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Sea Turtle Bycatch in Trawl Fisheries

MAFMC Meeting
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Why are we here?

- Fishery bycatch largest threat to turtles
- Trawl bycatch reduction research has been ongoing for 20 years
- At the point of sharing current results
- Considering potential measures, but not yet proposing anything
- Want to hear from you!



Credit for all presentation photos: NOAA, unless otherwise noted.

What species are we talking about?



Loggerhead



Photo: B. Witherington



Kemp's ridley



Leatherback

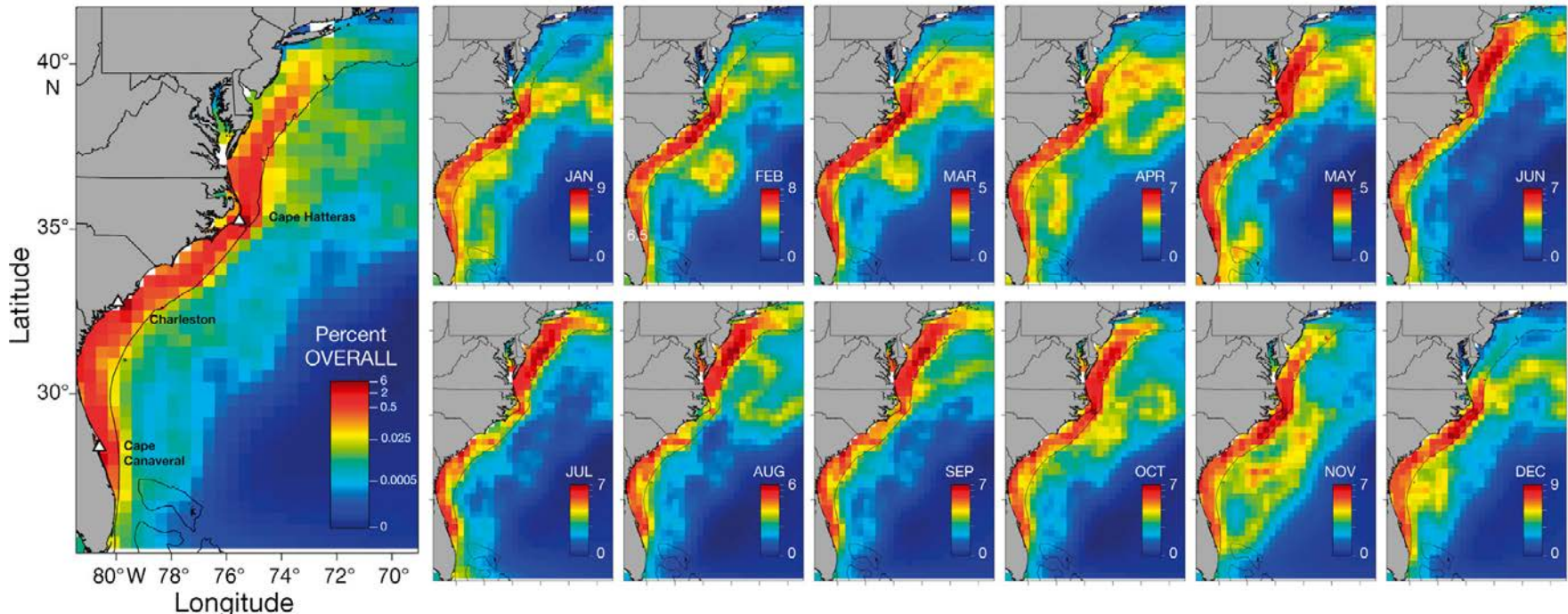


Credit: Caroline Rogers, USGS

Green

Sea Turtle Distribution

- Temperature dependent
- Generally present in region May through November
- Tagging research to assess distribution, density, behavior
 - Map based on 271 loggerheads tracked from 2004-2016
 - 205 additional loggerheads tagged from 2017 to present



Loggerhead Relative Density Winton et al. 2018

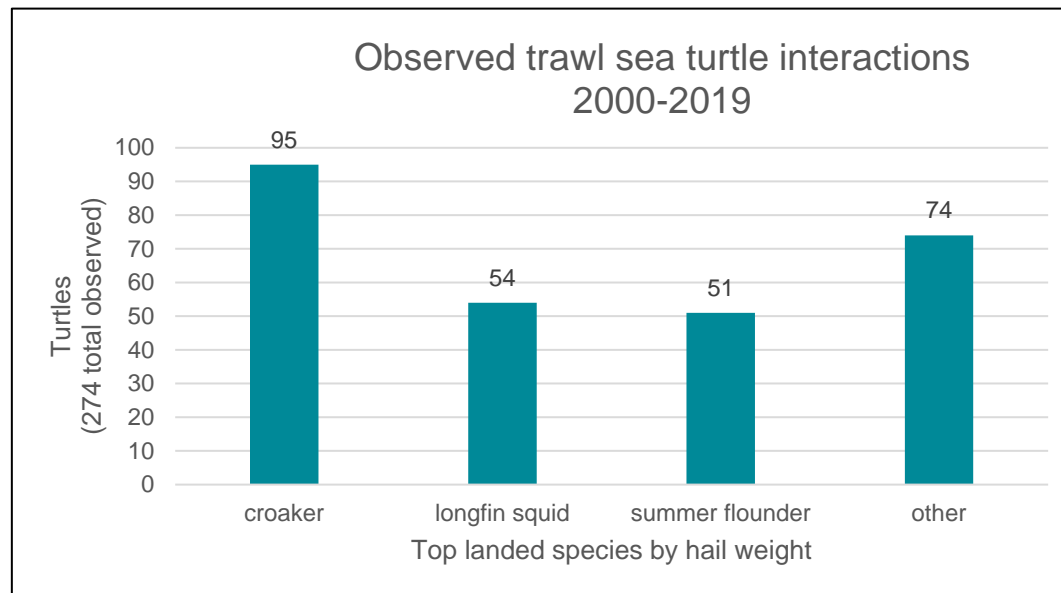
Why are we concerned about sea turtles?

