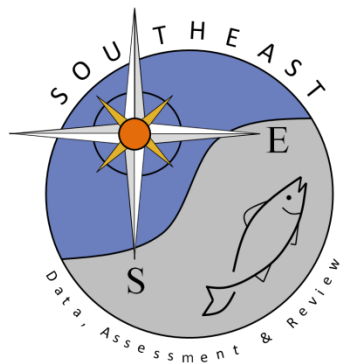


Descriptions of Florida's Gulf of Mexico Red Grouper Recreational Fishery Assessed Using Fishery-Dependent Survey Data

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Fishery-Dependent Survey Data

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Introduction

The following analysis is intended to characterize the interactions between the for-hire /private recreational fishing fleets and Red Grouper in the Gulf of Mexico. The data summaries presented include numbers of landed and released fish, typical fishing depth, size distribution (fork lengths in mm) of harvested and discarded fish, and release conditions of discarded fish in each region of the state.

All data presented are derived from two sources, long-term monitoring data collected by at-sea observers (At-Sea: 2009-2022) aboard randomly selected for-hire fishing vessels (smaller charter boats and large headboats) and dockside sampling of the private fleet (State Reef Fish Survey – SRFS: 2015-2022). All data are aggregated by fleet (charter, headboat, private) and region. Regions of west Florida are divided as such: northwest Florida (NWFL – Escambia to Dixie counties, statistical zones 7-10), southwest Florida (SWFL – Levy to Collier Counties, statistical zones 3-6), and Florida Keys (KEYS – Monroe County, statistical zones 1, 2, 748).

Surveys

State Reef Fish Survey

The State Reef Fish Survey has run continuously on Florida's Gulf coast since May 2015 (covering NWFL & SWFL regions). The survey was expanded state-wide in 2020 (extending coverage to include NEFL, SEFL, the KEYS). This survey is an effort to collect data from private recreational anglers who target reef fish species. Anglers wishing to harvest certain reef fish species, including Red Grouper, on Florida's coast are required to have a State Reef Fish Angler designation on their fishing license. The State Reef Fish Survey is composed of two survey components: a mail-in survey and a dockside intercept survey. The mail-in survey is sent to randomly selected anglers with the State Reef Fish Angler designation to collect data on angler effort. The dockside intercept survey stations biologists at sampling sites to interview anglers on angler catches and fishing practices. Interview assignments are drawn from a subset of sampling sites known to have offshore fishing activity to intercept fishers that target reef fish. Data collected during dockside assignments include information regarding fishing depths, distances from shore while fishing for offshore species, number of harvested fish, and self-reported estimates of fish released during the fishing day. A subset of harvested fish are

measured (fork length in mm) and weighed (in kilograms) during the survey. Data presented here summarizes the information from dockside sampling but does not estimate effort.

At-Sea Sampling of for-hire vessels

At-sea data are collected on both headboats and charter boats that were randomly selected weekly, throughout the year. Sampling coverage varied by region and fleet. No sampling occurred between April 2020 and May 2021 due to the COVID-19 pandemic.

Gulf Coast of Florida (NWFL, SWFL)

Headboat observer surveys were conducted on the Gulf coast of Florida from 2005 to 2007, funded by the Gulf Fisheries Information Network (GulfFIN). In June 2009, the state of Florida secured alternative funds to continue at-sea observer coverage in the northwest panhandle and central peninsula and expanded coverage to include the charter fleet. In 2014, data from headboats and charter vessels in NWFL and SWFL were a small subset of the sampled for-hire fleet and may not be representative of the fleet as a whole in that year.

Florida Keys (KEYS)

Headboat observer surveys were conducted in the Florida Keys from 2005 to 2007, funded by the Gulf Fisheries Information Network (GulfFIN) along with the Gulf coast. In 2010, headboat sampling coverage in the Florida Keys was re-initiated, along with the initiation of charter boat sampling. In 2014, representative at-sea observer data was only collected from charter vessels in the Florida Keys.

