2022 Maine White Shark Monitoring Update

About the Program

The Maine Department of Marine Resources (DMR) began monitoring white shark activity in the Gulf of Maine beginning late August of 2020 in response to the increased public interest. The objective of this program is to study and improve our understanding of the distribution and habitat use patterns of white sharks in coastal Maine. This information is used to bolster public safety at beaches and provide data in support of scientific research and outreach.

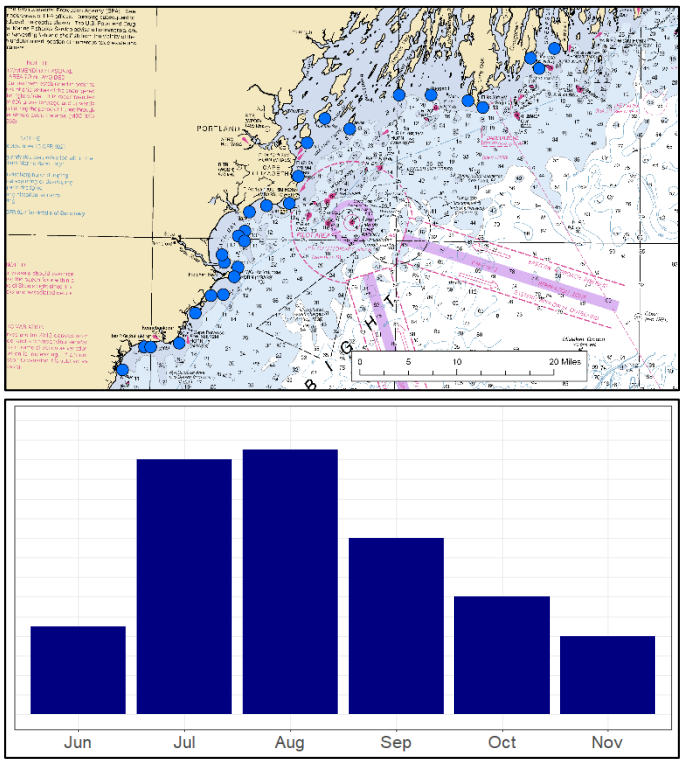
How Monitoring Works

The primary method by which shark movements are recorded is via electronic tracking technology. In the case of acoustic telemetry, sharks are outfitted with a waterproof transmitter, which is inserted into the back of the shark. Transmitters are built to last for up to 10 years and remain on the shark throughout its lifespan. When one of these transmitters comes within several hundred meters of a compatible acoustic receiver, a detection event is recorded and stored locally on the receiver. Receivers are deployed at fixed locations in mid to late spring, then recovered in the fall or early winter so scientists can download detection data for analysis. If a receiver is not found at the end of a season, scientists cannot access the data.

Above left: Picture of an acoustic receiver and acoustic transmitter. Above right: Deploying an acoustic receiver into the Gulf of Maine. Receivers are tethered to a marked fishing buoy.

Passive Acoustic Receivers

In 2022, the DMR White Shark Monitoring program completed its third year and second full season of acoustic monitoring, deploying a total of 33 sites from Ogunquit to the Sheepscot River. Of the active receivers, four were deployed in a collaborative effort by Dr. John Mohan and his research program at the University of New England (UNE). Across the 29 receivers that were recovered successfully, 39,803 detections were observed across 167 different animals. Of these detections, 1,042 were from white sharks. The greatest number of white sharks were observed at Hermit Island and Ragged Island, with both sites detecting 11 sharks each this year. This brings the total number of white sharks detected at Hermit Island to 28 since the array's inception, and 60 white sharks across all sites. For reference, there are approximately 250-300 white sharks currently carrying detectable acoustic tags from New England. With data combined across all years, white shark activity has been highest during the months of July and August.



Top: nautical map displaying the location of the 28 successfully recovered passive acoustic receivers deployed as part of the 2022 effort. Bottom: graph displaying the relative monthly shark activity (based on # days ≥ 1 white shark was detected) across all receivers since monitoring began in 2020.