- No sea turtle species has recovered
 - Fishery bycatch is the primary threat
 - ESA – prohibits take; promotes recovery
- Reducing mortalities from fisheries bycatch a priority in every ESA turtle recovery plan
- Loggerhead recovery plan (2008): Implement seasonal large-opening TED requirements in trawl fisheries from Cape Cod through Cape Hatteras
- MSA – National Standard 9 requires that bycatch be minimized and, if unavoidable, mortality minimized
- 2021 BiOp on 10 FMPs – non-discretionary RPMs/TCs
 - NMFS must continue to work on gear modifications to reduce incidental takes, and the severity of interactions that do occur

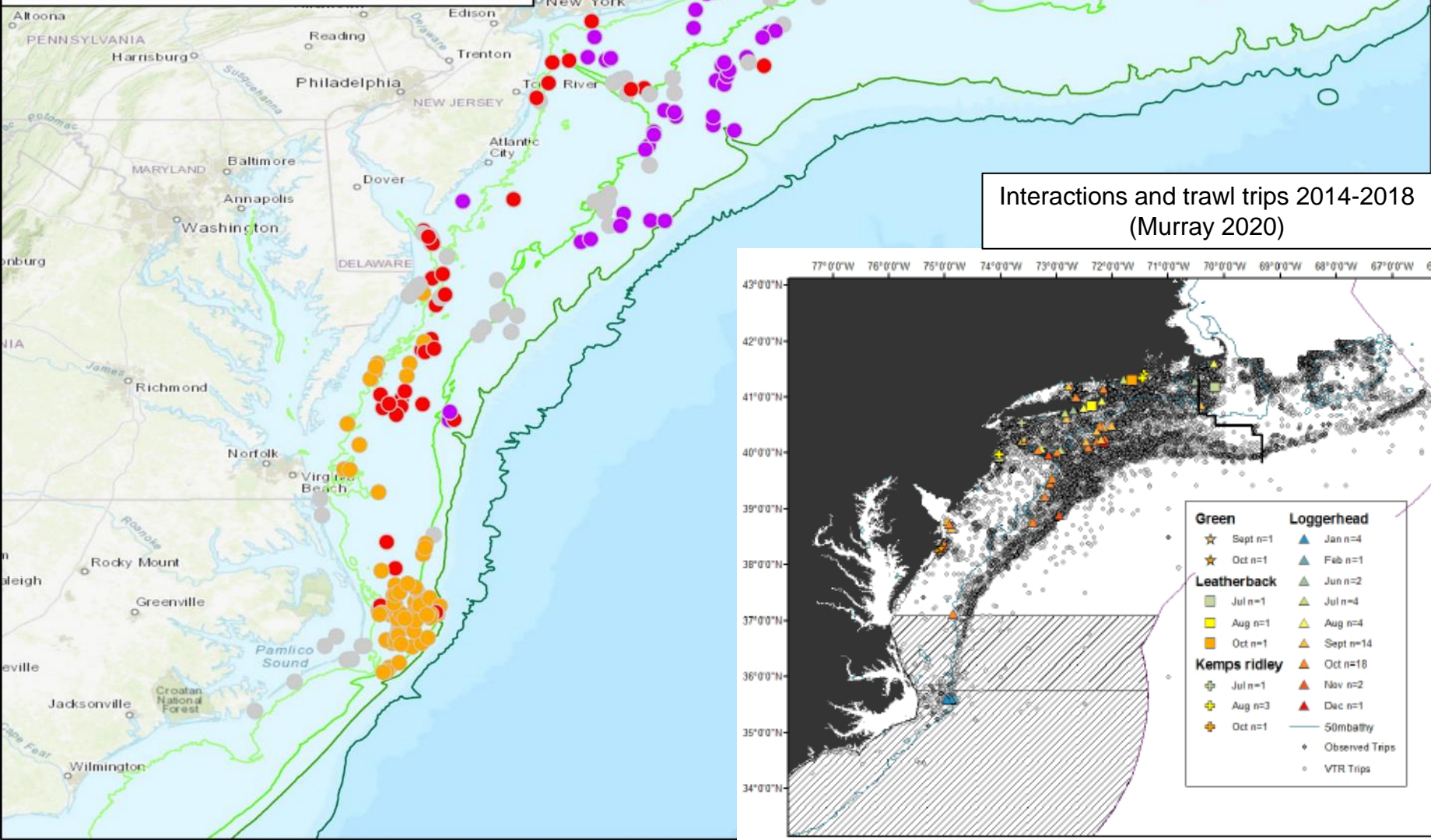


Why are we concerned about sea turtles?

