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UNIVERSITY OF MIAMI
COOPERATIVE INSTITUTE for MARINE & ATMOSPHERIC STUDIES

Tab C, No. 6(a)

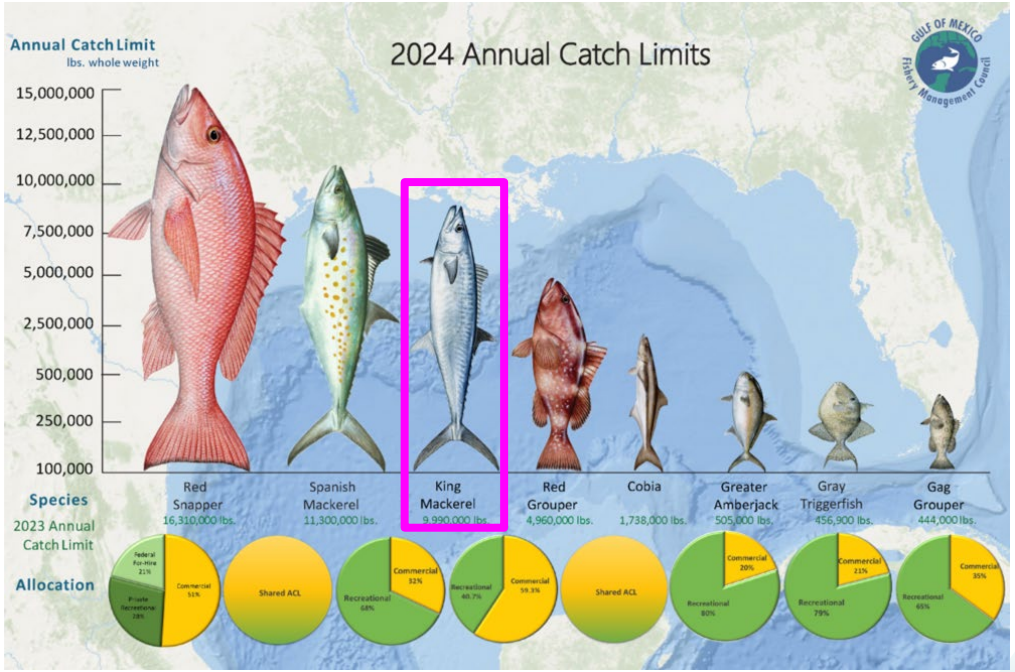
Gulf of Mexico King Mackerel: A preliminary assessment and response to GMFMC data request

Read Hendon, Walter Ingram, Mandy Karnauskas, **Brendan Turley***
***brendan.turley@noaa.gov**

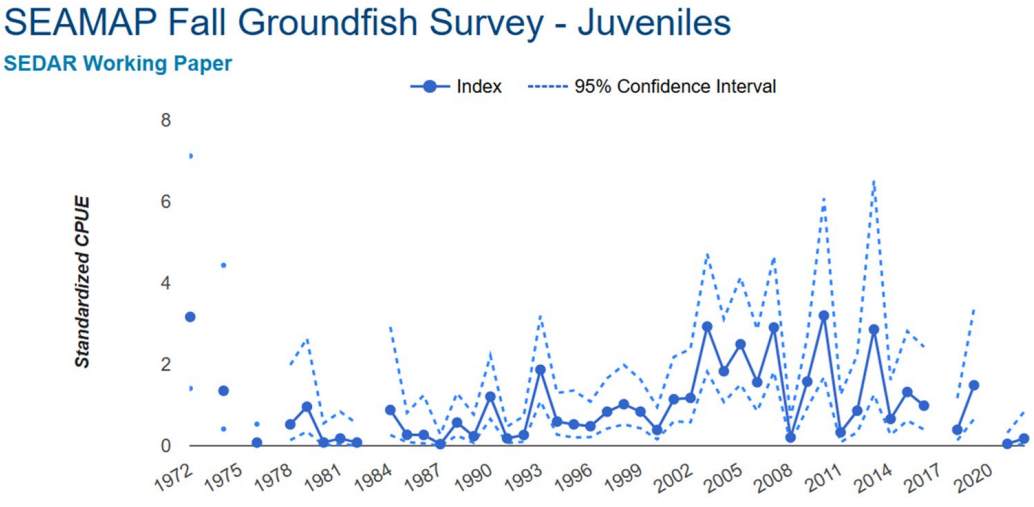
Gulf of Mexico Fishery Management Council Meeting
2025 January 27
Tab C

