Electronic Monitoring Documentation of Mutton Snapper (*Lutjanus analis*) in the Eastern Gulf of Mexico Bottom Longline Fishery

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SEDAR 79 - Mutton Snapper

August 4, 2023

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Overview of Electronic Monitoring Efforts in the Gulf of Mexico Commercial Bottom Longline Reef Fish Fishery

The Center for Fisheries Electronic Monitoring at Mote (CFEMM) has been pioneering electronic monitoring (EM) in the Gulf of Mexico (GoM) commercial reef fish fishery since 2016, utilizing Saltwater Inc. hardware and software. Industry volunteer participation has included collaborations with 22 commercial bottom longline (BLL) and vertical line vessels. Data reported for mutton snapper (*Lutjanus analis*) was generated by 15 Eastern Gulf of Mexico (EGoM) BLL vessels fishing out of ports along Florida's west coast from Cortez, FL to Inglis, FL from July 2016 through December 2022.

- Mutton Snapper = 819
- Catch Events = 107,030
- Trips = 392
- Hauls Reviewed = 2,136 (Represents 25% of all potentially analyzable set-haul events)
- Sea Days = 3,450

Video Review Protocol

Saltwater Inc. (SWI) (Anchorage, AK) Electronic Monitoring Unit hard drives from participating vessels are collected during dockside visits or mailed by the respective captains or vessel owners. These drives are loaded to workstations, where SWI review software is used to annotate the collected video footage. Sets and hauls are marked along a timeline by reading associated sensor data (hydraulic pressure and rotation). Subsamples of 25% of complete set/haul events from each trip are reviewed. Each recorded catch event is assigned characteristics based on a series of custom dropdown menus for the reviewer to select from. These variables include:

- **Species**
- **Handling**
    - Brought onboard,
    - Not handled (dropped off),
    - Cutoff at rail (no entanglement),
    - Cutoff at rail (entanglement), or
    - Unknown handling.
- **Condition**
    - Live healthy,
    - Live stomach and/or eyes protruding,
    - Live damaged,
    - Dead on arrival damaged,
    - Dead on arrival undamaged, and
    - Unknown condition.

- **Fate**
    - Retained,
    - Retained as bait,
    - Discarded live healthy (vented),
    - Discarded live healthy (not vented),
    - Discarded live damaged (not vented),
    - Discarded live damaged (vented),
    - Discarded dead,
    - Discarded unknown, and
    - Unknown fate.
- **Shark Specific Attributes**
    - Sex - Male/Female
    - Maturity - Juvenile/Known Adult
    - Size Estimate - Small (>1m), Medium (1.1 to 2.9m), and Large (>3m)

Post-Review Processing

Resulting data navigates a CFEMM established QA/QC process where all annotated events and sensor data anomalies are reviewed by experienced staff to screen for identification errors or missing catch. Aggregated groupings of trips are further screened using "R", applying a series of over 75 error checks to flag any abnormalities. Once approved, final data is appended to the master database in Microsoft (MS) Access™. For reporting purposes, additional automatic calculations and environmental metadata are linked to the MS Access™ database through an export routine in "R", allowing for key variables to be associated to catch events such as depth, average temperature, and bottom type, with over 200 variables recorded.

Overview of Mutton Snapper (*Lutjanus analis*) Occurrence in the EGoM BLL Fishery

The EGoM BLL fishery primarily targets red grouper (*Epinephelus morio*), red snapper (*Lutjanus campechanus*), and yellowedge grouper (*Epinephelus flavolimbatus*) (across the West Florida Shelf from The Edges to the Dry Tortugas. The CFEMM documented 819 captures of mutton snapper on EGoM BLL gear targeting reef fish, from 2,136 reviewed hauls. Mutton snapper in the region were the eighth most frequently caught species on this gear type and were recorded on 9.7% of all BLL hauls reviewed.

Catch and Fleet Effort Distribution

Mutton snapper were recorded on BLL gear from 24.46° latitude to 28.50° latitude, and as far west as 84.88° longitude, with the majority being recorded south of 26° latitude (Figure 1). These individuals were encountered in depths from 39m to 114.1m, with an average capture depth of 70.5m. Catch per unit effort (CPUE) was calculated based on hook-hours, using the EGoM regulatory limit of 750 hooks. The average species-specific

CPUE within 10 x 10 minute grid cells is depicted in Figure 2. Results showed high CPUE in the southern portion of the fishing area outside of the Pulley Ridge and Dry Tortugas boundaries. A hotspot analysis conducted for mutton snapper shows significant clustering of individuals coinciding with areas of high CPUE adjacent to these southern closed areas (Figure 3). A generalized additive model (GAM) was generated based on hook-hours to show CPUE at the haul level (Figure 4), depicting annual and seasonal effort changes that coincide with hotspot grid cells in Figure 3.