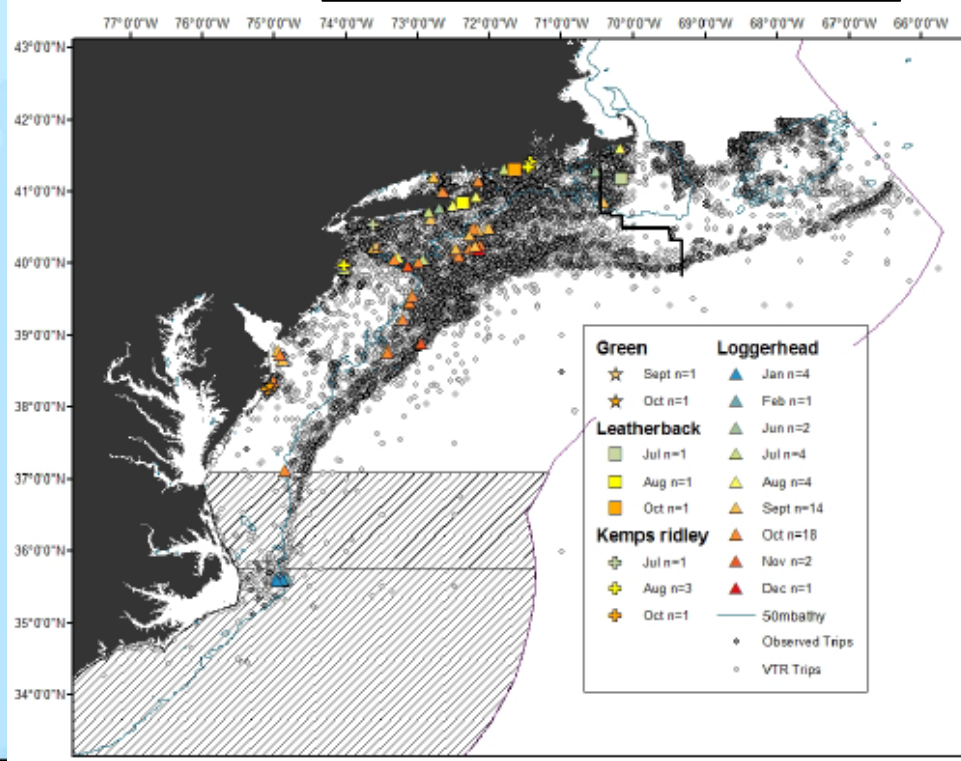
- Trawl bycatch estimate (2014-2018):
 - Total 571 loggerheads, 46 Kemp's ridleys, 16 greens, and 20 leatherbacks in mid-Atlantic
 - Total 12 loggerheads and 6 leatherbacks on Georges Bank
 - Rates stratified by latitude, season and depth
- Trawl mortality rate (2015-2019; n=55) is 43%. If tows are sufficiently short (<1 hour), survival is high.
- Three fisheries represent 73% of regional trawl bycatch



Sea Turtle-Trawl Interactions 2000-2019

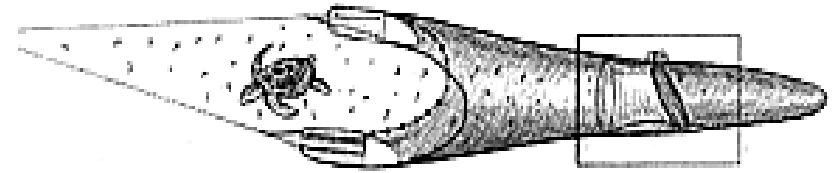
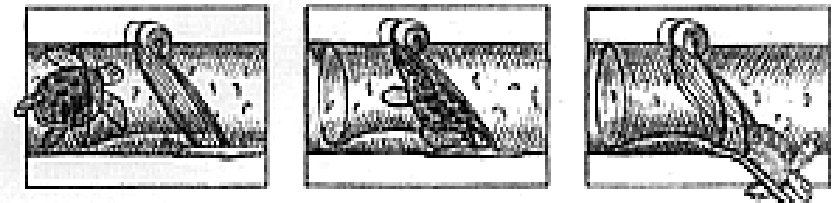


Interactions and trawl trips 2014-2018
(Murray 2020)



How can we reduce bycatch mortality?

- (1) Time/area management
- (2) Gear/operational modifications



How can we reduce bycatch mortality?

- 2007 and 2010 workshops with the fishing industry, scientists, and public to discuss bycatch reduction technologies in New England and Mid-Atlantic trawl fisheries
- Research needs included:
 - Improving the Turtle Excluder Devices (TEDs) currently required in the summer flounder fishery
 - Developing a TED appropriate for the croaker fishery that is capable of handling large target catch rates
 - Evaluating technology to monitor and enforce tow duration
 - Tow time data logger testing in the field

