<u>Sea Turtle / Fishery Interactions - Research Project Ideas</u>
National Marine Fisheries Service
Greater Atlantic Regional Fisheries Office and Northeast Fisheries Science Center
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The following research needs include both turtle biology and gear research ideas for Mid-Atlantic and Northeast fisheries. Further, while not specifically identified here, observer coverage continues to be needed to monitor sea turtle bycatch and the effectiveness of gear modifications.

Turtle behavior and ecology research

- Investigate turtle behavior and distribution in the Mid-Atlantic and Northeast (via satellite tagging, animal-borne cameras, or other means) to better understand their seasonal movements, habitat utilization, and how and where interactions with fishing gear are occurring.
- Ascertain sea turtle abundance, trends, and demographic parameters in the Mid-Atlantic and Northeast to help understand the impact of fishery and aquaculture interactions and mortality on the population.
- Investigate turtle ecology in the Northeast Region, including foraging behavior, diet, and health, to help better understand co-occurrence with fishing effort and impacts from gear interactions.
- Assess behavioral or other changes in association with climate change to characterize potential changes in fishery interaction rates.
- Monitor and determine mortality rates of turtles escaping bycatch reduction measures (e.g., Turtle Excluder Devices (TEDs), chain mat modified Turtle Deflector Dredges (TDD)).

Fishing gear research

I. Gillnet gear

Need: Reduce bycatch, or injury/mortality associated with such bycatch.
Large mesh (>7") gillnets, particularly those targeting monkfish, have been found to have high sea turtle and sturgeon bycatch. The gillnet fisheries with sea turtle bycatch can be found at http://www.nefsc.noaa.gov/publications/tm/tm225/

<u>Potential research topics</u>:

- Further test bycatch reduction measures in gillnet fisheries with sea turtle bycatch
  New innovative ideas are desired for reducing sea turtle bycatch in gillnet gear while retaining the target species. Ideas previously discussed can be found at http://www.greateratlantic.fisheries.noaa.gov/protected/seaturtles/docs/gillnetworkshopfinalreport_april2013.pdf.

- Further test low profile gillnet
  Background: The Harbor Porpoise Take Reduction Plan has requirements for tie-downs for certain mesh sizes in certain areas; more information can be found at http://www.greateratlantic.fisheries.noaa.gov/protected/porptrp/. Reducing the height of the gillnet gear and the length of the tie-downs has been found to reduce Atlantic sturgeon bycatch and has promise for sea turtle bycatch reduction. Efforts are underway to test this low profile net in areas with high sea turtle bycatch, but more work is needed. More information can be found at http://www.nefsc.noaa.gov/read/protspp/PR_gear_research/.

- Test lighted nets in NER

  Background: Research on LED lighted gillnets in the Pacific has shown reduced bycatch of green turtles while retaining catch of targeted species. The utility of lighted nets in the Atlantic and applicability to other sea turtle species/fisheries have not been sufficiently tested. More background information can be found in: Wang J, Barkan J, Fisler S, Godinez-Reyes C, Swimmer Y. 2013. Developing ultraviolet illumination of gillnets as a method to reduce sea turtle bycatch. Biol Lett 9: 20130383.http://dx.doi.org/10.1098/rsbl.2013.0383

II. Trawl gear

Need: Reduce bycatch, or injury/mortality associated with such bycatch.

Bottom trawl gear used in the mid-Atlantic has been documented to interact with sea turtles, with some interactions resulting in mortality. An estimate of sea turtle bycatch in trawl gear can be found at http://dx.doi.org/10.1016/j.biocon.2011.05.012

<u>Potential research topics</u>:

- Further test bycatch reduction measures in trawl fisheries with sea turtle bycatch

  New innovative ideas are desired for reducing sea turtle bycatch in trawl gear while retaining the target species. Ideas previously discussed and research conducted to date can be found at http://www.nefsc.noaa.gov/read/protspp/PR_gear_research/

- Test TEDs, including cable TEDs, in fisheries with high sea turtle bycatch (e.g., croaker, summer flounder, scallop, squid fisheries)

  Background: TEDs have to pass the small turtle test conducted by the NMFS Southeast Fisheries Science Center before being approved by NMFS. Catch retention work is needed on those approved TEDs and for those fisheries with the highest sea turtle bycatch. The trawl fisheries with high estimated sea turtle bycatch can be found at http://www.nefsc.noaa.gov/publications/crd/crd1104/

III. Dredge gear

Need: Reduce and monitor bycatch, or injury/mortality associated with such bycatch.

Chain mats and TDDs are currently required in the mid-Atlantic sea scallop dredge fishery. More information on research conducted to date can be found at http://www.nefsc.noaa.gov/read/protspp/PR_gear_research/

<u>Potential research topics</u>:

- Identify the most appropriate means to observe turtle bycatch in gears with bycatch reduction devices
- Determine where (i.e., on the bottom, in the water column) interactions with sea scallop dredge gear are occurring

IV. Pot/trap gear

Need: Reduce bycatch, or injury/mortality associated with such bycatch.

Sea turtles have been documented in the buoy lines of pot fisheries. The leatherback is the most commonly documented species with interactions occurring mostly in Massachusetts waters. Hard-shelled turtles have also been documented with interactions being more commonly reported in the southern mid-Atlantic. More information can be found at http://www.greateratlantic.fisheries.noaa.gov/prot_res/seaturtles/doc/Vertical%20Line%20Workshop_2008-web.pdf

Potential research topics:

- Test ways to stiffen vertical line to minimize turtle entanglements while retaining ability to haul gear (e.g., hard lay line, sheathing, new innovative options)
- Investigate visual deterrents to minimize turtle entanglements in vertical lines
- Investigate other options to minimize turtle entanglements in vertical lines while retaining operational feasibility of gear
- Evaluate post-release survival of sea turtles captured in pot/trap gear
- Evaluate potential impact of Atlantic Large Whale Take Reduction Plan vertical line rule on reducing sea turtle vertical line entanglements

V. Aquaculture gear

Need: Estimate, reduce and monitor bycatch, or injury/mortality associated with such bycatch.
Aquaculture in U.S. waters is expanding and has the potential to interact with protected species. Currently, data on interactions is very limited; one sea turtle entanglement has been documented in the vertical line of aquaculture gear in the Greater Atlantic Region. More information is needed on the extent to which these gears interact with these species and how interactions may be minimized.

Potential research topics:

- Test ways to stiffen vertical line to minimize turtle entanglements while retaining ability to harvest the target species
- Investigate visual deterrents to minimize turtle entanglements in vertical lines
- Investigate other options to minimize turtle entanglements in vertical lines while retaining operational feasibility of gear
- Investigate ways to minimize turtle entanglements in the spat lines of longline aquaculture gear