



SCIENCE SNAPSHOT

June 4, 2025

Gulf Menhaden Purse Seine Fishery 2024 Bycatch Study Preliminary Results

Background

Menhaden are small, oily fish that are a vital food source for many marine animals like striped bass, red drum, ospreys, and dolphins. They are also commercially harvested by the reduction industry which uses them to make fish oil, fishmeal, and animal feed. If too much menhaden is harvested or removed from the ocean, it may harm marine ecosystems by starving predators, reduce sport fish populations which hurts recreational fishing and coastal economies, and increase bycatch. This issue exists in both the Atlantic and the Gulf of Mexico where menhaden are heavily fished by large industrial operations.

**A list of select key definitions are provided at the end of this document.*

Study Description

This study, conducted across the 2024 fishing season, evaluated bycatch associated with the Gulf of Mexico Menhaden Purse Seine Fishery. It was conducted by LGL Ecological Research Associates, Inc., a science and consulting firm specializing in fisheries and ecological research. The study used a stratified random sampling design across three processing plants (Empire, LA; Abbeville, LA; Moss Point, MS) and seven months (April–October). In the context of the bycatch study, this means that net sets were divided by month and processing plant location. Single fishing events were then randomly selected from each group for observation. The results aimed to quantify species composition, survival rates, and mortality impacts, supporting future conservation and regulatory measures. A final report is expected in July 2025.

Sampling Overview

- 418 of 13,144 total net sets sampled (3.2%)
- Sampling was distributed across months and locations to capture spatial and seasonal variation.

Total Bycatch Estimates (Extrapolated from 418 Sampled Sets)

Bycatch Type	Est. Fish per Set	Est. Total Fish (season-wide)
Rollover	~11	~145,700
Chute	~12	~153,600
Retained	~28	~367,500

Bycatch Species-Specific Highlights

Red Drum

- Rollover Bycatch: ~27,200 fish (17% mortality = ~4,500 deaths)
- Chute Bycatch: ~21,100 fish (98% mortality = ~20,500 deaths)

- Retained Bycatch: 0 observed
- Net Effect: **~25,000 red drum likely killed in 2024**

Black Drum

- Rollover Bycatch: ~19,800 (10% mortality = ~2,000 deaths)
- Chute Bycatch: ~7,800 (99% mortality = ~7,700 deaths)
- Net Effect: ~9,700 black drum killed

Spotted Seatrout

- Chute Bycatch: ~314
- Retained: ~818 (all killed)
- Total: ~1,132 caught, 100% mortality for retained

Atlantic Croaker

- Retained Only: ~122,500 (100% mortality)

Other Common Bycatch

- Rollover: Cownose rays, gafftopsail catfish, jack crevalle
- Chute: Gafftopsail catfish, cownose rays, blacktip sharks
- Retained: Sand seatrout, spot, gafftopsail catfish

Survival Study Results

Live bycatch were held for 24 hours in flow-through tanks aboard tenders. To make sure survival results reflected normal handling conditions and not artificial tank problems, two survival rate scenarios were analyzed by scientists:

1. **All Tanked Fish (Survival A)** – Includes every fish in the tank, even those exposed to low oxygen.
2. **Only Fish Not Exposed to Prolonged Hypoxia (Survival B)** – Excludes fish that were in the tank during periods of hypoxia (typically longer than 1 hour), giving a more accurate picture of what fish might survive under normal, well-managed conditions.

Rollover Bycatch – Survival Rates

Species	Survival (A)	Survival (B)
Red Drum	83.9%	82.8%
Black Drum	87.8%	91.9%
Gafftopsail Catfish	73.5%	73.5%

Chute Bycatch – Survival Rates

Species	Survival (A)	Survival (B)
Red Drum	2.1%	2.5%
Black Drum	2.2%	0%
Gafftopsail Catfish	40.9%	40.5%

Implications

- Rollover bycatch shows comparatively high survival potential, particularly for red and black drum.
- Chute bycatch has a higher mortality due to handling stress and pressure.
- Retained bycatch, representing the largest category by volume, results in total mortality.
- Vitality assessments (Reflex Action Mortality Predictor scores) correlate with survival probabilities, supporting predictive assessments of fish fate post-release.

2024 Menhaden Fishery Highlights

- Gulf Landings: 371,210 mt (~1.22 billion fish), a 14% drop (434,118 mt) from 2023.
- Atlantic Landings: 147,780 mt (~486 million fish), up 12% from 2023.
- There were 32 vessels active in Gulf; 11 vessels on Atlantic coast.
- In 2024, the Gulf experienced challenging environmental conditions that may have stressed fish populations and affected fishing patterns, including one of the largest hypoxic (low-oxygen) “dead zones” on record¹, unusually heavy rainfall, and an active hurricane season with 18 named storms.