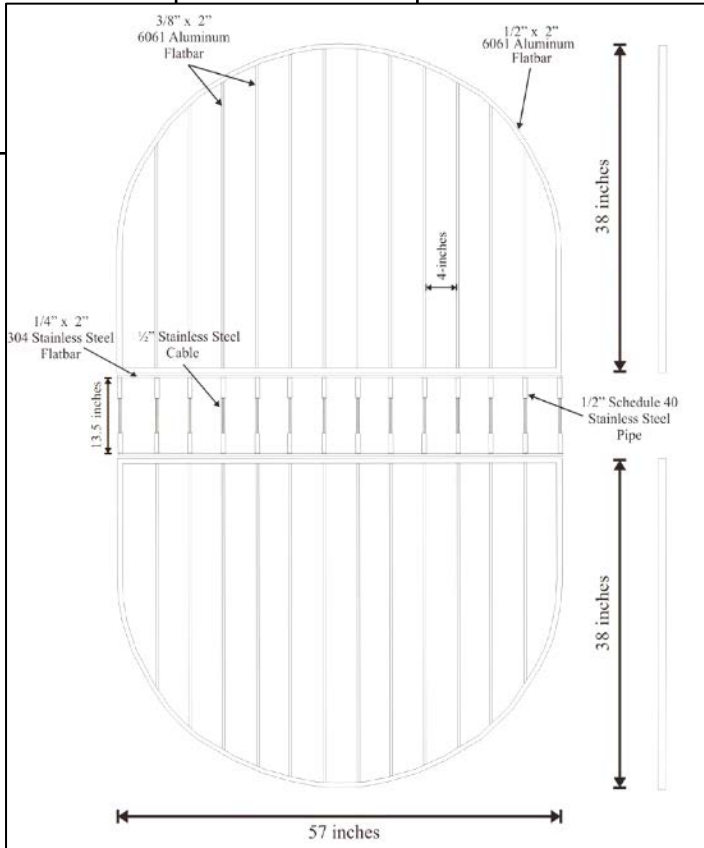




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Atlantic croaker/ weakfish

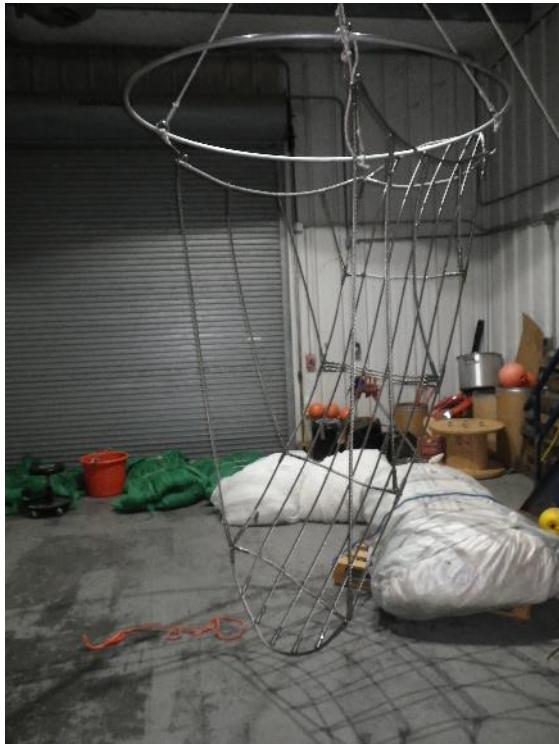
TEDs being considered	Escape opening (location, size)	Study details	Catch retention - target species	Other catch species
Flexible Flatbar Flynet	Top opening, large	<p><i>Years:</i> 2008-2009 <i>Location:</i> Off North Carolina <i>Tows completed:</i> 23 <i>Design:</i> Trouser trawl <i>Other:</i> 2 additional tows targeted bluefish and 12 targeted menhaden</p>	<ul style="list-style-type: none"> • ↓ 4% • Not statistically significant 	<ul style="list-style-type: none"> • ↓ 73% bluefish • ↓ 43% menhaden • ↓ 36 (weight) to 44% (number) sharks • ↓ 66 (weight) to 58% (number) rays • All statistically significant • Primarily spiny dogfish and clearnose rays



TEDs being considered	Escape opening (location, size)	Study details	Catch retention - target species	Other catch species
TI Cable TED	Top opening, large	<p><i>Year:</i> 2011 <i>Location:</i> Off Delaware Bay <i>Tows completed:</i> 13 <i>Design:</i> Unpaired tows <i>Other:</i> Tested in area of high ray/shark/horseshoe crab bycatch</p>	<ul style="list-style-type: none"> • >30,000 lbs landed 	<ul style="list-style-type: none"> • Ten times lower with cable TED installed • Primarily large rays and sharks
		<p><i>Years:</i> 2015-2017 <i>Location:</i> Off North Carolina <i>Tows completed:</i> 28 <i>Design:</i> Paired tows; alternate haul design</p>	<ul style="list-style-type: none"> • ↓ 19-77% (n=28 tows) • ↓ 54% when highly variable tows excluded (n=19 tows) • High variability due to sampling design and high volume catch • >20,000 lbs landed 	



TEDs being considered	Escape opening (location, size)	Study details	Catch retention - target species	Other catch
TII Cable TED	Bottom opening, large	<i>Years:</i> 2019-2020 <i>Location:</i> Suriname <i>Tows completed:</i> 38 <i>Design:</i> Paired tows; twin trawler	<ul style="list-style-type: none"> ● ↓ 16% in target catch ● Statistically significant (p=0.047) 	<ul style="list-style-type: none"> ● ↓ 40% ● Mainly stingrays (↓ 60%) ● Statistically significant