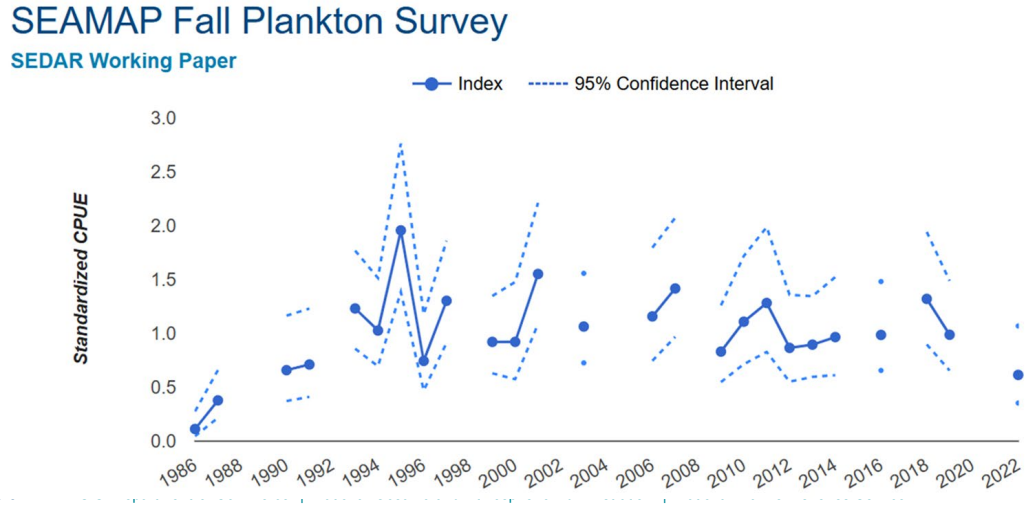
Purpose and need

- SEDAR38 Update (terminal year 2017) estimated stock **not overfished** and **not undergoing overfishing**
- SEDAR38U resulted in lower catch limits because SSB was above MSST but below MSY
- High level of uncertainty in SEAMAP juvenile index used in Interim Assessment (2023) resulted in no changes to catch advice
- <u>GMFMC requested additional data on commercial sector from SEFSC to assess KMK stock status for use in potential management actions</u>



MSST = Minimum Stock Size Threshold
MSY = Maximum Sustainable Yield
SSB = Spawning Stock Biomass





Fishery Independent Indices

* Gulf-wide monitoring programs not specifically geared for King Mackerel.

- Juvenile abundance data are from SEAMAP Fall Groundfish Survey uses a bottom trawl and does not consistently sample the pelagic environment where King Mackerel typically occur.
- Larval abundance data are from SEAMAP Fall Plankton Survey which typically occurs in September and is therefore only sampling a portion of the spawning season for King Mackerel (May-Oct).

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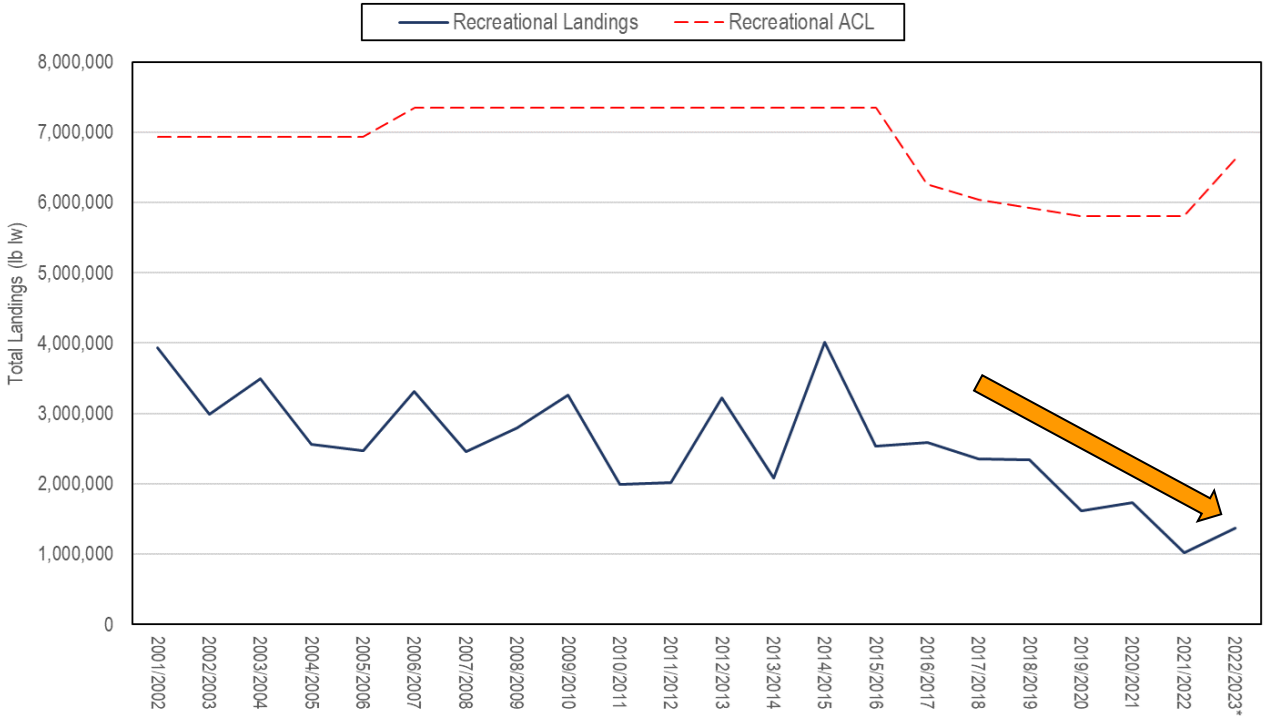
KMK Recreational landings versus ACL



- Recreational landings have decreased ~2.6 million lbs since fishing year 2001/2002 (↓ 65%)
- Have not achieved recreational ACL in past 22 years

Annual (fishing year) recreational landings of king mackerel in the GOM relative to ACL. Data are from Table 1.1.3. of 2024 Draft Framework document.

