October 2025 (Table 5).
- **Other Mid-Atlantic Acoustic Telemetry Observation System (MATOS) partners**
    - Continued collaboration with UMaine, USGS, University of New England, University of New Hampshire, ME DMR, and Ocean Tracking Network (OTN)-Canada projects.
    - These detections document regional connectivity in regional research arrays (see below).

White Sharks and Other Migratory Species (Table 1)

- 15 unique individuals were detected at offshore stations.
- Stations adjacent to Seguin Island exhibited highest detection rates.

Table 1. The number of detections and unique IDs at river and ocean stations for each species detected across two download cycles for the study period (November 2024 – October 2025).

Species	Ocean Detects	River Detects	Unique Ocean IDs	Unique River IDs
Atlantic sturgeon	953	396,510	14	35
Shortnose sturgeon	0	23,986	0	16
Striped bass	40	6,428	3	2
Thresher shark	14	0	1	0
White shark	171	0	10	0
Winter flounder	0	1	0	1
Totals	**1178**	**426,926**	**28**	**55**

Table 2. The number of detections at Lower- and Mid- River and Ocean stations for sturgeon across two download cycles for the study period (November 2024 – October 2025).

Species	Date Range	Type	Lower River	Mid River	Ocean
Atlantic sturgeon	Nov 2024–April 2025	Total Detects	39,601	7,748	487
		Unique IDs	13	6	4
	May 2025–October 2025	Total Detects	146,960	202,201	466
		Unique IDs	29	29	11
Shortnose sturgeon	Nov 2024–April 2025	Total Detects	7,437	1,106	0
		Unique IDs	11	8	0
	May 2025–October 2025	Total Detects	11,861	3,582	0
		Unique IDs	12	12	0

Table 3. The top five river stations for number of detections, with the corresponding percent totals across two download cycles for the study period (November 2024 – October 2025).

Species	Station Name	Detections	Percent Total
Atlantic sturgeon	JPARK[1]	178,404	45
	BIW01	79,767	20.1
	NBATH	56,193	14.2
	MMM	27,359	6.9
	ABBY	16,614	4.2
Shortnose sturgeon	GRGTN	8,926	37.2
	LEE	2,800	11.7
	MMM	2,322	9.7
	DPL	2,113	8.8
	EASTMID	2,015	8.4

[1] JPARK had a very high percentage of total AST detections, all from eight individuals, but was only deployed May-October 2025.

Table 4. The top five river stations for number of unique tags detected, with the top five river stations for number of detection days across two download cycles for the study period (November 2024 – October 2025).

Species	Station Name	Unique Tags	Station Name	Detection Days
Atlantic sturgeon	NBATH	29	NBATH	240
	BIW01	27	BIW01	189
	ABBY	26	MMM	163
	BIW02	26	BIW02	119
	MMM	26	SAS	108
Shortnose sturgeon	BIW01	11	GRGTN	90
	CHPT	11	CHPT	34
	NBATH	11	DPL	31
	SAS	11	LEE	30
	MMM	10	SAS	30

Table 5. Number of detections from newly tagged UMaine sturgeon (summer 2025) at river and ocean stations from the May – October 2025 monitoring period. (Data provided by Sander Elliott and Dr. Joe Zydlewski)

Species	Ocean Detects	River Detects	Unique Ocean IDs	Unique River IDs
Atlantic sturgeon	12	21,877	2	8
Shortnose sturgeon	0	83	0	3

Seasonal Patterns - Detection Summary Figure

- Monthly heatmap analyses (Figure 2) for AST show:
    - Peak Atlantic sturgeon detections and diversity in unique IDs during April–June, particularly at lower-river stations in the reach from LEE to NBATH.
    - Decline in detections observed through summer and early fall south of Brick Island (BRK).
    - Detections during winter months were limited compared to peak seasonal periods and were concentrated at Eastern River (EASTMID) and mid-river Courthouse Point (CHPT) stations.
    - The number of unique individuals detected during winter was low, suggesting reduced river occupancy or overwintering in other unmonitored areas during colder months.
    - Detection activity increased in late spring, consistent with seasonal upstream movements during warmer months.