Data collected included vessel location and fishing depth at each fishing station. Red Grouper landed (including both harvested and released individuals) during sampled trips were measured [midline length (ML = FL); mm]. The final disposition of Red Grouper was observed by biologists, including barotrauma treatment and the condition of discarded fish post-release. Observers assisted with handling fish, but decisions to harvest or retention of fish and whether barotrauma mitigation should occur were left to the anglers and crew. Many fish were tagged with conventional plastic-tipped dart tags, and angler recaptures were reported on a hotline.

Release Condition

At-sea observers collected data of live fish released, each fish was categorized in one of four conditions during monitored for-hire trips. The four release conditions were, in short: **good**: no barotrauma treatment, fish swam strongly down, **vent**: fish vented and swam strongly down, **impaired**: one of several visually obvious impairments at the surface, **deep-hooked**: fish hooked in damaging location or released with the hook in the body (more detail in Table 1). Fish released dead, observed preyed upon by a predator at the surface, or were recompressed using a descending device were also recorded.

Results

State Reef Fish Survey biologists intercepted 6,194 fishing trips that reported catching Red Grouper. In total, these anglers harvested a total of 1,995 fish and released 18,854 fish across the west coast of Florida (Table 2). However, it is important to note that sampling in the Florida Keys began in 2020. Additionally, sampling was suspended between March and mid-May of 2020 due to the COVID-19 pandemic. The mean number of Red Grouper encountered per angler statewide was 2.56. Most of the private anglers catching Red Grouper were fishing in shallow water, and the majority of fish encountered by private anglers were released (Figure 1).

The At-Sea for-hire survey encountered 41,008 Red Grouper between 2009 and 2022, with the bulk of the encounters resulting in release (Figure 2). Capture depth in the for-hire fleets varied by region. In the Florida Keys, 59.89% of the releases occurred in 0-9 meters of water. The Southwest region of Florida (SWFL) encountered the largest amount of Red Grouper in the for-hire fleets, accounting for 94.47% of the total encounters (Figure 2). In SWFL, 54.88% of the releases occurred in 10-20 meters of water. Fish were encountered in deeper waters in the Northwest region of Florida (NWFL). Anglers in NWFL encountered most Red Grouper in the 20–39-meter depth, accounting for 69.66% of the total releases in NWFL (Table 3, Figure 2). While numerous larger fish were encountered, many of the Red Grouper encountered on the for-hire fleets were smaller than the current legal size (20" total length) regardless of depth (Figure 3).

Most of the fish encountered were not legal to keep, making depredation, release condition, and post-release predation important factors to understand. Approximately 71.70% of

fish were released in good condition without being vented, 18.20% were vented but swam down strongly, and >1% of fish were descended in the for-hire fishery. Approximately 5.65% of fish were impaired upon release, 3.99% of fish were deep-hooked, and >1% were released dead or eaten by a predator (Table 5).

Literary Cited:

- Lombardi-Carlson, L. 2014. An age and growth description of Red Grouper (*Epinephelus morio*) from the northeastern Gulf of Mexico: 1978-2013 for SEDAR42 SEDAR42-DW-10. SEDAR, North Charleston, SC. 37 pp.
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Table 1. Description of release condition categories for Red Grouper observed on for-hire vessels (modified from Sauls 2014). In the mortality model, Impaired and Deep-Hooked fish were pooled for analysis. Fish that were descended, released dead, or preyed upon at the surface once released were not included in survival analyses.

Condition category	Description
Good (not vented/not impaired)	Fish immediately submerged without the assistance or venting, and did not exhibit any impairments
Vented (not impaired)	Fish immediately submerged after the swim bladder was vented, and did not exhibit any impairments
Impaired (vented or unvented: displaying distress)	Any fish that exhibited one or more of the following impairments: <ol style="list-style-type: none"> 1) chased by a predator near the surface 2) disoriented or unresponsive at the surface before submerging 3) buoyant at the surface and unable to submerge 4) improperly vented by puncturing the stomach or anus 5) bleeding from the gills 6) exophthalmia (pop-eye), indicative of severe barotrauma
Deep Hooked (hook embedded in deep tissue)	Any fish for which either of the following was true: <ol style="list-style-type: none"> 1) hook embedded in gill, eye, esophagus, or gut 2) released with hook still embedded
Dead	Any fish that was observed to float away making no movements
Preyed Upon	Any fish that was observed to be eaten by a marine predator once released. Most predators were dolphins, sharks, barracuda, and goliath grouper
Recompressed	Fish that were descended toward the bottom using a weighted device.