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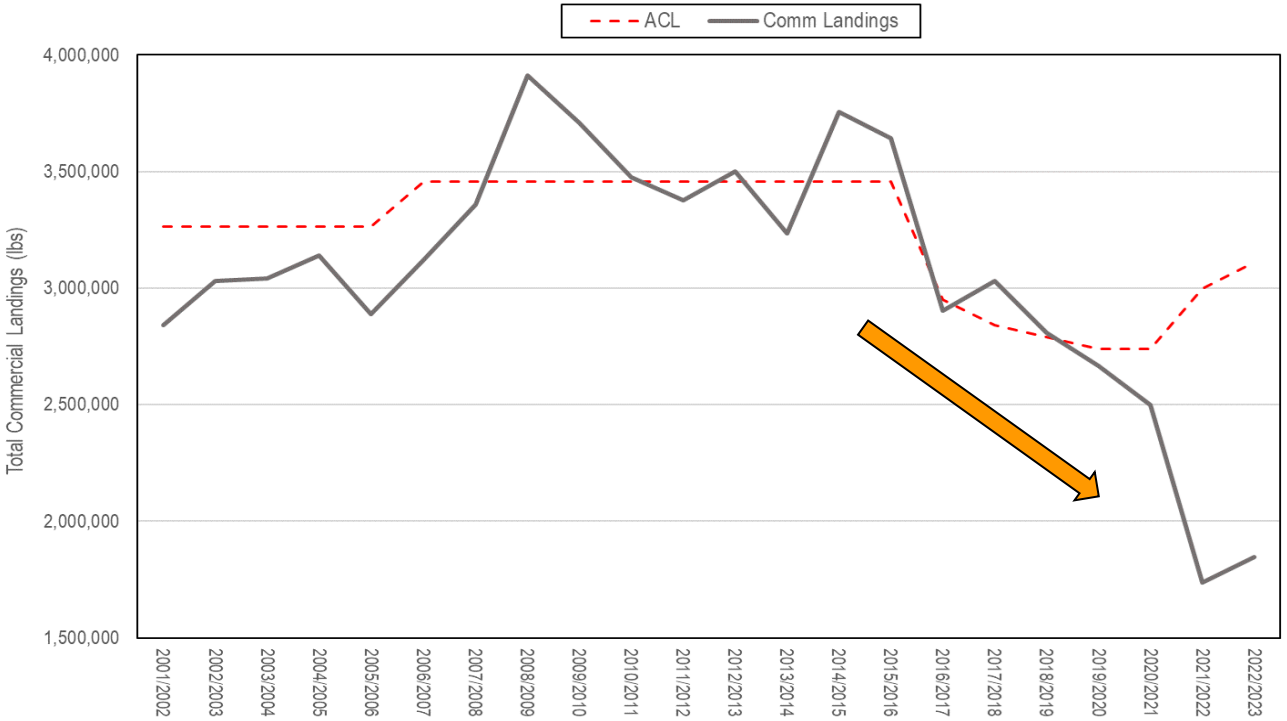
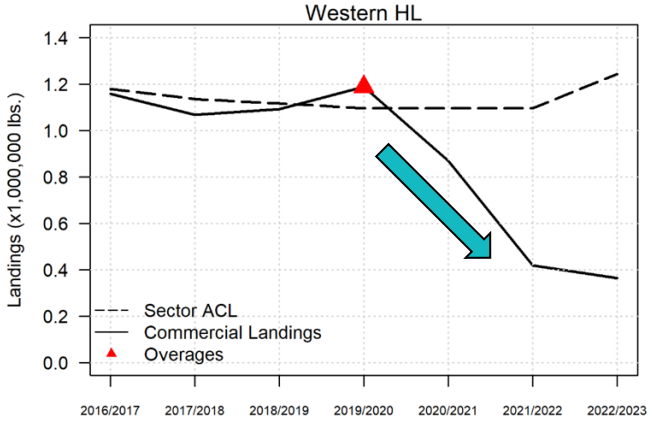
KMK Commercial landings versus ACL

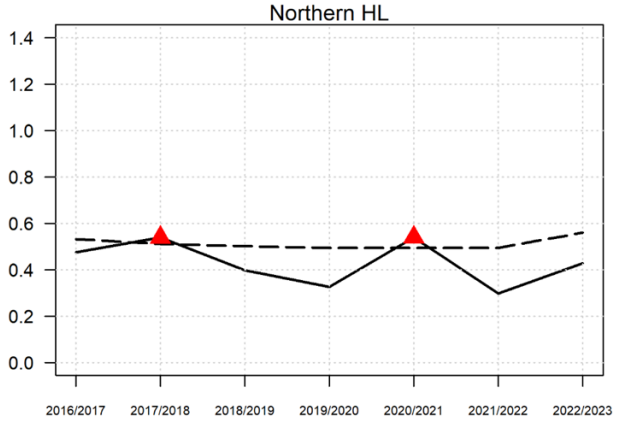


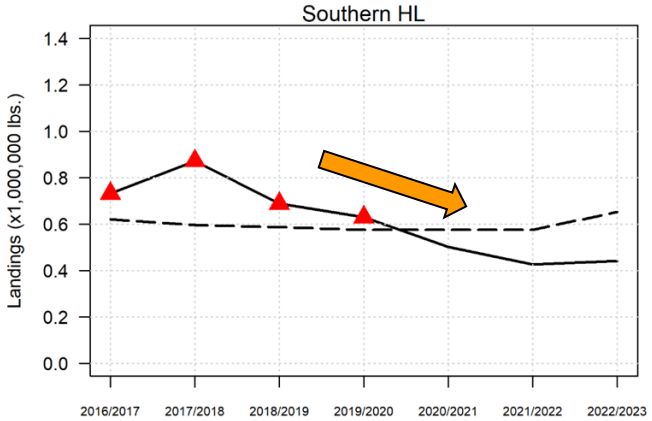
- Commercial landings have decreased ~1.8 million lbs since fishing year 2015/2016 (↓ 50%)
- Have not achieved commercial ACL since fishing year 2018/2019