Condition on Arrival, Discards, and Depredation

At vessel mortality for this species was 3.78%, with 0.85% showing signs of depredation (Table 1). Retention rates are high (>99%), with nominal discards primarily occurring due to damaged catch (Table 2), as the majority of catches were large individuals and well above the minimum commercial size limit.

Management Factors Influencing Catch in the BLL Fishery

Mainly a bycatch species in this fishery, mutton snapper are rarely a primary target, except on occasion during the BLL seasonal closure. This closure occurs inside 35 fathoms annually from June to September in an effort to reduce interactions with sea turtles. Over 84% of captures occur outside of this seasonally closed area, as shown in Figure 1. This three month time period accounts for 44% of all mutton snapper recorded, with 98% of the catch during this time occurring south of 26° latitude. This effort shift also coincides with mutton snapper spawning.

While the primary targets of this fishery are IFQ limited ("pay to play"), mutton snapper are not, making them an economically valuable option to target seasonally. This allows for full retention of legal sized mutton snapper, without the need to own or lease quota. With limited availability of gag grouper (*Mycteroperca microlepis*) quota into the foreseeable future, there is the potential for vessels to increase effort in mutton snapper prevalent areas, being that regions outside of the summer closure may be less economically beneficial if gag grouper are unable to be retained.

Table 1. Condition of mutton snapper on arrival on BLL gear in the EGoM.

Condition On Arrival	% of Mutton Snapper
Dead on Arrival - Damaged	0.85
Dead on Arrival - Undamaged	2.93
Live - Damaged	0.61
Live - Healthy	82.78
Live - Stomach and/or Eyes Protruding	12.70
Unknown Condition	0.12

Table 2. Fate of mutton snapper on BLL gear in the EGoM.

Catch Fate	% of Mutton Snapper
Discarded - Dead	0.61
Discarded - Live and Healthy (Not Vented)	0.12
Discarded - Live and Healthy (Vented)	0.24
Retained	99.02