Region	Number of Trips	Number Harvested	Number Released	Mean Fish/Trip
NWFL	565	202	848	1.858407
SWFL	5531	1774	17857	3.549268
KEYS	98	19	149	1.714286
<i>WEST FL</i>	<i>6194</i>	<i>1995</i>	<i>18854</i>	<i>2.56223</i>

Table 2. **Dockside Private Fleet Interviews (SRFS)** Red Grouper total catch, harvested fish, and released fish by Florida region. Total numbers of anglers reporting catching and keeping or catching and releasing Red Grouper, numbers of fish reported harvested, numbers of fish reported discarded, and mean numbers of fish per trip for fishers reporting catching Red Grouper. *Dockside sampling intercepts occurred in northwest and southwest Florida from 2016-2022, but only started to occur in the Florida Keys in 2020.

Depth (m)	% Released Fish					
	NWFL		SWFL		KEYS	
	<i>Charter (n=637)</i>	<i>Headboat (n=187)</i>	<i>Charter (n=17,047)</i>	<i>Headboat (n=18,997)</i>	<i>Charter (n=216)</i>	<i>Headboat (n=921)</i>
0-9	0.16	12.30	0.84	2.72	68.52	57.87
10-19	12.09	36.90	45.41	63.37	20.37	25.30
20-29	42.86	34.76	36.84	14.55	4.63	7.82
30-39	35.16	6.42	9.52	8.73	0.93	7.82
40-49	8.63	7.49	4.18	6.24	0.93	0.76
50-59	0.47	2.14	3.13	3.49	3.24	0.43
60-69	0.47	.	0.08	0.73	0.93	.
70-79	0.16	.	0.01	0.10	.	.
80+	.	.	.	0.07	0.46	.

Table 3. **At-Sea Observations of for-hire fleets (at-sea)** Numbers and percentage of Red Grouper released in each fleet by depth. Data are measured values (vessel exact fishing depth and counts of released fish) taken by observers deployed on for-hire fishing trips. Data represents 2009-2022.

Depth (m)	% Released Fish
0-9	5.77
10-19	40.65
20-29	29.88
30-39	18.34
40-49	3.56
50-59	0.51
60-69	0.42
70-79	0.18
80+	0.25

Table 4. **Dockside interviews of private fleet (SRFS)**. Statewide private fleet. Data are self-reported values collected dockside by samplers interviewing private anglers at the end of their fishing day. These values include recalled numbers of released fish and estimated maximum fishing depth for the day. Maximum fishing depth was chosen to represent the most conservative (worst case) scenario. Fishers were intercepted from 2016-2022 in SWFL & NWFL. Total number of interviewed trips that reported catching Red Grouper = **6,194**.

Release Condition	NWFL		SWFL		KEYS		Total
	Charter	Headboat	Charter	Headboat	Charter	Headboat	
1-Good	336	31	12609	13392	172	709	27,249
2-Vent	211	114	3025	3498	15	53	6,916
3-Impaired	73	39	579	1239	11	60	2,001
4-Deep-hooked	16	3	611	776	17	94	1,517
5-Dead	.	.	5	7	1	.	13
6-Preyed upon*	.	.	14	76	.	1	91
7-Recompressed	1	.	204	9	.	4	218
<i>Grand Total</i>	<i>637</i>	<i>187</i>	<i>17,047</i>	<i>18,997</i>	<i>216</i>	<i>921</i>	<i>38,005</i>

Table 5. **At-Sea Observations of for-hire fleets (at-sea)** Numbers of Red Grouper released by release category across all at-sea for-hire recreational fishery data 2009-2022. *Fish observed preyed upon at the surface by marine predator (dolphin, shark, barracuda, or Goliath Grouper).