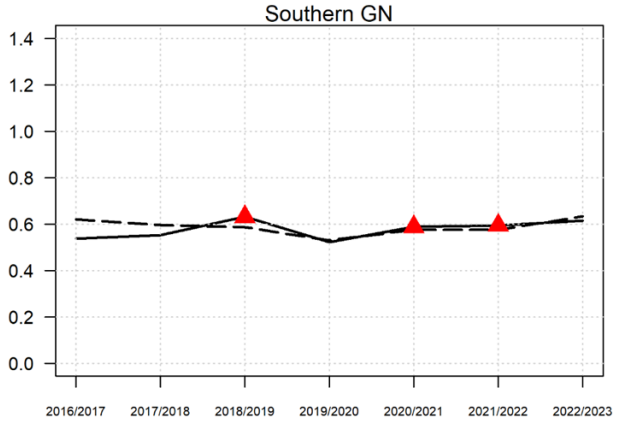
Based on data from Table 1.1.4. - *Reported zone-specific annual commercial landings relative to the total commercial ACL since 2001/2002 – 2002/2003 fishing year in lb lw; HL = hook-and-line; GN = gillnet* - from 2024 Draft Framework document: https://gulfcouncil.org/wp-content/uploads/C-5-KM_FA-15_Catch-limit_rec-bag-limit_6_20_v2.pdf

Post-Amendment 26 commercial landings by zone

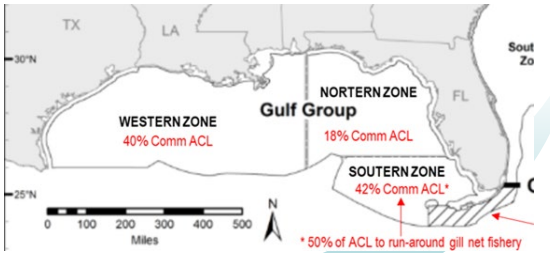




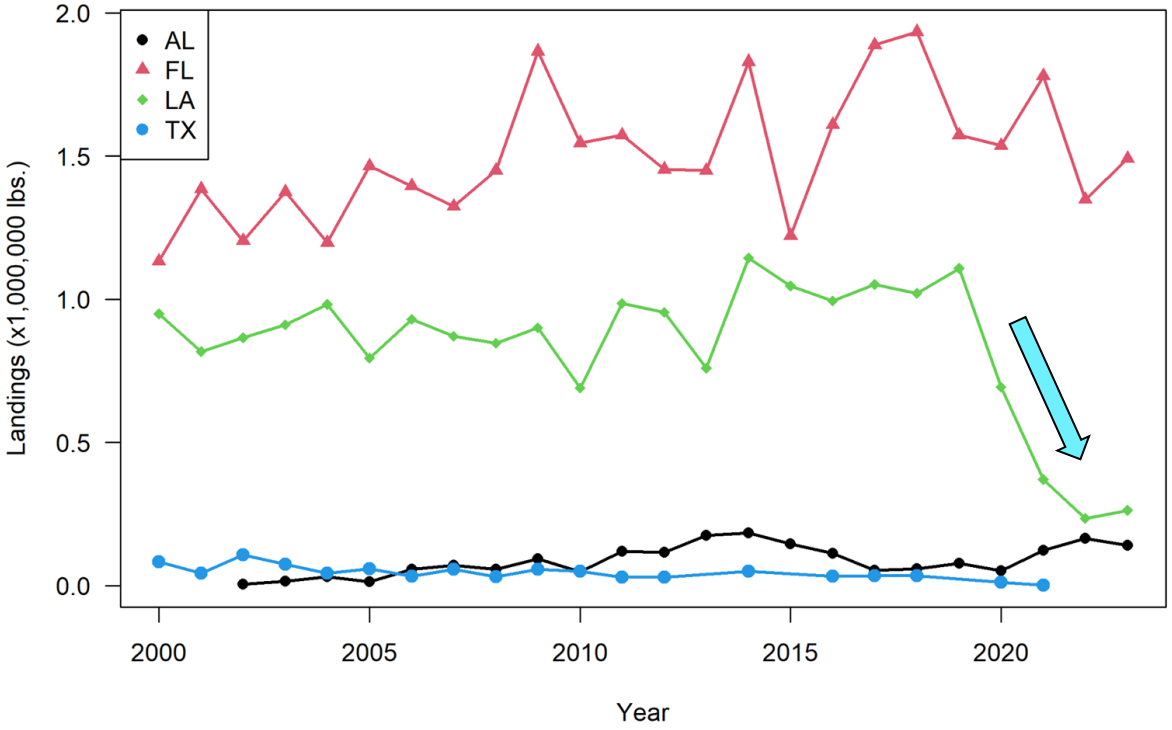




- Decrease in Western HL - ↓ ~70%
  - Port agents indicated offshore trips may be less economically viable
- Decrease in Southern HL - ↓ ~50%



Commercial landings by State



- Louisiana landings decrease starting 2020 (↓ ~75%)
- Mississippi landings confidential (not shown)
- Alabama landings (2000-2001) and Texas landings (2013, 2015, 2019, 2022-2023) confidential (not shown)
- Data from Gulf States Marine Fisheries Commission - Gulf Fisheries Information Network (GulfFIN) public database