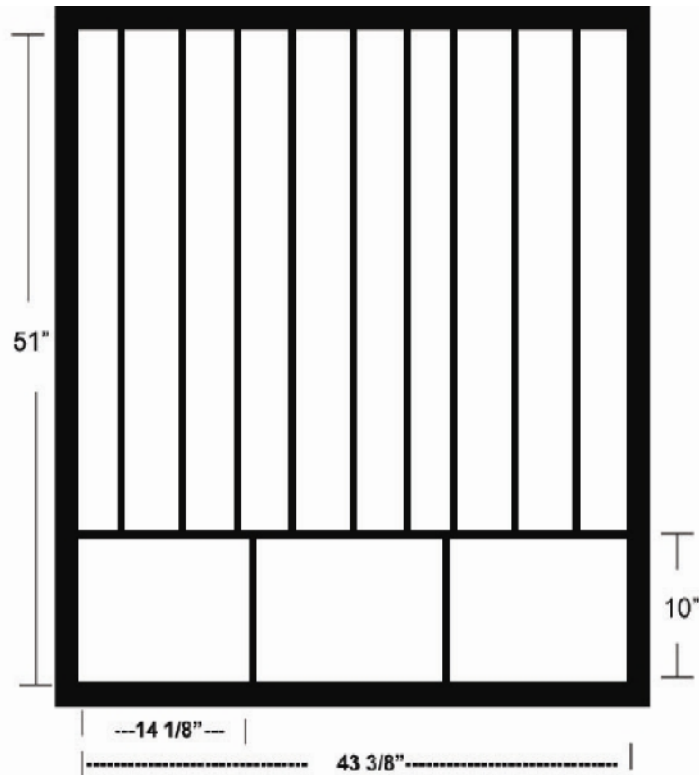




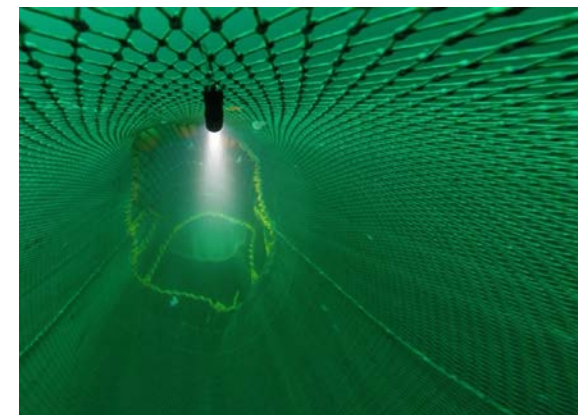
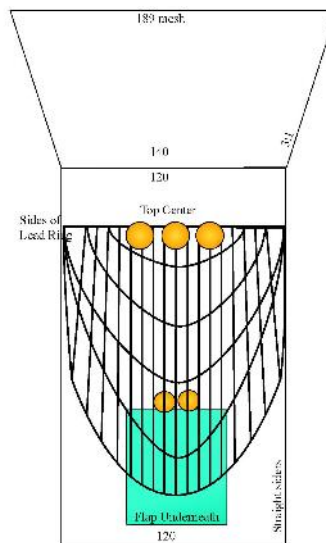
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Longfin squid

TEDs being considered	Escape opening (location, size)	Study details	Catch retention - target species	Other catch
Flounder TED (large size)	Top opening, large	<p><i>Year:</i> 2009</p> <p><i>Location:</i> Off southern MA, Hudson Canyon, offshore New Jersey and Maryland</p> <p><i>Tows completed:</i> 42 (16 tows after modification)</p> <p><i>Design:</i> Paired tows; alternate hauls</p>	<ul style="list-style-type: none"> • ↓ 55% initially (significant) • ↓ 10% after TED extension attachment modified • Not statistically significant 	<ul style="list-style-type: none"> • ↓ 25% initially • ↓ 3% after TED extension attachment modified • Dominant species included scallops (↓11%), spotted hake (↑74%), and butterfish (↑88%) after modification • All not statistically significant