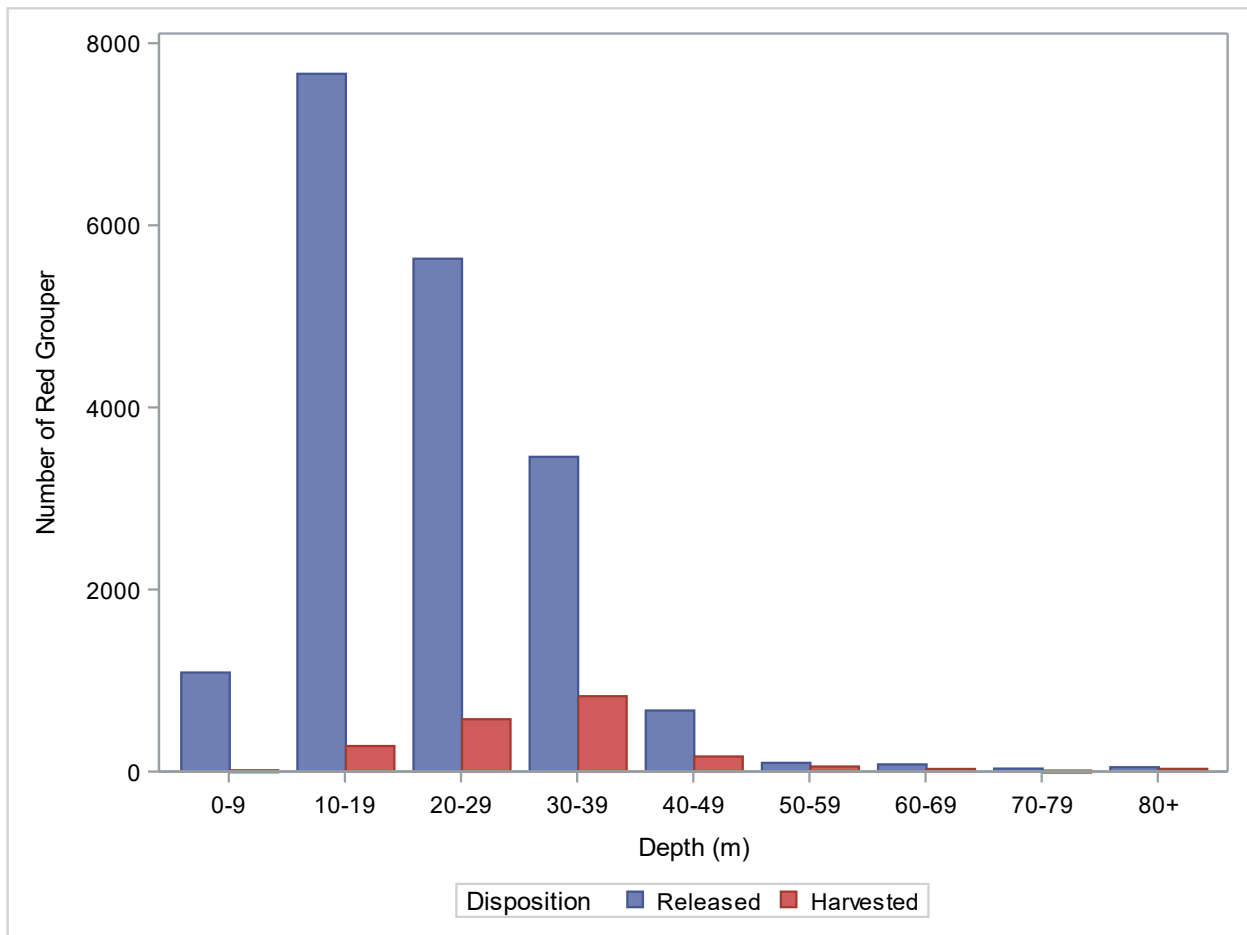


Figure 1. **Dockside Private Fleet Interviews (SRFS)**. Angler reported maximum fishing depth on trips for which Red Grouper were encountered (harvested and released). Maximum fishing depth was chosen to represent the most conservative (worst case) scenario. Data are found in Tables 2 & 4.