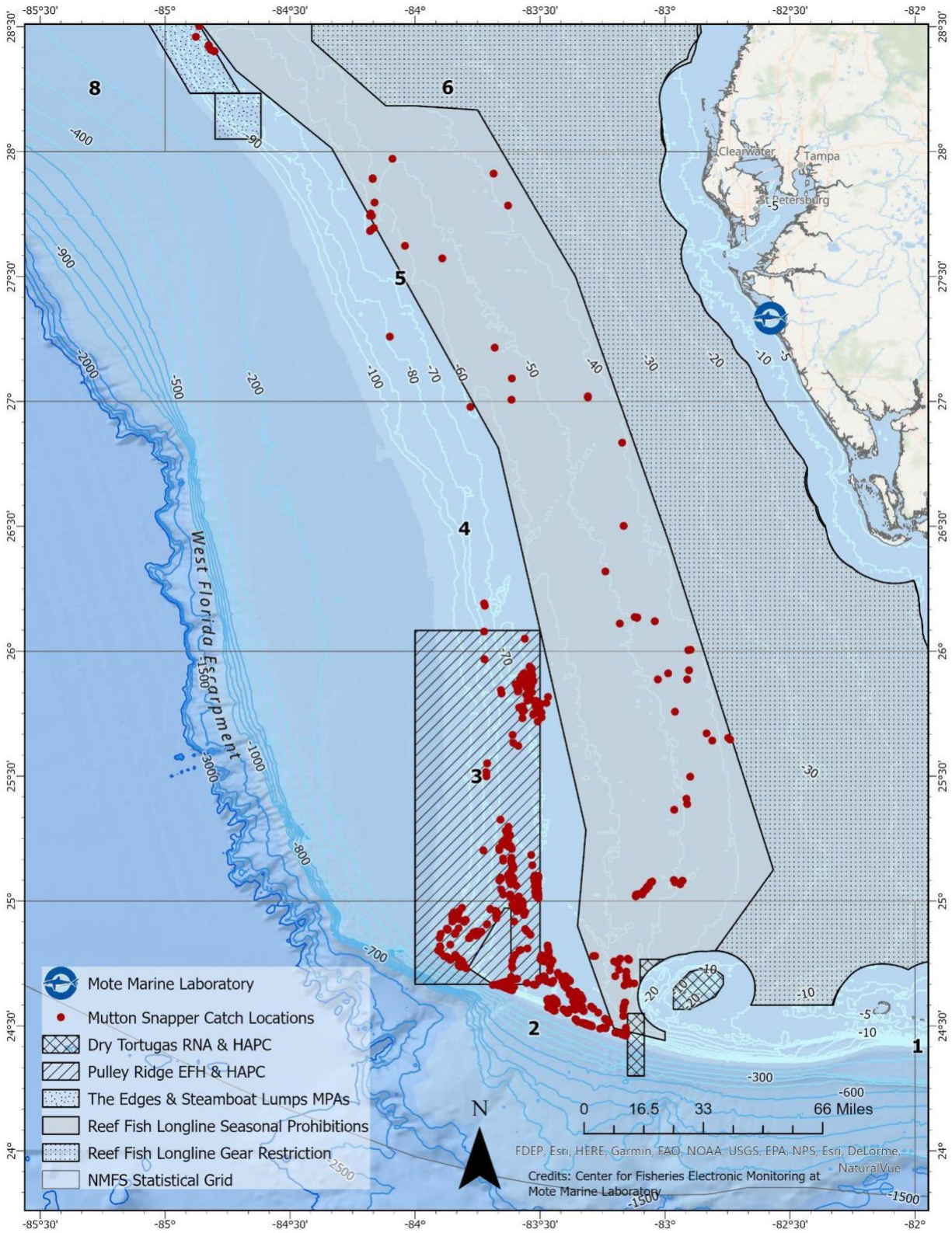

Figure 1. Individual locations of mutton snapper recorded in the EGoM BLL fishery (*n*=819).