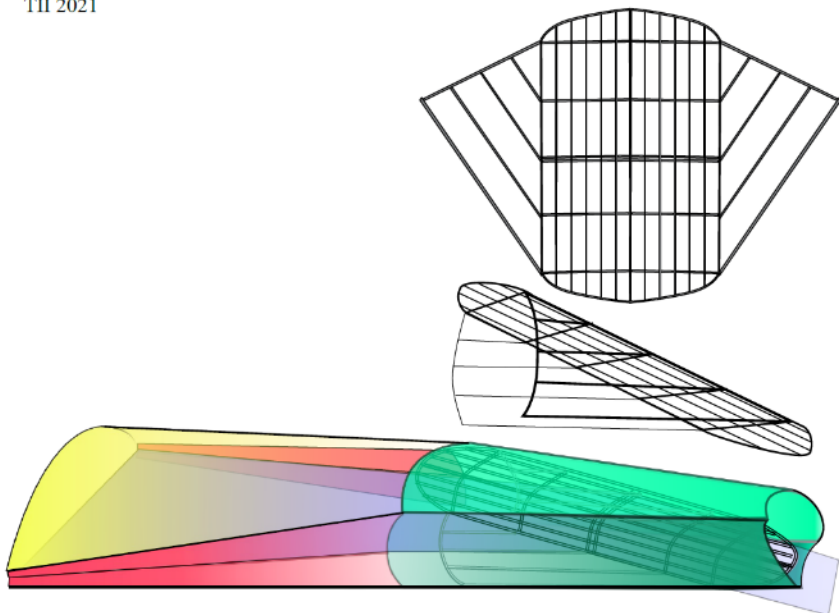


TEDs being considered	Escape opening (location, size)	Study details	Catch retention - target species	Other catch
TI Cable TED	Top opening, large	<p><i>Year:</i> 2017</p> <p><i>Location:</i> Hudson Canyon</p> <p><i>Tows completed:</i> 29 (17, then modified net flotation and conducted 12 additional tows)</p> <p><i>Design:</i> Paired tows; twin trawler</p>	<ul style="list-style-type: none"> ● ↓ 11% after modified net floatation ● No statistically significant difference (in catch and size of squid) 	<ul style="list-style-type: none"> ● ↑ 92% benthic invertebrates ● ↑ 42% benthic invertebrates after modified net floatation ● ↑ 85% finfish ● ↑ 34% finfish after modified net floatation
	Bottom opening, large	<p><i>Year:</i> 2018</p> <p><i>Location:</i> Hudson and Berkeley/Spencer Canyons</p> <p><i>Tows completed:</i> 28</p> <p><i>Design:</i> Paired tows; twin trawler</p>	<ul style="list-style-type: none"> ● ↑ 4% ● No statistically significant difference (in catch and size of squid) 	<ul style="list-style-type: none"> ● ↓ 47% invertebrates and trash ● ↓ 0.4% finfish



TEDs being considered	Escape opening (location, size)	Study details	Catch retention - target species	Other catch
TII Cable TED	Bottom opening, large	<p><i>Years:</i> 2019-2000</p> <p><i>Location:</i> Suriname</p> <p><i>Tows completed:</i> 38</p> <p><i>Design:</i> Paired tows; twin trawler</p>	<ul style="list-style-type: none"> ● ↓ 16% in target catch ● Statistically significant (p=0.047) 	<ul style="list-style-type: none"> ● ↓ 40% ● Mainly stingrays (↓60%) ● Statistically significant

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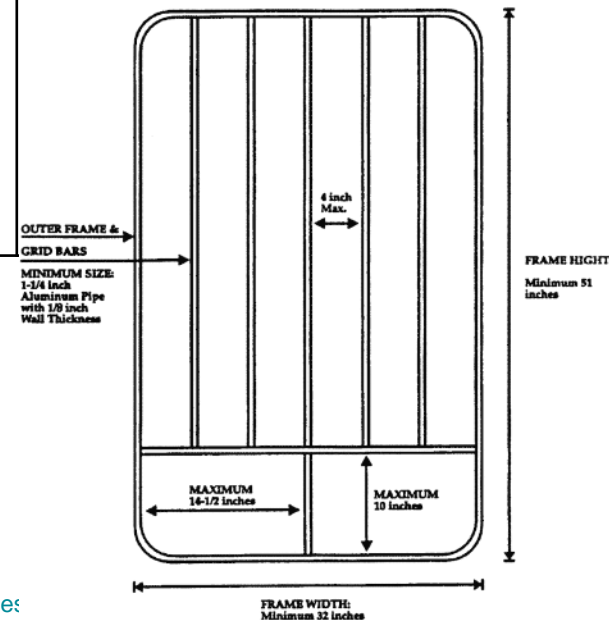




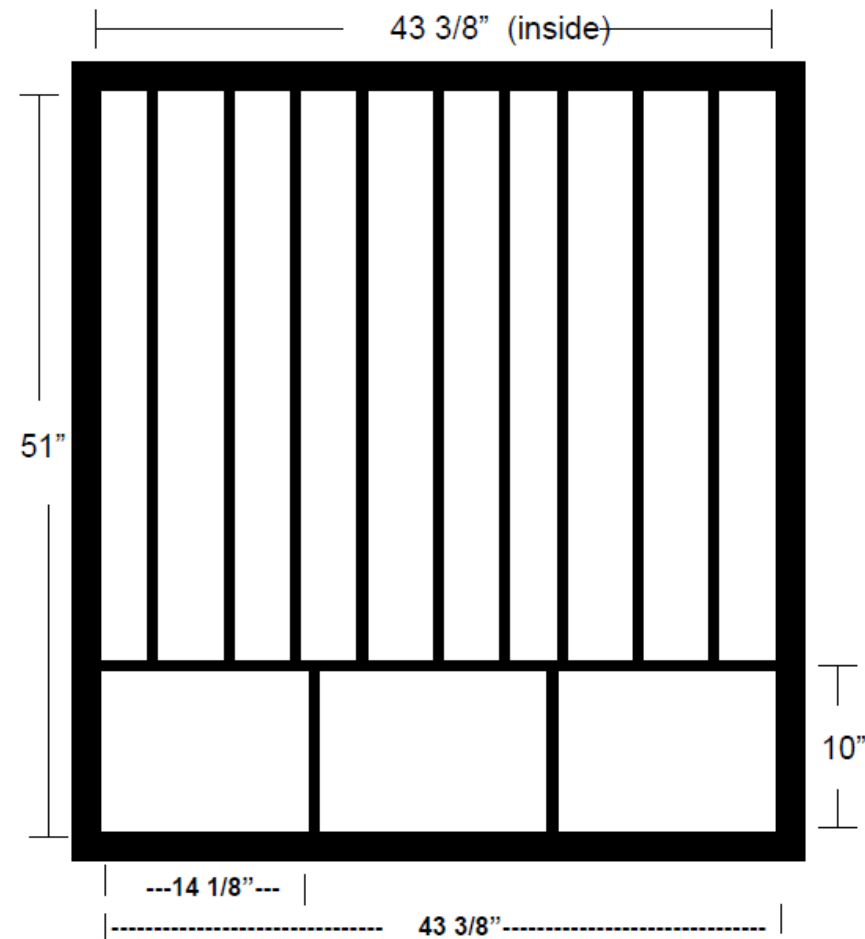
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Summer flounder