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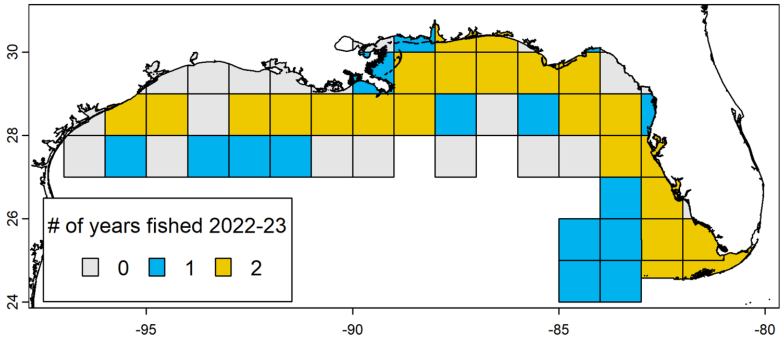
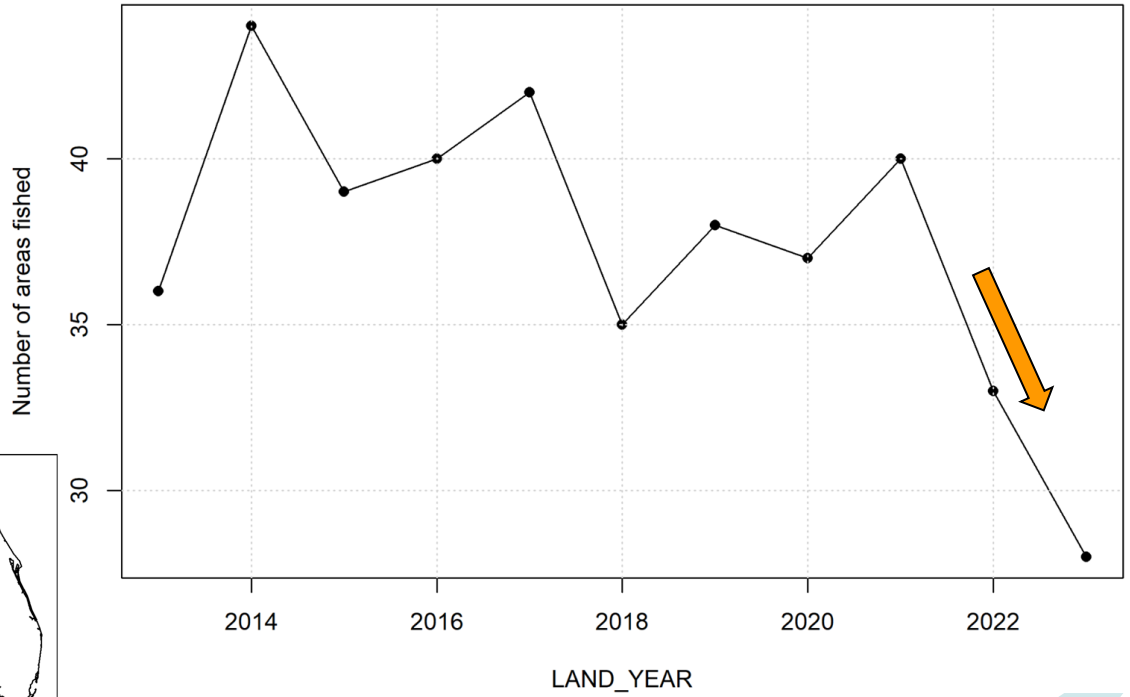
Coastal Logbook Data - Number of Areas Fished

- Coastal Logbook data began 1x1 degree reporting 2013
- No strong trends except reduction in number of areas fished (↓ ~30%) from 2021 to 2023
- Grids not fished in 2022-2023 are primarily coastal and offshore TX and LA





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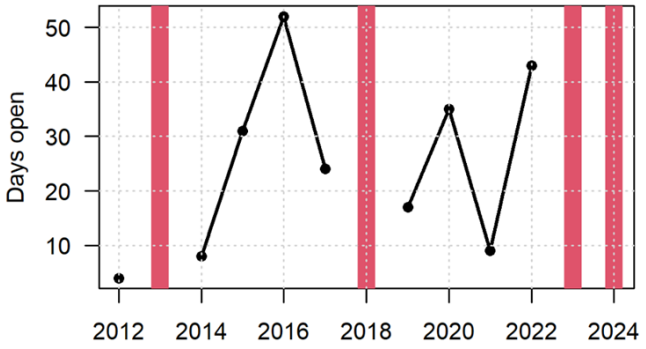
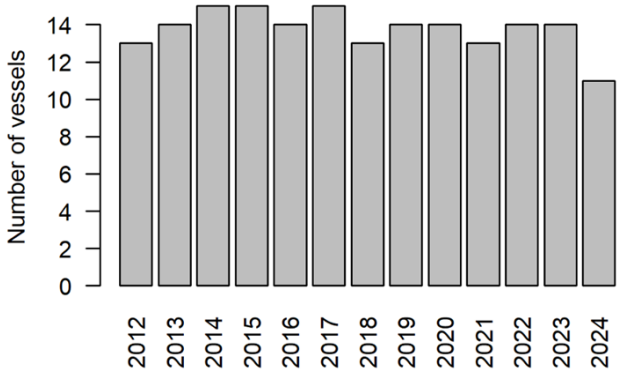
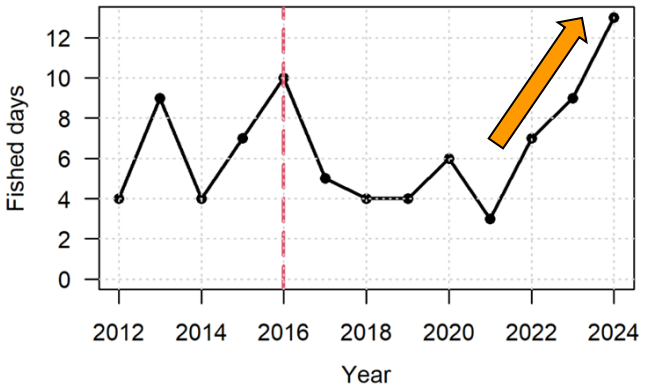
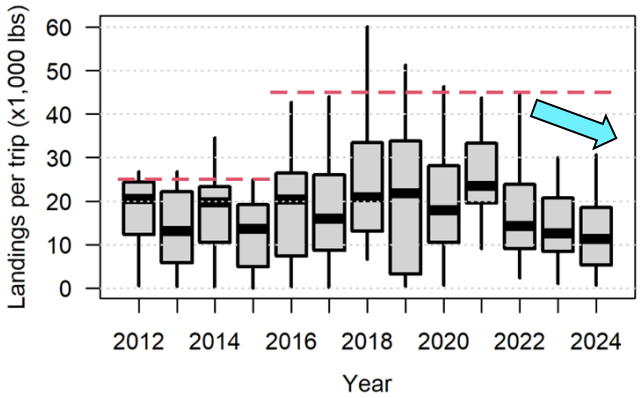
Southern gillnet daily landings