- SNS monthly heatmap analyses (Figure 2) showed similar peak months (April–June) in detections, but lower overall abundance, consistent with tagging effort.

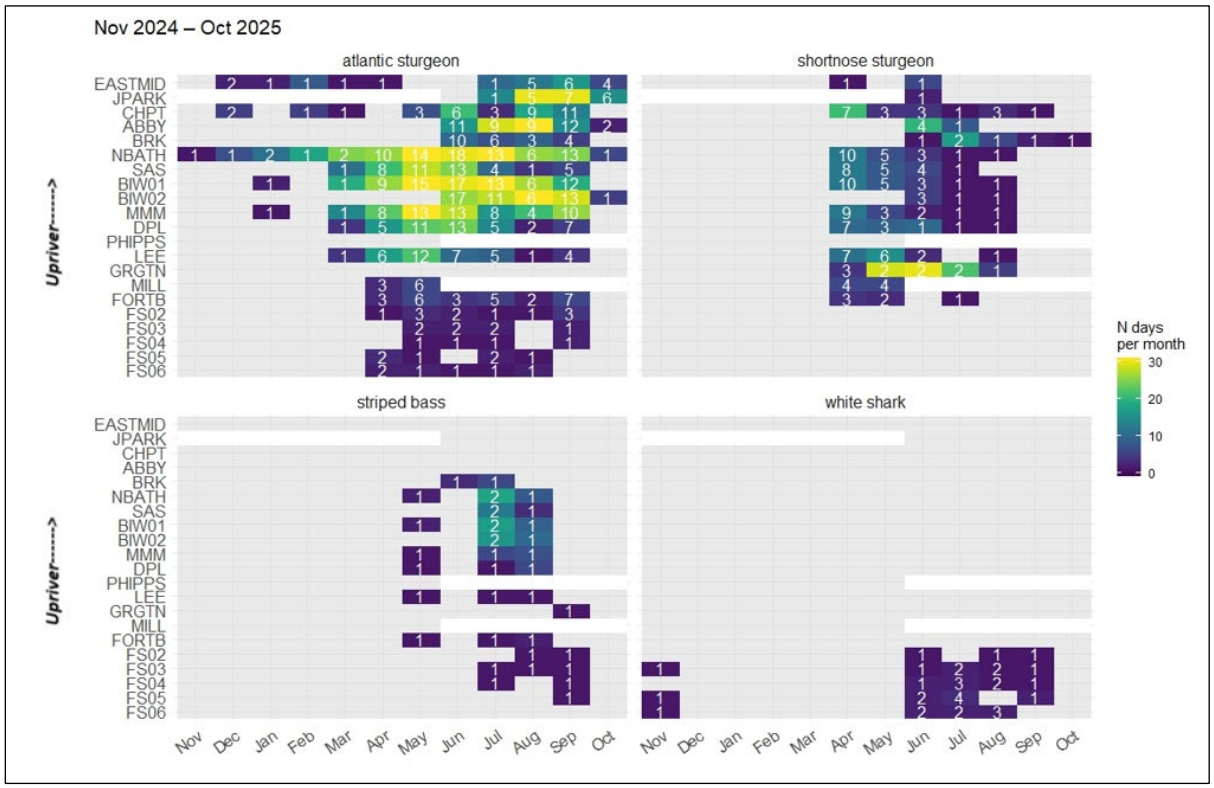

Figure 2. Species observed at each station during the monitoring period November 2024–October 2025. For each station-month cell, the color intensity represents the number of calendar days with at least one detection, and the numeric value in each cell indicates the total number of unique individuals detected during that month. Unshaded cells represent months with no receiver coverage at that station. Current active tagged fish numbers are not uniform across all species; results indicate presence and seasonality, but not relative abundance.

Maine Maritime Museum Pile Driving

The below summary represents opportunistic analysis of AST behavior during March 2025 impact pile driving operations at Deering Pier (MMM), conducted by GEI consultants, on behalf of the museum.

- During the two-week pile-driving period, detections at the MMM station were very high for a single unique individual (Tag A69-9001-62323), suggesting close proximity to the station throughout the pile driving event.

- This individual left the MMM detection area just prior to conclusion of pile driving.