Real-Time Acoustic Receivers

This year, in addition to passive acoustic telemetry the White Shark Monitoring Program incorporated a new technology that allows for real-time detection of white sharks at Maine beaches. Dr. John Mohan of UNE and scientists at the DMR each acquired one real-time acoustic receiver system to be placed in Saco Bay and at Popham Beach, respectively. These receivers differ from passive acoustic receivers in that they utilize cellular towers to alert beach officials when a shark is detected. Like passive acoustic receivers, real-time receivers are only capable of detecting animals that are carrying an active acoustic transmitter, and those animals must travel within several hundred meters of the receiver to be detected. Dr. Mohan's receiver in Saco Bay detected one individual in September of this year, while the receiver at Popham Beach detected one shark in November. Both real-time devices were generously funded by grants through the Maine Outdoor Heritage Fund and were coordinated with the help of the Maine Department of Conservation, Agriculture and Forestry.

Above: The top of a real-time acoustic telemetry buoy system. The pyramidal structures atop the buoy are solar panels.

Sighting Reports

Sightings are compiled through three methods: submissions through the Maine DMR Shark Sighting Reporter (https://survey123.arcgis.com/share/54efc00f829a474b958321caf71ca578), submissions through the phone app *Sharktivity* (https://www.atlanticwhiteshark.org/sharktivity-app), and personal communication from collaborators. White shark sightings are categorized as either confirmed or unconfirmed and are broken down into the following categories: basic sighting, predation event, real-time, and wounded mammal.

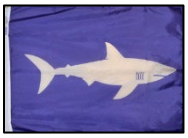
A basic sighting is considered when a white shark is physically seen by the observer, but not preying on an animal. A predation event occurs when a shark is seen preying on an animal. A real-time event is when a shark is detected on one of the real-time receivers. A wounded mammal record is taken when there is a marine mammal observed with signs of a shark bite. Any instances of a marine mammal displaying wounds from a shark interaction are reported to the Marine Mammals of Maine and/or Allied Whale.

2022 Confirmed Sighting Records				
Basic Sightings	Predation Events	Real-time Event	Wounded Mammals	Total
14	9	2	19	44

Left: QR code for Maine Shark Sighting Reporter. Right: QR code for *Sharktivity* app.

Maine Shark Working Group

The Maine Shark Working Group is a collective of beach officials, emergency medical professionals, educators, and scientists from Maine to Massachusetts working to improve public safety and messaging regarding shark activity at beaches. This effort, led by Arthur Howe of the Harpswell Department of Safety and Emergency Services, has been integral in forming the current shark sighting and shark encounter protocols at beaches throughout the state. Acoustic and sightings data collected by research entities are integral in shaping the foundations of these procedures and policies.



Above: Image of a shark warning flag flown at beaches. If you spot this flag, then a shark has been observed recently and you should seek beach officials for more information.

Acknowledgments

Transmitter data used in this research are owned and maintained by the Massachusetts Division of Marine Fisheries (MADMF), the Atlantic White Shark Conservancy, and the NOAA Greater Atlantic Regional Fisheries Office. The acoustic receivers being used are property of the DMR, Dr. James Sulikowski (Arizona State University), Dr. John Mohan, and MADMF. Deployments were made possible thanks to members of Maine Marine Patrol, Ed Hutchins and Riley Austin of the F/V Christina Mae II, and Justin Papkee of the F/V Pull n' Pray. Sightings reports are vetted with the support of John Chisholm of the Anderson Cabot Center for Ocean Life. Allied Whale generously shared their 2022 marine mammal records for tracking predator-prey interactions. We also thank the fishermen, beach officials, and citizen scientists who make our sightings data and receiver work possible.

Interested in survey contract participation, learning more, or sponsoring a new receiver site?

Contact us – Matthew.M.Davis@Maine.gov