- Approximately 20% of the annual commercial ACL
- Increasing number of days fished
- 2016 trip limit changed from 25K lbs to 45K lbs (dashed red lines)
- Before 2016, trips regularly hit limit, but after few reach limit
- Median landings per trip has been decreasing over past 3-4 years
- Size of KMK schools have been decreasing (port agent reported)

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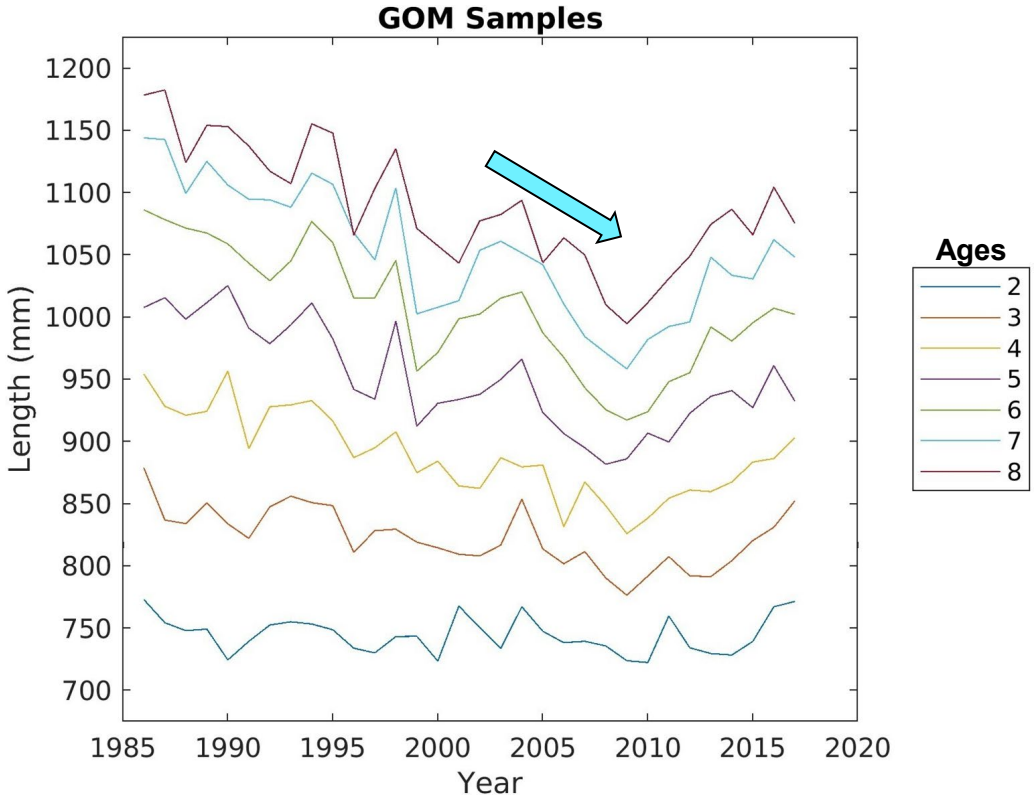
Gulf of Mexico KMK lengths at age



- Declines in mean lengths at age, primarily in older age classes and females
- Even with slight rebound ~2009, overall reduction in length at age
- Older fish tend to be smaller, and less fecund, which may point to food/growth issue
- 10% reduction in length = ~30% reduction in weight = >30% reduction in total reproductive output

*Analysis from manuscript in prep (Shropshire et al.) and data courtesy of SEFSC Panama City Lab

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Baitfish (menhaden) abundance and trends

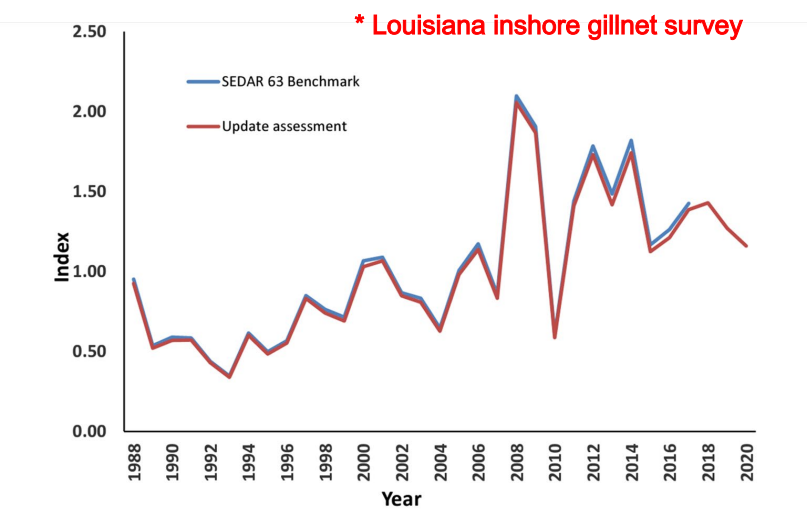

Figure 2. The gillnet index from the benchmark SEDAR 63 assessment and updated for the current assessment.