- Following the conclusion of pile driving, the number of unique AST individuals at the MMM station increased to three individuals. A similar trend occurred at the nearby BIW01 station, where unique fish counts rose from one to four individuals post-pile driving. This also coincided with typical increases in detections during the early Spring for this area.

- AST detections continued to occur at MMM and BIW01 during active pile driving, indicating continued site use during construction activities (Table 6).

- No clear reduction of detections was observed for Tag A69-9001-62323 during pile driving activity, although presence was limited prior to construction; however, it should be noted that overall detections were limited for those specific hours (dark outline; Figure 3) that impact hammering took place.

Table 6. Number of detections, detection days, and unique fish that were detected pre-, during, and post- pile driving operations at MMM during March 2025.

Species	Station	Period[1]	Total Detections	Detection Days	Unique Fish
AST	MMM	Pre	4	2	1
AST	MMM	During	1,706	12	1
AST	MMM	Post	168	7	3
AST	BIW01	Pre	1,393	9	1
AST	BIW01	During	894	10	1
AST	BIW01	Post	2,601	10	4

[1] Each "period" consisted of equivalent two-week intervals (i.e., two weeks pre-pile driving, two weeks of pile driving, and two weeks post-pile driving).

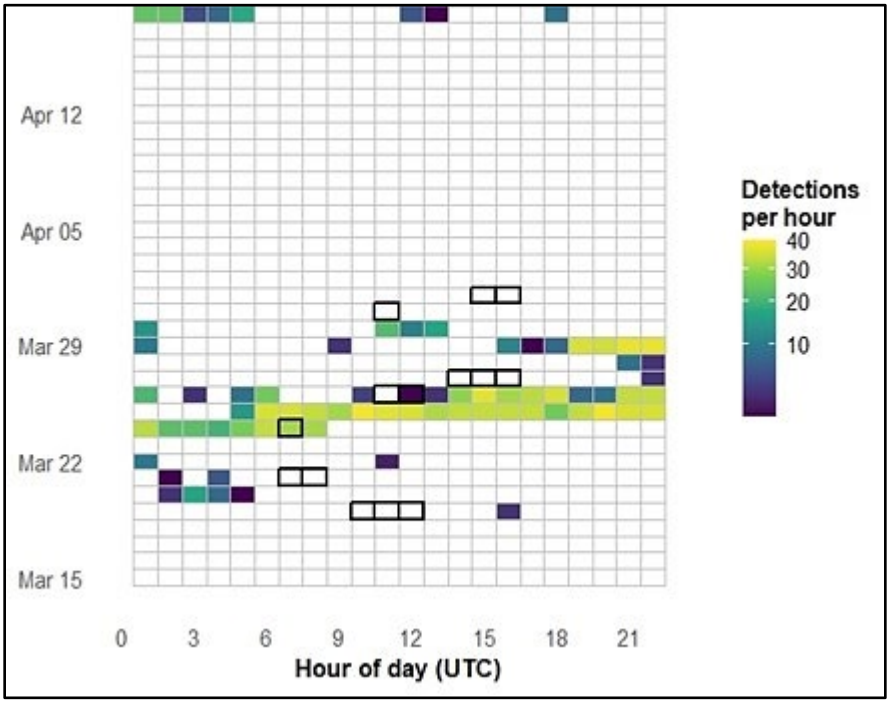

Figure 3. Detections of AST Tag A69-9001-62323 at Maine Maritime Museum (MMM) station before, during, and after pile driving at Deering Pier in March-April 2025.
Note: Dark outlines for hourly cells represent period of active impact pile driving.

Coastal Movements – NUWCDIVNPT tagged sturgeon

NUWCDIVNPT-tagged ATS were detected at multiple Gulf of Maine coastal arrays in 2025, with 10,435 detections (five individuals) at ME DMR Northern Gulf stations, 138 detections (two individuals) at Musquash MPA (OTN-Canada, ~300 km from Seguin Island), and smaller numbers at ME DMR Passive Monitoring Project (MEDMRPAM), University of New England Saco Bay, and University of New Hampshire arrays (Table 7; Figure 4).

Table 7. The number of ATS detections and unique ATS individuals that were detected coastally in the Gulf of Maine in 2025.