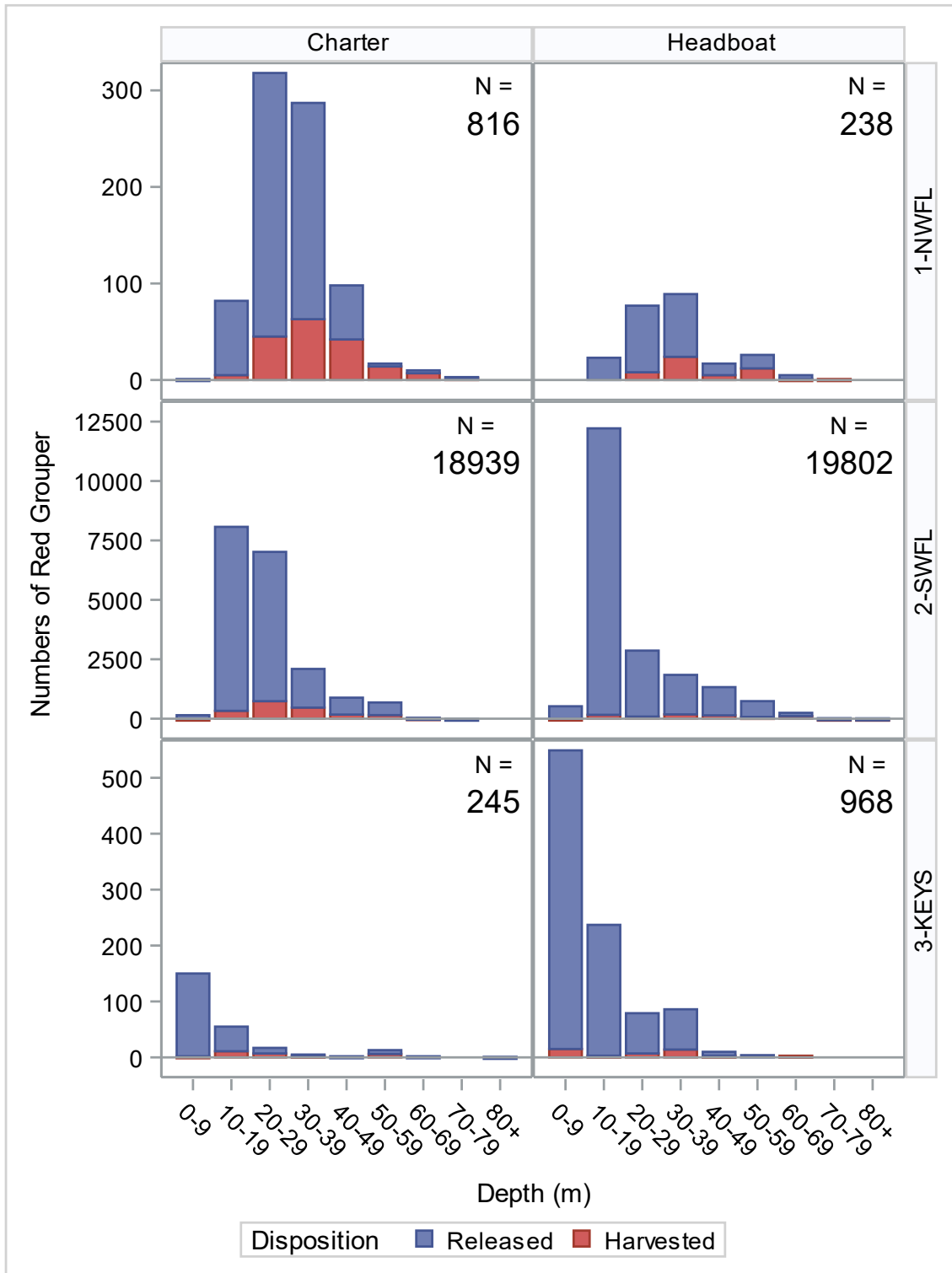


Figure 2. **At-Sea sampling of the For-hire fleet.** Numbers of Red Grouper harvested, and numbers released in each depth bin 2009-2022. Total numbers of fish observed in each fleet/region are listed in each panel.