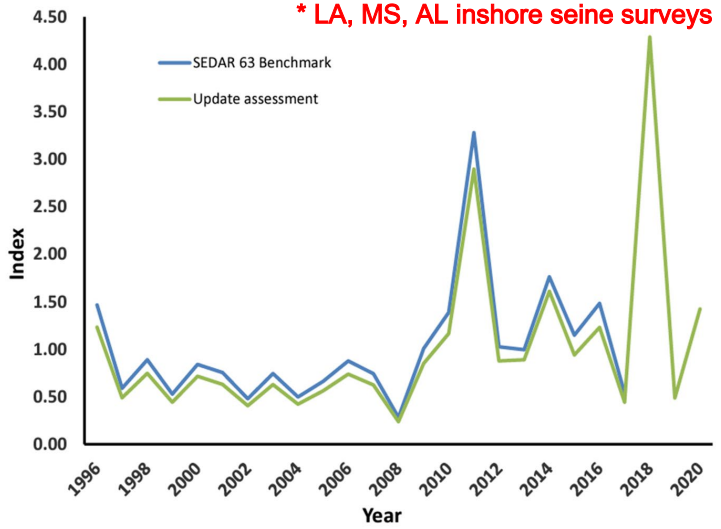

Figure 3. The seine index from the benchmark SEDAR 63 assessment and updated for the current assessment.

* No standardized or Gulf-wide monitoring programs for estimating the abundance of Gulf menhaden (or other pelagic bait species) in GoM, for adults or juveniles.

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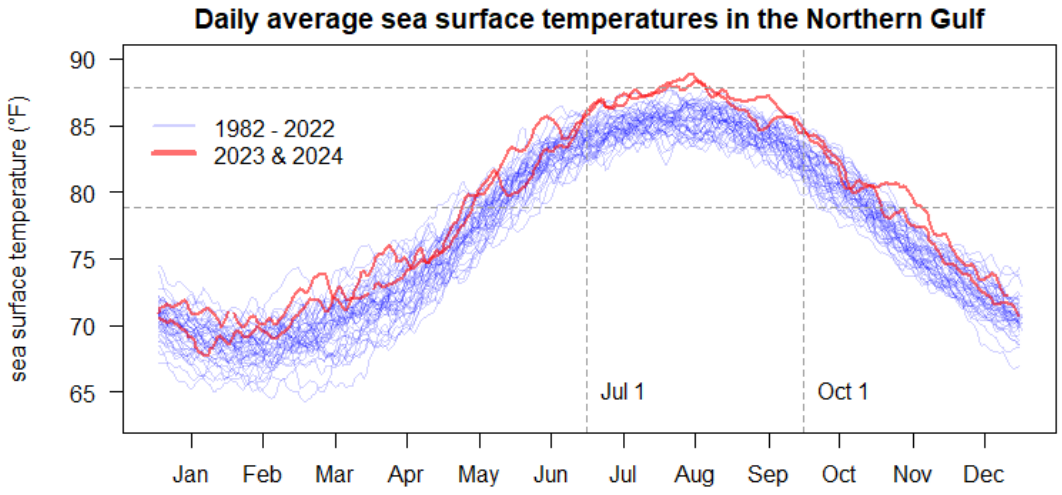

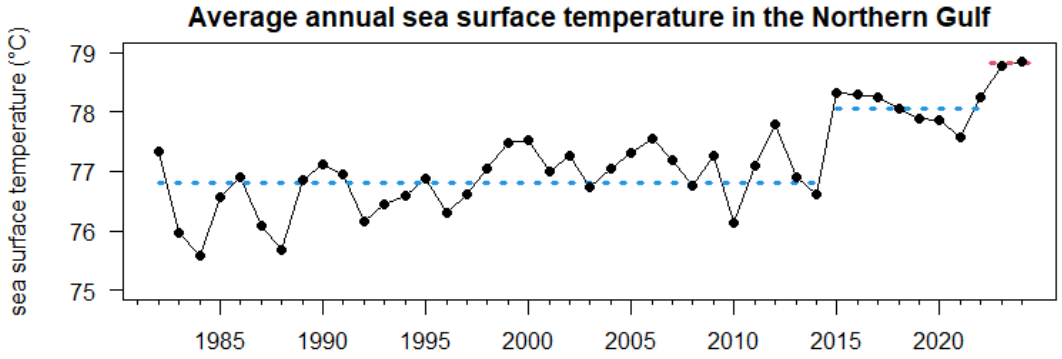

Environmental considerations

- King mackerel larvae found in temperatures between 78.8 - 87.8 °F (Denson 2021)
- Larvae fast-growing with high metabolism; short development stage
- Temperatures in the Northern Gulf (north of 26N latitude) increasing over time; 2023 and 2024 particularly warm
- Sea surface temperatures in 2024 well above average during the entire year
- Temperatures in recent years are 2°F above the historical (1982-2014) average

Data source: Huang et al. (2020) NOAA 0.25-degree Daily Optimum Interpolation Sea Surface Temperature (OISST), Version 2.1. NOAA National Centers for Environmental Information. https://doi.org/10.25921/RE9P-PT57. Accessed Jan 2025.