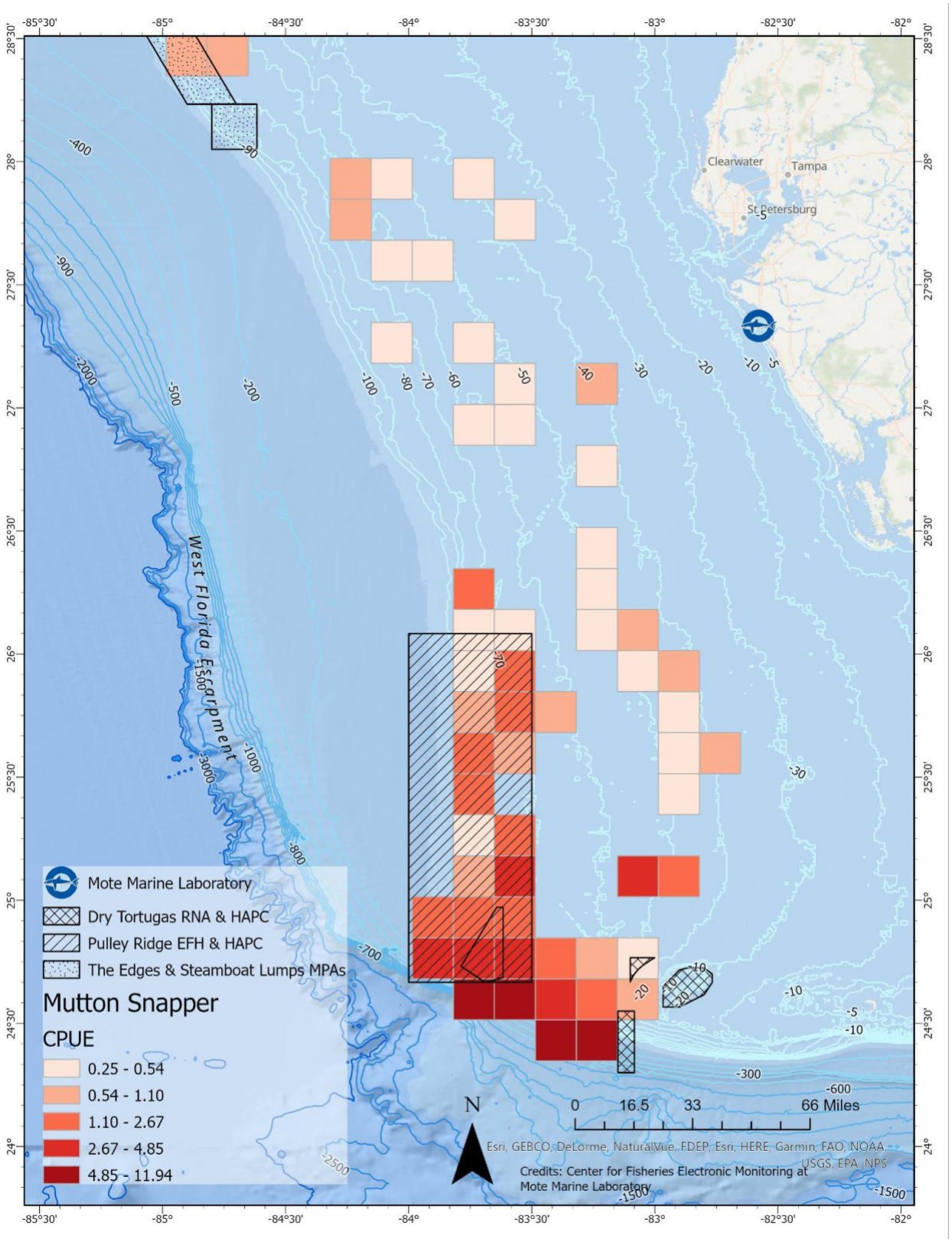

Figure 2. Catch per unit effort of mutton snapper in the EGoM BLL fishery with a grid cell size of 10 x 10min.