TEDs approved	Escape opening (location, size)	Study details	Catch retention - target species	Other catch
Flounder TED	Top opening, small	<p><i>Year: 2007</i> <i>Location: East of Delmarva and south of Long Island</i> <i>Tows completed: 37</i> <i>Design: Paired tows; alternate haul design</i></p>	<ul style="list-style-type: none"> ● ↓ 35% ● Statistically significant ● No difference in the size distribution of retained summer flounder 	<ul style="list-style-type: none"> ● ↓ 36% total ● Dominated by skates and rays (↓46%) ● Statistically significant ● Fished in areas with high rates of skate and ray bycatch, so clogging affected TED performance ● Horseshoe crab (↓34%), monkfish (↓49%), spiny dogfish (↓2%), smooth dogfish (↑2%), <i>Loligo</i> squid (↓18%) ● Not statistically significant
	Top opening, large	<p><i>Year: 2006</i> <i>Location: Off North Carolina</i> <i>Tows completed: 27</i> <i>Design: Paired tows, twin trawler</i></p>	<ul style="list-style-type: none"> ● ↑ 17% (by weight) ● Not statistically significant 	

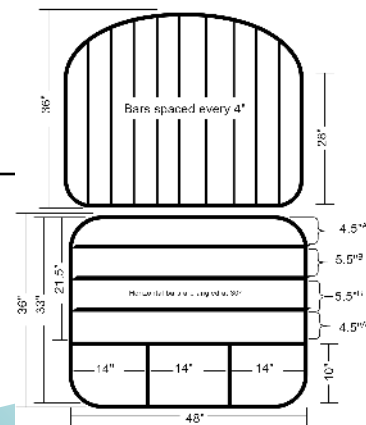


TEDs approved	Escape opening (location, size)	Study details	Catch retention - target species	Other catch
Large flounder TED	Top opening, large	<p><i>Year:</i> 2009</p> <p><i>Location:</i> Off Delaware through Long Island</p> <p><i>Tows completed:</i> 40</p> <p><i>Design:</i> Paired tows; alternate haul design</p>	<ul style="list-style-type: none"> ● ↓ 13% ● Not statistically significant ● ↓ 43% of large, “jumbo” summer flounder 	<ul style="list-style-type: none"> ● ↓ 34% total ● Dominated by skate (↓26%) ● Spiny dogfish (↓43%), smooth dogfish (↓54%), horseshoe crab (↓79%), croaker (↑23%)



Photos from Salerno and Eayrs 2010

TEDs approved	Escape opening (location, size)	Study details	Catch retention - target species	Other catch
Modified flounder TED	Modified flounder TED: top opening, small; Flounder TED: top opening, small	<i>Year:</i> 2009 <i>Location:</i> East of Delmarva and south of Long Island <i>Tows completed:</i> 43 <i>Design:</i> Paired tows, alternate haul design	<ul style="list-style-type: none"> • No statistically significant difference between 2 TEDs, in both catch and size • Thus assumes modified flounder TED with small escape opening has same catch loss (↓35%) as flounder TED with small escape opening 	<ul style="list-style-type: none"> • No statistically significant difference between 2 TEDs for non-target catch • No statistically significant difference between 2 TEDs for skates/rays and smooth/spiny dogfish • Modified flounder TED clogged less by skates/rays and dogfish and easier to haul aboard net reels
	Modified flounder TED: top opening, large; Large flounder TED: top opening, large	<i>Years:</i> 2009-2010 <i>Location:</i> Off North Carolina <i>Tows completed:</i> 32 <i>Design:</i> Paired tows, alternate haul design	<ul style="list-style-type: none"> • Modified flounder TED marginally improved catch retention • Modified flounder TED improved handling onboard net reels • No statistically significant difference between 2 TEDs • Thus assumes modified flounder TED with large escape opening has same catch loss (↓13%) as large flounder TED with large escape opening 	<ul style="list-style-type: none"> • No statistically significant difference between TEDs • Modified flounder TED marginally decreased bycatch levels • Dominated by clearnose skate, winter skate, spiny dogfish





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Limited tow times

Limited tow times with data loggers



- Turtle mortality increases with tow duration
- Incidental capture data suggest turtles survive tow durations under 1 hour
- Provides an alternative to TEDs
- NMFS tested data loggers that record and monitor tow duration in trawl fisheries
 - 9 vessels from MA-VA with hauls targeting mostly summer flounder and horseshoe crab
 - Timer that recorded tow duration started/ended when doors passed 5 m depth
 - Withstood fishing conditions and reliably recorded tow duration and detected tow exceedance
- Final research proposed – testing data loggers with new technology (Bluetooth, collect environmental data)

How can we reduce bycatch mortality?