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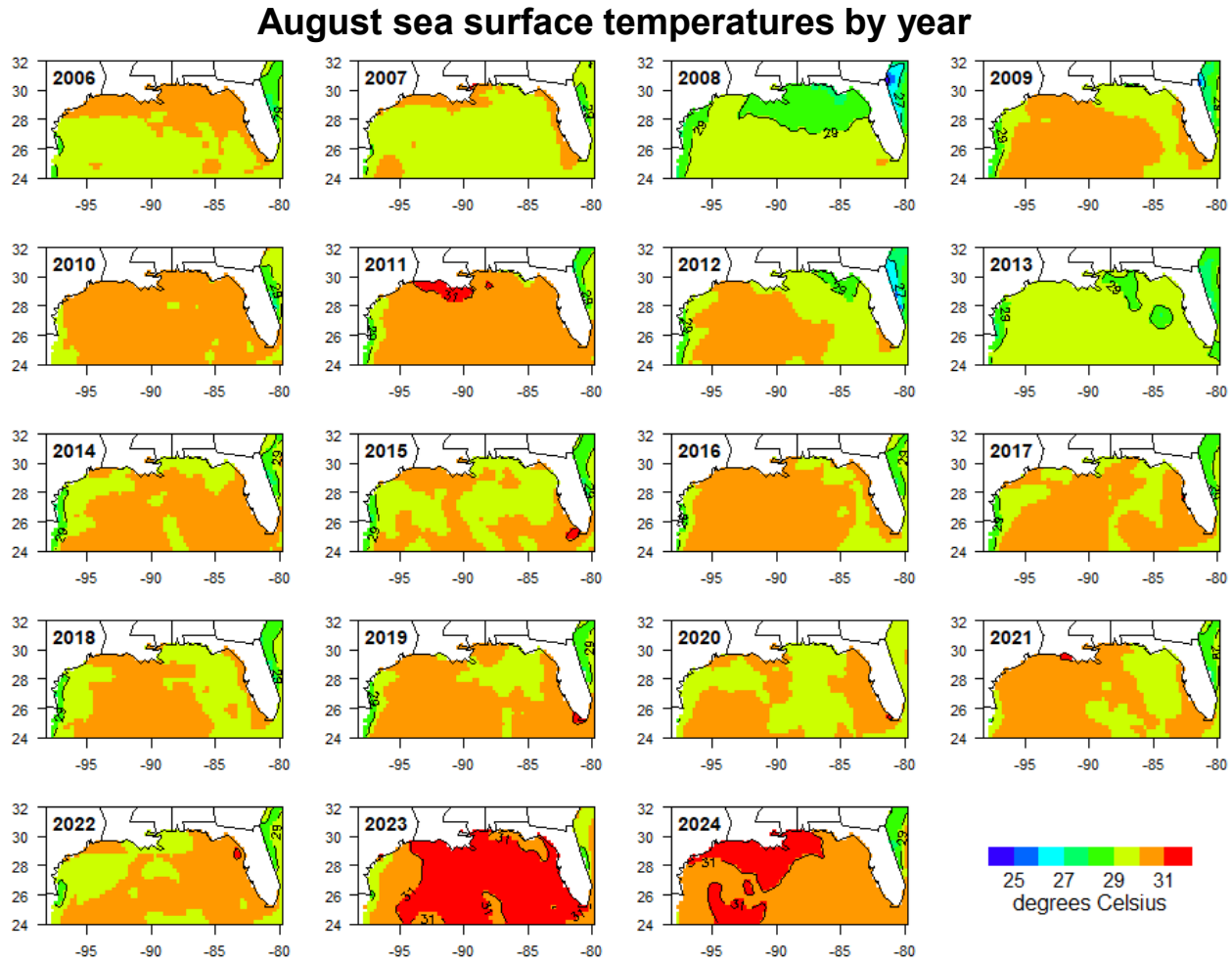

Environmental considerations

- Spawning in May - Sept, peak spawning in June - August
- Broad areas of the Gulf with sea surface temperatures above 31° C in recent years (red contour)

Possible impacts:

- Adults may move to deeper waters with more suitable spawning temperatures
- Larval metabolism increases with temperature and larvae may face starvation above a certain threshold

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Summary - recent anomalies

Analyses show a number of anomalous patterns:

- Recreational landings **reduced** by 65% since 2001/2002
- Commercial landings **reduced** by nearly 50%; low quota usage*
- ~70% **decrease** in commercial handline landings in Western Zone*
- ~75% **decrease** in commercial landings out Louisiana*
- ~30% **decrease** in total area fished (based on coastal logbook data)*
- Southern gillnet landings per trip has **decreased**; **increasing** number of days fished to reach quota*
- ~10% **reduction** mean length at age for older ages and more pronounced in females
- Standardized catch rates **declined** in SEAMAP fall plankton and fall groundfish surveys*
- **Increased** sea surface temperatures across the northern Gulf of Mexico, particularly during spawning season*

***Since 2021**

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Summary - possible explanations

- Species abundance decline…
  - due to fishing effort (e.g., undetected overfishing)?
  - due to changes in environment (e.g., temperature-induced recruitment failure)?
- Population distribution shift…
  - farther offshore in Gulf, due to depletion nearshore, changes in bait distribution, or temperature preferences?
  - to different region (e.g., to U.S. Atlantic waters)?
- A combination of some or all of the above

In all of these cases, protecting spawning stock biomass <u>may</u> facilitate stock resilience in the face of changing conditions

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