A Brief Overview of Total Allowable Catch (TAC)

A TAC is a management tool used to prevent overfishing and ensure sustainable fish populations. In the Atlantic menhaden fishery, a coastwide TAC of 231,215 mt is in place through 2025.² In the Gulf menhaden fishery, however, TACs are not currently tied to ecosystem impacts or bycatch concerns, and management is handled at the state level.³ TACs may be set using single-species assessments (focused on a target fish) or ecosystem-based models which consider the role of the species as prey and the impact on predators and bycatch.

- In the Atlantic, TACs have been adjusted over time based on peer-reviewed stock assessments and growing ecosystem concerns.
- In the Gulf, while overall landings are reported, there is less formal integration of TACs into adaptive management, especially regarding the impact on bycatch like drum and croaker.

Takeaways

- Millions of non-target fish, including valuable sport fish like red drum and black drum, are impacted by the menhaden reduction fishery.
- Significant mortality occurs through chute and retained bycatch pathways, with limited survival for chute-exposed fish.
- Improving exclusion technologies and revising bycatch management strategies is essential to protect ecologically and economically important species.
- Gulf menhaden landings are high and bycatch data from the 2024 study show significant unintended mortality of red drum, black drum, and other sport fish.
- Current TAC frameworks do not account for bycatch losses of sport fish or feeding pressure from predators on the broader ecosystem. There is a clear need for:
 - Ecosystem-informed TACs that factor predator needs and bycatch mortality.
 - Bycatch-adjusted quotas or limits to reduce harm to non-target species.
 - Better accountability in Gulf menhaden management to match evolving standards in the Atlantic.

Key Definitions

- Bycatch – the unintentional capture of non-target species.
- Rollover Bycatch – non-target fish remaining in the net but not pumped aboard. Generally larger individuals.

- Chute Bycatch – non-target fish pumped aboard but rejected via a grate before reaching the hold. High mortality due to pressure and handling.
- Retained Bycatch – non-target fish that pass through the grate and are stored with the menhaden catch resulting in 100% mortality.
- Stratified Random Sampling – A way of collecting data where the population is split into smaller, similar groups, and samples are taken randomly from each group to ensure that all types of situations or areas are fairly represented.
- Set – A single fishing event where a purse seine net is deployed to encircle a school of fish, then closed, and the catch brought aboard or processed. In practice, a set typically includes spotting, deploying the purse seine net around the school, closing the net at the bottom, pumping the catch from the net into the boat, and releasing any fish left in the net after pumping.
- Purse seine net – A large, curtain-like net that wraps around a school of fish and closes at the bottom, like a drawstring on a purse, to keep them from escaping.
- Tenders – Also called “run boats,” are vessels that do not themselves fish but transport and pump fish from the nets. For this bycatch study, these tenders were equipped with large, specially designed holding tanks called flow-through tanks.
- Flow-through tanks – Large containers on a boat filled with saltwater that constantly flows in and out, helping to keep the water fresh and oxygenated, similar to the fish’s natural environment.
- Tanked fish – Individual fish placed in flow-through tanks for a full day to measure their short-term survival. Each fish was monitored for signs of stress or injury and assessed again after 24 hours. Those that survived were tagged and released.
- Hypoxia – Low oxygen in the water, with levels so low that fish and other marine life may suffocate and become highly stressed. In the survival study, some tanks temporarily experienced hypoxia, especially when too many fish were placed in a tank or when water flow slowed down. This affected the accuracy of survival data.
- Total Allowable Catch (TAC) – The maximum amount of a specific fish species that can be legally harvested in a given year.
- Metric Ton – 1 metric ton = 1,000 kilograms or about 2,205 lbs. This is roughly equivalent to the weight of a small car. A landing of 371,210 mt is about 820 million pounds.

Citations

- 1 <https://www.noaa.gov/news-release/gulf-of-mexico-dead-zone-larger-than-average-scientists-find>
- 2 A Review of the Atlantic menhaden (*Brevoortia tyrannus*) fishery in coastal Maine waters: ecology, assessment, management, and future research recommendations. July 2024. https://www.maine.gov/dmr/sites/maine.gov/dmr/files/inline-files/Menhden_paper_final%20%28002%29.pdf?utm_source
- 3 Fishery Assessment Report: IFFO Global Standard for Responsible Supply of Fishmeal and Fish oil. (August 2018). https://www.marin-trust.com/sites/marintrust/files/approved-raw-materials/USA%20Gulf%20Menhaden%20Surveillance%20yr%202%20August%202018.pdf?utm_source

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The Science Snapshot is intended to provide an overview of science-based topics and convenings that are relevant to the mission of the TRCP. If you have additional questions, please contact Jamelle Ellis at jellis@trcp.org.