Measures under consideration

- 1) requiring TEDs with a large escape opening in trawls that target Atlantic croaker, weakfish, and longfin squid to reduce injury and mortality resulting from accidental capture in these fisheries
- 2) moving the current northern boundary of the TED requirements in the summer flounder fishery to a point farther north to more comprehensively address capture in this fishery
- 3) amending the TED requirements for the summer flounder fishery to require a larger escape opening to allow the release of larger hard-shelled and leatherback sea turtles
- 4) adding an option requiring limited tow durations, if feasible and enforceable, in lieu of TEDs to provide flexibility to the fisheries



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Public input desired...

What information is needed?

Mitigation Measures

- Other measures we should consider (e.g., time/area management, other gear measures)
- Temporal and geographic scope of measures
- Applicability of limited tow times in the different fisheries
- How to define the fisheries for sea turtle conservation measures, considering existing definitions

What information is needed?

Operational Considerations

- Operational issues that may occur with TEDs
- Appropriateness of including weakfish with Atlantic croaker given the similarities between the gear and fisheries
- Data loggers can also collect environmental data (e.g., bottom temperature) that could be accessed by fishermen at sea. Are there environmental parameters that would be informative to your fishing operations?

What information is needed?

Economic Considerations

- Would you be more likely to adopt limited tow durations (i.e., <1 hour) or TEDs?
- Additional costs associated with using a TED (e.g., extra fuel, additional tows, labor, other operational and catch considerations).
- If the TED causes target catch loss, would this be compensated through longer tows, additional tows, or another strategy?
- TEDs can reduce unwanted bycatch (e.g., skates, rays) in some situations. Is this an issue and would reducing catch of these species have an economic impact?
- Range of tow durations that may be used from May through November
- Typical trip length, and how many tows typically complete in 24 hours
- If limited tow duration causes catch loss, would this be compensated through additional tows and what would be the associated economic impacts?

Input/Public Comment Opportunities

Written comment: Email nmfs.gar.turtletrawl@noaa.gov. Input will be accepted until May 31, 2022.

Verbal comment:

- Virtual stakeholder webinars: 6:30-8:30 pm
 - February 16 (croaker focus)
 - March 1 (longfin squid focus)
 - March 14 (summer flounder focus)
- Call in days: (978) 281-9276
 - March 4 (8 am-3 pm); March 22 (noon-6 pm)
- Advisory Panel (longfin squid, summer flounder) coordination
- April Council meeting: provide summary of what we've heard and accept any additional comments from you



For more information, descriptions of TED designs, measures under consideration, information needed, and how to comment and participate in webinars, visit <https://www.fisheries.noaa.gov/sea-turtle-bycatch-reduction-trawl-fisheries>.

Thank You! Questions?



For more information, contact:
Carrie Upite (carrie.upite@noaa.gov, 978.282.8475)



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Additional information

(not presented during meeting)

Why croaker?

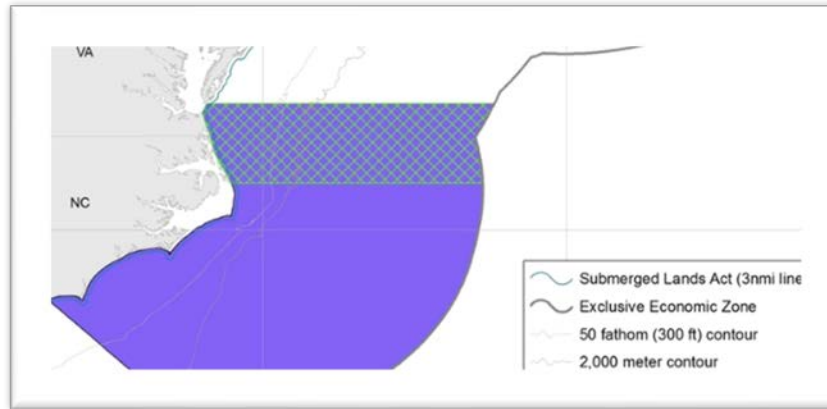
- 95 observed takes in croaker top landed trips (by hail weight) from 2000-2019
 - No observed takes on weakfish trips; considering weakfish with croaker fishery as harvested with the same type of trawl gear, same times, same areas, and often by the same vessels
 - Recognize current commercial landings lower than early 2000s
 - Remains high take potential - 20 sea turtles were observed on two trips
-
- Considering new TED requirements in the fishery or option for limited tow times
 - Final research proposed – expanded usability testing, TED construction workshops with net shops

Why longfin squid?

- 54 observed takes in longfin squid top landed trips (by haul weight) from 2000-2019
 - Annual interactions ranged from 0 to 15
-
- Considering new TED requirements in the fishery or option for limited tow times
 - Final research proposed – turtle escapement, resizing TED for use on smaller vessels, evaluating operational feasibility of TEDs on multiple-sized vessels, and working with industry/manufacturers on TED install/handling techniques

Why summer flounder?

- Since mid-1990s, TEDs required off Virginia and North Carolina, with exemptions January 15-March 5 north of Oregon Inlet, NC



- Can use any approved hard TED
 - Most landings after 2012 occurred north of Cape Charles with the majority off New Jersey and New York
 - 51 observed takes in summer flounder top landed trips (by haul weight) from 2000-2019
- Considering expanding TED requirements in the fishery and increasing escape opening size, or option for limited tow times