MATOS Project	Detections	Unique IDs	Affiliation
NGOMWS	10,435	5	ME DMR
MUSQMPA	138	2	Musquash MPA
MEDMRPAM	49	4	ME DMR PAM
UNESACOBAY	36	2	UNE
PRSMELT	2	1	UNH

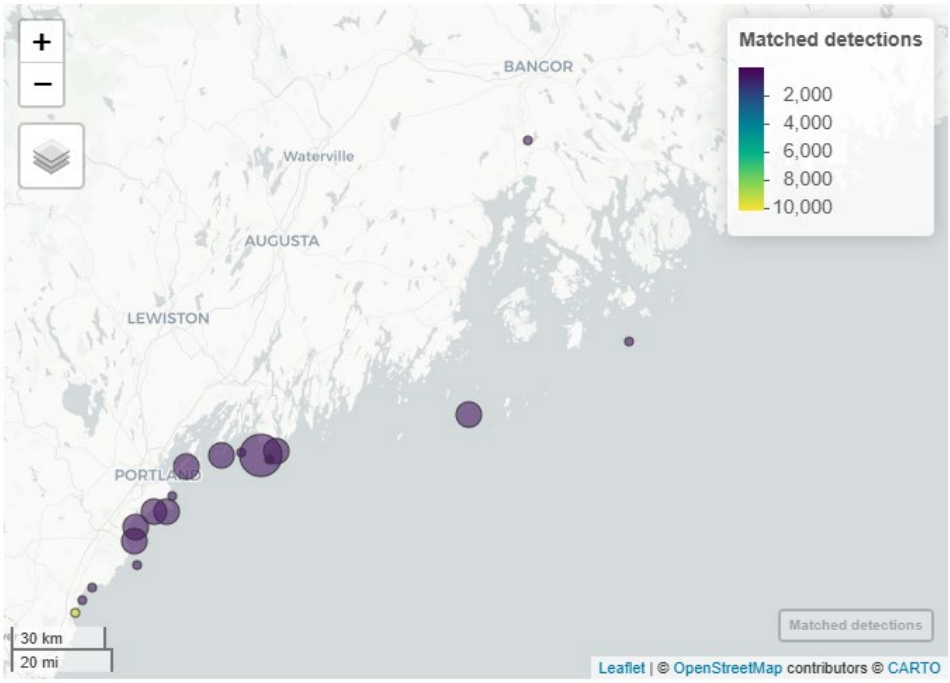

Figure 4. Stations with coastal detections of NUWCDIVNPT-tagged Atlantic Sturgeon in 2025. Both size and color reflect the number of detections at that location.

Summary

Overall, telemetry data collected over the past two monitoring years provide valuable information on sturgeon habitat use and seasonal movement patterns in the lower Kennebec River and adjacent coastal waters. Results consistently show that Atlantic sturgeon exhibit strong seasonal use of the mid-river corridor during spring and early summer months, with reduced presence in the lower river during Nov - March. Shortnose sturgeon detections indicate similar seasonal movements, with broader distribution across mid-river stations during the warmer months. Offshore monitoring stations also continue to document coastal movements of Atlantic sturgeon and other highly migratory species through the Gulf of Maine, demonstrating connectivity between the Kennebec and other river systems.

These findings provide an improved understanding of sturgeon habitat use and seasonal occurrence in the Kennebec River system and contribute to the development of an environmental baseline that supports Navy compliance and consultation requirements. This monitoring has improved the ability to identify periods of reduced sturgeon presence in specific areas of the Lower Kennebec, which can inform dredging schedules and other in-water activities to help maintain Navy operational readiness while minimizing impacts to ESA-listed species.

Going forward, monitoring work in the Kennebec will focus on the use of side-scan sonar and a telemetry position system to help estimate the spawning run size of both species. This work will help address a NMFS prior recommendation to conduct studies to update population estimates of sturgeon in the Kennebec River System. This focused work in spawning areas will directly complement a greater effort by our collaborators with the State of Maine Department of Marine Resources (DMR) and University of Maine (UMaine) to estimate the population of ATS and SNS in the Kennebec and Penobscot rivers.