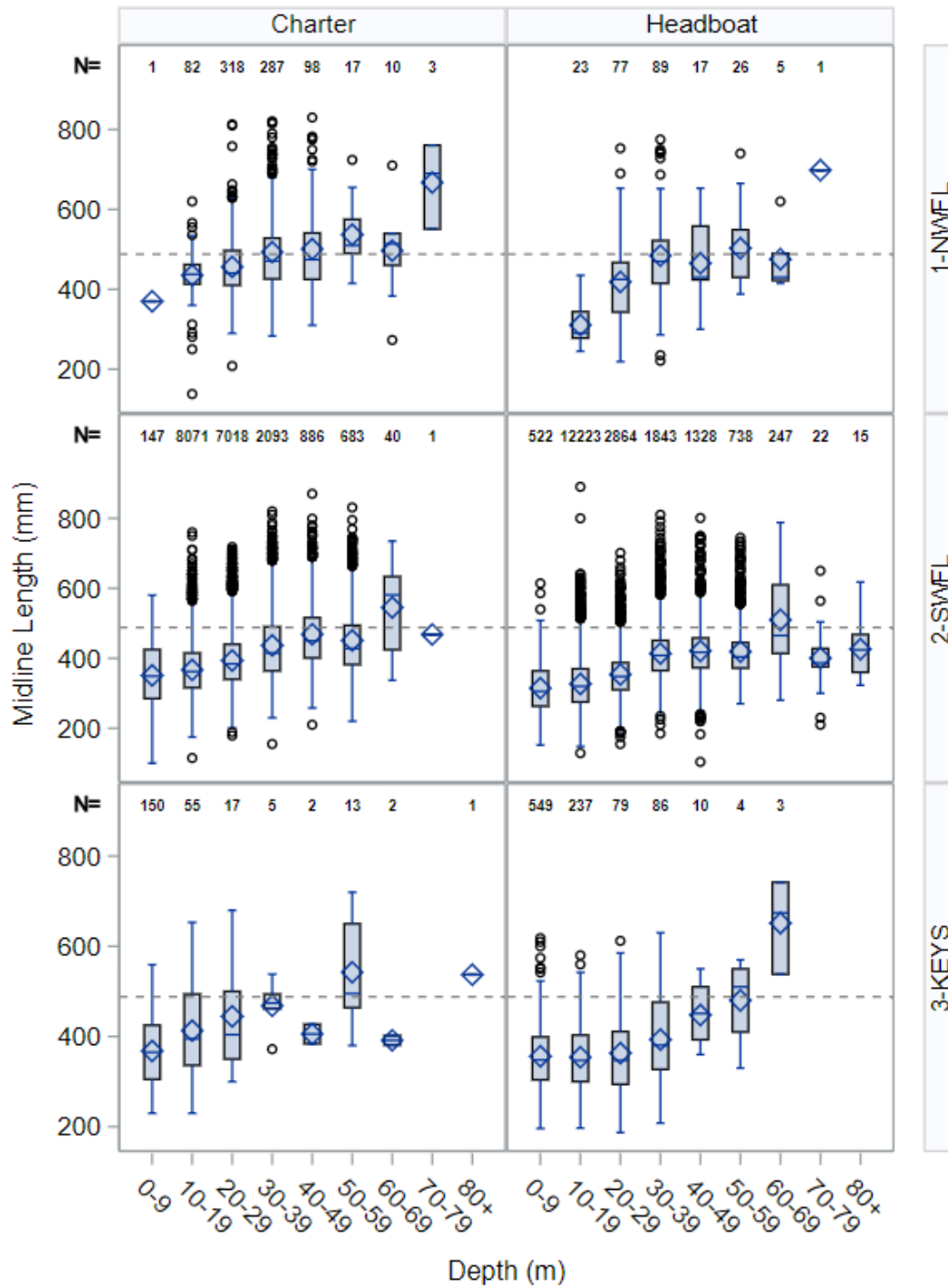


Figure 3. **At-Sea sampling of the For-hire fleet.** Numbers of Red Grouper **ENCOUNTERED (RETAINED + RELEASED)** by length and depth strata 2009-2022. Total numbers of fish in each depth interval are listed above each box. The dashed line represents the current minimum legal size (20" Total Length) converted to midline length using $FL = 5.35 + TL * 0.95$ (Lombardi-Carlson 2014).