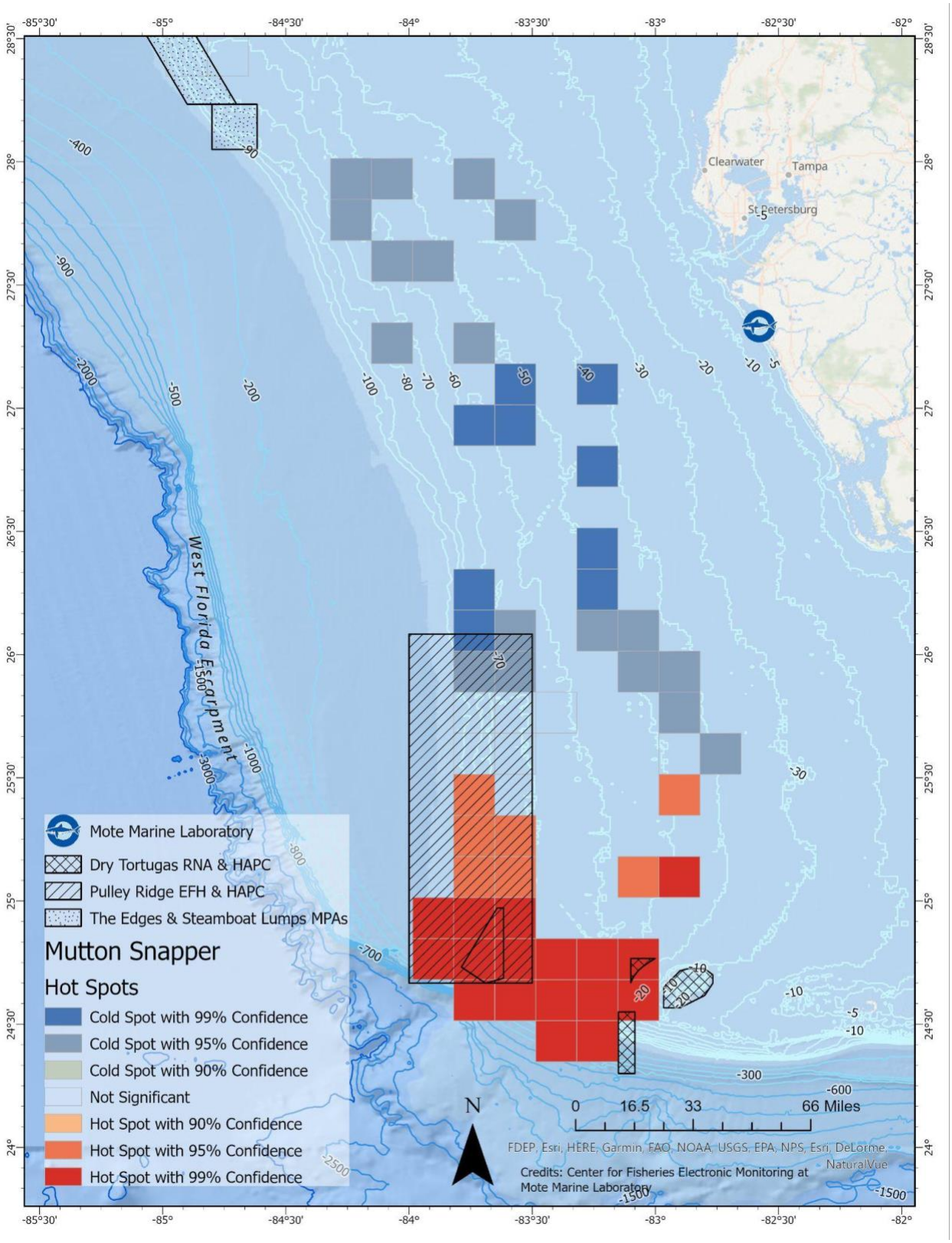

Figure 3. Hotspot analysis for mutton snapper in the EGoM BLL fishery.

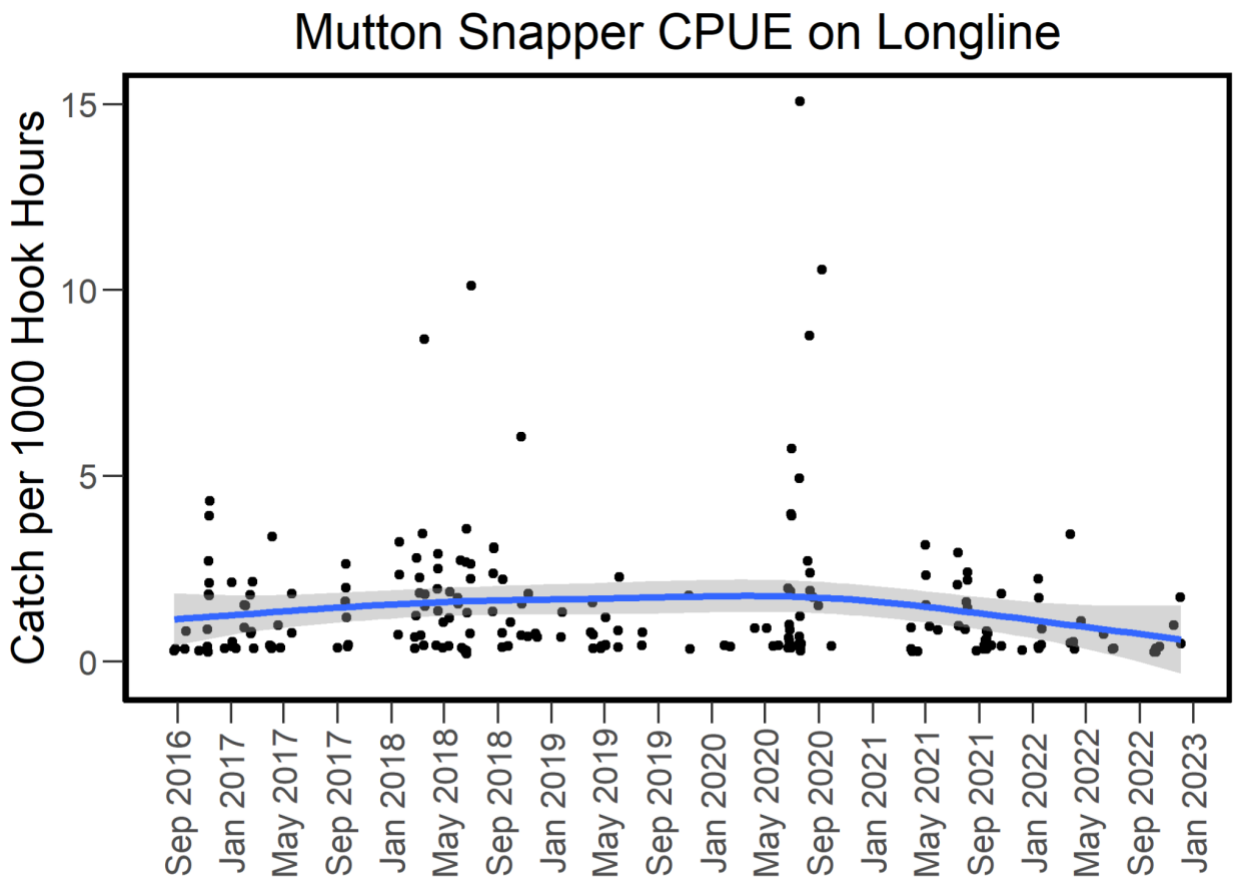

Figure 4. Mutton snapper catch per unit effort GAM for the EGoM BLL fishery, 7/2016 - 1/2023.