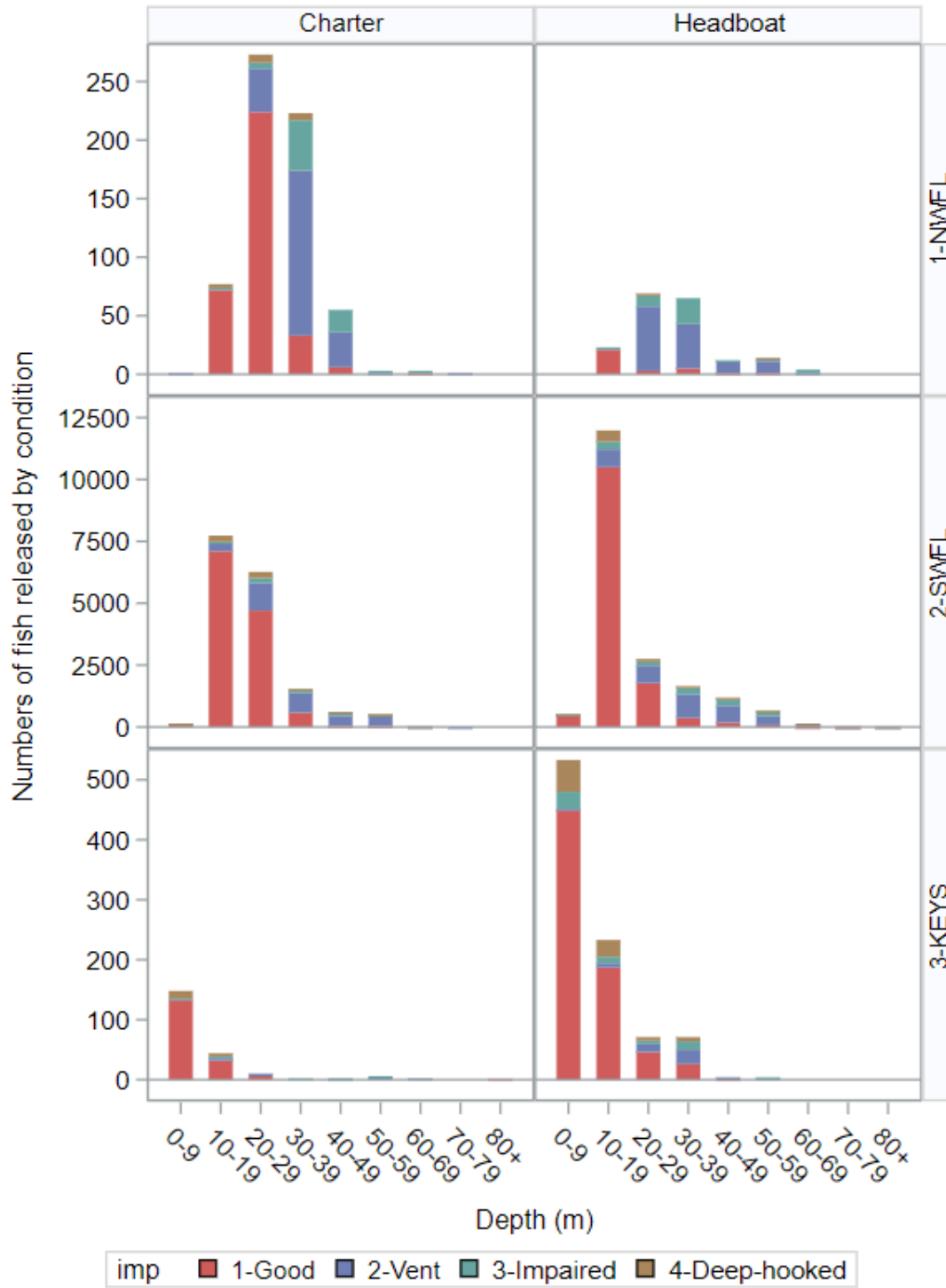


Figure 4. At-Sea sampling of the For-hire fleet. Numbers of Red Grouper released alive in each of the four release conditions (Table 1) by region/fleet and depth strata. Data are presented numerically in Table 5 (Release conditions 1-4).